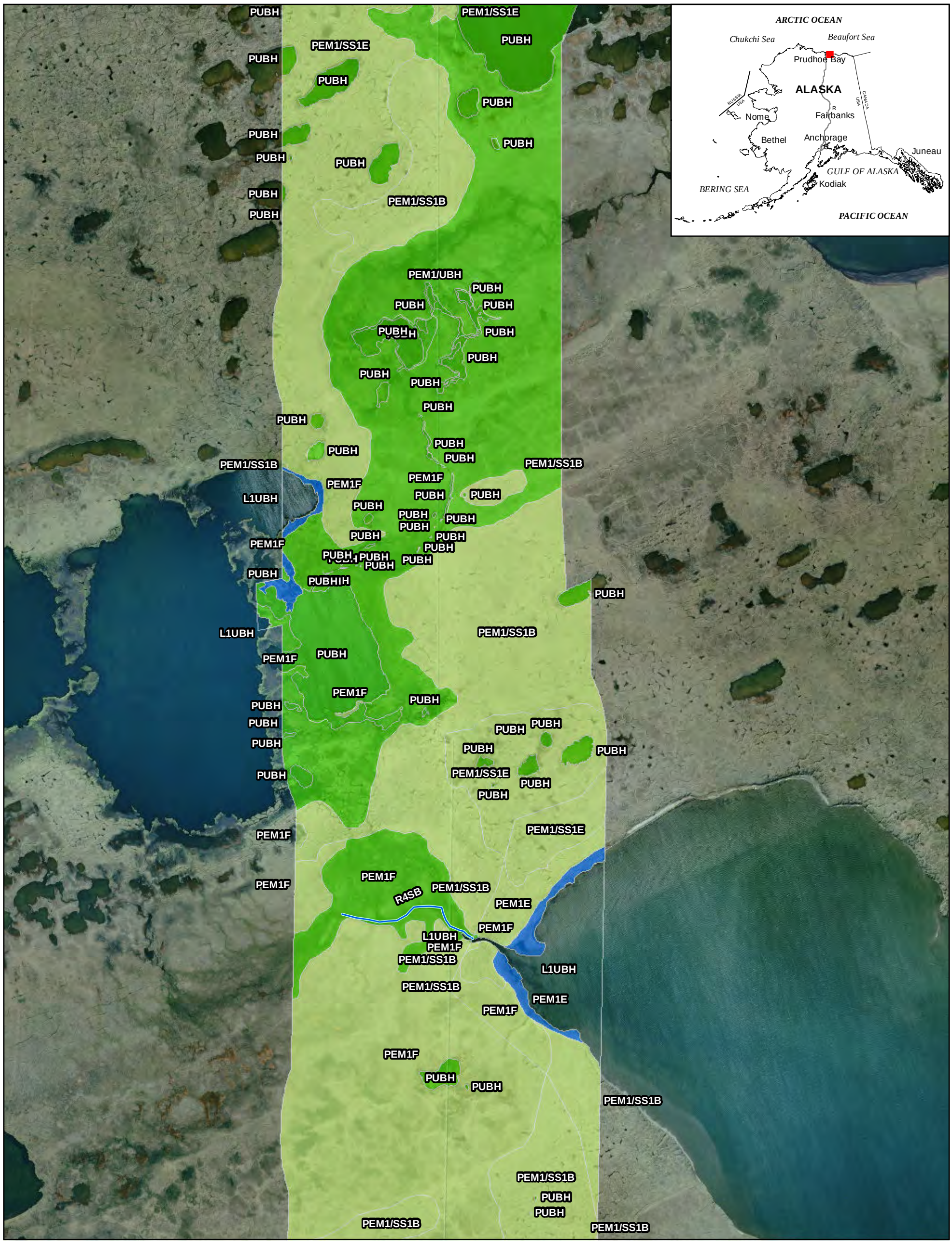
# Part 17 of 19 of Appendix G of Resource Report No. 2




## LEGEND

**HGM Class**

- Flat
- Depressional
- Slope
- Estuarine Fringe
- Lacustrine Fringe
- Riverine
- N/A
- Mapped Streams

**2015 Field Data**

- Wetland
- Vegetation
- Observation

Pre-FEED Rev B with Mile Post

Feet: 0 250 500 750 1,000

Meters: 0 100 200 300

ALASKA LNG

NOTES:
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DRAWN: ICS
CHECK:
DESIGN: TCS
APPR.:

ALASKA LNG
2015 WETLAND MAPPING

| PROJECTION | DATUM | CONTRACTOR NAME | MAP NUMBER | REV. |
|---|---|---|---|---|
| AK 4 | NAD83 | AECOM ALASKA | Page 727 of 755 | A |

| SCALE | DATE | PROJECT NUMBER | ORIG.PAGE SIZE |
|---|---|---|---|
| 1:7,200 | 23 Nov 2015 | 26221392 | 11 X 17 |

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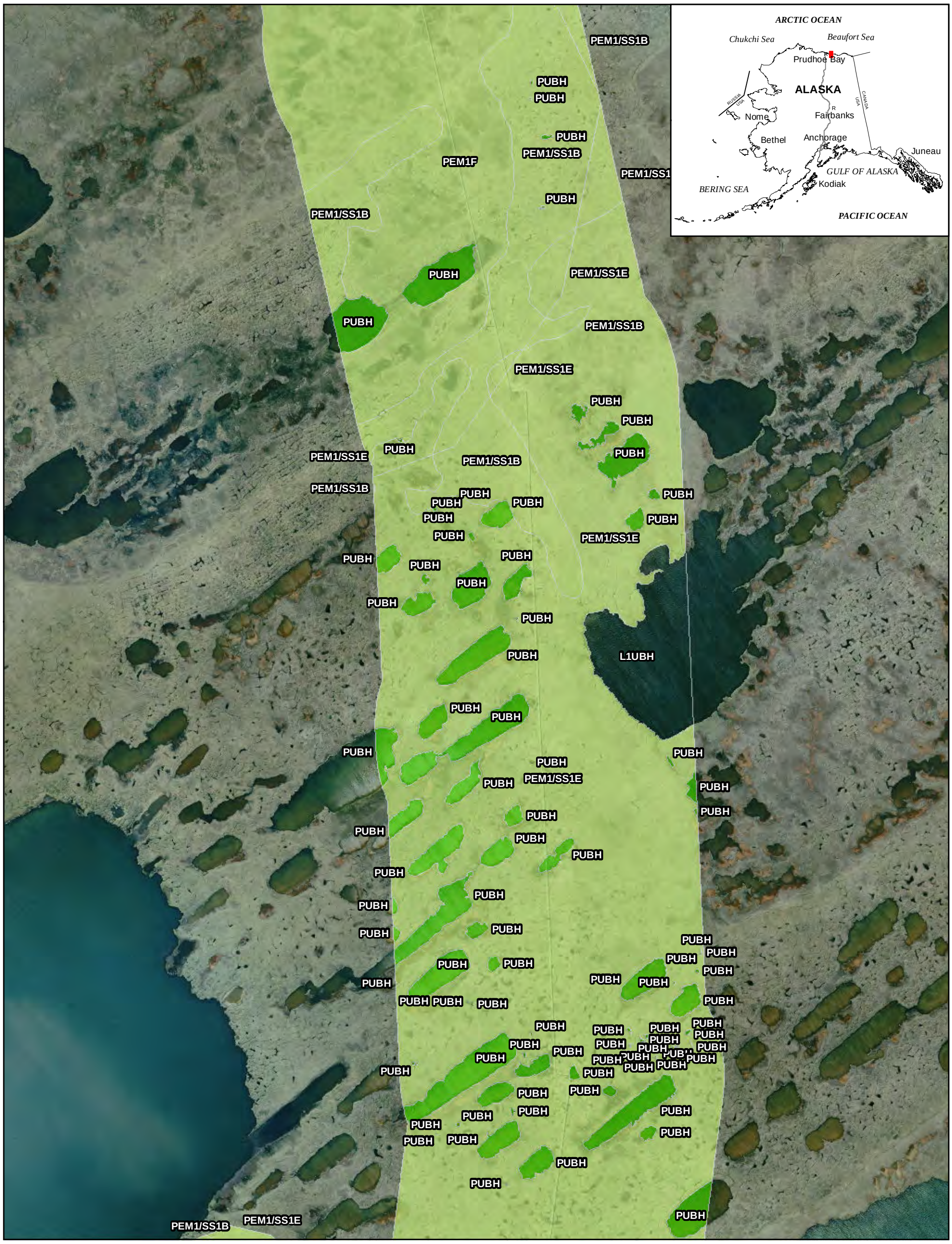


## LEGEND

**HGM Class**

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APPR.:

ALASKA LNG
2015 WETLAND MAPPING

| PROJECTION | DATUM | CONTRACTOR NAME | MAP NUMBER | REV. |
|---|---|---|---|---|
| AK 4 | NAD83 | AECOM ALASKA | Page 728 of 755 | A |

| SCALE | DATE | PROJECT NUMBER | ORIG.PAGE SIZE |
|---|---|---|---|
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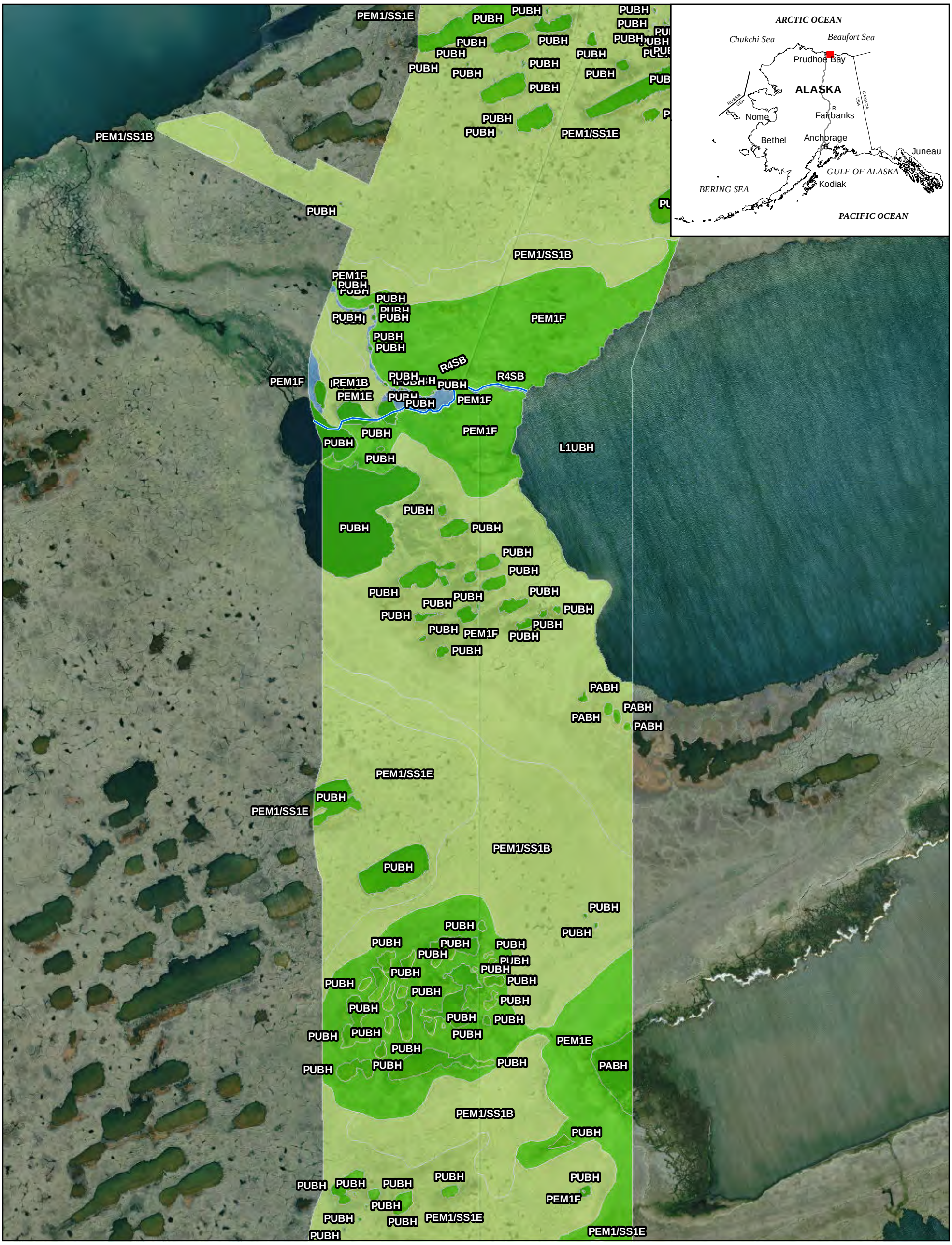


## LEGEND

**HGM Class**

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ALASKA LNG
2015 WETLAND MAPPING

| PROJECTION | DATUM | CONTRACTOR NAME | MAP NUMBER | REV. |
|---|---|---|---|---|
| AK 4 | NAD83 | AECOM ALASKA | Page 729 of 755 | A |

| SCALE | DATE | PROJECT NUMBER | ORIG.PAGE SIZE |
|---|---|---|---|
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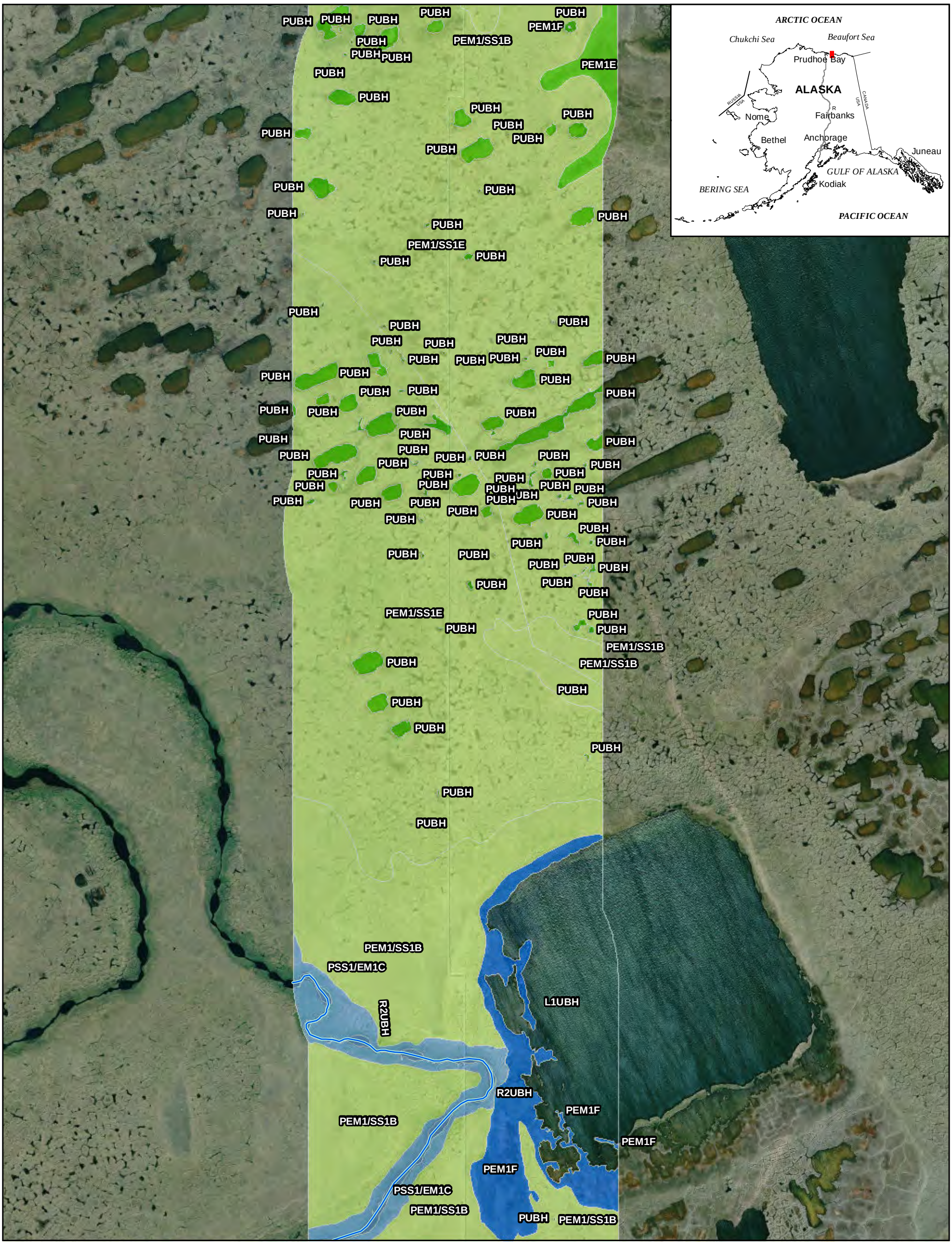


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**HGM Class**

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ALASKA LNG
2015 WETLAND MAPPING

| PROJECTION | DATUM | CONTRACTOR NAME | MAP NUMBER | REV. |
|---|---|---|---|---|
| AK 4 | NAD83 | AECOM ALASKA | Page 730 of 755 | A |

| SCALE | DATE | PROJECT NUMBER | ORIG.PAGE SIZE |
|---|---|---|---|
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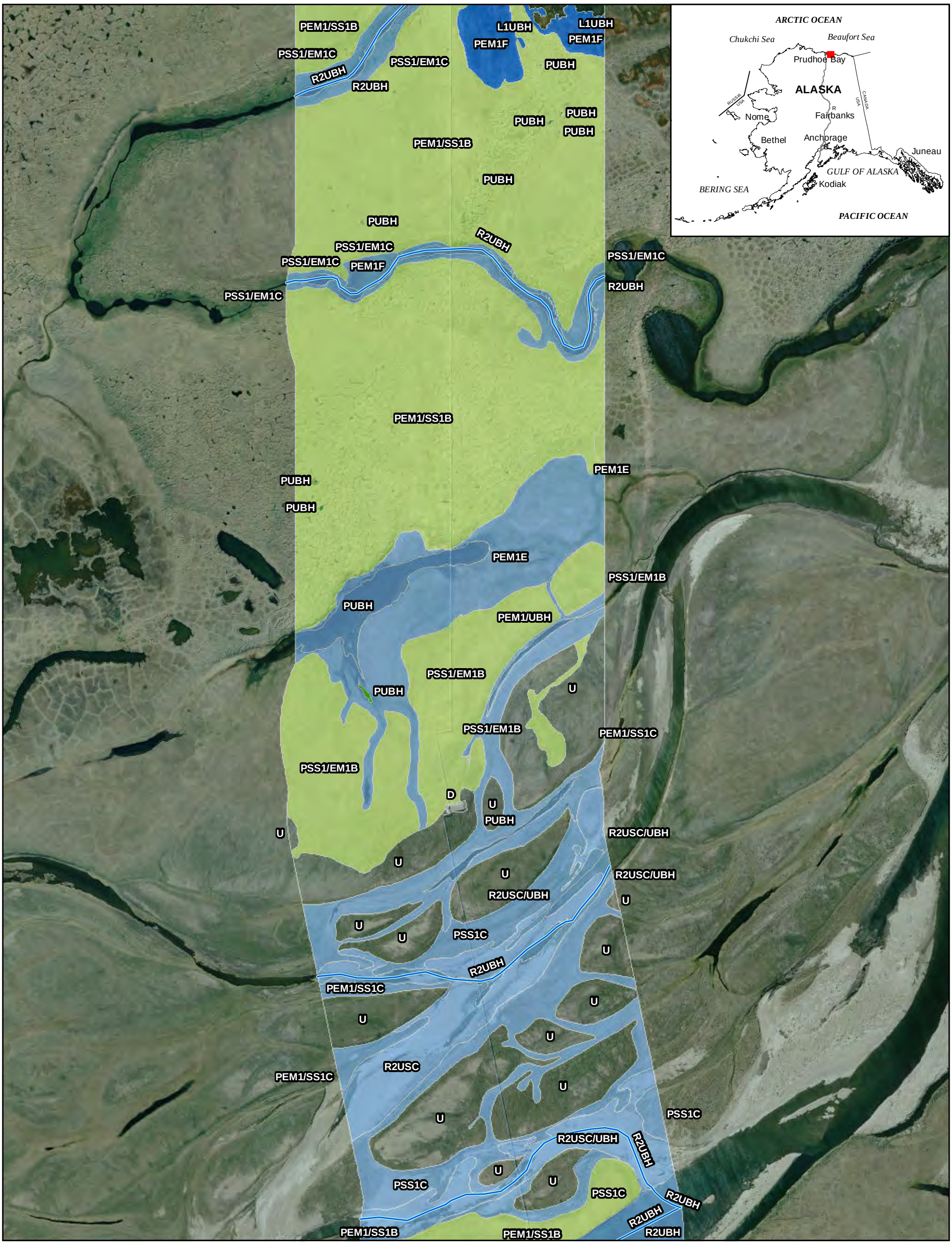


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ALASKA LNG
2015 WETLAND MAPPING

| PROJECTION | DATUM | CONTRACTOR NAME | MAP NUMBER | REV. |
|---|---|---|---|---|
| AK 4 | NAD83 | AECOM ALASKA | Page 731 of 755 | A |

| SCALE | DATE | PROJECT NUMBER | ORIG.PAGE SIZE |
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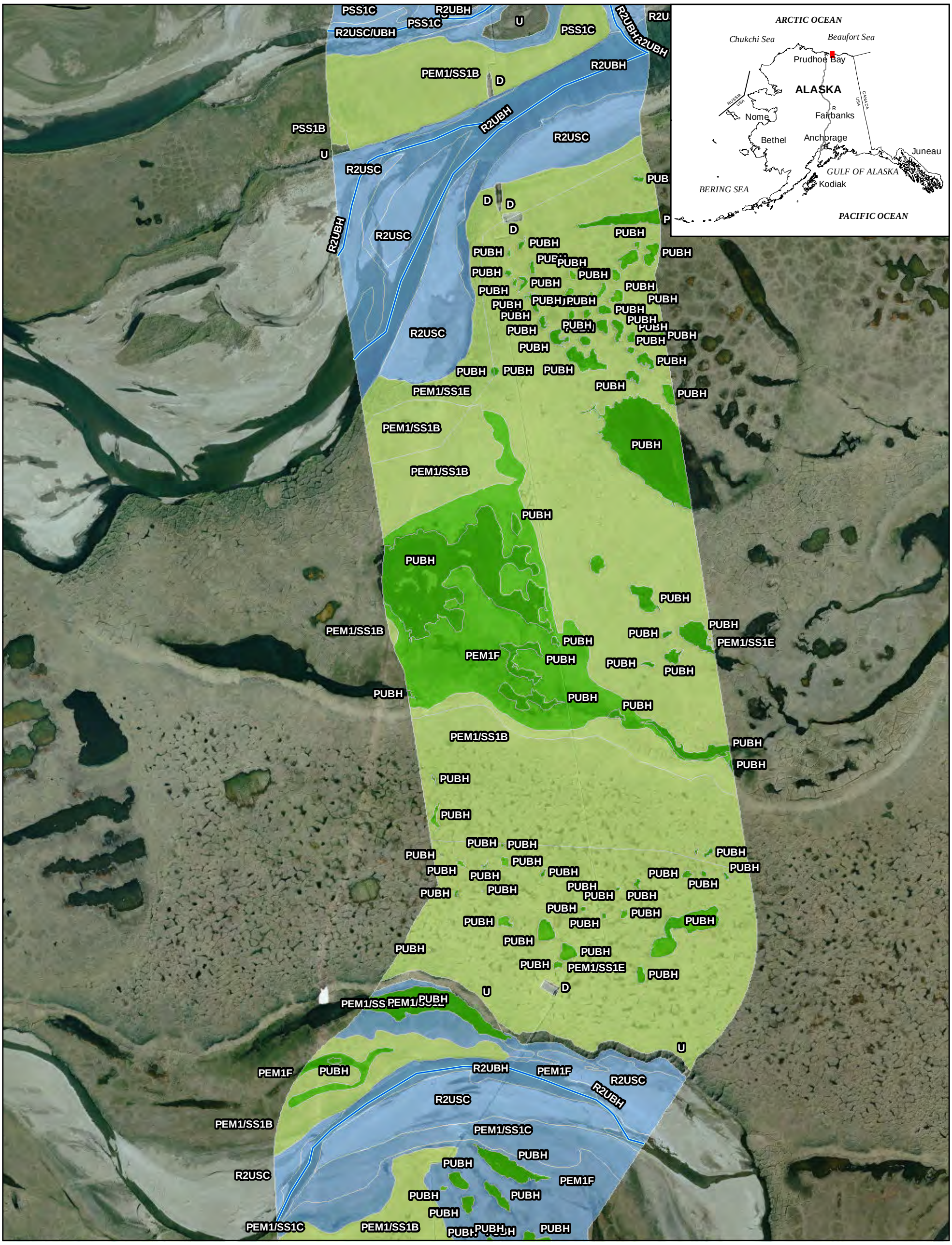


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ALASKA LNG
2015 WETLAND MAPPING

| PROJECTION | DATUM | CONTRACTOR NAME | MAP NUMBER | REV. |
|---|---|---|---|---|
| AK 4 | NAD83 | AECOM ALASKA | Page 732 of 755 | A |

| SCALE | DATE | PROJECT NUMBER | ORIG.PAGE SIZE |
|---|---|---|---|
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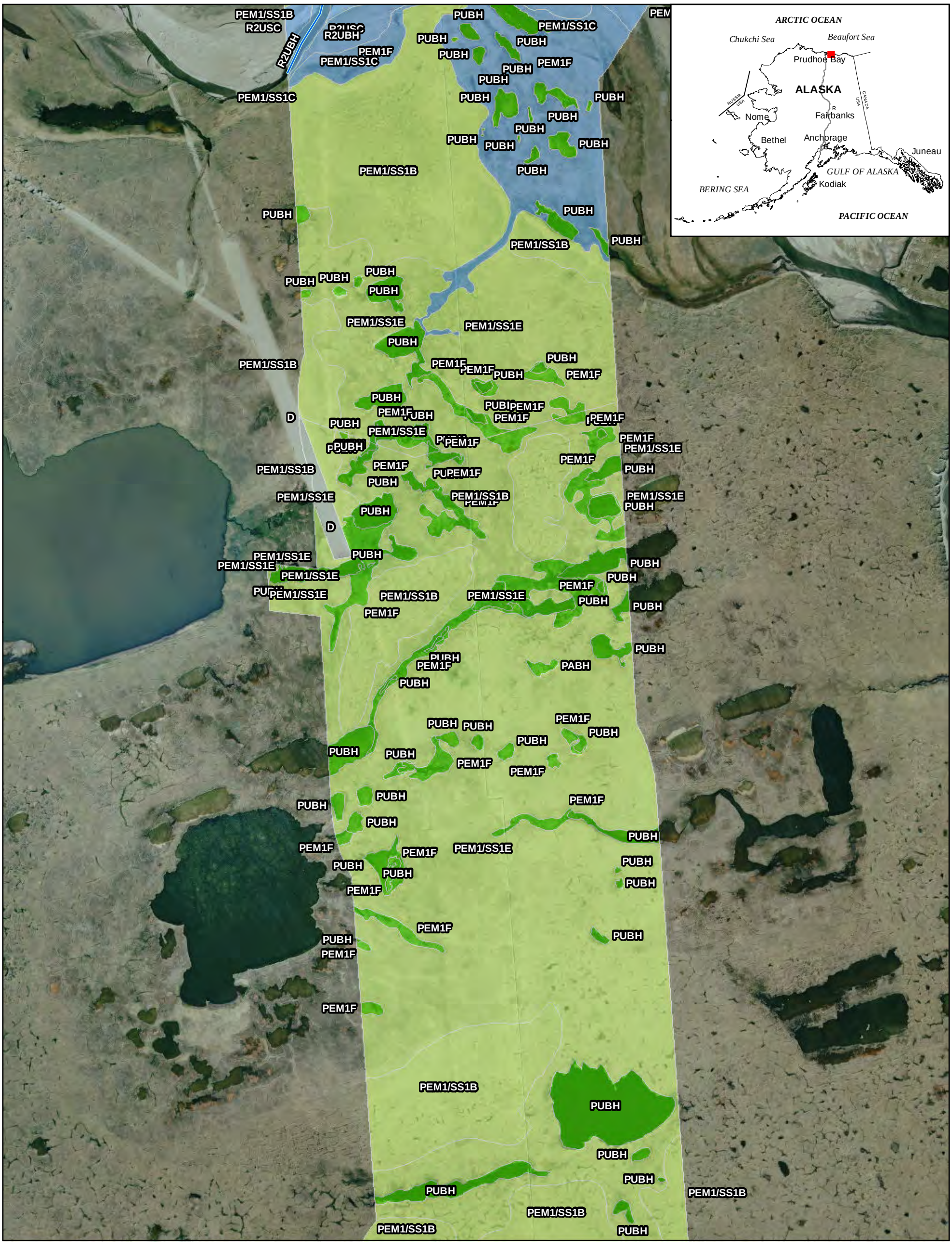


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2015 WETLAND MAPPING

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|---|---|---|---|---|
| AK 4 | NAD83 | AECOM ALASKA | Page 733 of 755 | A |

| SCALE | DATE | PROJECT NUMBER | ORIG.PAGE SIZE |
|---|---|---|---|
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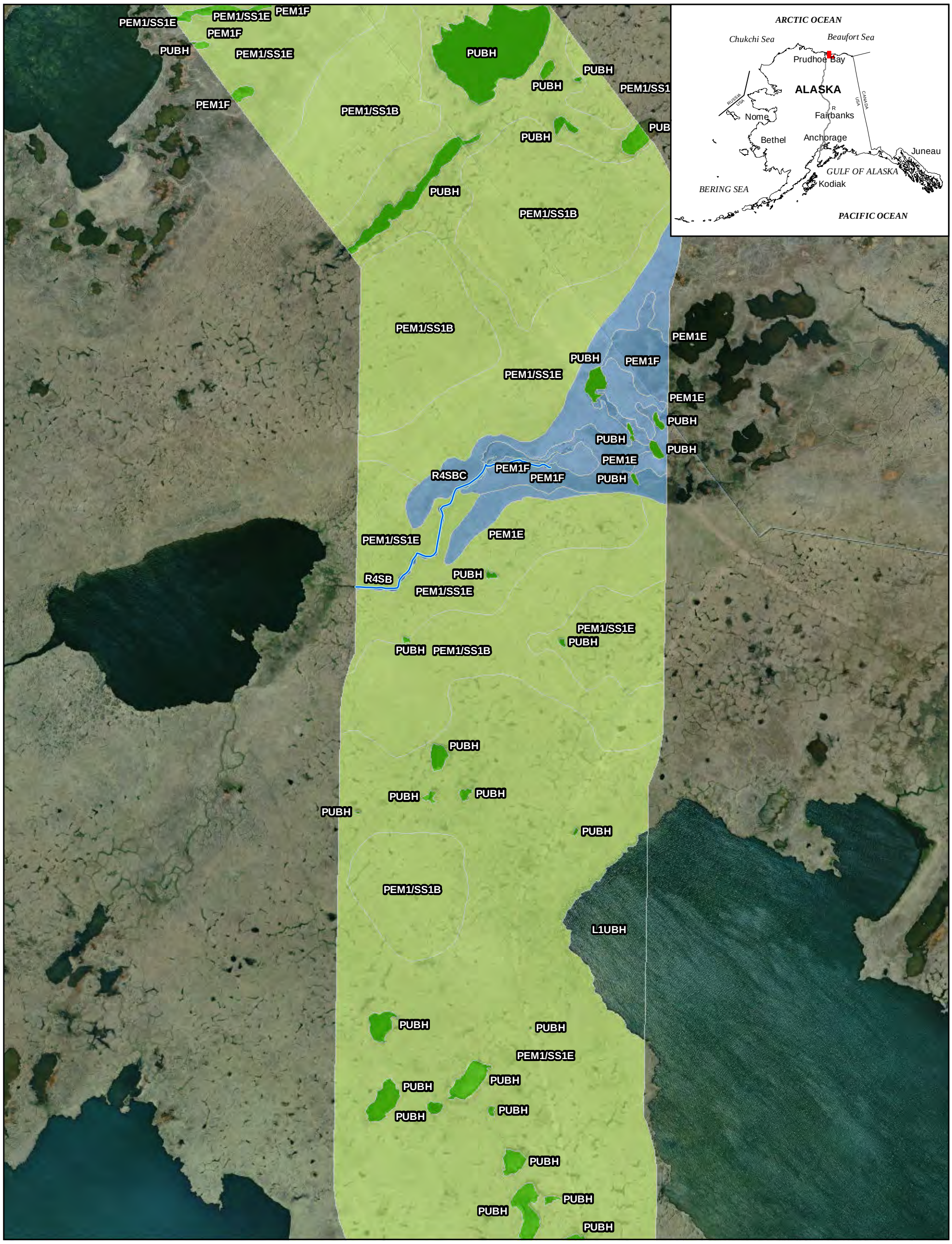


**LEGEND**

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2015 WETLAND MAPPING

| PROJECTION | DATUM | CONTRACTOR NAME | MAP NUMBER | REV. |
|---|---|---|---|---|
| AK 4 | NAD83 | AECOM ALASKA | Page 734 of 755 | A |

| SCALE | DATE | PROJECT NUMBER | ORIG.PAGE SIZE |
|---|---|---|---|
| 1:7,200 | 23 Nov 2015 | 26221392 | 11 X 17 |

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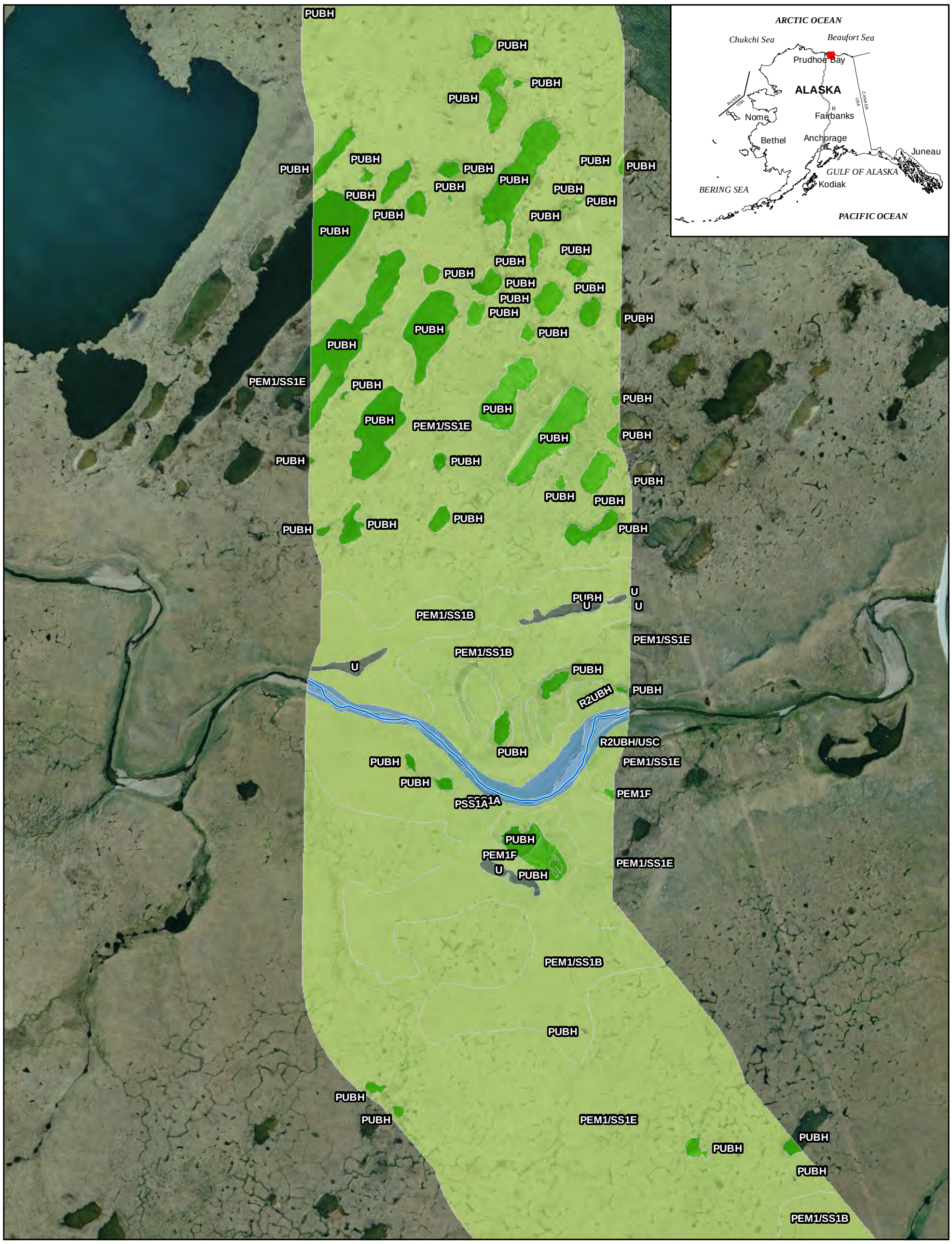


## LEGEND

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- Observation

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ALASKA LNG
2015 WETLAND MAPPING

| PROJECTION | DATUM | CONTRACTOR NAME | MAP NUMBER | REV. |
|---|---|---|---|---|
| AK 4 | NAD83 | AECOM ALASKA | Page 735 of 755 | A |

| SCALE | DATE | PROJECT NUMBER | ORIG.PAGE SIZE |
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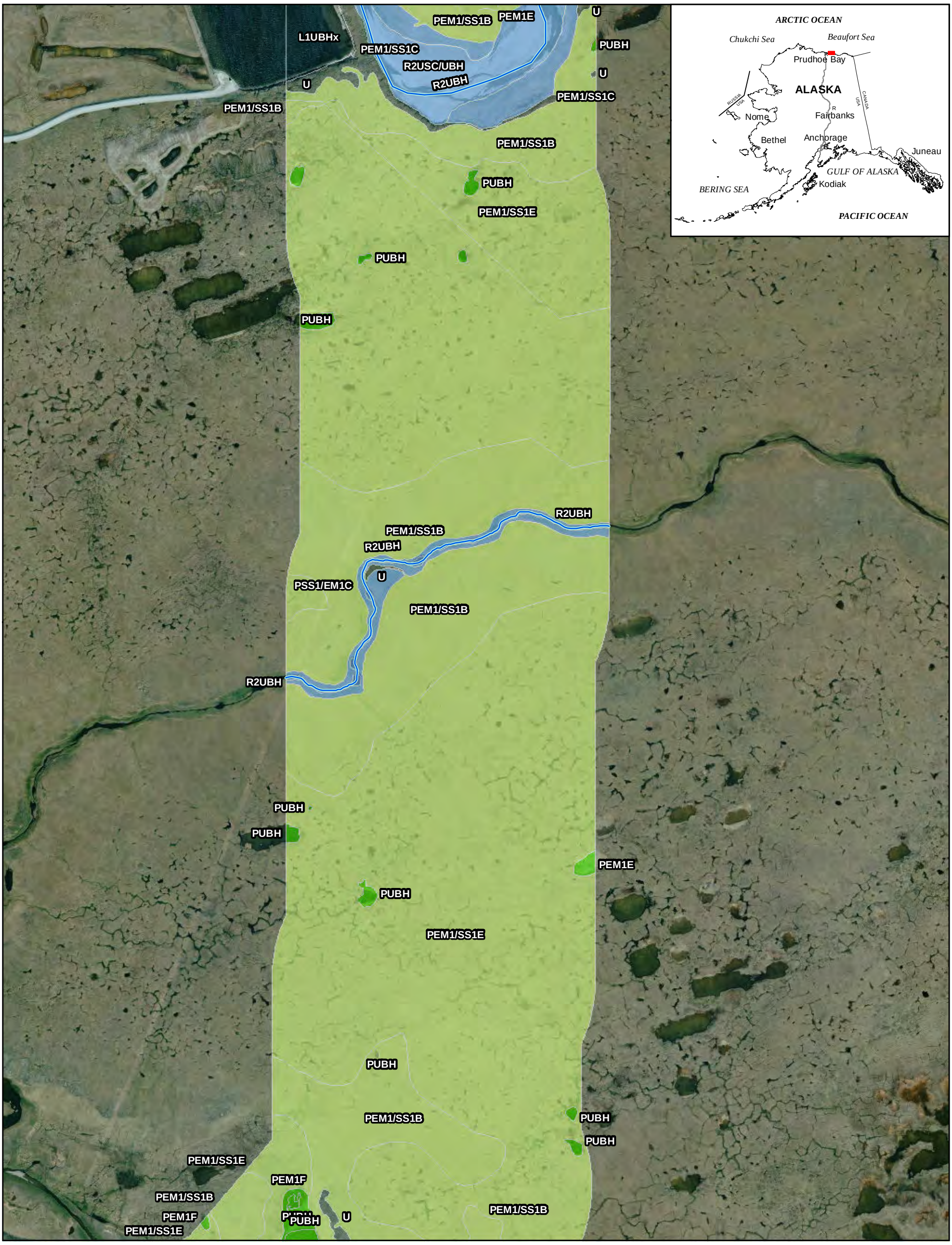


## LEGEND

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ALASKA LNG
2015 WETLAND MAPPING

| PROJECTION | DATUM | CONTRACTOR NAME | MAP NUMBER | REV. |
|---|---|---|---|---|
| AK 4 | NAD83 | AECOM ALASKA | Page 736 of 755 | A |

| SCALE | DATE | PROJECT NUMBER | ORIG.PAGE SIZE |
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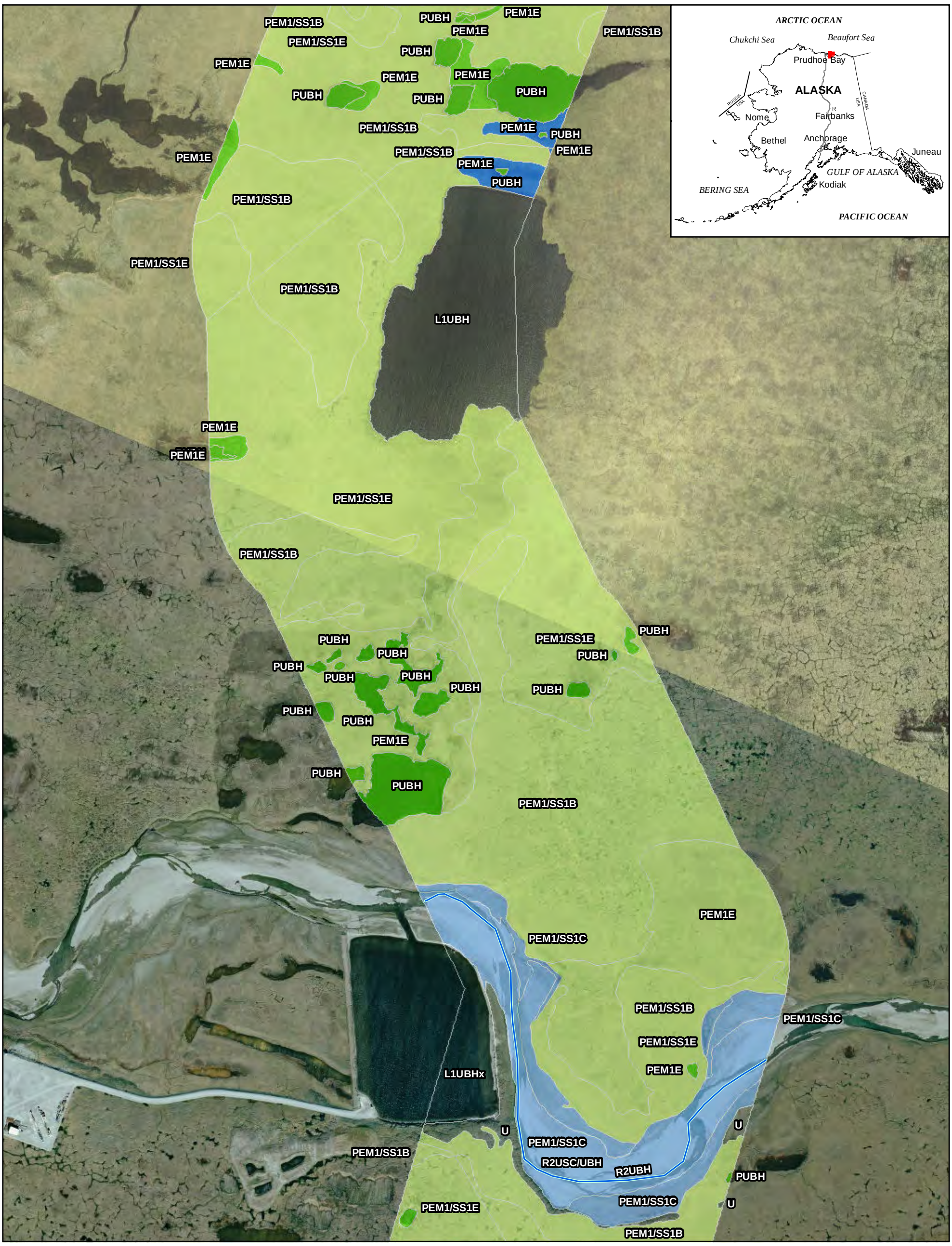


## LEGEND

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ALASKA LNG
2015 WETLAND MAPPING

| PROJECTION | DATUM | CONTRACTOR NAME | MAP NUMBER | REV. |
|---|---|---|---|---|
| AK 4 | NAD83 | AECOM ALASKA | Page 737 of 755 | A |

| SCALE | DATE | PROJECT NUMBER | ORIG.PAGE SIZE |
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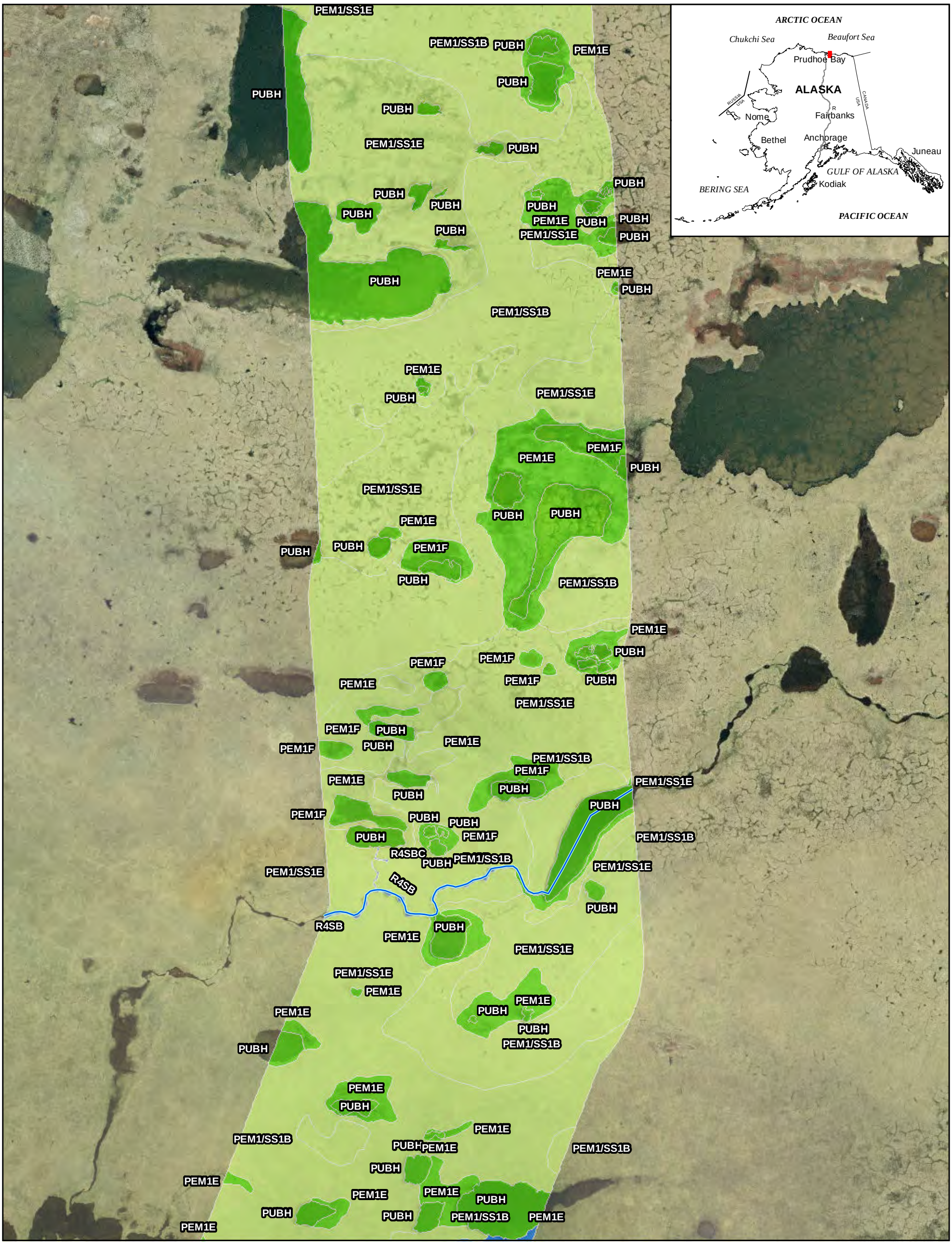


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ALASKA LNG
2015 WETLAND MAPPING

| PROJECTION | DATUM | CONTRACTOR NAME | MAP NUMBER | REV. |
|---|---|---|---|---|
| AK 4 | NAD83 | AECOM ALASKA | Page 738 of 755 | A |

| SCALE | DATE | PROJECT NUMBER | ORIG.PAGE SIZE |
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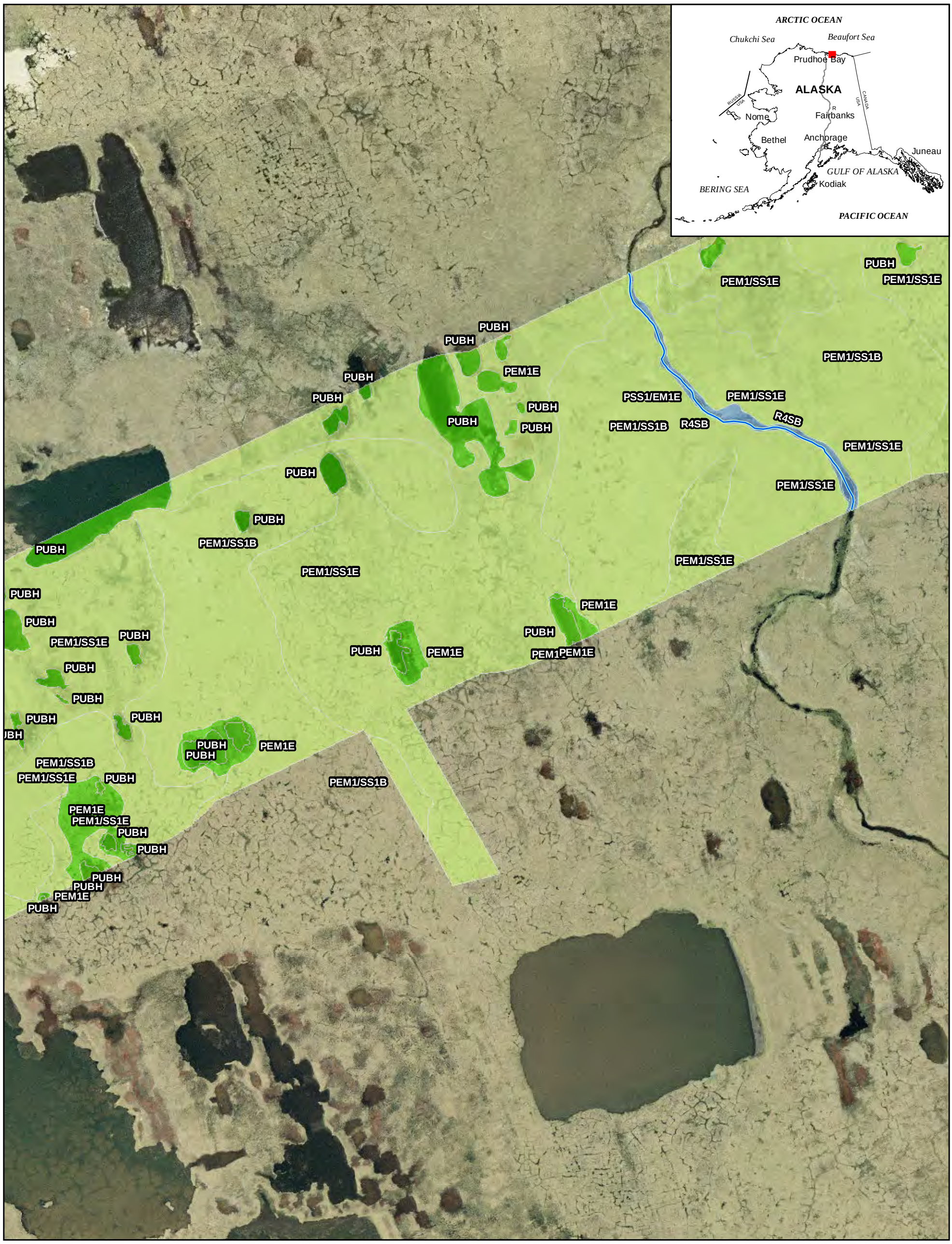


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ALASKA LNG
2015 WETLAND MAPPING

| PROJECTION | DATUM | CONTRACTOR NAME | MAP NUMBER | REV. |
|---|---|---|---|---|
| AK 4 | NAD83 | AECOM ALASKA | Page 739 of 755 | A |

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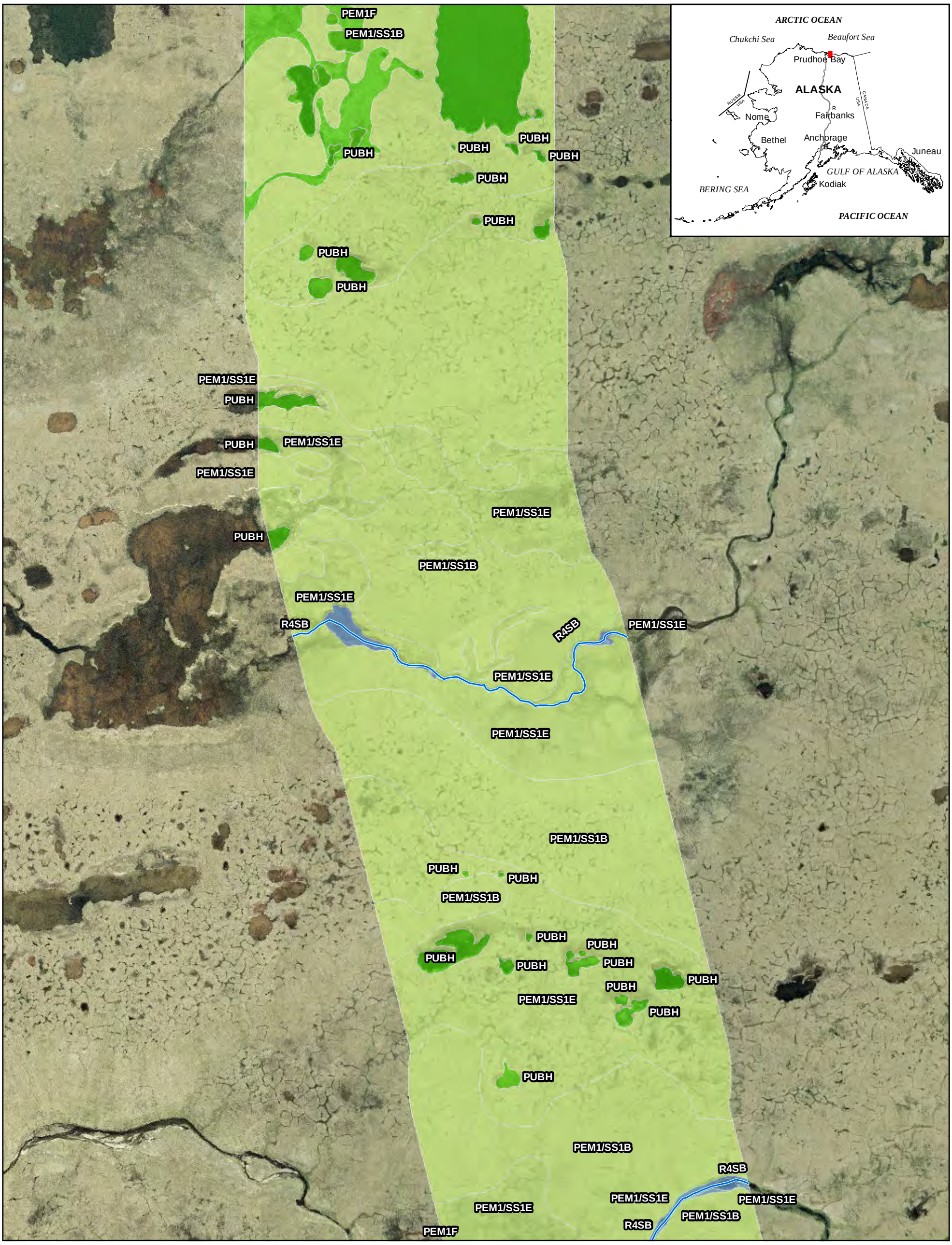


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| AK 4 | NAD83 | AECOM ALASKA | Page 740 of 755 | A |

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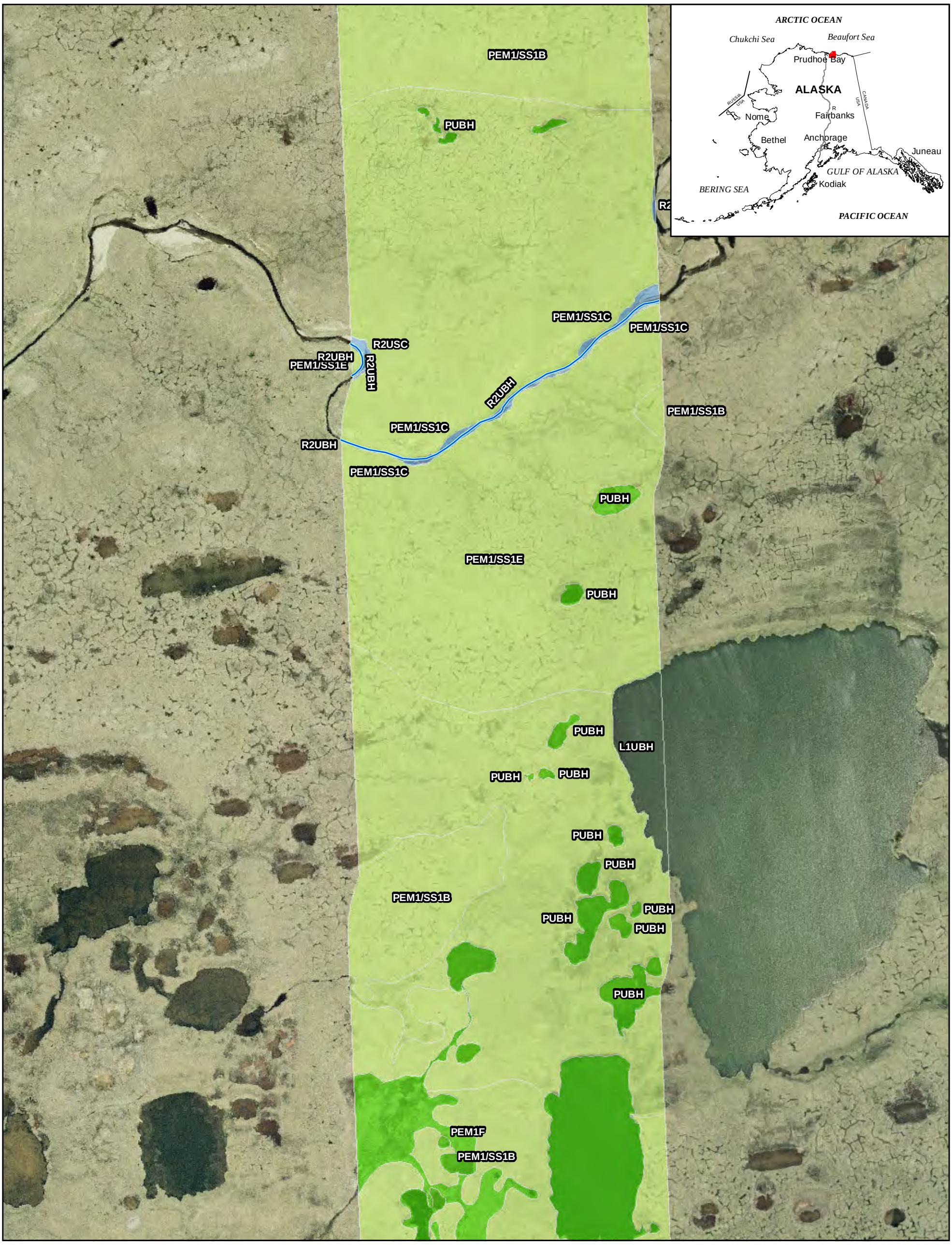


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DRAWN: ICS
CHECK:
DESIGN: TCS
APPR.:

ALASKA LNG
2015 WETLAND MAPPING

| PROJECTION | DATUM | CONTRACTOR NAME | MAP NUMBER | REV. |
|---|---|---|---|---|
| AK 4 | NAD83 | AECOM ALASKA | Page 741 of 755 | A |

| SCALE | DATE | PROJECT NUMBER | ORIG.PAGE SIZE |
|---|---|---|---|
| 1:7,200 | 23 Nov 2015 | 26221392 | 11 X 17 |

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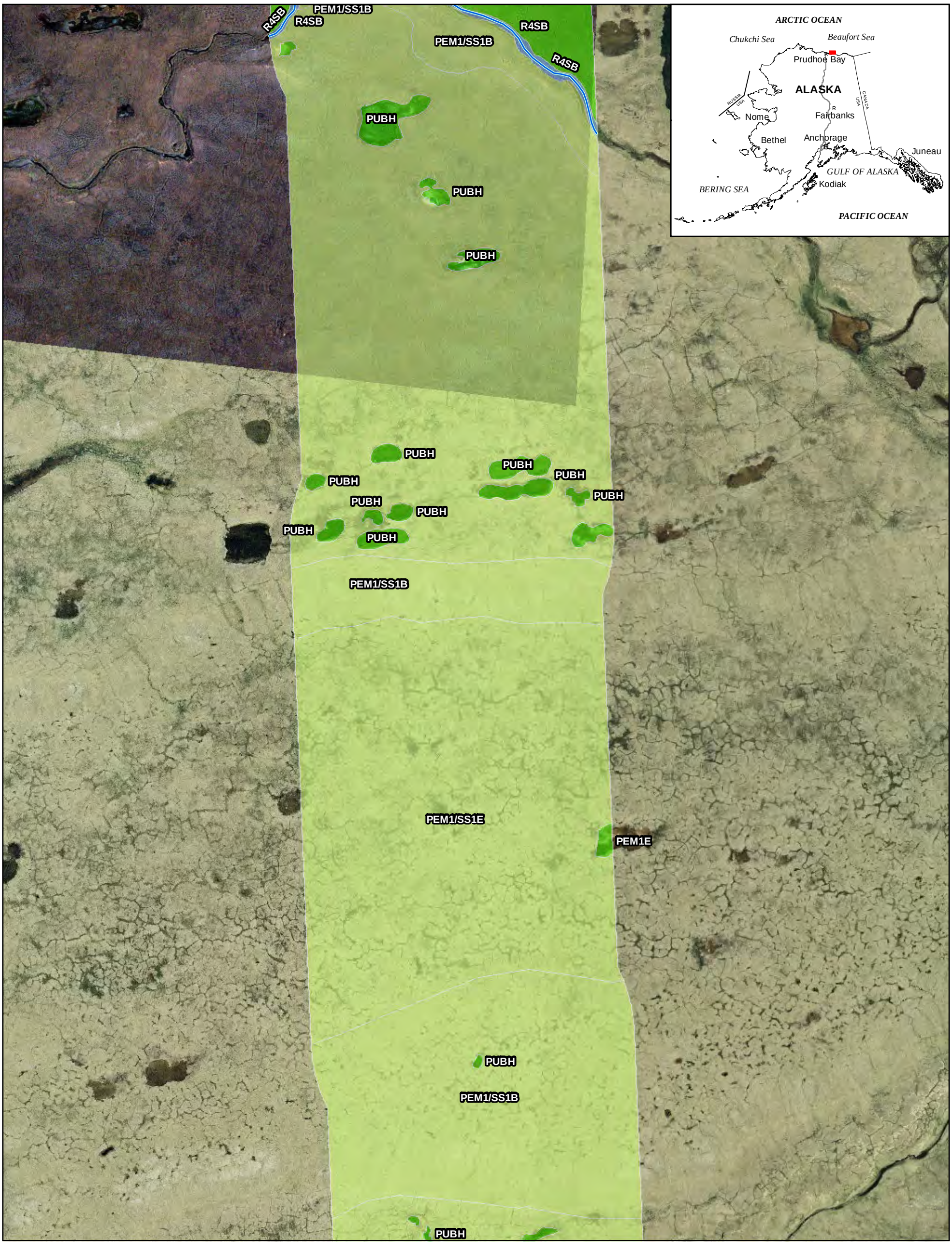


## LEGEND

**HGM Class**

- Flat
- Depressional
- Slope
- Estuarine Fringe
- Lacustrine Fringe
- Riverine
- N/A
- Mapped Streams

**2015 Field Data**

- Wetland
- Vegetation
- Observation

Pre-FEED Rev B with Mile Post

Feet: 0 250 500 750 1,000

Meters: 0 100 200 300

ALASKA LNG

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DRAWN: ICS
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APPR.:

ALASKA LNG
2015 WETLAND MAPPING

| PROJECTION | DATUM | CONTRACTOR NAME | MAP NUMBER | REV. |
|---|---|---|---|---|
| AK 4 | NAD83 | AECOM ALASKA | Page 742 of 755 | A |

| SCALE | DATE | PROJECT NUMBER | ORIG.PAGE SIZE |
|---|---|---|---|
| 1:7,200 | 23 Nov 2015 | 26221392 | 11 X 17 |

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## LEGEND

**HGM Class**

- Flat
- Depressional
- Slope
- Estuarine Fringe
- Lacustrine Fringe
- Riverine
- N/A
- Mapped Streams

**2015 Field Data**

- Wetland
- Vegetation
- Observation

Pre-FEED Rev B with Mile Post

Feet: 0 250 500 750 1,000

Meters: 0 100 200 300

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ALASKA LNG
2015 WETLAND MAPPING

| PROJECTION | DATUM | CONTRACTOR NAME | MAP NUMBER | REV. |
|---|---|---|---|---|
| AK 4 | NAD83 | AECOM ALASKA | Page 743 of 755 | A |

| SCALE | DATE | PROJECT NUMBER | ORIG.PAGE SIZE |
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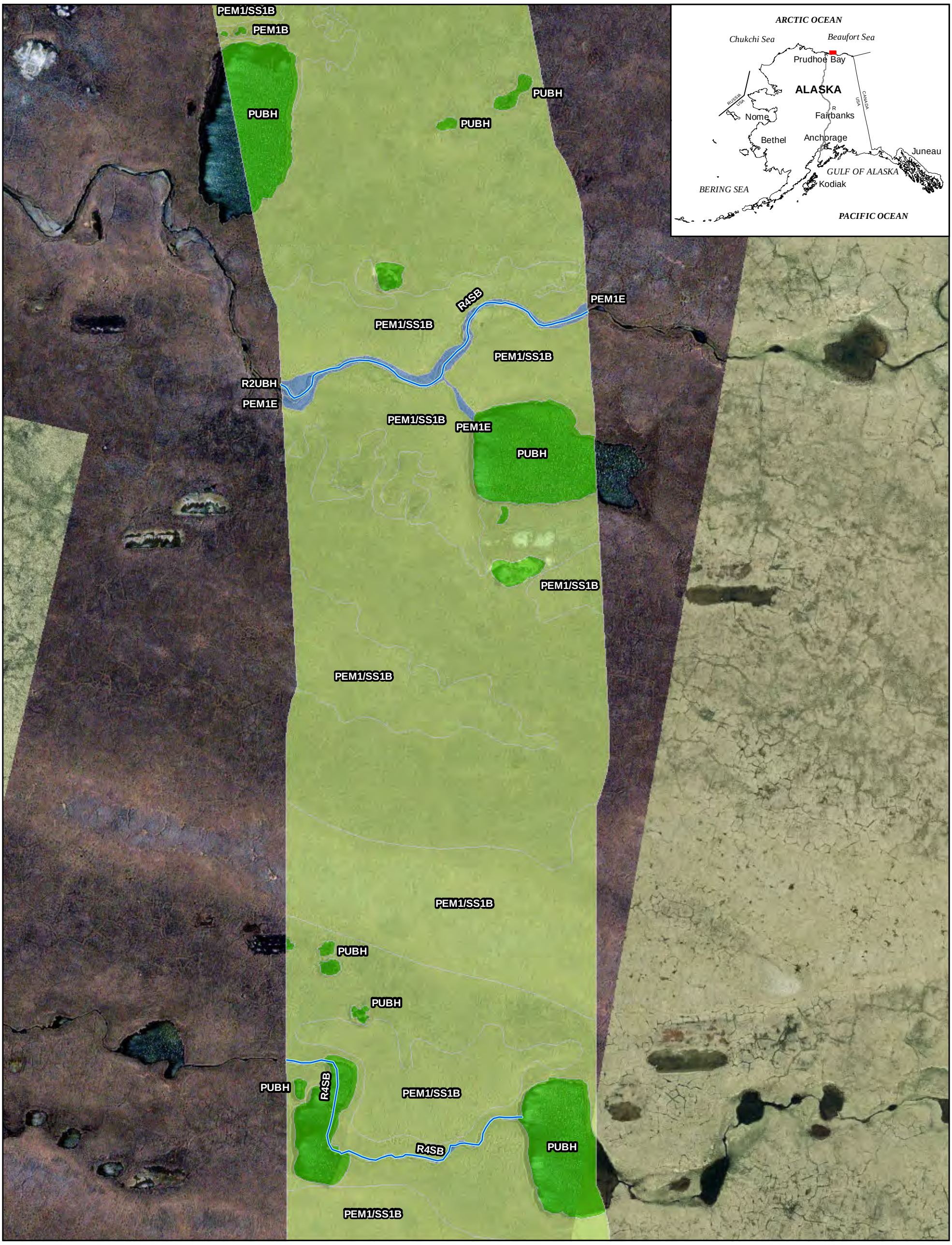


**LEGEND**

**HGM Class**

- Flat
- Depressional
- Slope
- Estuarine Fringe
- Lacustrine Fringe
- Riverine
- N/A
- Mapped Streams

**2015 Field Data**

- Wetland
- Vegetation
- Observation

Pre-FEED Rev B with Mile Post

Feet: 0 250 500 750 1,000

Meters: 0 100 200 300

ALASKA LNG

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ALASKA LNG
2015 WETLAND MAPPING

| PROJECTION | DATUM | CONTRACTOR NAME | MAP NUMBER | REV. |
|---|---|---|---|---|
| AK 4 | NAD83 | AECOM ALASKA | Page 744 of 755 | A |

| SCALE | DATE | PROJECT NUMBER | ORIG.PAGE SIZE |
|---|---|---|---|
| 1:7,200 | 23 Nov 2015 | 26221392 | 11 X 17 |

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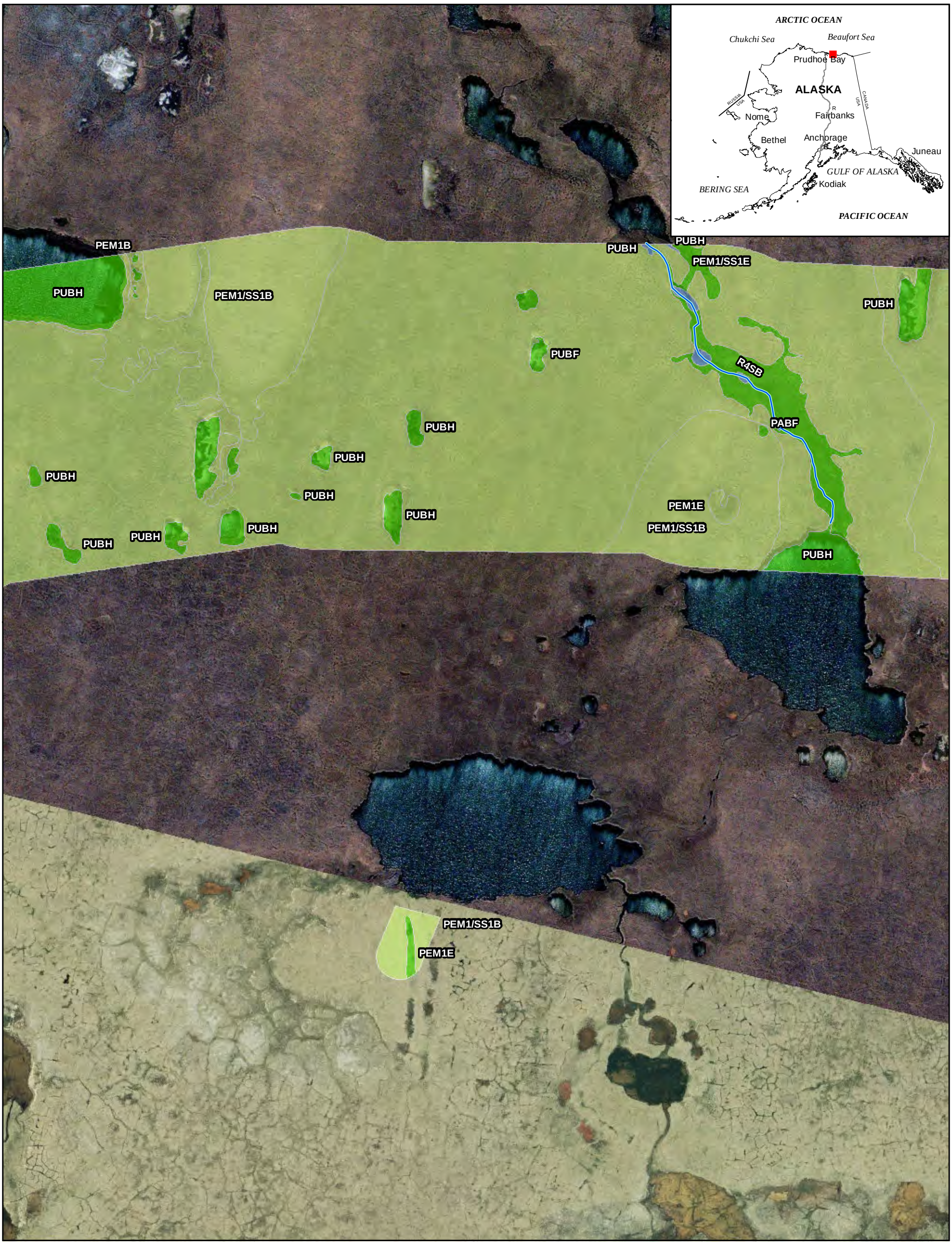


## LEGEND

**HGM Class**

- Flat
- Depressional
- Slope
- Estuarine Fringe
- Lacustrine Fringe
- Riverine
- N/A
- Mapped Streams

**2015 Field Data**

- Wetland
- Vegetation
- Observation

Pre-FEED Rev B with Mile Post

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ALASKA LNG
2015 WETLAND MAPPING

| PROJECTION | DATUM | CONTRACTOR NAME | MAP NUMBER | REV. |
|---|---|---|---|---|
| AK 4 | NAD83 | AECOM ALASKA | Page 745 of 755 | A |

| SCALE | DATE | PROJECT NUMBER | ORIG.PAGE SIZE |
|---|---|---|---|
| 1:7,200 | 23 Nov 2015 | 26221392 | 11 X 17 |

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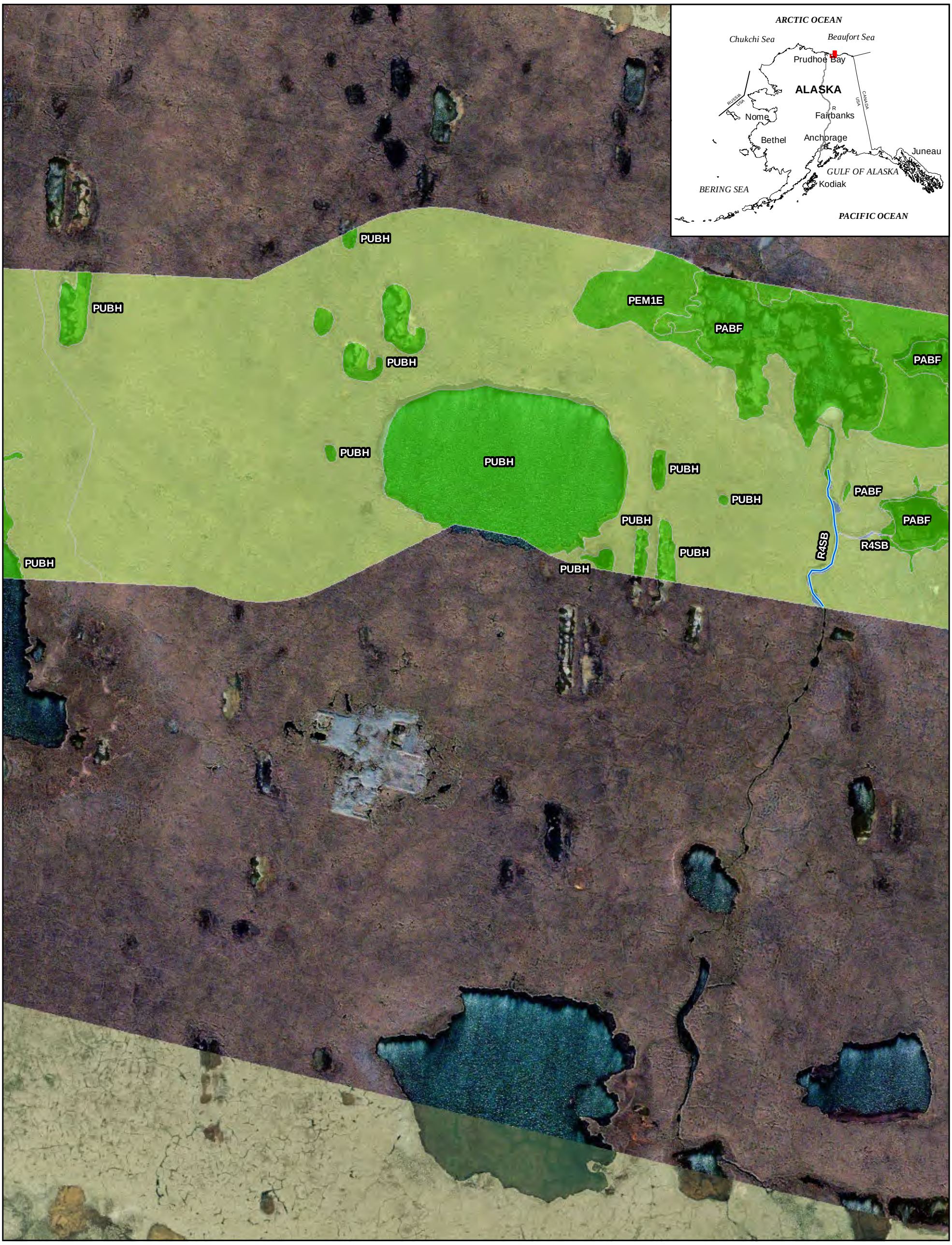


**LEGEND**

**HGM Class**

- Flat
- Depressional
- Slope
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**2015 Field Data**

- Wetland
- Vegetation
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Pre-FEED Rev B with Mile Post

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ALASKA LNG
2015 WETLAND MAPPING

| PROJECTION | DATUM | CONTRACTOR NAME | MAP NUMBER | REV. |
|---|---|---|---|---|
| AK 4 | NAD83 | AECOM ALASKA | Page 746 of 755 | A |

| SCALE | DATE | PROJECT NUMBER | ORIG.PAGE SIZE |
|---|---|---|---|
| 1:7,200 | 23 Nov 2015 | 26221392 | 11 X 17 |

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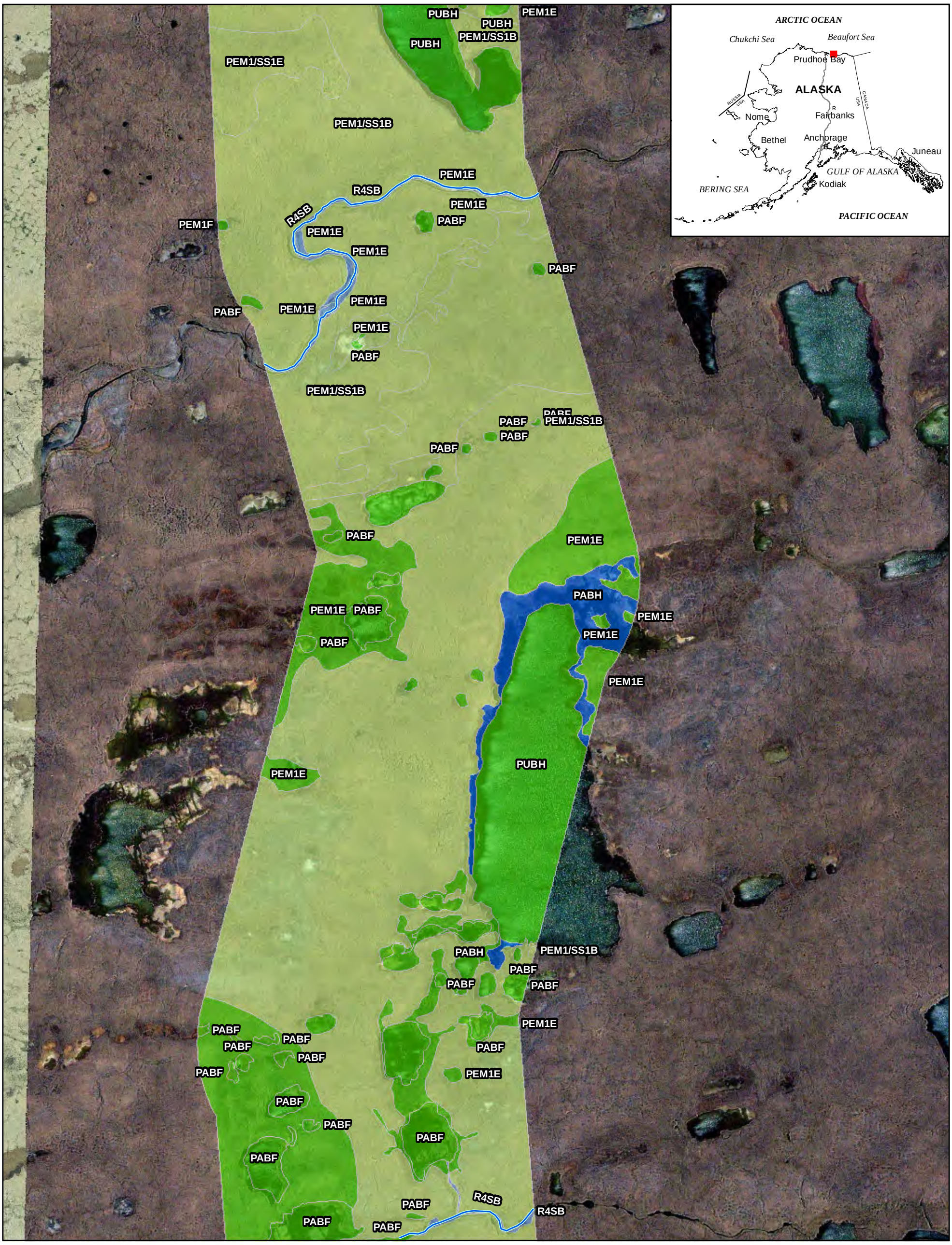


## LEGEND

**HGM Class**

- Flat
- Depressional
- Slope
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- Riverine
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**2015 Field Data**

- Wetland
- Vegetation
- Observation

Pre-FEED Rev B with Mile Post

Feet: 0 250 500 750 1,000

Meters: 0 100 200 300

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ALASKA LNG
2015 WETLAND MAPPING

| PROJECTION | DATUM | CONTRACTOR NAME | MAP NUMBER | REV. |
|---|---|---|---|---|
| AK 4 | NAD83 | AECOM ALASKA | Page 747 of 755 | A |

| SCALE | DATE | PROJECT NUMBER | ORIG.PAGE SIZE |
|---|---|---|---|
| 1:7,200 | 23 Nov 2015 | 26221392 | 11 X 17 |

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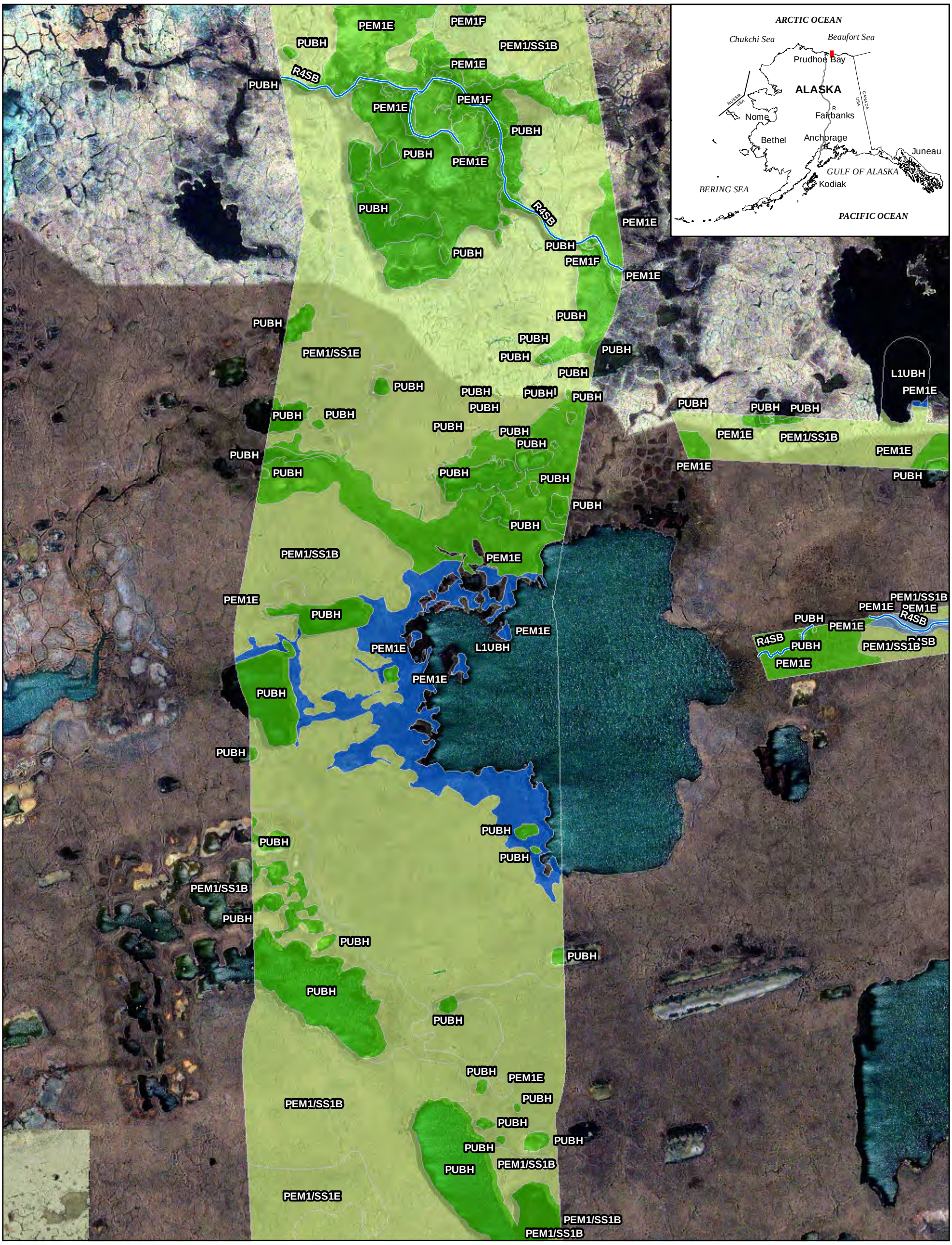


## LEGEND

**HGM Class**

- Flat
- Depressional
- Slope
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**2015 Field Data**

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Feet: 0 250 500 750 1,000

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ALASKA LNG
2015 WETLAND MAPPING

| PROJECTION | DATUM | CONTRACTOR NAME | MAP NUMBER | REV. |
|---|---|---|---|---|
| AK 4 | NAD83 | AECOM ALASKA | Page 748 of 755 | A |

| SCALE | DATE | PROJECT NUMBER | ORIG.PAGE SIZE |
|---|---|---|---|
| 1:7,200 | 23 Nov 2015 | 26221392 | 11 X 17 |

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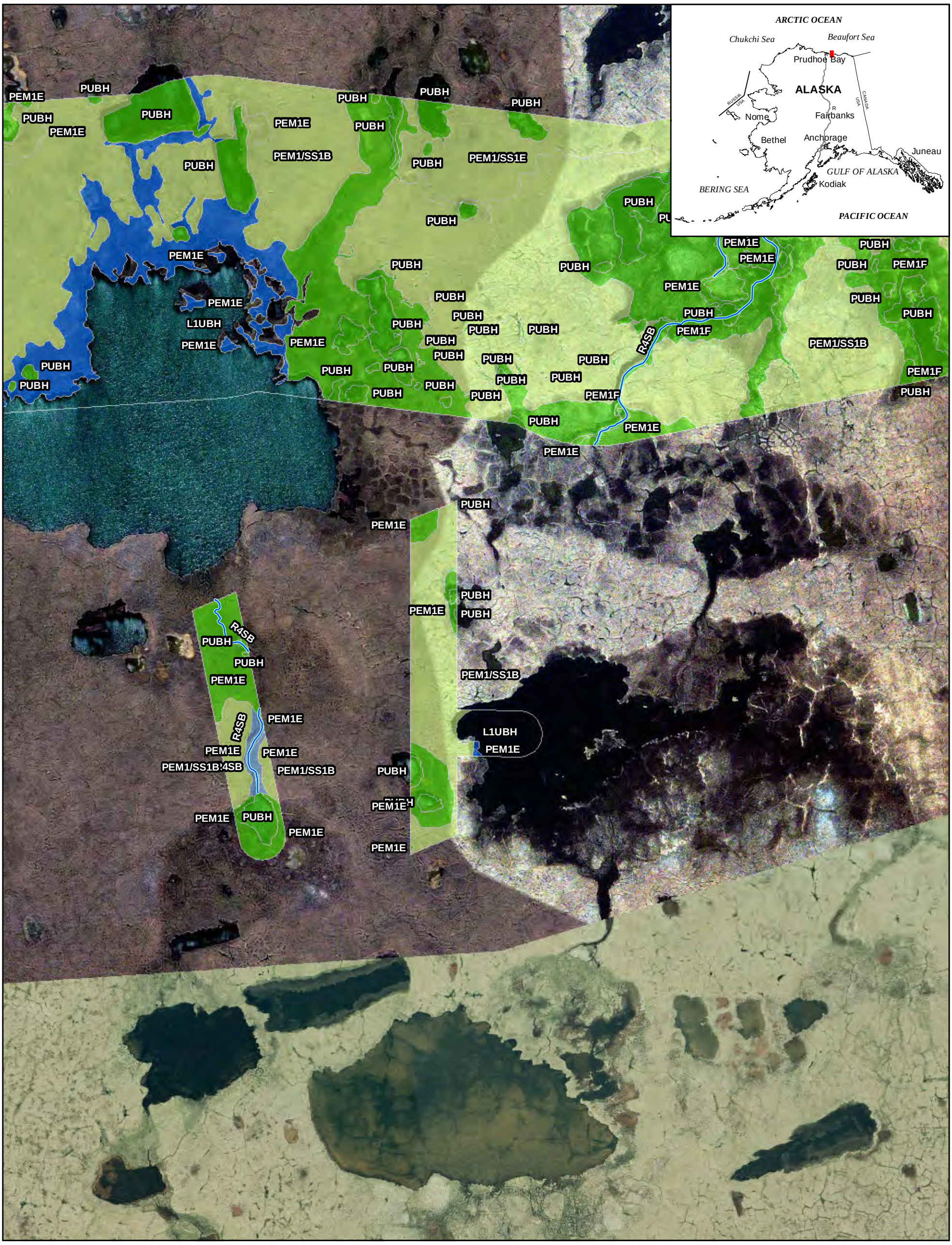


## LEGEND

**HGM Class**

- Flat
- Depressional
- Slope
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- Riverine
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**2015 Field Data**

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Pre-FEED Rev B with Mile Post

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ALASKA LNG
2015 WETLAND MAPPING

| PROJECTION | DATUM | CONTRACTOR NAME | MAP NUMBER | REV. |
|---|---|---|---|---|
| AK 4 | NAD83 | AECOM ALASKA | Page 749 of 755 | A |

| SCALE | DATE | PROJECT NUMBER | ORIG.PAGE SIZE |
|---|---|---|---|
| 1:7,200 | 23 Nov 2015 | 26221392 | 11 X 17 |

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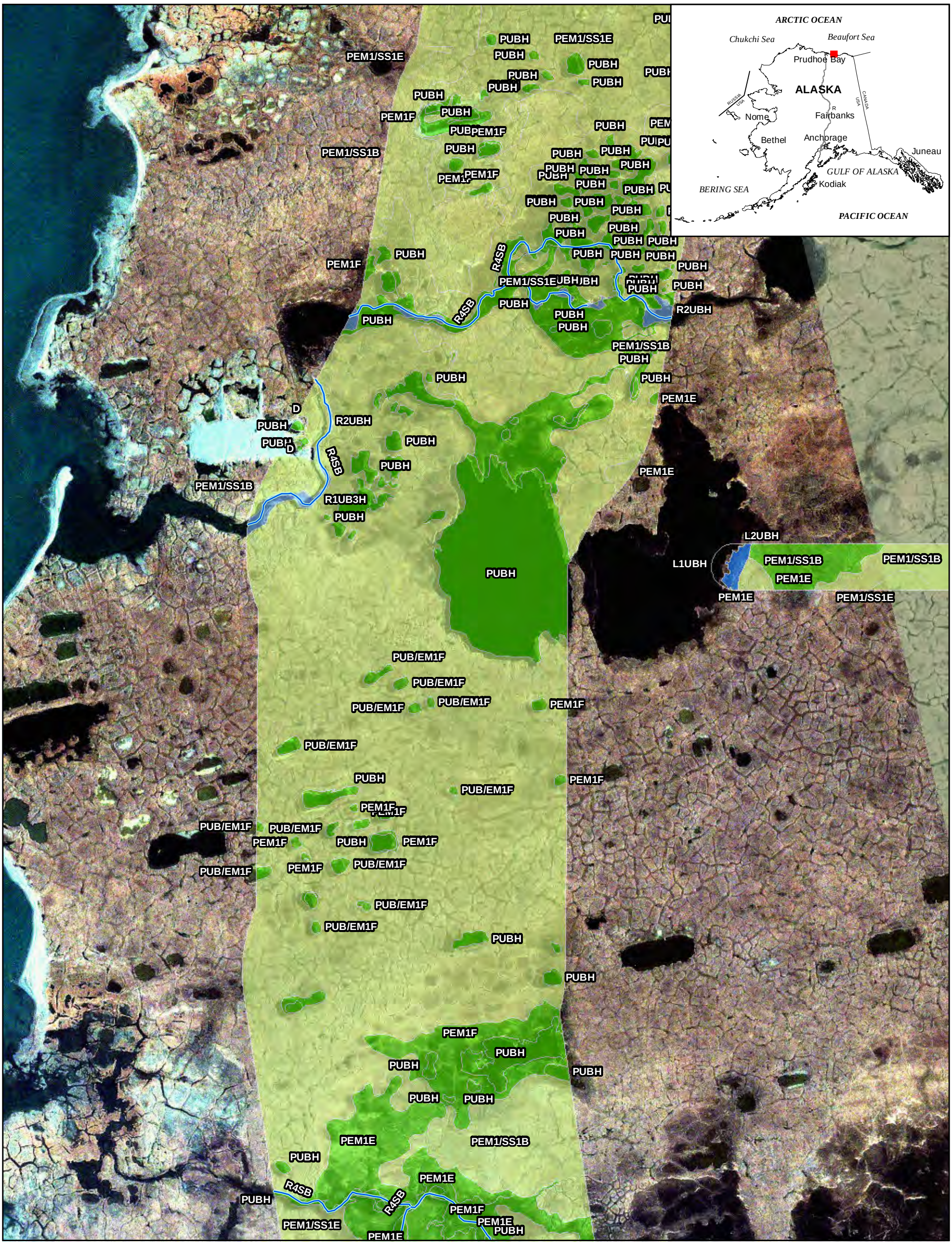


## LEGEND

**HGM Class**

- Flat
- Depressional
- Slope
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- Lacustrine Fringe
- Riverine
- N/A
- Mapped Streams

**2015 Field Data**

- Wetland
- Vegetation
- Observation

Pre-FEED Rev B with Mile Post

Feet: 0 250 500 750 1,000

Meters: 0 100 200 300

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ALASKA LNG
2015 WETLAND MAPPING

| PROJECTION | DATUM | CONTRACTOR NAME | MAP NUMBER | REV. |
|---|---|---|---|---|
| AK 4 | NAD83 | AECOM ALASKA | Page 750 of 755 | A |

| SCALE | DATE | PROJECT NUMBER | ORIG.PAGE SIZE |
|---|---|---|---|
| 1:7,200 | 23 Nov 2015 | 26221392 | 11 X 17 |

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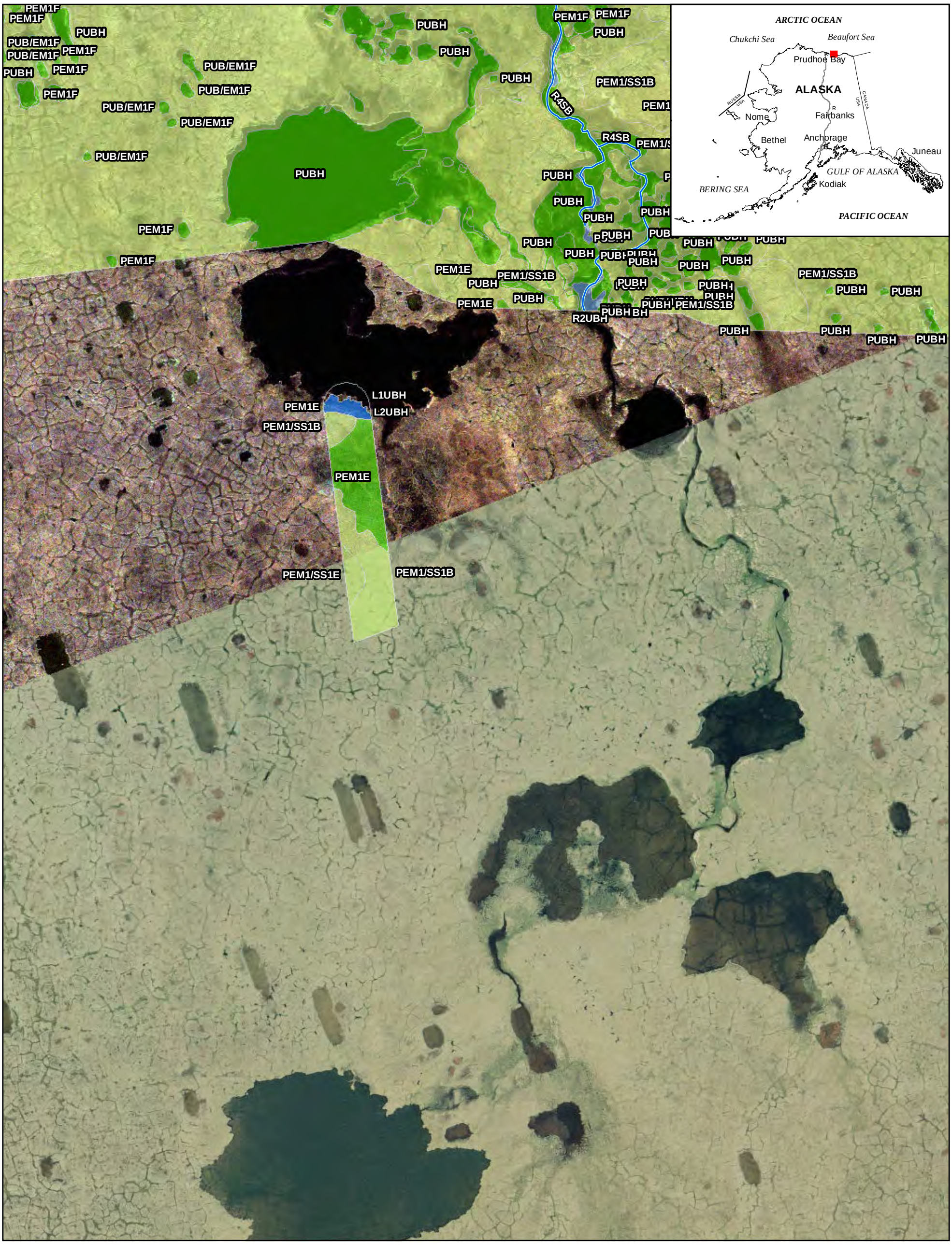


## LEGEND

**HGM Class**

- Flat
- Depressional
- Slope
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- Riverine
- N/A
- Mapped Streams

**2015 Field Data**

- Wetland
- Vegetation
- Observation

- Pre-FEED Rev B with Mile Post

Feet: 0 250 500 750 1,000

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ALASKA LNG

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ALASKA LNG
2015 WETLAND MAPPING

| PROJECTION | DATUM | CONTRACTOR NAME | MAP NUMBER | REV. |
|---|---|---|---|---|
| AK 4 | NAD83 | AECOM ALASKA | Page 751 of 755 | A |

| SCALE | DATE | PROJECT NUMBER | ORIG.PAGE SIZE |
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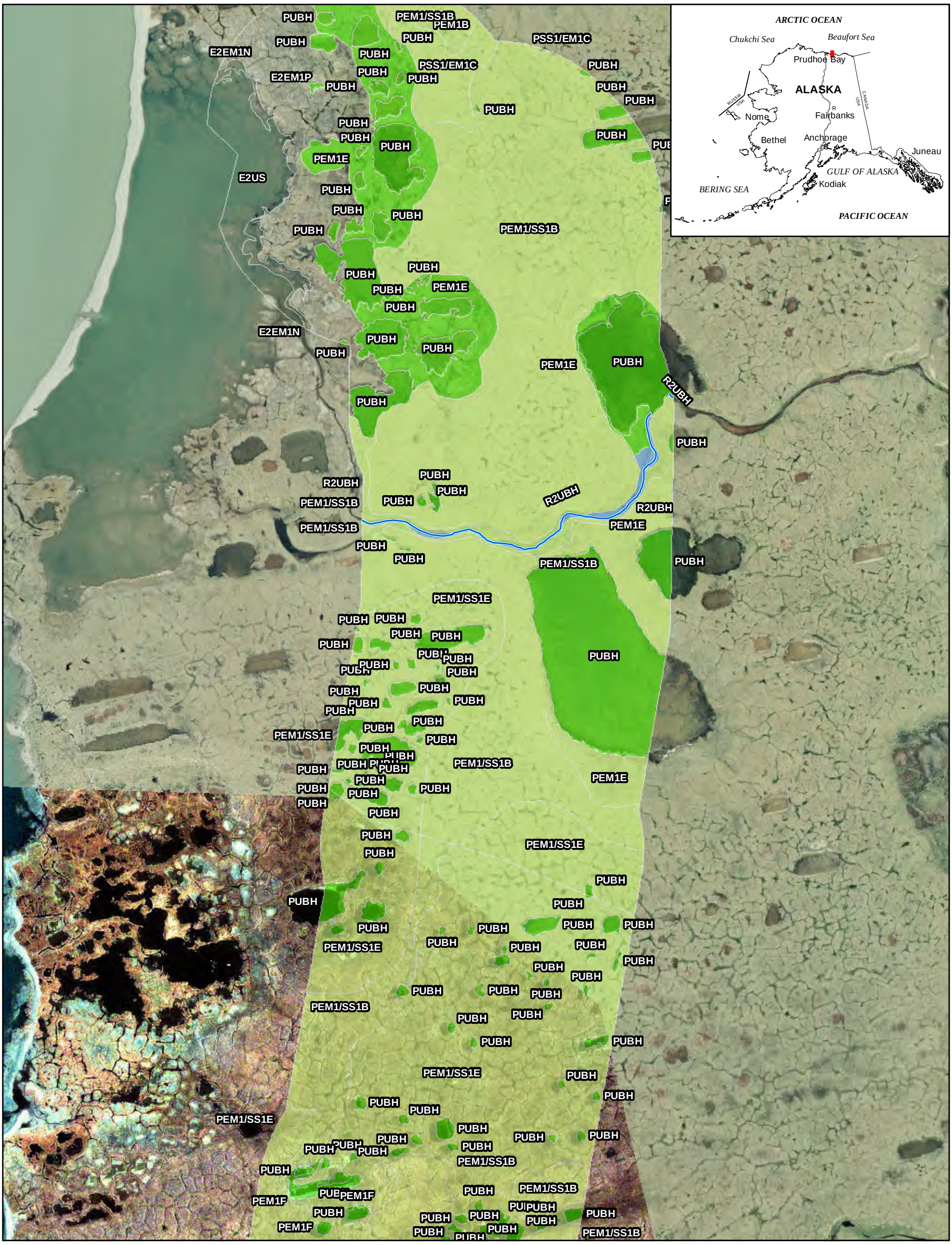


## LEGEND

**HGM Class**

- Flat
- Depressional
- Slope
- Estuarine Fringe
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- Riverine
- N/A
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**2015 Field Data**

- Wetland
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Pre-FEED Rev B with Mile Post

Feet: 0 250 500 750 1,000

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ALASKA LNG

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ALASKA LNG
2015 WETLAND MAPPING

| PROJECTION | DATUM | CONTRACTOR NAME | MAP NUMBER | REV. |
|---|---|---|---|---|
| AK 4 | NAD83 | AECOM ALASKA | Page 752 of 755 | A |

| SCALE | DATE | PROJECT NUMBER | ORIG.PAGE SIZE |
|---|---|---|---|
| 1:7,200 | 23 Nov 2015 | 26221392 | 11 X 17 |

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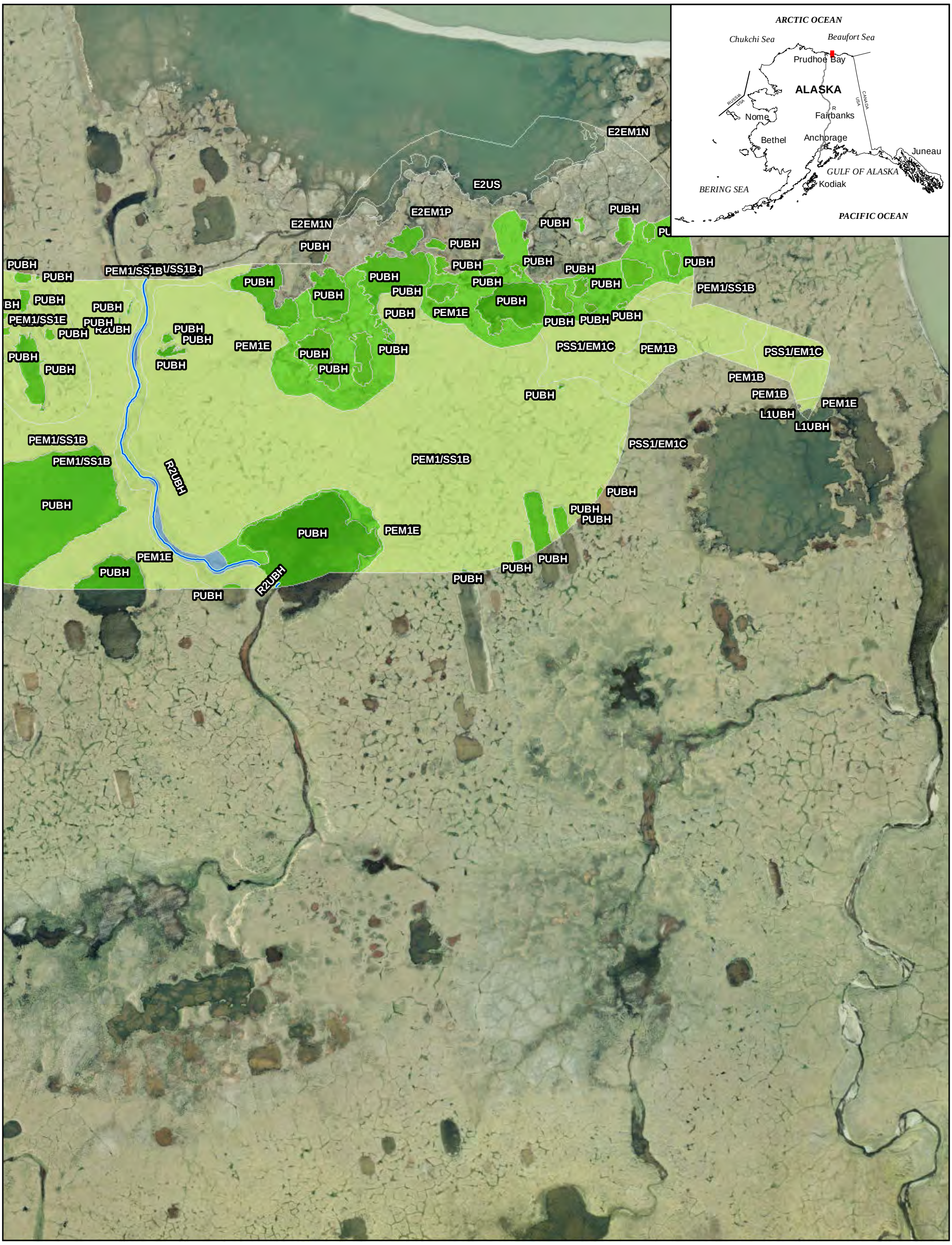


**LEGEND**

**HGM Class**

- Flat
- Depressional
- Slope
- Estuarine Fringe
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- Riverine
- N/A
- Mapped Streams

**2015 Field Data**

- Wetland
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Pre-FEED Rev B with Mile Post

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ALASKA LNG
2015 WETLAND MAPPING

| PROJECTION | DATUM | CONTRACTOR NAME | MAP NUMBER | REV. |
|---|---|---|---|---|
| AK 4 | NAD83 | AECOM ALASKA | Page 753 of 755 | A |

| SCALE | DATE | PROJECT NUMBER | ORIG.PAGE SIZE |
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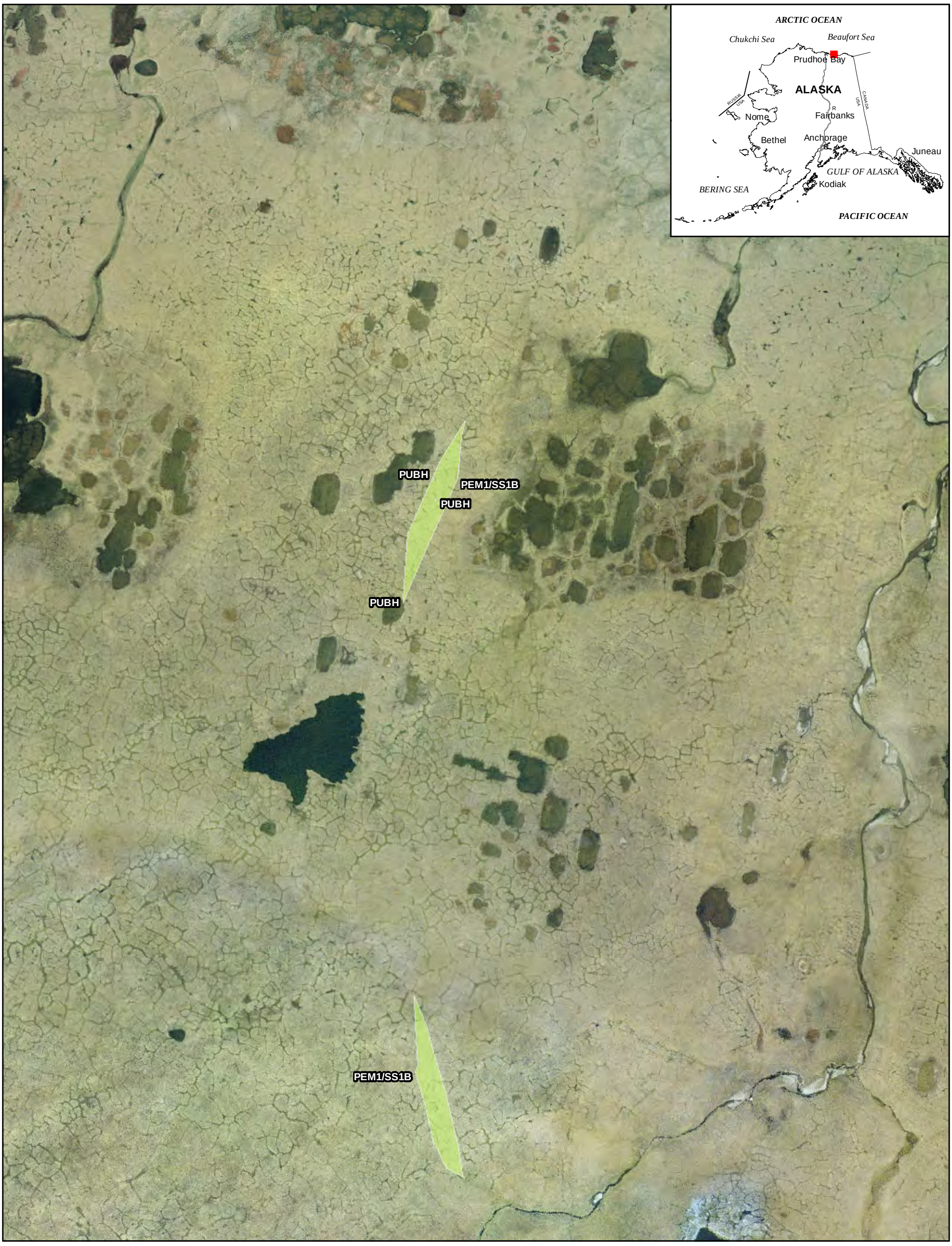


**LEGEND**

**HGM Class**

- Flat
- Depressional
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- Riverine
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- Wetland
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ALASKA LNG
2015 WETLAND MAPPING

| PROJECTION | DATUM | CONTRACTOR NAME | MAP NUMBER | REV. |
|---|---|---|---|---|
| AK 4 | NAD83 | AECOM ALASKA | Page 754 of 755 | A |

| SCALE | DATE | PROJECT NUMBER | ORIG.PAGE SIZE |
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| 1:7,200 | 23 Nov 2015 | 26221392 | 11 X 17 |

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**LEGEND**

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ALASKA LNG
2015 WETLAND MAPPING

| PROJECTION | DATUM | CONTRACTOR NAME | MAP NUMBER | REV. |
|---|---|---|---|---|
| AK 4 | NAD83 | AECOM ALASKA | Page 755 of 755 | A |

| SCALE | DATE | PROJECT NUMBER | ORIG.PAGE SIZE |
|---|---|---|---|
| 1:7,200 | 23 Nov 2015 | 26221392 | 11 X 17 |

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# APPENDIX C – 2016 WETLAND FIELD DATA SUMMARY TABLE AND US ARMY CORPS OF ENGINEERS ALASKA DISTRICT WETLAND DETERMINATION FORMS

| FEATURE ID | DATA TYPE[1] | SURVEY DATE | FIELD TARGET # | LATITUDE | LONGITUDE | COWARDIN CODE | HGM CLASSIFICATION[2] | VIERECK CLASSIFICATION |
|---|---|---|---|---|---|---|---|---|
| W105HT001 | WDF | 6/8/2016 | 212 | 63.0882 | -149.4784 | UPLAND | NA | II B 1 |
| W105HT001_OP | OP | 6/8/2016 | 212 | 63.0891 | -149.4807 | UPLAND | NA | I A 3, II C 2 |
| W105HT001_OP2 | OP | 6/8/2016 | 212 | 63.0886 | -149.4799 | UPLAND | NA | I A 3, II C 2 |
| W105HT001_OP3 | OP | 6/8/2016 | 212 | 63.0884 | -149.4780 | PUB/SS1F | DEPRESSIONAL | NONE, II B 1 |
| W105HT001_OP4 | OP | 6/8/2016 | 212 | 63.0888 | -149.4781 | PSS1C | SLOPE | II B 1 |
| W105HT001_OP5 | OP | 6/8/2016 | 212 | 63.0889 | -149.4772 | UPLAND | NA | II B 1 |
| W105HT002 | WDF | 6/8/2016 | 213 | 63.0896 | -149.4767 | PSS1C | SLOPE | II B 1 |
| W105HT002_OP | OP | 6/8/2016 | 213 | 63.0901 | -149.4757 | PSS1C | SLOPE | II B 1, II B 2 |
| W105HT003 | WDF | 6/8/2016 | 217 | 63.1323 | -149.4293 | PSS1C | SLOPE | II B 2, II C 2 |
| W105HT003_OP | OP | 6/8/2016 | 217 | 63.1330 | -149.4276 | PSS1/FO4B | SLOPE | I A 3, II B 2 |
| W105HT003_OP2 | OP | 6/8/2016 | 217 | 63.1325 | -149.4279 | PSS1/FO4B | SLOPE | I A 3, II B 2 |
| W105HT003_OP3 | OP | 6/8/2016 | 217 | 63.1320 | -149.4284 | PSS1/FO4B | SLOPE | I A 3, II B 2 |
| W105HT003_OP4 | OP | 6/8/2016 | 217 | 63.1324 | -149.4298 | UPLAND | NA | I A 2, II C 2 |
| W105HT003_OP5 | OP | 6/8/2016 | 217 | 63.1323 | -149.4290 | UPLAND | NA | I A 3, II C 2 |
| W105HT004 | WDF | 8/8/2016 | 241 | 63.6941 | -148.7724 | PSS1/4B | SLOPE | I A 3, II C 2 |
| W105HT004_OP | OP | 8/8/2016 | 241 | 63.6945 | -148.7726 | PFO4/SS1B | SLOPE | I A 2, II C 2 |
| W105HT005 | WDF | 8/8/2016 | 240 | 63.6906 | -148.7645 | PSS1/4B | FLAT | I A 3, II C 2 |
| W105HT005_OP | OP | 8/8/2016 | 240 | 63.6908 | -148.7647 | PSS1/4B | FLAT - ORGANIC | I A 3, II C 2 |
| W105LH001 | WDF | 6/12/2016 | 252 | 64.2186 | -149.2971 | PFO4/SS1B | FLAT | I A 2, II C 2 |
| W105LH001_OP | OP | 6/12/2016 | 252 | 64.2177 | -149.2966 | UPLAND | NA | I A 1 |
| W105LH001_OP2 | OP | 6/12/2016 | 252 | 64.2176 | -149.2971 | PFO4/SS4B | SLOPE | I A 2, II C 2 |
| W105LH001_OP3 | OP | 6/12/2016 | 252 | 64.2176 | -149.2970 | UPLAND | NA | I A 1 |
| W105LH001_OP4 | OP | 6/12/2016 | 252 | 64.2176 | -149.2974 | UPLAND | NA | I A 2, II A 2 |
| W105LH001_OP5 | OP | 6/12/2016 | 252 | 64.2177 | -149.2978 | PSS4/FO4B | FLAT - ORGANIC | I A 2, II C 2 |
| W105LH001_OP6 | OP | 6/12/2016 | 252 | 64.2177 | -149.2984 | UPLAND | NA | I A 2 |
| W105LH001_OP7 | OP | 6/12/2016 | 252 | 64.2184 | -149.2969 | UPLAND | NA | I C 2 |
| W105LH001_OP8 | OP | 6/12/2016 | 252 | 64.2186 | -149.2962 | UPLAND | NA | I C 2 |
| W105LH001_OP9 | OP | 6/12/2016 | 252 | 64.2181 | -149.2975 | PFO4/SS4B | SLOPE | I A 2, II C 2 |
| W105LH002 | WDF | 6/12/2016 | 251 | 64.2061 | -149.3004 | PSS4B | FLAT | II A 2 |
| W105LH003 | WDF | 6/13/2016 | 253 | 64.5567 | -149.1090 | UPLAND | NA | I B 2 |
| W105PA001_OP | OP | 7/27/2016 | A | 68.5691 | -149.4563 | PEM1/SS1C | FLAT - ORGANIC | III A 2, II D 2 |
| W105PA001_OP2 | OP | 7/27/2016 | A | 68.5695 | -149.4560 | UPLAND | NA | III A 2, II D 2 |

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|---|---|---|---|---|---|---|---|---|
| W105PA001_OP3 | OP | 7/27/2016 | A | 68.5689 | -149.4574 | PEM1/SS1C | FLAT - ORGANIC | III A 2, II D 2 |
| W105PA001_OP4 | OP | 7/27/2016 | A | 68.5686 | -149.4586 | PEM1/SS1C | FLAT - ORGANIC | III A 2, II D 2 |
| W105PA001_OP5 | OP | 7/27/2016 | A | 68.5682 | -149.4605 | UPLAND | NA | III A 2, II D 2 |
| W105PA002_OP | OP | 7/27/2016 | B | 68.8213 | -148.8110 | PEM1E | DEPRESSIONAL | II C 2, III A 3 |
| W105PA002_OP2 | OP | 7/27/2016 | B | 68.8229 | -148.8084 | UPLAND | NA | II C 2, II D |
| W105PA002_OP3 | OP | 7/27/2016 | B | 68.8220 | -148.8066 | UPLAND | NA | II C 2, II D |
| W105PA002_OP4 | OP | 7/27/2016 | B | 68.8219 | -148.8073 | PSS1/EM1B | FLAT - MINERAL | II C 2, III A 2 |
| W105TI001 | WDF | 5/22/2016 | 196 | 62.1690 | -150.2065 | PFO4/SS4B | FLAT | I A 2, II A 2 |
| W105TI001_OP1 | OP | 5/20/2016 | 197 | 62.1760 | -150.2104 | PSS1/FO1B | SLOPE | I B 2, II B 2 |
| W105TI001_OP2 | OP | 5/21/2016 | 197 | 62.1760 | -150.2111 | UPLAND | NA | I B 2, II B 2 |
| W105TI001_OP3 | OP | 5/21/2016 | 197 | 62.1785 | -150.2143 | UPLAND | NA | I B 2 |
| W105TI002 | WDF | 5/22/2016 | 195 | 62.1656 | -150.2057 | UPLAND | NA | I B 2 |
| W105TI002_OP | OP | 5/22/2016 | 195 | 62.1656 | -150.2060 | PFO1/4B | FLAT - ORGANIC | I C 2, II B 2 |
| W105TI002_OP2 | OP | 5/22/2016 | 195 | 62.1664 | -150.2045 | PSS1/FO1B | FLAT - ORGANIC | I C 3, II B 2 |
| W105TI003 | WDF | 5/22/2016 | 194 | 62.0385 | -150.2153 | UPLAND | NA | I C 2, II B 2 |
| W105TI004 | WDF | 5/23/2016 | 188 | 61.4343 | -150.6709 | PFO4/1B | SLOPE | I C 2, II B 2 |
| W105TI004_OP | OP | 5/23/2016 | 188 | 61.4343 | -150.6716 | UPLAND | NA | I B 2, II C 2 |
| W105TI004_OP2 | OP | 5/23/2016 | 188 | 61.4354 | -150.6711 | UPLAND | NA | I B 2, II C 2 |
| W105TI005 | WDF | 5/23/2016 | 182 | 61.3428 | -150.9285 | PFO4B | SLOPE | I A 2, II C 2 |
| W105TI006 | WDF | 5/24/2016 | 179 | 61.3257 | -151.0278 | PSS1/EM1B | SLOPE | II B 2, III A 2 |
| W105TI006_OP | OP | 5/24/2016 | 179 | 61.3237 | -151.0393 | PSS1C | NA | II B 1 |
| W105TI006_OP2 | OP | 5/24/2016 | 179 | 61.3240 | -151.0379 | PSS1A | NA | II B 2 |
| W105TI006_OP3 | OP | 5/24/2016 | 197 | 61.3246 | -151.0366 | PUB/EM2H | NA | NONE, III A 3 |
| W105TI006_OP4 | OP | 5/24/2016 | 179 | 61.3253 | -151.0310 | PSS1/EM1B | NA | II B 2, III A 2 |
| W105TI007 | WDF | 5/24/2016 | 178 | 61.3185 | -151.0562 | PSS1/FO1B | SLOPE | I C 3, II B 2 |
| W105TI007_OP | OP | 5/24/2016 | 178 | 61.3228 | -151.0417 | PSS1/FO1B | SLOPE | II B 2, I B 3 |
| W105TI007_OP2 | OP | 5/24/2016 | 178 | 61.3223 | -151.0435 | PEM1/SS1B | NA | III A 2, II B 2 |
| W105TI007_OP3 | OP | 5/24/2016 | 179 | 61.3212 | -151.0469 | R3UBH | NA | NONE |
| W105TI007_OP4 | OP | 5/24/2016 | 178 | 61.3207 | -151.0480 | R3UBH | NA | NONE |
| W105TI007_OP5 | OP | 5/24/2016 | 178 | 61.3206 | -151.0486 | R3UBH | NA | NONE |
| W105TI007_OP6 | OP | 5/24/2016 | 178 | 61.3189 | -151.0537 | R4SBC | NA | NONE |
| W105TI007_OP7 | OP | 5/24/2016 | 178 | 61.3175 | -151.0579 | UPLAND | NA | I C 3, II B 2 |
| W105TI007_OP8 | OP | 5/24/2016 | 178 | 61.3166 | -151.0605 | R3UBH | NA | NONE |
| W105TI007_OP9 | OP | 5/24/2016 | 178 | 61.3158 | -151.0631 | PUBH | NA | NONE |

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|---|---|---|---|---|---|---|---|---|
| W105TI008_OP | OP | 5/30/2016 | 176 | 61.3135 | -151.0298 | UPLAND | NA | I C 2, II C 2 |
| W105TI008_OP2 | OP | 5/30/2016 | 176 | 61.3134 | -151.0288 | PFO1/4B | SLOPE | I C 2, II C 2 |
| W105TI008_OP3 | OP | 5/30/2016 | 176 | 61.3130 | -151.0295 | UPLAND | NA | I C 2, II C 2 |
| W105TI008_OP4 | OP | 5/30/2016 | 176 | 61.3123 | -151.0272 | UPLAND | NA | I C 2, II B 2 |
| W106AY001 | WDF | 6/28/2016 | 273 | 65.9558 | -149.9445 | PSS4/1B | FLAT | I A 2, II C 2 |
| W106AY001_OP | OP | 6/28/2016 | 273 | 65.9554 | -149.9434 | PSS4/1B | FLAT - ORGANIC | I A 2, II C 2 |
| W106AY001_OP2 | OP | 6/28/2016 | 273 | 65.9545 | -149.9439 | UPLAND | NA | II A 2, II C 2 |
| W106AY002 | WDF | 6/28/2016 | 274 | 65.9887 | -150.0130 | UPLAND | NA | I C 2, II B 2 |
| W106AY003 | WDF | 6/29/2016 | 275 | 65.9993 | -150.0108 | PSS1/4B | SLOPE | I A 3, II B 2 |
| W106AY003_OP | OP | 6/29/2016 | 275 | 65.9992 | -150.0105 | UPLAND | NA | I A 2, II B 2 |
| W106AY003_OP2 | OP | 6/29/2016 | 275 | 65.9991 | -150.0190 | UPLAND | NA | I A 2, II B 2 |
| W106AY004 | WDF | 6/29/2016 | 276 | 66.0152 | -150.0939 | UPLAND | NA | I A 2, II C 2 |
| W106AY004_OP | OP | 6/29/2016 | 276 | 66.0131 | -150.0898 | UPLAND | NA | I A 2, II C 2 |
| W106AY005 | WDF | 6/30/2016 | 277 | 66.5344 | -150.7449 | PFO4/SS1B | FLAT | I A 2, II C 2 |
| W106AY006 | WDF | 6/30/2016 | 282 | 66.8850 | -150.5187 | PFO4/SS1B | FLAT | I A 3, II C 2 |
| W106AY007 | WDF | 7/1/2016 | 286 | 67.2334 | -150.2264 | PSS1/FO4B | FLAT | II B 2, I A 3 |
| W106AY007_OP | OP | 7/1/2016 | 286 | 67.2325 | -150.2256 | PEM1E | DEPRESSIONAL | III A 3 |
| W106AY007_OP2 | OP | 7/1/2016 | 286 | 67.2335 | -150.2292 | UPLAND | NA | I A 2, II C 2 |
| W106AY008 | WDF | 7/1/2016 | 285 | 67.2293 | -150.2081 | UPLAND | NA | I A 2, II C 2 |
| W106AY008_OP | OP | 7/1/2016 | 285 | 67.2281 | -150.2121 | PSS1B | FLAT | II C 2 |
| W106AY009 | WDF | 7/1/2016 | 288 | 67.2688 | -150.1665 | PFO4/SS1B | FLAT | I A 2, II C 2 |
| W106AY010 | WDF | 7/1/2016 | 287 | 67.2532 | -150.1674 | UPLAND | NA | I A 2, II C 2 |
| W106AY010_OP | OP | 7/1/2016 | 287 | 67.2528 | -150.1704 | UPLAND | NA | I A 2, II C 2 |
| W106AY010_OP2 | OP | 7/1/2016 | 287 | 67.2524 | -150.1719 | UPLAND | NA | I A 2, II C 2 |
| W106AY011 | WDF | 7/2/2016 | 278 | 66.5430 | -150.8028 | UPLAND | NA | I A 2 |
| W106AY011_OP | OP | 7/2/2016 | 278 | 66.5440 | -150.8017 | UPLAND | NA | I A 2 |
| W106AY012 | WDF | 7/2/2016 | 279 | 66.7127 | -150.6467 | PSS1/EM1B | FLAT | II D 2, III A 2 |
| W106AY012_OP | OP | 7/2/2016 | 279 | 66.7144 | -150.6523 | UPLAND | NA | I B 3, II C 2 |
| W106AY013 | WDF | 7/2/2016 | 280 | 66.7493 | -150.6540 | UPLAND | NA | II D 2, III A 2 |
| W106AY013_OP | OP | 7/2/2016 | 280 | 66.7518 | -150.6576 | PEM1/SS1B | FLAT - ORGANIC | III A 2, II C 2 |
| W106AY014 | WDF | 7/3/2016 | 318 | 67.3466 | -150.1377 | UPLAND | NA | II A 2, II C 2 |
| W106AY014_OP | OP | 7/3/2016 | 318 | 67.3467 | -150.1362 | PSS4/1B | FLAT - ORGANIC | II A 2, II C 2 |
| W106AY015 | WDF | 7/3/2016 | 290 | 67.3528 | -150.1470 | PFO4/SS4B | FLAT | I A 2, II C 2 |
| W106AY015_OP | OP | 7/3/2016 | 290 | 67.3525 | -150.1519 | PSS4/1B | SLOPE | II A 2, II C 2 |

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|---|---|---|---|---|---|---|---|---|
| W106AY015_OP2 | OP | 7/3/2016 | 290 | 67.3522 | -150.1518 | PSS4/1B | FLAT - ORGANIC | II A 2, II C 2 |
| W106AY016 | WDF | 7/3/2016 | 289 | 67.3173 | -150.1232 | UPLAND | NA | I A 2, II C 2 |
| W106AY017 | WDF | 7/5/2016 | 284 | 67.0161 | -150.2832 | PSS1/EM1B | FLAT | II C 2, III A 2 |
| W106AY018 | WDF | 7/5/2016 | 283 | 66.8958 | -150.5343 | PSS4/1B | FLAT | II A 2, II C 2 |
| W106AY018_OP | OP | 7/5/2016 | 283 | 66.8961 | -150.5316 | UPLAND | NA | I A 2, II C 2 |
| W106AY019 | WDF | 7/5/2016 | 281 | 66.8221 | -150.6763 | UPLAND | NA | II B 2, II C 2 |
| W106AY019_OP | OP | 7/5/2016 | 281 | 66.8213 | -150.6756 | UPLAND | NA | II B 2, II C 2 |
| W106AY020 | WDF | 7/6/2016 | 293 | 67.6755 | -149.7219 | UPLAND | NA | I A 3, II C 2 |
| W106AY020_OP | OP | 7/6/2016 | 293 | 67.6747 | -149.7219 | PSS1/4B | SLOPE | II C 2, II A 3 |
| W106AY020_OP2 | OP | 7/6/2016 | 293 | 67.6754 | -149.7220 | PFO4/SS1B | SLOPE | I A 3, II C 2 |
| W106AY021 | WDF | 7/6/2016 | 294 | 67.6750 | -149.7138 | UPLAND | NA | I A 2, II B 2 |
| W106AY021_OP | OP | 7/6/2016 | 294 | 67.6746 | -149.7172 | UPLAND | NA | I A 2, II C 2 |
| W106AY021_OP2 | OP | 7/6/2016 | 294 | 67.6747 | -149.7143 | UPLAND | NA | I A 2, II B 2 |
| W106AY022 | WDF | 7/6/2016 | 291 | 67.4162 | -150.0680 | PSS4/1B | FLAT | II A 3, II C 2 |
| W106AY023 | WDF | 7/7/2016 | 295 | 67.7391 | -149.7537 | UPLAND | NA | I A 3, II C 2 |
| W106AY023_OP | OP | 7/7/2016 | 295 | 67.7381 | -149.7531 | UPLAND | NA | I A 3, II C 2 |
| W106AY023_OP2 | OP | 7/7/2016 | 295 | 67.7415 | -149.7550 | PSS1/4B | SLOPE | II A 3, II C 2 |
| W106AY024 | WDF | 7/7/2016 | 296 | 67.7928 | -149.8047 | UPLAND | NA | I A 2, II B 2 |
| W106AY025 | WDF | 7/7/2016 | 297 | 67.8408 | -149.8352 | UPLAND | NA | I A 3, II C 2 |
| W106AY025_OP | OP | 7/7/2016 | 297 | 67.8404 | -149.8292 | UPLAND | NA | I A 3, II C 2 |
| W106AY025_OP2 | OP | 7/7/2016 | 297 | 67.8410 | -149.8357 | PSS1/FO4B | SLOPE | I A 3, II C 2 |
| W106AY026 | WDF | 7/7/2016 | 292 | 67.5185 | -149.8384 | PSS4/1B | SLOPE | I A 3, II C 2 |
| W106AY026_OP | OP | 7/7/2016 | 292 | 67.5172 | -149.8387 | UPLAND | NA | I A 3, II C 2 |
| W106AY026_OP2 | OP | 7/7/2016 | 292 | 67.5183 | -149.8374 | PSS4/1B | SLOPE | I A 3, II C 2 |
| W106AY027 | WDF | 7/8/2016 | 298 | 67.8846 | -149.8251 | UPLAND | NA | I A 3, II B 2 |
| W106AY027_OP | OP | 7/8/2016 | 298 | 67.8858 | -149.8225 | UPLAND | NA | I A 2, II C 2 |
| W106AY027_OP2 | OP | 7/8/2016 | 298 | 67.8860 | -149.8281 | UPLAND | NA | I A 2, II C 2 |
| W106AY027_OP3 | OP | 7/8/2016 | 298 | 67.8870 | -149.8232 | UPLAND | NA | I A 3, II B 2 |
| W106AY028 | WDF | 7/8/2016 | 299 | 67.9312 | -149.8217 | PFO4/SS1B | SLOPE | I A 3, II B 2 |
| W106AY028_OP | OP | 7/8/2016 | 299 | 67.9299 | -149.8229 | PSS4/1B | SLOPE | I A 3, II A 3 |
| W106AY028_OP2 | OP | 7/8/2016 | 299 | 67.9302 | -149.8245 | PSS4/1B | SLOPE | I A 3, II A 3 |
| W106AY029 | WDF | 7/8/2016 | 300 | 67.9526 | -149.7761 | PSS1/FO4B | SLOPE | I A 3, II B 2 |
| W106AY029_OP | OP | 7/8/2016 | 300 | 67.9528 | -149.7769 | UPLAND | NA | I C 3, II B 1 |
| W106AY030 | WDF | 7/9/2016 | 301 | 67.9699 | -149.7679 | UPLAND | NA | I A 2 |

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|---|---|---|---|---|---|---|---|---|
| W106AY030_OP | OP | 7/9/2016 | 301 | 67.9711 | -149.7670 | UPLAND | NA | II B 2 |
| W106AY031 | WDF | 7/9/2016 | 302 | 68.0043 | -149.7438 | UPLAND | NA | I A 2, II C 2 |
| W106AY032 | WDF | 7/9/2016 | 303 | 68.0097 | -149.7381 | UPLAND | NA | I C 2, II B 2 |
| W106AY033 | WDF | 7/10/2016 | 306 | 68.0361 | -149.6527 | UPLAND | NA | II B 2, II C 2 |
| W106AY033_OP | OP | 7/10/2016 | 306 | 68.0364 | -149.6515 | UPLAND | NA | II B 2, II C 2 |
| W106AY034 | WDF | 7/10/2016 | 307 | 68.0537 | -149.6160 | PSS1/EM1B | FLAT | II C 2, III A 2 |
| W106AY035 | WDF | 7/10/2016 | 308 | 68.0707 | -149.5721 | PSS1/EM1C | SLOPE | II C 2, III A 2 |
| W106AY035_OP | OP | 7/10/2016 | 308 | 68.0712 | -149.5729 | UPLAND | NA | II C 2 |
| W106AY035_OP2 | OP | 7/10/2016 | 308 | 68.0702 | -149.5785 | PSS1/EM1C | SLOPE | II C 2, III A 2 |
| W106AY036 | WDF | 7/11/2016 | 309 | 68.1115 | -149.5361 | PSS1/EM1B | FLAT | II C 2, III A 2 |
| W106AY037 | WDF | 7/11/2016 | 304 | 68.0244 | -149.7104 | PFO1/4C | SLOPE | I C 2, II B 2 |
| W106AY037_OP | OP | 7/11/2016 | 304 | 68.0244 | -149.7101 | UPLAND | NA | I C 2, II B 1 |
| W106AY038 | WDF | 7/11/2016 | 305 | 68.0250 | -149.7120 | PFO4/SS1B | SLOPE | I A 2, II B 2 |
| W106AY039 | WDF | 7/17/2016 | COLDFOOT 2 | 67.4111 | -150.0716 | UPLAND | NA | I A 3, II C 2 |
| W106AY040 | WDF | 7/18/2016 | COLDFOOT 1 | 66.7734 | -150.6577 | PSS1/EM1B | SLOPE | II C 2, III A 2 |
| W106AY041 | WDF | 7/18/2016 | COLDFOOT 4 | 66.6584 | -150.6637 | PSS4/1B | FLAT | II A 2, II C 2 |
| W106AY042 | WDF | 7/18/2016 | YUKON 1 | 66.2462 | -150.2778 | PSS1B | SLOPE | II B 2 |
| W106HT001 | WDF | 6/3/2016 | 198 | 62.4019 | -150.2636 | PFO1/SS1B | SLOPE | I C 2, II B 2 |
| W106HT001_OP | OP | 6/3/2016 | 198 | 62.4015 | -150.2635 | UPLAND | NA | I C 2, II B 2 |
| W106HT002 | WDF | 6/3/2016 | 199 | 62.4157 | -150.2579 | UPLAND | NA | I C 2, II B 2 |
| W106HT003 | WDF | 6/4/2016 | 201 | 62.4453 | -150.2649 | PSS1/FO4B | SLOPE | I C 2, II B 2 |
| W106HT003_OP | OP | 6/4/2016 | 201 | 62.4453 | -150.2645 | UPLAND | NA | I C 2, II B 2 |
| W106HT004 | WDF | 6/4/2016 | 200 | 62.4348 | -150.2552 | PEM1/FO1B | SLOPE | I B 3, III A 2 |
| W106HT004_OP | OP | 6/4/2016 | 200 | 62.4361 | -150.2545 | PEM1/FO1B | SLOPE | I B 3, III A 2 |
| W106HT005 | WDF | 6/4/2016 | 202 | 62.4338 | -150.2602 | UPLAND | NA | I C 2, II B 2 |
| W106HT006 | WDF | 6/7/2016 | 203 | 62.5459 | -150.2468 | PFO1/4B | SLOPE | I C 2, II B 2 |
| W106HT006_OP | OP | 6/7/2016 | 203 | 62.5459 | -150.2460 | UPLAND | NA | I C 2, II B 2 |
| W106HT006_OP2 | OP | 6/7/2016 | 203 | 62.5453 | -150.2445 | UPLAND | NA | I C 2, II B 2 |
| W106HT006_OP3 | OP | 6/7/2016 | 203 | 62.5454 | -150.2430 | PSS1/FO1B | SLOPE | I C 3, II B 1 |
| W106HT007 | WDF | 6/7/2016 | 209 | 63.0152 | -149.5774 | PSS1/EM1B | SLOPE | II C 2, III A 2 |
| W106HT007_OP | OP | 6/7/2016 | 209 | 63.0155 | -149.5814 | UPLAND | NA | II C 1 |
| W106HT008 | WDF | 6/8/2016 | 208 | 63.0130 | -149.5580 | PSS1/EM1B | SLOPE | II B 2, III A 2 |
| W106HT008_OP | OP | 6/8/2016 | 208 | 63.0097 | -149.5501 | UPLAND | NA | II B 2, II C 2 |
| W106HT008_OP2 | OP | 6/8/2016 | 208 | 63.0116 | -149.5523 | PSS1B | SLOPE | II B 1 |

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|---|---|---|---|---|---|---|---|---|
| W106HT009 | WDF | 6/8/2016 | 210 | 63.0561 | -149.5108 | UPLAND | NA | III A 2, II C 2 |
| W106HT010 | WDF | 6/8/2016 | 211 | 63.0563 | -149.5063 | PSS1B | SLOPE | II B 1 |
| W106HT011 | WDF | 6/9/2016 | 219 | 63.1438 | -149.4192 | UPLAND | NA | II B 1, III A 2 |
| W106HT011_OP | OP | 6/9/2016 | 217 | 63.1365 | -149.4374 | UPLAND | NA | II B 2, III A 2 |
| W106HT011_OP2 | OP | 6/9/2016 | 217 | 63.1348 | -149.4332 | R4SB | NA | NONE |
| W106HT011_OP3 | OP | 6/9/2016 | 217 | 63.1334 | -149.4290 | PEM1B | SLOPE | III A 2 |
| W106HT011_OP4 | OP | 6/9/2016 | 217 | 63.1338 | -149.4287 | UPLAND | NA | I A 2, II B 2 |
| W106HT011_OP5 | OP | 6/9/2016 | 217 | 63.1325 | -149.4293 | PFO4/SS1C | SLOPE | I A 2, II B 2 |
| W106HT011_OP6 | OP | 6/9/2016 | 217 | 63.1352 | -149.4418 | PSS1/EM1F | SLOPE | II B 2, III A 2 |
| W106HT012 | WDF | 6/9/2016 | 218 | 63.1425 | -149.4158 | PSS1B | SLOPE | II B 1, III A 2 |
| W106HT012_OP | OP | 6/9/2016 | 218 | 63.1429 | -149.4145 | UPLAND | NA | III A 2 |
| W106HT013 | WDF | 6/10/2016 | 204 | 62.8733 | -149.8429 | UPLAND | NA | I A 2, II B 2 |
| W106HT013_OP | OP | 6/10/2016 | 204 | 62.8729 | -149.8436 | UPLAND | NA | III B 2, III A 2 |
| W106HT013_OP2 | OP | 6/10/2016 | 204 | 62.8745 | -149.8413 | PEM1B | DEPRESSIONAL | III A 2 |
| W106HT013_OP3 | OP | 6/10/2016 | 204 | 62.8743 | -149.8413 | UPLAND | NA | III A 2 |
| W106HT014 | WDF | 6/10/2016 | 205 | 62.8798 | -149.8372 | PSS1E | SLOPE | II B 1, III B 2 |
| W106HT014_OP | OP | 6/10/2016 | 205 | 62.8793 | -149.8402 | R4SB | NA | NONE |
| W106HT015 | WDF | 6/10/2016 | 220 | 63.1904 | -149.3555 | PSS1B | SLOPE | I A 3, II B 2 |
| W106HT016 | WDF | 6/11/2016 | 214 | 63.1109 | -149.4777 | UPLAND | NA | III A 2, III B 2 |
| W106HT016_OP | OP | 6/11/2016 | 214 | 63.1077 | -149.4854 | UPLAND | NA | III B 2 |
| W106HT016_OP2 | OP | 6/11/2016 | 214 | 63.1081 | -149.4836 | UPLAND | NA | II B 2 |
| W106HT016_OP3 | OP | 6/11/2016 | 214 | 63.1116 | -149.4762 | UPLAND | NA | III A 2, III B 2 |
| W106HT017 | WDF | 6/11/2016 | 215 | 63.1086 | -149.4807 | UPLAND | NA | I A 2, II C 2 |
| W106HT017_OP | OP | 6/11/2016 | 215 | 63.1088 | -149.4800 | R3UBH | NA | NONE |
| W106HT018 | WDF | 6/11/2016 | 216 | 63.1095 | -149.4724 | PSS1B | SLOPE | II B 1, III A 2 |
| W106HT019 | WDF | 6/11/2016 | 226 | 63.3333 | -149.1352 | PSS1B | FLAT | II C 2, III A 2 |
| W106HT019_OP | OP | 6/11/2016 | 226 | 63.3311 | -149.1405 | PSS1B | FLAT - ORGANIC | II C 2, I A 3 |
| W106HT019_OP2 | OP | 6/11/2016 | 226 | 63.3317 | -149.1390 | PSS1/EM1B | FLAT - ORGANIC | II C 2, III A 2 |
| W106HT020 | WDF | 6/12/2016 | 242 | 63.8469 | -149.0193 | UPLAND | NA | II C 1, I A 3 |
| W106HT021 | WDF | 6/12/2016 | 239 | 63.7930 | -148.9196 | UPLAND | NA | I A 2, II B 1 |
| W106HT022 | WDF | 6/12/2016 | 225 | 63.3115 | -149.1835 | UPLAND | NA | II C 1 |
| W106HT022_OP | OP | 6/12/2016 | 225 | 63.3103 | -149.1790 | UPLAND | NA | II C 1 |
| W106HT022_OP2 | OP | 6/12/2016 | 225 | 63.3114 | -149.1838 | PSS1B | FLAT - ORGANIC | II C 1 |
| W106HT023 | WDF | 7/27/2016 | CANTWELL 1 | 63.8559 | -149.0106 | PSS4/1B | FLAT | I A 2, II C 2 |

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|---|---|---|---|---|---|---|---|---|
| W106LH001 | WDF | 6/13/2016 | 245 | 63.9354 | -149.0943 | UPLAND | NA | I A 3, II C 1 |
| W106LH001_OP | OP | 6/13/2016 | 245 | 63.9368 | -149.0995 | R3UBH | NA | NONE |
| W106LH001_OP2 | OP | 6/13/2016 | 245 | 63.9366 | -149.0961 | PSS1B | FLAT - ORGANIC | II C 1 |
| W106LH001_OP3 | OP | 6/13/2016 | 245 | 63.9358 | -149.0936 | PSS1B | FLAT - ORGANIC | II C 1, I A 3 |
| W106LH001_OP4 | OP | 6/13/2016 | 245 | 63.9343 | -149.0935 | UPLAND | NA | I C 2, II C 2 |
| W106LH001_OP5 | OP | 6/13/2016 | 245 | 63.9336 | -149.0919 | PSS1B | FLAT - ORGANIC | II C 1, I A 3 |
| W106LH002 | WDF | 6/13/2016 | 249 | 64.0987 | -149.2249 | UPLAND | NA | I A 2, II C 2 |
| W106LH002_OP | OP | 6/13/2016 | 249 | 64.0985 | -149.2246 | PSS4/1F | SLOPE | I A 2, II C 2 |
| W106LH002_OP2 | OP | 6/13/2016 | 249 | 64.0980 | -149.2252 | PSS4/1F | SLOPE | I A 2, II C 2 |
| W106LH002_OP3 | OP | 6/13/2016 | 249 | 64.0964 | -149.2258 | UPLAND | NA | I A 3, II C 2 |
| W106LH003 | WDF | 6/20/2016 | 255 | 64.6300 | -149.0728 | PEM1F | SLOPE | III A 3 |
| W106LH004 | WDF | 6/20/2016 | 254 | 64.5848 | -149.1145 | PEM1/SS1B | SLOPE | III A 2, II B 2 |
| W106LH005 | WDF | 6/21/2016 | 258 | 64.7560 | -148.8111 | PFO4/SS1B | FLAT | I A 2, II C 2 |
| W106LH005_OP | OP | 6/21/2016 | 258 | 64.7540 | -148.8124 | UPLAND | NA | I A 2, II C 2 |
| W106LH005_OP2 | OP | 6/21/2016 | 258 | 64.7560 | -148.8055 | PFO4/SS4B | FLAT - ORGANIC | I A 2, II C 2 |
| W106LH006 | WDF | 6/21/2016 | 259 | 64.8420 | -148.7806 | PFO4/SS1B | FLAT | I A 2, II C 2 |
| W106LH006_OP | OP | 6/21/2016 | 259 | 64.8430 | -148.7753 | UPLAND | NA | I C 2, II C 2 |
| W106LH006_OP2 | OP | 6/21/2016 | 259 | 64.8430 | -148.7788 | UPLAND | NA | I C 2, II C 2 |
| W106LH007 | WDF | 6/21/2016 | 256 | 64.7030 | -148.9571 | UPLAND | NA | I A 2, II C 2 |
| W106LH007_OP | OP | 6/21/2016 | 256 | 64.7030 | -148.9560 | PFO4/SS1B | SLOPE | I A 2, II C 2 |
| W106LH008 | WDF | 6/22/2016 | 262 | 64.9414 | -148.6896 | UPLAND | NA | I A 2 |
| W106LH008_OP | OP | 6/22/2016 | 262 | 64.9403 | -148.6893 | UPLAND | NA | I A 2 |
| W106LH009 | WDF | 6/22/2016 | 265 | 64.9630 | -148.6839 | PSS1B | FLAT | II C 1 |
| W106LH010 | WDF | 6/22/2016 | 260 | 64.8920 | -148.6830 | UPLAND | NA | II A 1 |
| W106LH010_OP | OP | 6/22/2016 | 260 | 64.8922 | -148.6774 | PSS1/EM1B | SLOPE | II B 2, III A 2 |
| W106LH010_OP2 | OP | 6/22/2016 | 260 | 64.8924 | -148.6846 | UPLAND | NA | I A 2 |
| W106LH011 | WDF | 6/23/2016 | 257 | 64.6396 | -149.0507 | UPLAND | NA | I C 2 |
| W106LH011_OP | OP | 6/23/2016 | 257 | 64.6404 | -149.0495 | PFO1B | SLOPE | I C 2, II B 2 |
| W106LH012 | WDF | 6/23/2016 | 250 | 64.1240 | -149.2438 | PSS1/4B | SLOPE | II C 2, II A 3 |
| W106LH013 | WDF | 6/24/2016 | 266 | 65.4489 | -148.2474 | UPLAND | NA | II A 2 |
| W106LH013_OP | OP | 6/24/2016 | 266 | 65.4501 | -148.2441 | PFO1/4A | SLOPE | I C 2, II B 2 |
| W106LH014 | WDF | 7/19/2016 | FAIRBANKS 10 | 65.4689 | -148.6571 | PSS1/FO4B | FLAT | I A 3, II C 2 |
| W106LH015 | WDF | 7/22/2016 | FAIRBANKS 4 | 64.6835 | -148.8469 | UPLAND | NA | I C 2, II C 2 |
| W106LH015_OP | OP | 7/22/2016 | FAIRBANKS 4 | 64.6849 | -148.8505 | UPLAND | NA | II B 1 |

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|---|---|---|---|---|---|---|---|---|
| W106LH016 | WDF | 7/22/2016 | FAIRBANKS 3 | 64.9468 | -148.6441 | UPLAND | NA | I A 2, II C 2 |
| W106LH017 | WDF | 7/23/2016 | FAIRBANKS 1 | 65.3987 | -148.4585 | PSS4/1B | SLOPE | II A 3, II C 2 |
| W106LH018 | WDF | 7/23/2016 | FAIRBANKS 8 | 65.4001 | -148.4585 | PSS4/1B | SLOPE | II A 3, II C 2 |
| W106LH019 | WDF | 7/23/2016 | FAIRBANKS 9 | 65.3972 | -148.4692 | PSS4/1B | SLOPE | II A 3, II C 2 |
| W106LH019_OP | OP | 7/23/2016 | FAIRBANKS 9 | 65.3980 | -148.4572 | PFO4/SS1B | SLOPE | I A 2, II C 2 |
| W106LH020 | WDF | 7/24/2016 | FAIRBANKS 5 | 64.5563 | -149.1186 | UPLAND | NA | I C 2, II B 2 |
| W106LH021 | WDF | 7/24/2016 | FAIRBANKS 6 | 65.2721 | -148.6026 | UPLAND | NA | I C 2, II C 2 |
| W106LH022 | WDF | 7/24/2016 | FAIRBANKS 2 | 65.2458 | -148.6017 | UPLAND | NA | I C 2, II B 2 |
| W106LH023 | WDF | 7/25/2016 | FAIRBANKS 7 | 65.3028 | -148.6073 | UPLAND | NA | I A 1 |
| W106LH024 | WDF | 7/26/2016 | 247 | 63.9605 | -149.1256 | PSS4/1B | FLAT | II A 2, II C 2 |
| W106LH025 | WDF | 7/26/2016 | 246 | 63.9512 | -149.1207 | PFO4/SS1B | SLOPE | I A 2, II C 2 |
| W106PA001 | WDF | 7/13/2016 | 312 | 68.3708 | -149.3212 | UPLAND | NA | II C 2, II D 1 |
| W106PA001_OP | OP | 7/13/2016 | 312 | 68.3697 | -149.3212 | PEM1/SS1B | FLAT | III A 2, II C 2 |
| W106PA001_OP2 | OP | 7/13/2016 | 312 | 68.3700 | -149.3211 | UPLAND | NA | II C 2, II D 1 |
| W106PA002 | WDF | 7/13/2016 | 311 | 68.3033 | -149.3552 | PSS1/EM1B | SLOPE | II C 2, III A 2 |
| W106PA002_OP | OP | 7/13/2016 | 311 | 68.3034 | -149.3550 | UPLAND | NA | II C 1 |
| W106PA003 | WDF | 7/13/2016 | 310 | 68.2478 | -149.4191 | UPLAND | NA | II C 2 |
| W106PA003_OP | OP | 7/13/2016 | 310 | 68.2476 | -149.4177 | UPLAND | NA | II C 2, III A 2 |
| W106PA003_OP2 | OP | 7/13/2016 | 310 | 68.2450 | -149.4160 | UPLAND | NA | II C 2, II D 1 |
| W106PA004 | WDF | 7/14/2016 | 313 | 68.4575 | -149.4909 | UPLAND | NA | II C 2, II D 1 |
| W106PA004_OP | OP | 7/14/2016 | 313 | 68.4574 | -149.4912 | PSS1/EM1B | SLOPE | II C 2, III A 2 |
| W106PA005 | WDF | 7/15/2016 | 314 | 68.5646 | -149.5067 | PEM1/SS1C | SLOPE | III A 2, II C 2 |
| W106PA005_OP | OP | 7/15/2016 | 314 | 68.5648 | -149.5087 | PEM1F | SLOPE | III A 3 |
| W106PA006 | WDF | 7/15/2016 | 315 | 68.6180 | -149.3081 | PSS1/EM1B | SLOPE | II D 2, III A 2 |
| W106PA006_OP | OP | 7/15/2016 | 315 | 68.6177 | -149.3090 | PSS1/EM1B | SLOPE | II D 2, III A 2 |
| W106PA007 | WDF | 7/15/2016 | 316 | 68.6773 | -149.1315 | PEM1/SS1B | FLAT | III A 2, II D 2 |
| W106PA008 | WDF | 7/16/2016 | 320 | 69.0212 | -148.8280 | UPLAND | NA | II C 2 |
| W106PA009 | WDF | 7/16/2016 | 319 | 68.9824 | -148.8217 | UPLAND | NA | II B 2, II C 2 |
| W106PA009_OP | OP | 7/16/2016 | 319 | 68.9843 | -148.8267 | PEM1F | SLOPE | III A 3 |
| W106PA009_OP2 | OP | 7/16/2016 | 319 | 68.9823 | -148.8251 | UPLAND | NA | II C 2, III A 2 |
| W106PA010 | WDF | 7/16/2016 | 317 | 68.7640 | -148.8567 | PSS1/EM1B | FLAT | II C 2, III A 2 |
| W106PA010_OP | OP | 7/16/2016 | 317 | 68.7641 | -148.8555 | UPLAND | NA | II C 2, II D 2 |
| W106PA011 | WDF | 7/16/2016 | 322 | 69.5475 | -148.5951 | UPLAND | NA | III A 2, II D 1 |
| W106PA011_OP | OP | 7/16/2016 | 322 | 69.5357 | -148.5852 | UPLAND | NA | II D 1, II C 2 |

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|---|---|---|---|---|---|---|---|---|
| W106PA012 | WDF | 7/17/2016 | COLDFOOT 3 | 68.2140 | -149.3877 | PSS1/EM1B | SLOPE | II C 2, III A 2 |
| W106PA012_OP | OP | 7/17/2016 | COLDFOOT 3 | 68.2135 | -149.3893 | PEM1/SS1B | SLOPE | III A 2, II D 2 |
| W106TI001 | WDF | 5/22/2016 | 184 | 61.3671 | -150.8554 | PFO4B | FLAT | I A 2, II C 2 |
| W106TI001_OP | OP | 5/21/2016 | 197 | 62.1783 | -150.2145 | PFO1/4B | SLOPE | I C 2, II B 2 |
| W106TI001_OP2 | OP | 5/22/2016 | 184 | 61.3680 | -150.8460 | PFO1B | SLOPE | I B 2 |
| W106TI001_OP3 | OP | 5/22/2016 | 184 | 61.3665 | -150.8514 | UPLAND | NA | I B 2, II B 2 |
| W106TI002 | WDF | 5/22/2016 | 183 | 61.3647 | -150.8605 | PSS1E | SLOPE | II C 2, III A 3 |
| W106TI003 | WDF | 5/22/2016 | 185 | 61.3862 | -150.7815 | PSS4/1B | FLAT | II A 2, II C 2 |
| W106TI004 | WDF | 5/23/2016 | 190 | 61.8138 | -150.3021 | PSS1/EM1E | DEPRESSIONAL | II C 2, III A 3 |
| W106TI005 | WDF | 5/23/2016 | 191 | 61.8147 | -150.2997 | UPLAND | NA | I C 2, II B 2 |
| W106TI005_OP | OP | 5/23/2016 | 191 | 61.8148 | -150.3016 | PSS1B | DEPRESSIONAL | II C 2, III A 2 |
| W106TI006 | WDF | 5/23/2016 | 192 | 61.9677 | -150.1870 | PSS1/3B | FLAT | II B 2, II C 2 |
| W106TI007 | WDF | 5/23/2016 | 193 | 61.9764 | -150.1971 | PSS1/EM1B | FLAT | II B 2, III A 2 |
| W106TI007_OP | OP | 5/23/2016 | 193 | 61.9756 | -150.1958 | UPLAND | NA | II B 2, II C 2 |
| W106TI008 | WDF | 5/24/2016 | 189 | 61.5930 | -150.5169 | PEM1/FO1B | SLOPE | III A 2, I B 3 |
| W106TI008_OP | OP | 5/24/2016 | 189 | 61.5959 | -150.5115 | PEM1B | SLOPE | III A 2 |
| W106TI009 | WDF | 5/24/2016 | 180 | 61.3317 | -150.9820 | UPLAND | NA | I C 2, II B 2 |
| W106TI010 | WDF | 5/24/2016 | 181 | 61.3383 | -150.9566 | PFO1/4B | SLOPE | I C 3, II B 2 |
| W106TI010_OP | OP | 5/24/2016 | 181 | 61.3382 | -150.9575 | PFO1/4B | SLOPE | I C 3, II B 2 |
| W106TI011 | WDF | 5/25/2016 | 170 | 61.2929 | -151.0595 | UPLAND | NA | I C 2, II C 2 |
| W106TI011_OP | OP | 5/25/2016 | 170 | 61.2908 | -151.0567 | PFO4/1B | SLOPE | I C 2, II B 2 |
| W106TI011_OP2 | OP | 5/25/2016 | 170 | 61.2929 | -151.0593 | PFO4/1B | SLOPE | I C 2, II B 2 |
| W106TI011_OP3 | OP | 5/25/2016 | 170 | 61.2934 | -151.0576 | PFO4/1B | SLOPE | I C 2, II B 2 |
| W106TI012 | WDF | 5/25/2016 | 169 | 61.2953 | -151.0551 | PFO1/4B | SLOPE | I C 2, II C 2 |
| W106TI013 | WDF | 5/25/2016 | 173 | 61.3028 | -151.0422 | PFO4/1B | SLOPE | I C 2, II B 2 |
| W106TI013_OP | OP | 5/25/2016 | 173 | 61.3018 | -151.0404 | PFO4/1B | SLOPE | I C 2, II B 2 |
| W106TI014 | WDF | 5/26/2016 | 177 | 61.3261 | -151.0203 | UPLAND | NA | I C 3, II B 2 |
| W106TI014_OP | OP | 5/26/2016 | 177 | 61.3262 | -151.0201 | PFO1/4B | SLOPE | I C 3, II B 2 |
| W106TI014_OP2 | OP | 5/26/2016 | 179 | 61.3255 | -151.0240 | R3UBH | RIVERINE | NONE |
| W106TI015 | WDF | 5/26/2016 | 175 | 61.3103 | -150.9676 | UPLAND | NA | I C 2, II B 2 |
| W106TI015_OP | OP | 5/26/2016 | 175 | 61.3084 | -150.9640 | PSS1/EM1E | SLOPE | II C 2, III A 3 |
| W106TI016 | WDF | 5/26/2016 | 162 | 61.1915 | -151.1562 | UPLAND | NA | II C 2 |
| W106TI017 | WDF | 5/29/2016 | 166 | 61.2724 | -150.9064 | UPLAND | NA | I B 3, II B 1 |
| W106TI017_OP | OP | 5/29/2016 | 166 | 61.2673 | -150.8956 | PSS4B | SLOPE | II A 2, II C 2 |

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|---|---|---|---|---|---|---|---|---|
| W106TI017_OP2 | OP | 5/29/2016 | 166 | 61.2678 | -150.8990 | UPLAND | NA | NONE |
| W106TI017_OP3 | OP | 5/29/2016 | 166 | 61.2717 | -150.9061 | UPLAND | NA | I B 1 |
| W106TI018 | WDF | 5/29/2016 | 168 | 61.2819 | -150.9200 | UPLAND | NA | I C 2, II B 2 |
| W106TI018_OP | OP | 5/29/2016 | 166 | 61.2727 | -150.9090 | R4SBF | RIVERINE | NONE |
| W106TI018_OP2 | OP | 5/29/2016 | 166 | 61.2737 | -150.9122 | UPLAND | NA | I C 1, II B 2 |
| W106TI018_OP3 | OP | 5/29/2016 | 168 | 61.2791 | -150.9212 | UPLAND | NA | I C 2, II B 2 |
| W106TI018_OP4 | OP | 5/29/2016 | 166 | 61.2741 | -150.9123 | PEM1Bb | RIVERINE | III A 2 |
| W106TI019 | WDF | 5/30/2016 | 164 | 61.2523 | -151.1349 | PFO4/1B | SLOPE | I C 2, II B 2 |
| W106TI020 | WDF | 5/30/2016 | 163 | 61.2461 | -151.1307 | PFO1/4B | SLOPE | I C 2, II B 2 |
| W106TI021 | WDF | 5/30/2016 | 176 | 61.3106 | -151.0277 | UPLAND | NA | I C 2, II B 2 |
| W106TI022 | WDF | 5/31/2016 | 186 | 61.3978 | -150.7478 | PFO4B | SLOPE | I A 2, II B 2 |
| W106TI022_OP | OP | 5/31/2016 | 186 | 61.3967 | -150.7512 | PFO1/SS1B | SLOPE | I B 2, II B 2 |
| W106TI022_OP2 | OP | 5/31/2016 | 186 | 61.3972 | -150.7496 | UPLAND | NA | I B 2, II B 2 |
| W106TI023 | WDF | 5/31/2016 | 187 | 61.4073 | -150.7315 | PEM1/SS1B | SLOPE | II B 2, III A 2 |
| W106TI024 | WDF | 6/1/2016 | 165 | 61.2702 | -150.8770 | UPLAND | NA | I C 2, II B 2 |
| W106TI024_OP | OP | 6/1/2016 | 165 | 61.2694 | -150.8773 | UPLAND | NA | I C 2, II B 2 |
| W106TI024_OP2 | OP | 6/1/2016 | 165 | 61.2727 | -150.8765 | PFO1/4B | SLOPE | I C 2, III A 2 |
| W106TI025 | WDF | 6/1/2016 | 167 | 61.2791 | -150.8756 | PFO1/4B | SLOPE | I C 2, II B 2 |
| W106TI025_OP | OP | 6/1/2016 | 167 | 61.2745 | -150.8765 | PUBH | SLOPE | NONE |
| W106TI025_OP2 | OP | 6/1/2016 | 167 | 61.2750 | -150.8761 | UPLAND | NA | I B 1 |
| W106TI025_OP3 | OP | 6/1/2016 | 167 | 61.2799 | -150.8756 | PFO1/4B | SLOPE | I C 2, II B 2 |
| W106TI026 | WDF | 6/2/2016 | 172 | 61.2970 | -150.9417 | UPLAND | NA | I C 1, III A 2 |
| W106TI026_OP | OP | 6/2/2016 | 165 | 61.2669 | -150.8796 | PEM1B | SLOPE | III A 3 |
| W106TI026_OP2 | OP | 6/2/2016 | 165 | 61.2668 | -150.8795 | UPLAND | NA | I B 2, III A 2 |
| W106TI026_OP3 | OP | 6/2/2016 | 168 | 61.2857 | -150.9220 | PUBH | SLOPE | NONE |
| W106TI026_OP4 | OP | 6/2/2016 | 168 | 61.2873 | -150.9274 | PEM1F | SLOPE | III A 3 |
| W106TI026_OP5 | OP | 6/2/2016 | 172 | 61.2905 | -150.9313 | PFO4/1B | SLOPE | I C 2, II B 2 |
| W106TI026_OP6 | OP | 6/2/2016 | 172 | 61.2980 | -150.9441 | PFO4/1B | FLAT - ORGANIC | I C 3, III A 2 |
| W106TI027 | WDF | 7/28/2016 | WASILLA 2 | 61.5431 | -150.5603 | UPLAND | NA | I C 2, II B 2 |
| W106TI028 | WDF | 7/28/2016 | WASILLA 1 | 61.9358 | -150.2153 | UPLAND | NA | III B 2, II C 2 |
| W106YL001 | WDF | 6/25/2016 | 270 | 65.6656 | -149.0857 | PSS1/EM1B | FLAT | II C 2, III A 2 |
| W106YL001_OP | OP | 6/25/2016 | 270 | 65.6645 | -149.0830 | UPLAND | NA | II B 2, III A 2 |
| W106YL001_OP2 | OP | 6/25/2016 | 270 | 65.6656 | -149.0759 | UPLAND | NA | I A 3, II B 1 |
| W106YL002 | WDF | 6/25/2016 | 269 | 65.6638 | -149.0994 | PEM1/SS1B | FLAT | III A 2, II C 2 |

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|---|---|---|---|---|---|---|---|---|
| W106YL002_OP | OP | 6/25/2016 | 269 | 65.6631 | -149.1052 | PEM1/SS1B | FLAT - ORGANIC | III A 2, II C 2 |
| W106YL003 | WDF | 6/25/2016 | 272 | 65.8671 | -149.7417 | UPLAND | NA | II A 2 |
| W106YL004 | WDF | 6/26/2016 | 268 | 65.6345 | -148.9654 | PSS1/FO4B | FLAT | II C 2, I A 3 |
| W106YL004_OP | OP | 6/26/2016 | 268 | 65.6344 | -148.9710 | PSS1/EM1B | FLAT - MINERAL | II C 2, III A 2 |
| W106YL005 | WDF | 6/29/2016 | 267 | 65.6322 | -148.9613 | PSS1/4B | FLAT | II C 2, II A 3 |
| W106YL005_OP | OP | 6/26/2016 | 267 | 65.6336 | -148.9645 | UPLAND | NA | I A 3, II C 2 |
| W106YL006 | WDF | 6/28/2016 | 271 | 65.8200 | -149.5738 | UPLAND | NA | I A 2, II C 2 |
| W106YL006_OP | OP | 6/28/2016 | 271 | 65.8195 | -149.5715 | UPLAND | NA | I A 2, II B 2 |
| W106YL006_OP2 | OP | 6/28/2016 | 271 | 65.8191 | -149.5752 | PFO4/SS1B | SLOPE | I A 2, II B 2 |

[1]WDF = Wetland Determination Data Form Completed; OP = Observation Point. No Data Form Completed.

[2]HGM Classification was not always collected at Observation Points

W105HT001

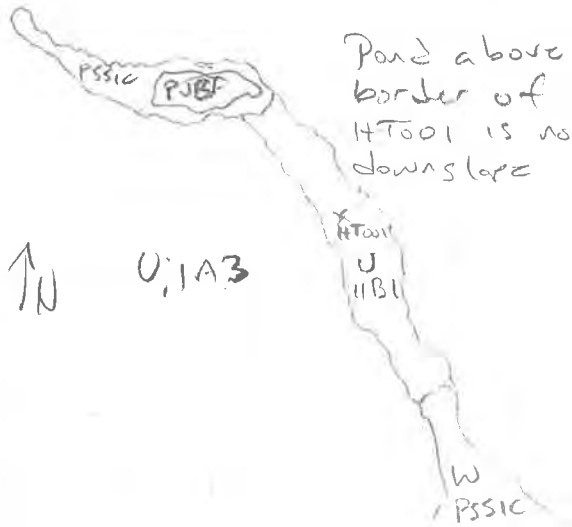
# WETLAND DETERMINATION DATA FORM

| SITE DESCRIPTION | | | |
|---|---|---|---|
| Survey Type: Centerline____ Access Road (explain)_____ Other (explain) X | | Field Target: 212 | Map #: 92 Map Date: 5/27/16 |
| Date: 6/8/16 | Project Name: Alaska LNG Compressor Station Honolulu Creek | | Feature Id: W105HT001 |
| Investigators: Bryan Strong Jen Anderson | | | Team No.: W105 |
| State: Alaska | Region: Alaska | Milepost: 597.5 | |
| Latitude: 63°.088 | Longitude: -149°.478 | | Datum: WGS84 |
| Logbook No.: 2 | Logbook Page No.: 36 | Picture No.: W105HT001_V_V_P_PLUG | |

| SITE PARAMETERS | |
|---|---|
| Subregion: Alaska Range | Landform (hillslope, terrace, hummocks, etc.): Swale |
| Slope (%): 4-5% | Local relief (concave, convex, none): slightly concave across hummocky small |
| Pre-mapped Alaska LNG/NWI classification: PSS1B 11B1 | Evidence of Wildlife Use: songbirds |
| Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes) | Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.) |
| Are Vegetation_____, Soil_____, or Hydrology X Significantly Disturbed? | No X (If yes, explain in Notes) |
| Are Vegetation_____, Soil_____, or Hydrology_____ 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): 11B1 |

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Early season. Ferns, grasses, etc. still emerging. Cover of veg will continue to increase through the growing season. See map for sketch.




Pond above point is surrounded by upland with narrow border of wet willow at pond edge. the swale at HT001 is non-wetland but, groundwater intersects farther downslope

W105HT001

# WETLAND DETERMINATION DATA FORM

linear Shaped plot - swale

## VEGETATION (use scientific names of plants)

| Tree Stratum (Plot sizes: 50 dia) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Picea glauca | Edge | N | FU |
| 2. | | | |
| 3. | | | |
| 4. | | | |

Total Cover: —

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

| Sapling/Shrub Stratum (26' dia) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Alnus viridis | 65 | Y | FAC |
| 2. Ribies hudsonianum | 5 | | FAC |
| 3. Ribies triste | T | | FAC |
| 4. Spirea stevensii | 1 | | FACU |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 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: 1 (A)

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

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

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species: | — | X 1 = | — |
| FACW species: | — | X 2 = | — |
| FAC species | 72 | X 3 = | 216 |
| FACU species | 23 | X 4 = | 92 |
| UPL species | — | X 5 = | |
| Column Totals: | 95 (A) | | 308 (B) |

PI = B/A = 3.2

## VEGETATION (use scientific names of plants)

| Herb Stratum (26' dia) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Dryopteris expansa | 20 | Y | FACU |
| 2. Rubus pedatus | 1 | | FAC |
| 3. Calamagrostis canadensis | 2 | | FAC |
| 4. Streptopsis amplexifolia | 1 | | FACU |
| 5. Veratrum viride | E | | FAC |
| 6. Trientalis europea | 1 | | FACU |
| 7. Viola sp | T | | |
| 8. Chamerion angustifolium | E | | FACU |
| 9. Rubus articus | T | | FAC |
| 10. Dryopteris cinnocarpum | T | | FACU |

Total Cover: 25

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

**Hydrophytic Vegetation Indicators:**

N Dominance Test is > 50%

N Prevalence Index is ≤ 3.0

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

N Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

0 % Cover of Wetland Bryophytes

2 Total Cover of Bryophytes

0 % Cover of Water

**Hydrophytic Vegetation Present (Y/N):** N

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

W105HT001

# WETLAND DETERMINATION DATA FORM

6/8/16 W105HT001 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 | 0-4 | 7.5YR 2.5/3 | 100 | | | | | SiL | Andic material |
| $A_2$ | 4-6 | 10YR 3/2 | 100 | | | | | SiL | Eolian material |
| E | 6-7.5 | 10YR 5/2 | 100 | | | | | SiL | discontinuous E horizon |
| $B_h$ | 7.5-13 | 7.5YR 2.5/2 | 100 | | | | | GR.SiL | weakly cemented - gravelly till |
| $B_w$ | 13-20 | 10YR 4/3 | 100 | | | | | GR Loam | till 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) |

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and 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): NA

**Hydric Soil Present (Y/N):** N

Notes: Spodisol with andic properties in the surface horizon. Moderately well drained. Weak cementation in the Bh Horizon. Swale remains dry below the mapped pinch point/neck downslope.

| 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:

593.7 LZ (217 - FT)

W105HT001

# 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: W105HT001 Field Target: 212 Date: 6/8/16

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. **Photos**

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

X Jennifer Anderson X 6/18/16

Wetland Scientist (print) Signature / Date

X Brian Strong X 6/8/16

Field Crew Chief (print) Signature / Date

W105HT002

# WETLAND DETERMINATION DATA FORM

| SITE DESCRIPTION | | | |
|---|---|---|---|
| Survey Type: Centerline ___ Access Road (explain)___ Other (explain) X | | Field Target: 213 | Map #: 92 Map Date: 5/27/16 |
| Date: 6/8/16 | Project Name: Alaska LNG Honolulu Creek Compressor Station Camp | Feature Id: W105HT002 | |
| Investigators: Brian Strong, Jen Anderson | | | Team No.: W105 |
| State: Alaska | Region: Alaska | Milepost: 597.4 | |
| Latitude: 63.0895 | Longitude: -149.47 | | Datum: WGS84 |
| Logbook No.: 2 | Logbook Page No.: 37 | Picture No.: W105HT002_V_V_P_Plug | |

| SITE PARAMETERS | |
|---|---|
| Subregion: Alaska Range | Landform (hillslope, terrace, hummocks, etc.): Swale |
| Slope (%): 3-4% | Local relief (concave, convex, none): Concave, hummocky-moderate |
| Pre-mapped Alaska LNG/NWI classification: PSS1/F04B | Evidence of Wildlife Use: Songbirds, Bear 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 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.) Ponded/flooded/oxy/aquatic |

| SUMMARY OF FINDINGS | |
|---|---|
| Hydrophytic Vegetation Present? Yes Y No___ | Is the Sampled Area within a Wetland? Yes Y No___ |
| Hydric Soil Present? Yes* Y No___ | Wetland Type: PSS1C |
| Wetland Hydrology Present? Yes Y No___ | Alaska Vegetation Classification (Viereck): 11B1 |

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Seep/spring fed wetland. Oxygenated ponded/flooded soil. Complex network of wetland on edges where Picea trees occur on non-wetland sites interspersed with some small wet/seeping swales. See map for sketch. Shooting stars!

W105HT002

# WETLAND DETERMINATION DATA FORM

linear shaped Plot - swale - surrounding area is non-wetland

## VEGETATION (use scientific names of plants)

| Tree Stratum (Plot sizes: 50 R) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Picea Glauca | 3 | Y | FacU |
| 2. | | | |
| 3. | | | |
| 4. | | | |

Total Cover: 3

50% of total cover: 1.5 20% of total cover: .6

| Sapling/Shrub Stratum (13' R) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Alnus viridis | 7 | | Fac |
| 2. Salix pulchra | 40 | Y | FacW |
| 3. Salix barclaii | 20 | Y | Fac |
| 4. Dasiphora fruticosa | 2 | | Fac |
| 5. Betula nana | 1 | | Fac |
| 6. ~~Ledum decumbens~~ Rhododendrum tomentosum | E | | FacW |
| 7. | | | |
| 8. | | | |
| 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: 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: | 48 | X 2 = 96 |
| FAC species | 47 | X 3 = 141 |
| FACU species | 3 | X 4 = 12 |
| UPL species | | X 5 = |
| Column Totals: | 98 (A) | 249 (B) |

PI = B/A = 2.54

anemone sp T

grass sp T

~~Valeriana capilata~~ Rs T

Dodecathion sp T

Fac.

## VEGETATION (use scientific names of plants)

| Herb Stratum (13' R) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Calamagrostis canadensis | 10 | Y | Fac |
| 2. Rumex articus | 3 | | Fac |
| 3. Sanguisorba canadensis | 5 | Y | FacW |
| 4. Petisities frigida | 1 | | FacW |
| 5. Rubus articus | 1 | | Fac |
| 6. Gentianella sp | T | | Fac |
| 7. Polemonium acutifolia | 1 | | Fac |
| 8. Rhodiola integrifolia | 1 | | Fac |
| 9. Viola palustris | 2 | | FacW |
| 10. Mertensia paniculata | T | | FacU |

Total Cover: 25

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

| | | |
|---|---|---|
| Equisetum sylvaticum | 1 | Fac |
| Geranium erithronium | T | FacU |
| Streptopsis amplexifolia | T | FacU |
| Commarum palustre | T | OBL |
| Water | 5 | |
| Spiraeum annotinum | T | |
| Empetrum nigrum | T | |

**Hydrophytic Vegetation Indicators:**

Y Dominance Test is > 50%

Y 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.

T % Bare Ground

65 % Cover of Wetland Bryophytes

90 Total Cover of Bryophytes

5 % Cover of Water

**Hydrophytic Vegetation Present (Y/N):** Y

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

W105HT002

# WETLAND DETERMINATION DATA FORM

6/8/16 W105HT002 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 |
|---|---|---|---|---|---|---|---|---|
| Oe 0-4 | | | | | | | hemic | |
| AC 4-20 | 10YR 2/2 | 100 | | | | | MkSiL | - No positive reaction to alpha alpha. High N-value |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced 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 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: N Depth (inches): NA

**Hydric Soil Present (Y/N):** Y

Notes: Oxyaquic conditions - Ponded/flooded site Seeps/spring fed slope wetland

| HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient) | | SECONDARY INDICATORS (2 or more required) | |
|---|---|---|---|
| Surface Water (A1) Y | Surface Soil Cracks (B6) N | Water-stained Leaves (B9) Y | Stunted or Stressed Plants (D1) N |
| High Water Table (A2) Y | Inundation Visible on Aerial Imagery (B7) N | Drainage Patterns (B10) Y | Geomorphic Position (D2) Y |
| Saturation (A3) Y | Sparsely Vegetated Concave Surface (B8) N | Oxidized Rhizospheres along Living Roots (C3) N | Shallow Aquitard (D3) N |
| Water Marks (B1) N | Marl Deposits (B15) N | Presence of Reduced Iron (C4) N | Microtopographic Relief (D4) N |
| Sediment Deposits (B2) N | Hydrogen Sulfide Odor (C1) N | Salt Deposits (C5) N | FAC-Neutral Test (D5) Y |
| Drift Deposits (B3) Y | 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): 1-3" | 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: 28µS pH 7.55 - surface water |

Notes: R4SB Stream channel

W105HT002

# 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 100 Scrub Shrub-Evergreen-Broad-leaved____ Scrub Shrub-Evergreen-Needle-leaved____ Emergent-Non-persistent____ Emergent-Persistent____ Aquatic Bed____

**Percent Cover (P)**: Tree (>5 dbh, >6m tall) 1 Sapling (<5 dbh, <6m tall) 0 Tall shrub (2-6m) 40 Short shrub (0.5-2m) 30 Dwarf shrub (<0.5m) 1 Tall herb (≥1m) 0 Short herb (<1m) 27 Moss-Lichen 1 Floating 0 Submerged 0

**Number of Wetland Types (M)**: 1 | **Evenness of Wetland Type Distribution (M)**: Even X Highly Uneven____ Moderately even____

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

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

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

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

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

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

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

**HGM Class (P)**: Slope X Flat____ Lacustrine Fringe____ Depressional____ Riverine____ Estaurine Fringe____

## SOIL VARIABLES

**Soil Factors (P)**: Soil Lacking____ Histosol:Fibric____ Histosol:Hemic____ Histosol: Sapric____ 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____ Sediment Observed on Wetland Substrate____ Fluvaquent Soils Sediment Created X

**Microrelief of Wetland Surface (P)**: Absent____ Poorly Developed (6in.)____ Well Developed (6-18in.) X Pronounced (>18in.)____

**Frequency of Overbank Flooding (P)**: No Overbank Flooding____ Return Interval 1-2 yrs 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) X Acid (<5.5)____ **pH Reading** 7.55

**Surficial Geologic Deposit Under Wetland (P)**: High Permeability Stratified Deposits X Low Permeability Stratified Deposits____ Glacial Till/Not Permeable____

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

**Evidence of Seeps and Springs (P)**: No Seeps or Springs____ Seeps Observed X Intermittent Spring____ Perennial Spring____

## LANDSCAPE VARIABLES (M)

**Wetland Juxtaposition**: Wetland Isolated____ Wetlands within 400m, Not Connected____ Only Connected Below X Only Connected Above____ Connected Upstream & Downstream____ Unknown____

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

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

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

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

## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W105HT002 Field Target: 213 Date: 6/8/16

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. **Photos**

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

X Jennifer Anderson — X [signature] 6/18/16

Wetland Scientist (print) — Signature / Date

X Brian Strong — X [signature] 6/18/16

Field Crew Chief (print) — Signature / Date

W10SHT003

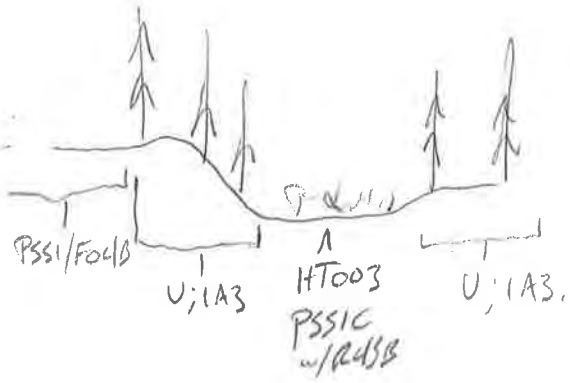
# WETLAND DETERMINATION DATA FORM

| SITE DESCRIPTION | | | |
|---|---|---|---|
| Survey Type: Centerline___ Access Road (explain)____ Other (explain) X | | Field Target: 217 | Map #: 88 Map Date: 5/27/16 |
| Date: 6/8/16 | Project Name: Alaska LNG Facility 1 | | Feature Id: W10SHT003 |
| Investigators: Bryan Strong Jen Anderson | | | Team No.: W10S |
| State: Alaska | Region: Alaska | Milepost: 594 | |
| Latitude: 63.13234 | Longitude: -149.42934 | | Datum: WGS84 |
| Logbook No.: 2 | Logbook Page No.: 38 | Picture No.: W10ST003-V | |

| SITE PARAMETERS | |
|---|---|
| Subregion: Alaska Range | Landform (hillslope, terrace, hummocks, etc.): Swale |
| Slope (%): 5-7 | Local relief (concave, convex, none): Concave across |
| Pre-mapped Alaska LNG/NWI classification: U | Evidence of Wildlife Use: Songbirds |
| Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes) | Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.) |
| Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed? | No X (If yes, explain in Notes) |
| Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic? | No X (If yes, explain in Notes.) |

| SUMMARY OF FINDINGS | |
|---|---|
| Hydrophytic Vegetation Present? Yes Y No_____ | Is the Sampled Area within a Wetland? Yes Y No_____ |
| Hydric Soil Present? Yes Y No_____ | Wetland Type: PSS1C |
| Wetland Hydrology Present? Yes Y No_____ | Alaska Vegetation Classification (Viereck): 11B2, 11C2 |

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Small R4SB stream in plot. Saturated to the surface. $H_2S$ odor at ~10". Sides of swale where PICGLA grows tall are upland. East of point on bench is a seepage slope. Linear shaped plot - swale characterized.



W105HT003

# WETLAND DETERMINATION DATA FORM

linear plot - swale

## VEGETATION (use scientific names of plants)

| Tree Stratum (Plot sizes: 30 L) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Picea glauca | E | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |

Total Cover: _____

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

| Sapling/Shrub Stratum (13 R) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Salix barclayi | 10 | Y | FAC |
| 2. Salix Pulchra | 20 | Y | FACW |
| 3. Picea glauca | 1 | | FACU |
| 4. dasiphora fruticosa | T | | FAC |
| 5. Spiraea stevenii | 1 | | FACU |
| 6. Salix richardsonii | 5 | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |

Total Cover: 37

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

**Dominance Test worksheet:**

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

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

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

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species: | 2 | X 1 = | 2 |
| FACW species: | 22 | X 2 = | 44 |
| FAC species | 65 | X 3 = | 195 |
| FACU species | 3 | X 4 = | 12 |
| UPL species | 0 | X 5 = | 0 |
| Column Totals: | 92 (A) | | 253 (B) |

PI = B/A = 2.75

* FAC Neutral on Hydro page

## VEGETATION (use scientific names of plants)

| Herb Stratum (13 R) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Comarum palustre | 2 | | OBL |
| 2. Equisetum arvense | 4 | | FAC |
| 3. Calamagrostis canadensis | 60 | Y | FAC |
| 4. Mertensia paniculata | 1 | | FACU |
| 5. Rumex arcticus | 1 | | FAC |
| 6. Sanguisorba canadensis | 1 | | FACW |
| 7. Viola sp BSS (unknown) | 1 | | FACW |
| 8. Dryopteris expansa | T | | |
| 9. | | | |
| 10. | | | |

Total Cover: 70

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

Water 3

**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

3 % Cover of Wetland Bryophytes

3 Total Cover of Bryophytes

3 % Cover of Water

**Hydrophytic Vegetation Present (Y/N):** Y

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

W105HT003

# WETLAND DETERMINATION DATA FORM

6/8/16 W105HT003 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 |
|---|---|---|---|---|---|---|---|---|---|
| AC | 0-8 | 10YR 4/2 | 100 | | | | | SiL | |
| Bg | 8-14 | 2.5Y 4/1 | 93 | 7.5YR 4/6 | 7 | C | PL | SiL | |
| | | | | | | | | | |
| BCg | 14-20 | 2.5Y 4/2 | 30 | 7.5YR 4/6 | 10 | C | PL | SiL | Massive |
| | | 5Y 5/1 | 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 - 14" deep | 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) Y - Positive alpha alpha ponded flooded |

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

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

**Hydric Soil Present (Y/N):** Y

Notes: Positive alpha alpha at ~3". $H_2S$ odor at ~10". Soil is slightly sticky, plastic lower

| 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) Y | 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) Y | 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): 5" | |
| Saturation Present (Y/N): (includes capillary fringe) Y | Depth (in): 0 | EC: 16mS pH 6.7 |

Notes:

Stream EC 16mS pH 6.7
Soil pit EC 18mS

W105NT003

# 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) 1 Tall shrub (2-6m) 15 Short shrub (0.5-2m) 30 Dwarf shrub (<0.5m) 0 Tall herb (≥1m) 53 Short herb (<1m) 1 Moss-Lichen 0 Floating 0 Submerged 0

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

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

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

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

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

**Cover Distribution of Dominant Layer (P):** No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ 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_____ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created X

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

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

**Degree of Outlet Restriction (P):** No Outflow_____ Restricted Outflow_____ 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_____ 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: W105HT003 Field Target: 217 Date: 6/8/16

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. **Photos**

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

X Jennifer Anderson — X [signature] 6/18/16

Wetland Scientist (print) — Signature / Date

X Brean Strong — X [signature] 6/18/16

Field Crew Chief (print) — Signature / Date

W105 HT004

# WETLAND DETERMINATION DATA FORM

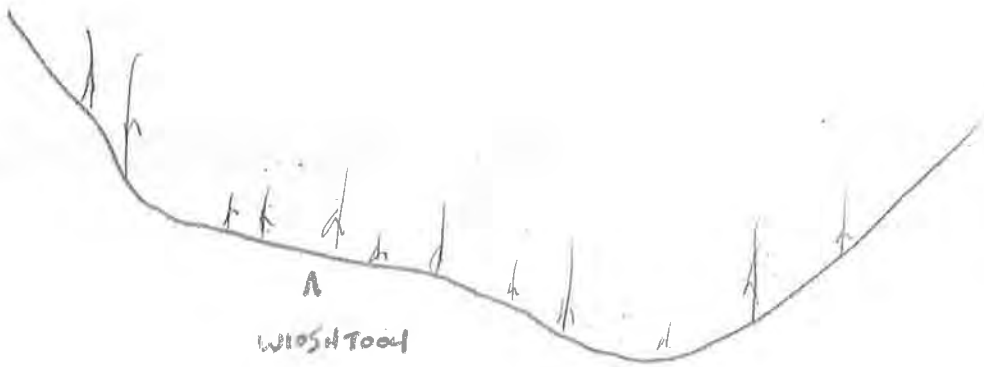
| SITE DESCRIPTION | | | |
|---|---|---|---|
| Survey Type: Centerline___ Access Road (explain) X Other (explain)_____ | | Field Target: 241 | Map #: FERC Map C4 Map Date: 5/27/16 |
| Date: 8/8/16 | Project Name: Alaska LNG | | Feature Id: W105HT004 |
| Investigators: Brian Strong Kaley Volper | | | Team No.: W105 |
| State: Alaska | Region: Alaska | Milepost: 542.3 | |
| Latitude: 63° 41.643385' N | | Longitude: 148° 46.345275' W | Datum: WGS84 |
| Logbook No.: 5 (FERC) | Logbook Page No.: 33 | Picture No.: 001-004 W105 HT004 _V_V_PIT_PLUG | |

| SITE PARAMETERS | |
|---|---|
| Subregion: Ak Range | Landform (hillslope, terrace, hummocks, etc.): Backslope |
| Slope (%): 7% | Local relief (concave, convex, none): Flat to slightly convex - hummocky Moss. |
| Pre-mapped Alaska LNG/NWI classification: PSS1/4B | Evidence of Wildlife Use: Game trails |
| Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes) heavy rains in past few weeks | Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.) |
| Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed? | No X (If yes, explain in Notes) |
| Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic? | No X (If yes, explain in Notes.) |

| SUMMARY OF FINDINGS | |
|---|---|
| Hydrophytic Vegetation Present? Yes X No_____ | Is the Sampled Area within a Wetland? Yes X No_____ |
| Hydric Soil Present? Yes X No_____ | Wetland Type: PSS1/4B X |
| Wetland Hydrology Present? Yes X No_____ | Alaska Vegetation Classification (Viereck): IA3, IIC2 |

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

Slope HGM. Rainy season



# WETLAND DETERMINATION DATA FORM

W105HT004

**VEGETATION** (use scientific names of plants)

| Tree Stratum (Plot sizes: 50' dia) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Picea glauca | 2 | | FACU |
| 2. Picea mariana | P | | FACW |
| 3. | | | |
| 4. | | | |
| Total Cover: — | | | |
| 50% of total cover: — | 20% of total cover: — | | |

| Sapling/Shrub Stratum (25) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Picea glauca | 20 | Y | FACU |
| 2. Salix pulchra | 10 | Y | FACW |
| 3. Betula nana | 5 | | FAC |
| 4. Salix glauca | 10 | Y | FAC |
| 5. Empetrum nigrum | 7 | | FAC |
| 6. Vaccinium vitis-idaea | 15 | Y | FAC |
| 7. Vaccinium uliginosum | 10 | Y | FAC |
| 8. Rhododendron groenlandicum | 10 | Y | FAC |
| 9. Salix reticulata | 2 | | FAC |
| Total Cover: 95 | | | |
| 50% of total cover: 47.5 | 20% of total cover: 19 | | |

**Dominance Test worksheet:**

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

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

% Dominant Species that are OBL, FACW, or FAC: 86 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: |
|---|---|---|
| OBL species: | 0 | X 1 = 0 |
| FACW species: | 17 | X 2 = 34 |
| FAC species | 91 | X 3 = 273 |
| FACU species | 22 | X 4 = 88 |
| UPL species | 0 | X 5 = 0 |
| Column Totals: | 130 (A) | 395 (B) |

PI = B/A = 3.04

Shrubs cont'd

| | | |
|---|---|---|
| Arctous rubra | 2 | FAC |
| Salix myrtillifolia | 1 | FACW |
| Salix richardsonii | 1 | FACW |

**VEGETATION** (use scientific names of plants)

| Herb Stratum (25) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Carex bigelowii | 30 | Y | FAC |
| 2. Petasites frigidus | 5 | | FACW |
| 3. Geocaulon lividum | T | | FACU |
| 4. Equisetum variegata | T | | FACW |
| 5. Saussurea angustifolia | T | | FAC |
| 6. Arctagrostis latifolia | T | | FACW |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| Total Cover: 35 | | | |
| 50% of total cover: 17.5 | 20% of total cover: 7 | | |

**Hydrophytic Vegetation Indicators:**

Y Dominance Test is > 50%

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

10 % Cover of Wetland Bryophytes

100 Total Cover of Bryophytes

0 % Cover of Water

**Hydrophytic Vegetation Present (Y/N):** Y

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

Feather moss - 90
Sphagnum 10

W10SHT004

# WETLAND DETERMINATION DATA FORM

8/8/16 W10SHT004 Y

| SOIL | Date | Feature ID | Soil Pit Required (Y/N) |
|---|---|---|---|
| | 8/8/16 | W10SHT004 | 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 |
|---|---|---|---|---|---|---|---|---|---|
| O. | 0-4 | | | | | | | fibric | |
| Oa | 4-13 | | | | | | | Sapric | |
| Bw | 13-20 | 2.5Y 4/4 | 75 | 7.5YR 5/6 | 20 | C | PL | Loam | Sticky, plastic |
| | | | | 2.5Y 4/2 | 5 | D | 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) 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: 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) 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 |
| Sediment Deposits (B2) N | Hydrogen Sulfide Odor (C1) N | Salt Deposits (C5) N | FAC-Neutral Test (D5) N |
| Drift Deposits (B3) N | Dry-Season Water Table (C2) N | Notes: | |
| Algal Mat or Crust (B4) N | Other (Explain in Notes): | | |
| Iron Deposits (B5) N | | | |

| | | |
|---|---|---|
| Surface Water Present (Y/N): N | Depth (in): NA | **Wetland Hydrology Present (Y/N):** Y |
| Water Table Present (Y/N): Y | Depth (in): 12 | |
| Saturation Present (Y/N): (includes capillary fringe) Y | Depth (in): 6" | EC: 185 µS pH 6.47 |

Notes: Slope HGM

WIOSHT004

# AQUATIC SITE ASSESSMENT DATA FORM

## VEGETATION VARIABLES P= Plot, M= Matrix

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

**Percent Cover (P):** Tree (>5 dbh, >6m tall)_2_ Sapling (<5 dbh, <6m tall)_20_ Tall shrub (2-6m)_0_ Short shrub (0.5-2m)_40_ Dwarf shrub (<0.5m) _20_ Tall herb (≥1m) _0_ Short herb (<1m) _15_ Moss-Lichen_10_ Floating_0_ Submerged_0_

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

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

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

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

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

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

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

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

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

## SOIL VARIABLES

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

## HYDROLOGIC VARIABLES

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

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

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

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

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

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

**Water pH (P):** No surface water_____ Circumneutral (5.5-7.4)_X_ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** 6.97

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

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

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

## LANDSCAPE VARIABLES (M)

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

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

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

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

Crew Chief QA/QC check: [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: W105HT004 Field Target: 241 Date: 8/8/16

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. **Photos**

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

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

X Haley Volper X Haley Volper 8-10-16

Wetland Scientist (print) Signature / Date

X Brian Strong X Brian Strong 8/8/16

Field Crew Chief (print) Signature / Date

# WETLAND DETERMINATION DATA FORM

| SITE DESCRIPTION | | | |
|---|---|---|---|
| Survey Type: Centerline___ Access Road (explain) X Other (explain)_____ | | Field Target: 240 | Map #: NA Map Date: NA |
| Date: 8/8/16 | Project Name: Alaska LNG | | Feature Id: W105HT005 |
| Investigators: Brian Strong Kaleb Volper | | | Team No.: W105 |
| State: Alaska | Region: Alaska | Milepost: 542.5 | |
| Latitude: 63 41.43385 | | Longitude: -148 45.874329 | Datum: WGS84 |
| Logbook No.: 5 | Logbook Page No.: 33 | Picture No. P_W105HT005_001-004 | |

| SITE PARAMETERS | |
|---|---|
| Subregion: Alaska Range | Landform (hillslope, terrace, hummocks, etc.): Terrace |
| Slope (%): 5 | Local relief (concave, convex, none): Flat to slight concave |
| Pre-mapped Alaska LNG/NWI classification: | Evidence of Wildlife Use: game trails hummocky - moderate |
| Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes) wet/Rainy (last few weeks) | Are "Normal Circumstances" present: Yes_____ No X (If no, explain in Notes.) |
| Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed? | No X (If yes, explain in Notes) |
| Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic? | No X (If yes, explain in Notes.) |

| SUMMARY OF FINDINGS | |
|---|---|
| Hydrophytic Vegetation Present? Yes X No_____ | **Is the Sampled Area within a Wetland?** Yes X No_____ |
| Hydric Soil Present? Yes X No_____ | **Wetland Type:** PSS1/4B |
| Wetland Hydrology Present? Yes X No_____ | Alaska Vegetation Classification (Viereck): IA3, IIC2 |

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

Rainy season.

# WETLAND DETERMINATION DATA FORM

W105HT005

**VEGETATION** (use scientific names of plants)

| Tree Stratum (Plot sizes: 50 dia) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Picea glauca | 3 | | FACU |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| Total Cover: — | | | |
| 50% of total cover: — | 20% of total cover: — | | |

| Sapling/Shrub Stratum (25') | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Picea glauca | 23 | Y | FACU |
| 2. Salix richardsonii | 5 | | FACW |
| 3. Salix glauca | 15 | Y | FAC |
| 4. Salix pulchra | 3 | | FACW |
| 5. Rhododendron groenlandicum | 15 | Y | FAC |
| 6. Vaccinium uliginosum | 3 | | FAC |
| 7. Vaccinium vitis idea | 15 | Y | FAC |
| 8. Arctous rubra | T | | FAC |
| 9. Empetrum nigrum | T | | FAC |
| 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: 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: | 0 | X 1 = 0 |
| FACW species: | 17 | X 2 = 24 |
| FAC species | 90 | X 3 = 270 |
| FACU species | 26 | X 4 = 104 |
| UPL species | 0 | X 5 = 0 |
| Column Totals: | 128 (A) | 398 (B) |

PI = B/A = 3.1

Vaccinium oxycoccus T OBL

**VEGETATION** (use scientific names of plants)

| Herb Stratum (25') | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Carex bigelowii | 30 | Y | FAC |
| 2. Petasites frigida | 4 | | FACW |
| 3. Equisetum arvense | 12 | Y | FAC |
| 4. Equisetum variegatum | T | | FACW |
| 5. Pyrola secunda (Porthilia) | T | | FACU |
| 6. Tofeldia sp | T | | — |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| Total Cover: 46 | | | |
| 50% of total cover: 23 | 20% of total cover: 9.2 | | |

**Hydrophytic Vegetation Indicators:**

Y Dominance Test is > 50%

N Prevalence Index is ≤ 3.0

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

— Problematic Hydrophytic Vegetation[1] (Explain)

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

_____ % Bare Ground

_____ % Cover of Wetland Bryophytes

_____ Total Cover of Bryophytes

_____ % Cover of Water

not collected in field

**Hydrophytic Vegetation Present (Y/N):** Y

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

W105HT005

# WETLAND DETERMINATION DATA FORM

8/8/16 W105HT005 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 | 0-5 | | | | | | | fibric | |
| Oa | 5-12 | | | | | | | sapric | |
| A | 12-15 | 10yr 2/1 | 100 | | | | | Mk Sil | |
| | | | | | | | | | |
| Bgf | 15-20 | 2.5Y 5/1 | 90 | 10yr 5/6 | 10 | C | M | Sil | alpha alpha positive |
| | | | | | | | | | |
| | | | | | | | | | |

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

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

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

Restrictive Layer (if present): Type: Permafrost Depth (inches): 15

**Hydric Soil Present (Y/N):** Y

Notes:

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

| | | |
|---|---|---|
| Surface Water Present (Y/N): N | Depth (in): NA | **Wetland Hydrology Present (Y/N):** Y |
| Water Table Present (Y/N): N | Depth (in): NA | |
| Saturation Present (Y/N): (includes capillary fringe) Y | Depth (in): 11 | EC: NA |

Notes:

W05HT005

# 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)_3_ Sapling (<5 dbh, <6m tall)_22_ Tall shrub (2-6m)_0_ Short shrub (0.5-2m)_25_ Dwarf shrub (<0.5m) _30_ Tall herb (≥1m) _0_ Short herb (<1m) _28_ Moss-Lichen_0_ Floating_0_ Submerged_0_

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

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

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

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

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

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

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

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

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

**SOIL VARIABLES**

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

**HYDROLOGIC VARIABLES**

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

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

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

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

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

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

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

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

**Basin Topographic Gradient (M):** Low Gradient (<2%)_____ 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: KV

## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W105 HT005 Field Target: 240 Date: 8/8/16

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. **Photos**

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

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

X Haley Volper X Haley Volper 8-10-16

Wetland Scientist (print) Signature / Date

X Brian Strong X [illegible]

Field Crew Chief (print) Signature / Date

W10SLH001

# WETLAND DETERMINATION DATA FORM

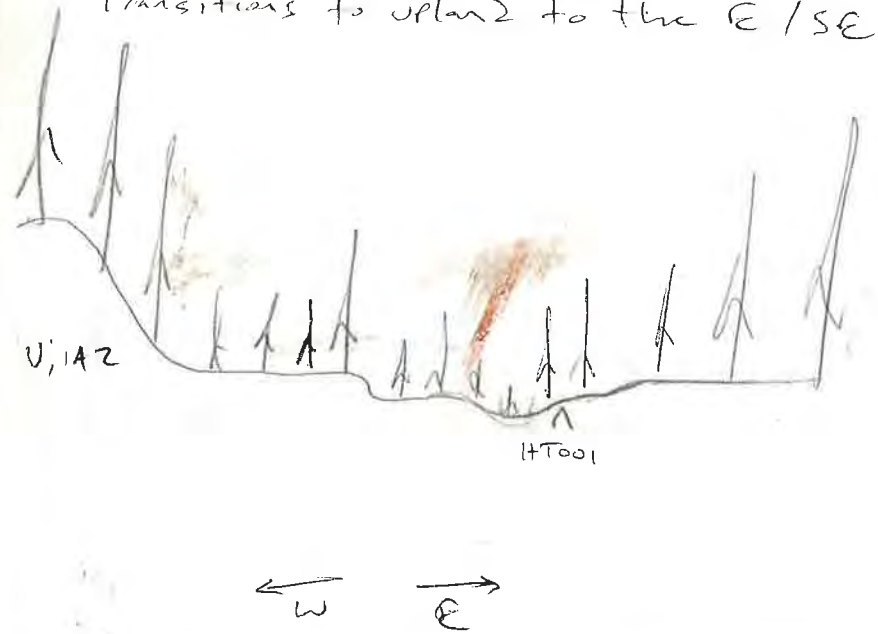
| SITE DESCRIPTION | | | |
|---|---|---|---|
| Survey Type: Centerline X Access Road (explain)____ Other (explain) X | | Field Target: 252 | Map #: 69 Map Date: 5/27/16 |
| Date: 6/12/16 | Project Name: Alaska LNG Center line/facility | Feature Id: W10SLH001 | |
| Investigators: Brian Strong Jen Anderson | | | Team No.: W10S |
| State: Alaska | Region: Alaska | Milepost: 498.5 | |
| Latitude: 64.21863 | Longitude: -149.29717 | | Datum: WGS84 |
| Logbook No.: 3 | Logbook Page No.: 2 | Picture No.: W10SLH001_V_V_P_Bing | |

| SITE PARAMETERS | |
|---|---|
| Subregion: Interior / Intermontane | Landform (hillslope, terrace, hummocks, etc.): Abandoned channel / terrace |
| Slope (%): ~3 | Local relief (concave, convex, none): Concave, hummocky - Moderate |
| Pre-mapped Alaska LNG/NWI classification: PFO4B | Evidence of Wildlife Use: Spruce grouse scat |
| Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No____ (if no explain in Notes) Wet last couple weeks | Are "Normal Circumstances" present: Yes X No____ (If no, explain in Notes.) |
| Are Vegetation____, Soil____, or Hydrology____ Significantly Disturbed? | No X (If yes, explain in Notes) |
| Are Vegetation____, Soil____, or Hydrology____ Naturally Problematic? | No X (If yes, explain in Notes.) |

| SUMMARY OF FINDINGS | |
|---|---|
| Hydrophytic Vegetation Present? Yes X No____ | Is the Sampled Area within a Wetland? Yes X No____ |
| Hydric Soil Present? Yes X No____ | Wetland Type: PFO4/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 is a swale/abandoned channel on a river terrace
Transitions to upland to the E/SE and North




EC 65mS
PH 6.2 / Soil pit

W105LH001

# WETLAND DETERMINATION DATA FORM

**VEGETATION** (use scientific names of plants)

| Tree Stratum (Plot sizes: 50 dia) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Picea mariana | 15 | Y | FacW |
| 2. Picea glauca | P | | FacU |
| 3. | | | |
| 4. | | | |

Total Cover: 15

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

| Sapling/Shrub Stratum (26 dia) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Picea mariana | 20. | Y | FacW |
| 2. Rhododendron groenlandicum | 10 | | Fac |
| 3. Vaccinium uliginosum | 5 | | Fac |
| 4. Vaccinium vitis idea | 30. | Y | Fac |
| 5. Salix pulchra | 2 | | FacW |
| 6. Empetrum nigrum | 25. | Y | Fac |
| 7. Alnus viridis | 5. | | Fac |
| 8. Rosa acicularis | T | | FacU |
| 9. Arctous rubea | 2 | | Fac |
| Betula neoalaskana | T | | FacU |

Total Cover: 100

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

**Dominance Test worksheet:**

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

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

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

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species: | — | X 1 = | — |
| FACW species: | 76 | X 2 = | 152 |
| FAC species | 77 | X 3 = | 231 |
| FACU species | 4 | X 4 = | 16 |
| UPL species | | X 5 = | |
| Column Totals: | 157 (A) | | 399 (B) |

PI = B/A = 2.54

FAC N - hydro

**VEGETATION** (use scientific names of plants)

| Herb Stratum (26 dia) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Arctogrostis latifolia | 20 | Y | FacW |
| 2. Equisetum pratense | 12 | Y | FacW |
| 3. Equisetum arvense | T | | Fac |
| 4. Rubus chamemorus | 6 | | FacW |
| 5. Carex bigelowii | 5 | | Fac |
| 6. Eriophorum vaginatum | T | | FacW |
| 7. Geocaulon lividum | 4 | | FacU |
| 8. Equisetum scirpoides | T | | FacW |
| 9. | | | |
| 10. | | | |

Total Cover: 42

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

**Hydrophytic Vegetation Indicators:**

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

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

____ Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

3 % Cover of Wetland Bryophytes

98 Total Cover of Bryophytes

0 % Cover of Water

**Hydrophytic Vegetation Present (Y/N):** Y

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

Feather moss 90
Sphagnum sp 3
Moss 5

W10SLH001

# WETLAND DETERMINATION DATA FORM

6/12/16

| 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 |
|---|---|---|---|---|---|---|---|---|---|
| Oi | 0 - 6 | | | | | | | fibric | |
| Oe | 6 - 9 | | | | | | | hemic | |
| Bgf | 9 - 12+ | 5Y 5/1 | 58 | 7.5YR 4/6 | 12 | Conc | Matrix | vfSaL | - eolian - close to river |
| | | 5Y 4/1 | 30 | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

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

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

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

Restrictive Layer (if present): Type: Permafrost Depth (inches): 9

**Hydric Soil Present (Y/N):** Y

Notes:

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

| | | |
|---|---|---|
| Surface Water Present (Y/N): N | Depth (in): NA | **Wetland Hydrology Present (Y/N):** Y |
| Water Table Present (Y/N): Y | Depth (in): 8 | |
| Saturation Present (Y/N): (includes capillary fringe) Y | Depth (in): 4 | EC: 165 µS - Soil Pit |

Notes: Some surface water observed nearby (south of point) but not in plot. Concave site. Transitioning to upland in surrounding areas

WI05LH001

# 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) 15 Sapling (<5 dbh, <6m tall) 20 Tall shrub (2-6m) 0 Short shrub (0.5-2m) 25 Dwarf shrub (<0.5m) 10 Tall herb (≥1m) 5 Short herb (<1m) 20 Moss-Lichen 0 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

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

**Evidence of Seeps and Springs (P):** No Seeps or Springs X Seeps Observed____ Intermittent Spring____ Perennial Spring____

## LANDSCAPE VARIABLES (M)

**Wetland Juxtaposition:** Wetland Isolated____ Wetlands within 400m, Not Connected____ Only Connected Below X Only Connected Above____ Connected Upstream & Downstream____ Unknown____

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

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

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

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

## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W105L4001 Field Target: 252 Date: 6/12/16

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. **Photos**

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

X Jennifer Anderson X 6/12/16

Wetland Scientist (print) Signature / Date

X Brian Strong X 6/12/16

Field Crew Chief (print) Signature / Date

W105LH002

# WETLAND DETERMINATION DATA FORM

| SITE DESCRIPTION | | | |
|---|---|---|---|
| Survey Type: Centerline____ Access Road (explain) X Other (explain)_____ | | Field Target: 251 | Map #: 70 Map Date: 5/27/16 |
| Date: 6/12/16 | Project Name: Alaska LNG | | Feature Id: W105LH002 |
| Investigators: Brian Strong Jen Anderson | | | Team No.: W105 |
| State: Alaska | Region: Alaska | Milepost: 499.4 | |
| Latitude: 64.20615 | | Longitude: -149.30043 | Datum: WGS84 |
| Logbook No.: 3 | Logbook Page No.: 3 | Picture No.: W105LH002_V_V_P_Ply | |

| SITE PARAMETERS | |
|---|---|
| Subregion: Interior - Intermontane boreal | Landform (hillslope, terrace, hummocks, etc.): Terrace |
| Slope (%): 2 | Local relief (concave, convex, none): Flat, hummocky-Mod |
| Pre-mapped Alaska LNG/NWI classification: PFO4/SS4B | Evidence of Wildlife Use: None observed |
| Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes) Wet last few weeks | Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.) |
| Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed? | No X (If yes, explain in Notes) |
| Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic? | No X (If yes, explain in Notes.) |

| SUMMARY OF FINDINGS | |
|---|---|
| Hydrophytic Vegetation Present? Yes X No_____ | Is the Sampled Area within a Wetland? Yes X No_____ |
| Hydric Soil Present? Yes X No_____ | Wetland Type: PSS4B |
| Wetland Hydrology Present? Yes X No_____ | Alaska Vegetation Classification (Viereck): IIA2 |

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Flat terrace - even aged stunted spruce. Feather moss w/very little Sphagnum. Water table - alpha alpha positive in frozen mineral. See field map for site sketch

W10SLH002

# WETLAND DETERMINATION DATA FORM

**VEGETATION** (use scientific names of plants)

| Tree Stratum (Plot sizes: 50 dia) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Picea mariana | 3 | Y | FACU |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| Total Cover: 3 | | | |
| 50% of total cover: 1.5 | 20% of total cover: 0.6 | | |

| Sapling/Shrub Stratum ( 26 R ) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Picea mariana | 52 | Y | FACW |
| 2. Rhododendron groenlandicum | 15 | | FAC |
| 3. Vaccinium vitis-idea | 10 | | FAC |
| 4. | | | |
| 5. | | | |
| 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: 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: | 52 | X 2 = 104 |
| FAC species | 33 | X 3 = 99 |
| FACU species | 8 | X 4 = 32 |
| UPL species | | X 5 = |
| Column Totals: | 93 (A) | 235 (B) |

PI = B/A = 2.5

**VEGETATION** (use scientific names of plants)

| Herb Stratum ( 26 R ) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Calamagrostis lapponica | 5 | Y | FAC |
| 2. Equisetum sylvaticum | 3 | | FAC |
| 3. Geocaulon lividicum | 5 | Y | FACU |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| Total Cover: 13 | | | |
| 50% of total cover: 6.5 | 20% of total cover: 2.6 | | |

**Hydrophytic Vegetation Indicators:**

N 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

10 Total Cover of Bryophytes

0 % Cover of Water

**Hydrophytic Vegetation Present (Y/N):** Y

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

Feather moss 85
Foliose LN 10
Polytrichum sp 5

W105LH002

# WETLAND DETERMINATION DATA FORM

6/12/16 W105LH002 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 | 0-4 | | | | | | | fibric | |
| Oe | 4-9 | | | | | | | hemic | |
| Ncg | 9-15 | 10YR 2/1 | 20 | | | | | fSaL | xx Positive - frozen |
| | | 10YR 3/2 | 80 | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced 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) Positive alpha alpha |

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

Restrictive Layer (if present): Type: Permafrost Depth (inches): 9

**Hydric Soil Present (Y/N):** Y

Notes:

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

| | | |
|---|---|---|
| Surface Water Present (Y/N): N | Depth (in): NA | **Wetland Hydrology Present (Y/N):** Y |
| Water Table Present (Y/N): Y | Depth (in): 6 | |
| Saturation Present (Y/N): (includes capillary fringe) Y | Depth (in): 3 | EC: 48 µS - Soil pit |

Notes: pH 5.8

W105L1H002

# AQUATIC SITE ASSESSMENT DATA FORM

## VEGETATION VARIABLES P= Plot, M= Matrix

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

**Percent Cover (P):** Tree (>5 dbh, >6m tall)__3__ Sapling (<5 dbh, <6m tall)__82__ Tall shrub (2-6m)__0__ Short shrub (0.5-2m)__15__ Dwarf shrub (<0.5m) __0__ Tall herb (≥1m) __0__ Short herb (<1m) __0__ Moss-Lichen__0__ Floating__0__ Submerged__0__

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

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

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

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

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

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

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

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

**HGM Class (P):** Slope_____ Flat__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__

**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: [illegible] GPS Technician QA/QC check: [illegible]

## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W105L14002 Field Target: 251 Date: 6/12/16

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. **Photos**

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

X Jennifer Anderson X [signature] 6/12/16

Wetland Scientist (print) Signature / Date

X Brian Strang X [signature] 6/12/16

Field Crew Chief (print) Signature / Date

# WETLAND DETERMINATION DATA FORM

| SITE DESCRIPTION | | | |
|---|---|---|---|
| Survey Type: Centerline____ Access Road (explain)____ Other (explain) x | | Field Target: 253 | Map #: 68 Map Date: 5/27/16 |
| Date: 6/13/16 | Project Name: Alaska LNG facility | | Feature Id: W105LH003 |
| Investigators: Bryan Strong Valerie Watkins, Jen Anderson | | | Team No.: W105 |
| State: Alaska | Region: Alaska | Milepost: 473.7 | |
| Latitude: 64 33' 24.20" | | Longitude: -149 06' 32.57" | Datum: WGS84 |
| Logbook No.: 3 | Logbook Page No.: 5 | Picture No.: W105LH003_v_v_pit_plug | |

| SITE PARAMETERS | |
|---|---|
| Subregion: Interior - Intermontane | Landform (hillslope, terrace, hummocks, etc.): Abandoned channel |
| Slope (%): 3 - 5 | Local relief (concave, convex, none): Concave across, flat |
| Pre-mapped Alaska LNG/NWI classification: U; 1C2 | Evidence of Wildlife Use: None observed |
| Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes) | 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 |

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor. Abandoned channel. Across the gravel road the abandoned channel forms a wet depression.

# WETLAND DETERMINATION DATA FORM

**VEGETATION** (use scientific names of plants)

| Tree Stratum (Plot sizes: 100 dia) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Betula neoalaskana | 25 | Y | FACU |
| 2. Picea glauca | 3 | | FACU |
| 3. Salix bebbiana | 5 | | FAC |
| 4. Populus balsamifera | 3 | | FACU |
| Total Cover: 36 | | | |
| 50% of total cover: 18 | 20% of total cover: 7.2 | | |

| Sapling/Shrub Stratum (26 dia) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Salix bebbiana | 20 | Y | FAC |
| 2. Picea glauca | 20 | Y | FACU |
| 3. Betula neoalaskana | 5 | | FACU |
| 4. Rosa acicularis | 15 | Y | FACU |
| 5. Viburnum edule | T | | FACU |
| 6. Populus balsamifera | 2 | | FACU |
| 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: 5 (B)

% Dominant Species that are OBL, FACW, or FAC: 0.4 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: |
|---|---|---|
| OBL species: | — | X 1 = — |
| FACW species: | 45 | X 2 = 90 |
| FAC species | 30 | X 3 = 90 |
| FACU species | 73 | X 4 = 293 |
| UPL species | — | X 5 = — |
| Column Totals: | 148 (A) | 473 (B) |

PI = B/A = 3.19

**VEGETATION** (use scientific names of plants)

| Herb Stratum (26 dia) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Equisetum pratense | 45 | Y | FACW |
| 2. Calamagrostis canadensis | 5 | Y | FAC |
| 3. Cornus canadensis | T | | FACU |
| 4. Equisetum arvense | T | | FAC |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| Total Cover: 50 | | | |
| 50% of total cover: 25 | 20% of total cover: 10 | | |

**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

5 Total Cover of Bryophytes

0 % Cover of Water

**Hydrophytic Vegetation Present (Y/N):** N

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

Litter 95
Moss 5

W10SLH003

# WETLAND DETERMINATION DATA FORM

6/13/16 W10SLH003 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 |
|---|---|---|---|---|---|---|---|---|---|
| Oe | 0-3 | | | | | | | hemic | |
| BC | 3-6 | 10YR 4/3 | 91 | 10YR 5/6 | 7 | C | PL | SiL | |
| | | | | 10YR 5/2 | 2 | D | PL | | |
| Ab | 6-7.5 | 10YR 3/1 | 100 | | | | | SiL | |
| Bw | 7.5-13 | 10YR 4/4 | 85 | 5YR 5/1<br>2.5YR 5/6 | 5<br>10 | D<br>C | RC/PL<br>M | vfSaL | |
| Ab | 13-14 | 10YR 3/1 | 100 | | | | | | |
| Bw | 14-20 | 10YR 4/4 | 70 | 7.5YR 5/6 | 15 | C | M | | 2.5Y 5/1 15 - Second Mad mix |

[1]Type: C=Concentration, D=Depletion, RM=Reduced 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): NA

**Hydric Soil Present (Y/N):** N

Notes: Soil is moist - no saturation. Some limited reduction may occur in root channels from 7-13". This may occur out of the growing season Less than needed to meet hydric criteria. No positive reaction to alpha alpha dipiridil

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

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

Notes:

W105214003

# 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: W105L14003 Field Target: 253 Date: 6/13/16

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

**8. Photos**

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

X Jennifer Anderson X 6/13/16

Wetland Scientist (print) Signature / Date

X Brian Strong X 6/13/16.

Field Crew Chief (print) Signature / Date

# WETLAND DETERMINATION DATA FORM

| SITE DESCRIPTION | | | |
|---|---|---|---|
| Survey Type: Centerline X Access Road (explain)____ Other (explain)_____ | | Field Target: 196 | Map #: 2 Map Date: 5/20/16 |
| Date: 5/22/16 | Project Name: Alaska LNG | | Feature Id: W105T1001 |
| Investigators: BS, JA, VW | | | Team No.: W105 |
| State: Alaska | Region: Alaska | Milepost: 675.8 | |
| Latitude: 62° 10' 8.32" | | Longitude: 150° 12' 23.61 | Datum: WGS84 |
| Logbook No.: 1 | Logbook Page No.: 3 | Picture No.: W105T1001_v_v_P_Plug | |

| SITE PARAMETERS | |
|---|---|
| Subregion: Southcentral | Landform (hillslope, terrace, hummocks, etc.): Toeslope / Backslope |
| Slope (%): 2-3% | Local relief (concave, convex, none): Hummocky-Mod, Flat to slight concave |
| Pre-mapped Alaska LNG/NWI classification: PF04 / SS4B | 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.) A2 No |

| 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: PF04 / SS4B |
| Wetland Hydrology Present? Yes X No_____ | Alaska Vegetation Classification (Viereck): 1A2, 11A2 |

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

W105T1001

# WETLAND DETERMINATION DATA FORM

**VEGETATION** (use scientific names of plants)

| Tree Stratum (Plot sizes: 50' ℓ) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Picea Mariana | 20 | Y | FACW |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| Total Cover: 20 | | | |
| 50% of total cover: 10 | 20% of total cover: 4 | | |

| Sapling/Shrub Stratum (26") | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Picea Mariana | 17 | Y | FACW |
| 2. Betula nana | 20 | Y | FAC |
| 3. Spirea stevenii | 1 | | FACU |
| 4. Rhododendrum groenlandicum | 12 | | FAC |
| 5. Empetrum nigrum | 15 | | FAC |
| 6. Rosa acicularis | 2 | | FACU |
| 7. Andromeda polifolia | T | | FACW |
| 8. Chamaedaphne calyculata | 5 | | FACW |
| 9. Vaccinium uliginosum | 4 | | FAC |
| 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: 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: | 47 | X 2 = | 94 |
| FAC species | 89 | X 3 = | 267 |
| FACU species | 3 | X 4 = | 12 |
| UPL species | | X 5 = | |
| Column Totals: | 136 (A) | | 369 (B) |

PI = B/A = 2.69

Vaccinium Oxycoccus T OBL
vaccinium vitis-idaea 1% FAC

**VEGETATION** (use scientific names of plants)

| Herb Stratum (26") | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Equisetum arvense * | 10 | Y | FAC |
| 2. ~~Andromeda polifolia~~ | | | |
| 3. Rubus chamaemorus | 5 | | FACW |
| 4. Calamagrostis sp ** | 25 | Y | FAC |
| 5. Drosera rotundifolia | T | | OBL |
| 6. Carex microglochin | T | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| Total Cover: 40 | | | |
| 50% of total cover: 20 | 20% of total cover: 8 | | |

**Hydrophytic Vegetation Indicators:**

✓ Dominance Test is > 50%

✓ Prevalence Index is ≤ 3.0

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

____ Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

60 % Cover of Wetland Bryophytes Sphagnum

30 Total Cover of Bryophytes Feathermoss

Trace % Cover of Water

**Hydrophytic Vegetation Present (Y/N):** Y

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

* Equisetum is small, + hard to determine species. Arvense is our best estimate.

** Calamagrostis is most likely canadensis.

# WETLAND DETERMINATION DATA FORM

| SOIL | Date 5/20/16 | Feature ID W105T1001 | 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 |
|---|---|---|---|---|---|---|---|---|---|
| Oi | 0-5 | | | | | | | fibric | sphagnum and PLESCH fibers |
| Oe | 5-7 | | | | | | | hemic | saturated ↓ |
| OA | 7-12 | | | | | | | sapric | mixed organics with mineral |
| | | | | | | | | | |
| A1 | 12-20 | 7.5YR 3/2 | 100 | | | | | MkSiL | andic 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) 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) Y Positive alpha alpha |

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and 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: alpha alpha positive at 5". Water table at 7" saturation at 3".

| HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient) | | SECONDARY INDICATORS (2 or more required) | |
|---|---|---|---|
| Surface Water (A1) X Y | Surface Soil Cracks (B6) N | Water-stained Leaves (B9) N | Stunted or Stressed Plants (D1) N |
| High Water Table (A2) X Y | Inundation Visible on Aerial Imagery (B7) N | Drainage Patterns (B10) N | Geomorphic Position (D2) N |
| Saturation (A3) X 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) 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): 3 | Wetland Hydrology Present (Y/N): Y |
| Water Table Present (Y/N): Y | Depth (in): 7 | |
| Saturation Present (Y/N): (includes capillary fringe) Y | Depth (in): 3 | EC: 40 µS |

Notes: Pockets of standing water scattered around site ~ 3 inches deep.

W105T1001

# 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)__20__ Sapling (<5 dbh, <6m tall)__15__ Tall shrub (2-6m)_____ Short shrub (0.5-2m)__30__ Dwarf shrub (<0.5m) __10__ Tall herb (≥1m) __0__ Short herb (<1m) __15__ Moss-Lichen__10__ Floating__0__ Submerged__0__

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

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

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

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

**Presence of Islands (M):** Absent (none) __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__X__ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

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

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

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

**Water pH (P):** No surface water_____ Circumneutral (5.5-7.4)__X__ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** 5.55

**Surficial Geologic Deposit Under Wetland (P):** High Permeability Stratified Deposits__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)__X__ Large (>100 acres)_____

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

## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W105T1001 Field Target: 196 Date: 5/22/2016

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

**8. Photos**

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

X Jennifer Anderson X 5/22/16

Wetland Scientist (print) Signature / Date

X Bryan Strong X 5/22/16

Field Crew Chief (print) Signature / Date

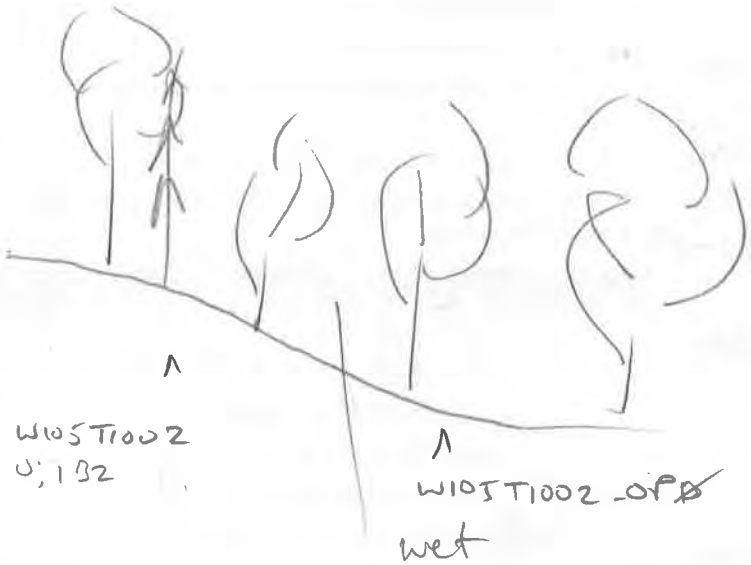
# WETLAND DETERMINATION DATA FORM

| SITE DESCRIPTION | | | |
|---|---|---|---|
| Survey Type: Centerline X Access Road (explain)____ Other (explain)_____ | | Field Target: 195 | Map #: 108 4 Map Date: 5/20/16 |
| Date: 5/22/16 | Project Name: Alaska LNG | | Feature Id: W105T1002 |
| Investigators: BS, JA, VW | | | Team No.: W105 |
| State: Alaska | Region: Alaska | Milepost: 676 | |
| Latitude: 62° 9' 56.29" | | Longitude: 150°12' 20.68" | Datum: WGS84 |
| Logbook No.: 1 | Logbook Page No.: 3 | Picture No.: W105T1002_v_v_pit_plug | |

| SITE PARAMETERS | |
|---|---|
| Subregion: South Central | Landform (hillslope, terrace, hummocks, etc.): backslope |
| Slope (%): 7 | Local relief (concave, convex, none): convex - slight |
| Pre-mapped Alaska LNG/NWI classification: PFO1/4B | Evidence of Wildlife Use: Moose scat |
| Are climatic/hydrologic conditions on the site typical for this time of year? Yes ✓ No_____ (if no explain in Notes) | Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.) |
| Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed? | No X (If yes, explain in Notes) |
| Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic? | No X (If yes, explain in Notes.) |

| SUMMARY OF FINDINGS | |
|---|---|
| Hydrophytic Vegetation Present? Yes_____ No X | Is the Sampled Area within a Wetland? Yes_____ No X |
| Hydric Soil Present? Yes_____ No X | Wetland Type: Upland |
| Wetland Hydrology Present? Yes_____ No X | Alaska Vegetation Classification (Viereck): I B 2 |

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



# WETLAND DETERMINATION DATA FORM

**VEGETATION** (use scientific names of plants)

| Tree Stratum (Plot sizes: 50' ) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Picea glauca | 7 | | FACU |
| 2. Betula neoalaskana | 40 | Y | FACU |
| 3. | | | |
| 4. | | | |
| Total Cover: 47 | | | |
| 50% of total cover: 23.5 | 20% of total cover: 9.4 | | |

| Sapling/Shrub Stratum ( 26' ) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Rubus idaeus | 1 | | FACU |
| 2. Oplopanax horridus | 6 | Y | FACU |
| 3. Alnus viridis | 3 | Y | FAC |
| 4. Sambucus racemosa | T | | FACU |
| 5. Ribes spp. | T | | — |
| 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: 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 = | 0 |
| FACW species: | 0 | X 2 = | 0 |
| FAC species | 19 | X 3 = | 57 |
| FACU species | 119 | X 4 = | 476 |
| UPL species | 0 | X 5 = | 0 |
| Column Totals: | 138 (A) | | 533 (B) |

PI = B/A = 3.86

**VEGETATION** (use scientific names of plants)

| Herb Stratum ( 26' ) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Equisetum sylvaticum | 2 | | FAC |
| 2. Dryopteris expansa | 65 | Y | FACU |
| 3. Calamagrostis canadensis | 12 | | FAC |
| 4. Gymnocarpium dryopteris | T | | FACU |
| 5. ~~Geocaulon lividum~~ | — | | ~~FACU~~ |
| 6. Cornus spp | T | | — |
| 7. Equisetum arvense * | 2 | | FAC |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| Total Cover: 81 | | | |
| 50% of total cover: 40.5 | 20% of total cover: 16.2 | | |

**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

____ Total Cover of Bryophytes

0 % Cover of Water

**Hydrophytic Vegetation Present (Y/N):** N

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

Spinulum anotinum T

* Equisetum arvense is best estimate. Plants are small.

W105T100 2

# WETLAND DETERMINATION DATA FORM

**SOIL** Date 5/22/16 Feature ID W105T1002 Soil Pit Required (Y/N) Y

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

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox % | Type[1] | Loc[2] | Texture | Notes |
|---|---|---|---|---|---|---|---|---|
| 0-1 | | | | | | | | |
| 1-3 | 7.5YR 3/3 | 100 | | | | | silt loam | Bh characteristics |
| 3-7 | 5YR 2.5/2 | 70 | | | | | silt loam | somewhat discontinuous |
| | 5Y 6/1 | 30 | | | | | silt loam | C horizon |
| 7-11 | 5YR 3/4 | 100 | | | | | silt loam | |
| 11-16 | 10YR 5/6 | 100 | | | | | silt loam | Bs material in upper part |
| 16-24 | 10YR 5/4 | 100 | | | | | silt loam | |

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

| HYDRIC SOIL INDICATORS | | INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3] |
|---|---|---|
| Histosol or Histel (A1) 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: — None 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): — | 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:

WOS 11002

# 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: BrOW GPS Technician QA/QC check: Jeff

## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W105 T1 002 Field Target: 195 Date: 5/22/16

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. **Photos**

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

X Jennifer Anderson X 5/22/16

Wetland Scientist (print) Signature / Date

X Brian Strong X 5/22/16

Field Crew Chief (print) Signature / Date

# WETLAND DETERMINATION DATA FORM

| SITE DESCRIPTION | | | |
|---|---|---|---|
| Survey Type: Centerline X Access Road (explain)____ Other (explain)_____ | | Field Target: 194 | Map #: 5 (109) Map Date: 5/20/16 |
| Date: 5/22/16 | Project Name: Alaska LNG | | Feature Id: W105T1003 |
| Investigators: BS, SA, VW | | | Team No.: W105 |
| State: Alaska | Region: Alaska | Milepost: 686 | |
| Latitude: 62° 2' 18.61" | | Longitude: 150° 12' 55.36" | Datum: WGS84 |
| Logbook No.: 1 | Logbook Page No.: 3 | Picture No.: W105T1003_r_v_pit_plug | |

| SITE PARAMETERS | |
|---|---|
| Subregion: Southcentral | Landform (hillslope, terrace, hummocks, etc.): backslope |
| Slope (%): 3-4 % | Local relief (concave, convex, none): slightly convex |
| Pre-mapped Alaska LNG/NWI classification: Upland | Evidence of Wildlife Use: none present |
| Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes) | Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.) |
| Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed? | No X (If yes, explain in Notes) |
| Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic? | No X (If yes, explain in Notes.) |

| SUMMARY OF FINDINGS | |
|---|---|
| Hydrophytic Vegetation Present? Yes X No_____ | Is the Sampled Area within a Wetland? Yes_____ No X |
| Hydric Soil Present? Yes_____ No X | Wetland Type: Upland |
| Wetland Hydrology Present? Yes_____ No X | Alaska Vegetation Classification (Viereck): 1C2, 11B2 |

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

Much tree throw. Marginal 1C2 vs 1A2, See field map for sketch info.

# WETLAND DETERMINATION DATA FORM

## VEGETATION (use scientific names of plants)

| Tree Stratum (Plot sizes: 30 R) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. ~~Picea glauca~~ | — | | ~~FACU~~ |
| 2. Picea mariana | 30 | Y | FACW |
| 3. Betula neoalaskana | 6 | | FAC ~~X~~ |
| 4. | | | |

Total Cover: 36

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

| Sapling/Shrub Stratum (26 R) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Betula neoalaskana | 20 | Y | FACU |
| 2. Salix pulchra | 1 | | ~~FACW~~ |
| 3. Linnaea borealis | 1 | | FACU |
| 4. Empetrum nigrum | 3 | | FAC |
| 5. Picea glauca | T | | FACU |
| 6. Vaccinium vitis-idaea | 3 | | FAC |
| 7. Vaccinium ovalifolium | T | | |
| 8. Vaccinium uliginosum | 3 | | FAC |
| 9. | | | |

Total Cover: 31

50% of total cover: 15.5 20% of total cover: 6.2

**Dominance Test worksheet:**

No. of Dominant Species that are OBL, FACW, or FAC: 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: | 31 | X 2 = | 62 |
| FAC species | 20 ~~14~~ | X 3 = | ~~42~~ 60 |
| FACU species | 22 ~~28~~ | X 4 = | ~~112~~ 88 |
| UPL species | 0 | X 5 = | 0 |
| Column Totals: | 73 (A) | | ~~216~~ (B) 210 |

PI = B/A = ~~2.95~~ 2.87

## VEGETATION (use scientific names of plants)

| Herb Stratum (26 R) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. ~~Vaccinium vitis-idaea~~ | | | ~~FAC~~ |
| 2. Equisetum sylvaticum | 2 | Y | FAC |
| 3. Cornus Suecica | 3 | Y | FAC |
| 4. ~~Vaccinium uliginosum~~ | | | ~~FAC~~ |
| 5. Dryopteris expansa | 1 | | FACU |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |

Total Cover: 6

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

**Hydrophytic Vegetation Indicators:**

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

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

____ Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

0 % Cover of Wetland Bryophytes

75 Total Cover of Bryophytes

0 % Cover of Water

**Hydrophytic Vegetation Present (Y/N):** Y

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

Picea glauca trees present outside of plot.

# WETLAND DETERMINATION DATA FORM

| SOIL | Date 5/22/11 | Feature ID W105T1003 | 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 |
|---|---|---|---|---|---|---|---|---|---|
| O | 0-3.5 | | | | | | | Fibric | |
| A | 3.5-5 | 10YR 2/1 | 100 | | | | | SiL | |
| BhE | 5-10 | 7.5YR 3/4 | 85 | | | | | vfSaL | |
| | | 2.5Y 6/1 | 15 | | | | | | |
| Bw | 10-19 | 10YR 5/4 | 80 | | | | | vfSaL | |
| | | 10YR 4/4 | 20 | | | | | | |
| BC | 19-24 | 2.5Y 4/4 | 100 | | | | | SiL | Platy |

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

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

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

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

**Hydric Soil Present (Y/N):** N

Notes:

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

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

Notes: Many downed spruce - most covered in moss - older windfall

# 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: W105T1003 Field Target: 194 Date: 5/22/16

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

**8. Photos**

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

X Jennifer Anderson X 5/22/16

Wetland Scientist (print) Signature / Date

X Bryan Strong X 5/22/16

Field Crew Chief (print) Signature / Date

# WETLAND DETERMINATION DATA FORM

| SITE DESCRIPTION | | | |
|---|---|---|---|
| Survey Type: Centerline X Access Road (explain)____ Other (explain) V | | Field Target: 188 | Map #: 115 Map Date: 5/20 |
| Date: 5/23/2016 | Project Name: Alaska LNG facility | | Feature Id: W105T1004 |
| Investigators: Brian Strong Jen Anderson | | | Team No.: W105 |
| State: Alaska | Region: Alaska | Milepost: 735.1 | |
| Latitude: 61 26 03.2 | | Longitude: -150 40 15.26 | Datum: WGS84 |
| Logbook No.: 41 JA | Logbook Page No.: 4 | Picture No.: W105T1004_V_V_P_P | |

| SITE PARAMETERS | |
|---|---|
| Subregion: Southcentral | Landform (hillslope, terrace, hummocks, etc.): Toeslope |
| Slope (%): 4 | Local relief (concave, convex, none): Concave |
| Pre-mapped Alaska LNG/NWI classification: PFO4B 1A2, 1C2 | Evidence of Wildlife Use: |
| Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes) | Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.) |
| Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed? | No X (If yes, explain in Notes) |
| Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic? | No X (If yes, explain in Notes.) |

| SUMMARY OF FINDINGS | |
|---|---|
| Hydrophytic Vegetation Present? Yes ~~X~~ No X JA | Is the Sampled Area within a Wetland? Yes X No_____ |
| Hydric Soil Present? Yes X No_____ | Wetland Type: PFO4/1B |
| Wetland Hydrology Present? Yes X No_____ | Alaska Vegetation Classification (Viereck): 1C2, 1B2 |

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

$H_2S$ odor at 6". Water table at soil surface. Narrow strip adjacent to stream (2' wide 3" deep RSUBH) that has more spruce mixed with Birch and Poplar. PICL, BETNEO, POPBAL, ALNTRU, VIBEDU, MEN.

EC: 96µS pH 6.98 Soil pit water - (~~no surface water~~ BS)
small amount of standing water

# WETLAND DETERMINATION DATA FORM

**VEGETATION** (use scientific names of plants)

| Tree Stratum (Plot sizes: 100 dia) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Picea Glauca 65' | 15 | Y | Fac U |
| 2. Betula neoalaskana 60' | 30 | Y | Fac W |
| 3. Populus balsamifera | 5 | | Fac U |
| 4. | | | |

Total Cover: 50

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

| Sapling/Shrub Stratum (26 dia) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Alnus incana 15' | 20 | Y | Fac |
| 2. Menziesia ferruginea | 1 | | Fac U |
| 3. Viburnum edule | 1 | | Fac U |
| 4. Rosa acicularis | 5 | | Fac U |
| 5. Ribes triste | 2 | | Fac |
| 6. Streptopus amplexifolius | 3 | | FU |
| 7. | | | |
| 8. | | | |
| 9. | | | |

Total Cover: 38

50% of total cover: 19 20% of total cover: 7.6

**Dominance Test worksheet:**

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

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

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

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species: | 8 | X 1 = | 8 |
| FACW species: | 8 | X 2 = | 16 |
| FAC species | 98 | X 3 = | 294 |
| FACU species | 40 | X 4 = | 160 |
| UPL species | | X 5 = | — |
| Column Totals: | 154 (A) | | 478 (B) |

PI = B/A = 3.1

Phegopteris connectilles T

Water T

~~Carex lapponica OBL~~

**VEGETATION** (use scientific names of plants)

| Herb Stratum (26 dia) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Equisetum arvense | 35 | Y | Fac |
| 2. Athyrium cyclosorum | 3 | | Fac |
| 3. Gymnocarpium dryopteris | 2 | | Fac U |
| 4. Cornus suecica | 4 | | Fac |
| 5. Trientalis europa | 2 | | Fac U |
| 6. Calamagrostis canadensis | 2 | | Fac |
| 7. ~~Carex capillaris~~ | | | |
| 8. Geranium erianthum | T | | Fac U |
| 9. Viola sp | 8 | | Fac W |
| 10. Rubus arcticus sp | 2 | | Fac |

*sanguisorba sp

carex lapponica OBL T

8

Total Cover: 66

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

**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.

____ % 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):

*Viola Not I.D. but probable I.D is FacW

WI05T1004

# WETLAND DETERMINATION DATA FORM

| SOIL | Date 05/23/16 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 |
|---|---|---|---|---|---|---|---|---|
| 0a 0-20+ | | | | | | | Saprik | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced 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 6" | | Alaska Gleyed without 5Y Hue or Redder Underlying Layer N |
| Thick Dark Surface (A12) N | | Other (Explain in Notes) Y |

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

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

**Hydric Soil Present (Y/N):** Y

Notes: High water table

| HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient) | | SECONDARY INDICATORS (2 or more required) | |
|---|---|---|---|
| Surface Water (A1) Y | Surface Soil Cracks (B6) N | Water-stained Leaves (B9) Y | Stunted or Stressed Plants (D1) N |
| High Water Table (A2) Y | Inundation Visible on Aerial Imagery (B7) N | Drainage Patterns (B10) Y | Geomorphic Position (D2) Y |
| Saturation (A3) Y | Sparsely Vegetated Concave Surface (B8) 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) Y |
| Sediment Deposits (B2) N | Hydrogen Sulfide Odor (C1) Y | Salt Deposits (C5) N | FAC-Neutral Test (D5) |
| Drift Deposits (B3) N | Dry-Season Water Table (C2) N | Notes: | |
| Algal Mat or Crust (B4) N | Other (Explain in Notes): | | |
| Iron Deposits (B5) N | | | |

| | | |
|---|---|---|
| Surface Water Present (Y/N): Y | Depth (in): 3" | Wetland Hydrology Present (Y/N): Y |
| Water Table Present (Y/N): Y | Depth (in): 0 | |
| Saturation Present (Y/N): (includes capillary fringe) Y | Depth (in): 0 | EC: 9645 pH 6.98 |

Notes:

# AQUATIC SITE ASSESSMENT DATA FORM

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

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

**Percent Cover (P):** Tree (>5 dbh, >6m tall)__30__ Sapling (<5 dbh, <6m tall)__0__ Tall shrub (2-6m)__25__ Short shrub (0.5-2m)__10__ Dwarf shrub (<0.5m) __0__ Tall herb (≥1m) __10__ Short herb (<1m) __10__ Moss-Lichen __5__ Floating__0__ Submerged__0__

**Number of Wetland Types (M):** __3__ | **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even __X__

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

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

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

**Presence of Islands (M):** Absent (none) __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__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** 6.98

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

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

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

**LANDSCAPE VARIABLES (M)**

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

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

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

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

Crew Chief QA/QC check: Brian Shay GPS Technician QA/QC check: Jaylen Dove

## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W105T1004 Field Target: 188 Date: 5/23/15

*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 5/23/16

Wetland Scientist (print) Signature / Date

X Bryan Strong X 5/23/16

Field Crew Chief (print) Signature / Date

# WETLAND DETERMINATION DATA FORM

| SITE DESCRIPTION | | | |
|---|---|---|---|
| Survey Type: Centerline X Access Road (explain)____ Other (explain)_____ | | Field Target: 182 | Map #: 121 Map Date: 5/20/16 |
| Date: 5/23/16 | Project Name: Alaska LNG | | Feature Id: W105T1005 |
| Investigators: Brian Strong, Jen Anderson | | | Team No.: W105 |
| State: Alaska | Region: Alaska | Milepost: 746.5 | |
| Latitude: 61 20. 34.2 | | Longitude: 150 55. 42.4 | Datum: WGS84 |
| Logbook No.: 01 | Logbook Page No.: 04 | Picture No.: W105T1005_V_V_P_Plug | |

| SITE PARAMETERS | |
|---|---|
| Subregion: Southcentral | Landform (hillslope, terrace, hummocks, etc.): Footslope, flat / slight concave |
| Slope (%): ~3% | Local relief (concave, convex, none): hummocky, moderate |
| Pre-mapped Alaska LNG/NWI classification: PF04B 1A2, 11C2 | Evidence of Wildlife Use: Songbirds, 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 X, or Hydrology_____ Naturally Problematic? | No ~~Yes~~ (If yes, explain in Notes.) No NTCHS indicator positive alpha-alpha |

| 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: PF04B 1A2, 11C2 |
| Wetland Hydrology Present? Yes Y No_____ | Alaska Vegetation Classification (Viereck): 1A2, 11C2 |

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

Tablet battery died during data collection. Site located within 20' of pre-selected field target location. GPS accuracy of tablet may be reduced. Lat/Long on form recorded from Garmin handheld unit. Point (waypoint) in Garmin

Even canopy of even-aged black spruce. A few scattered BETNEO trees, some standing water in microlows

See map for sketch info.

W105 T1005

# WETLAND DETERMINATION DATA FORM

**VEGETATION** (use scientific names of plants)

| Tree Stratum (Plot sizes: 100 dia) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Picea mariana | 50 | Y | FacW |
| 2. Betula neoalaskana | 6 | | FacN |
| 3. | | | |
| 4. | | | |
| Total Cover: 56 | | | |
| 50% of total cover: 28 | 20% of total cover: 11.2 | | |

| Sapling/Shrub Stratum (26 dia) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Picea mariana 8'-15' | 1 | | FacW |
| 2. Betula neoalaskana 4-10' | 1 | | FacU |
| 3. Menziesia ferruginea | 3 | Y | FacU |
| 4. Betula nana | 3 | Y | Fac |
| 5. Rosa acicularis | 3 | Y | FacU |
| 6. Spirea stevensii | 2 | | FacU |
| 7. Vaccinium vitis idea | 10 | Y | Fac |
| 8. Empetrum nigrum | 2 | | Fac |
| 9. Salix pulchra 2' | T | | FacW |
| 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: 6 (A)

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

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

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species: | — | X 1 = | — |
| FACW species: | 61 | X 2 = | 122 |
| FAC species | 59 | X 3 = | 177 |
| FACU species | 13 | X 4 = | 52 |
| UPL species | — | X 5 = | — |
| Column Totals: | 133 (A) | | 351 (B) |

PI = B/A = 2.63

**VEGETATION** (use scientific names of plants)

| Herb Stratum (26 dia) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Equisetum arvense | 20 | Y | Fac |
| 2. Rubus chamaemorus | 10 | Y | FacW |
| 3. Calamagrostis sp | 8 | | Fac |
| 4. Equisetum sylvaticum | T | | Fac |
| 5. Spinulum annotinum | 4 | | FacU |
| 6. Rubus pedatus | T | | Fac |
| 7. Orthilia secunda | T | | FacU |
| 8. Cornus suecica | 10 | Y | Fac |
| 9. Carex lapponica* | T | | OBL |
| 10. Anemone sp | T | | |
| geocaulon lividum | Total Cover: 52 | | |
| T | 50% of total cover: 26 | 20% of total cover: 10.4 | |

**Hydrophytic Vegetation Indicators:**

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

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

____ Problematic Hydrophytic Vegetation[1] (Explain)

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

____ % Bare Ground

____ % Cover of Wetland Bryophytes

____ Total Cover of Bryophytes

____ % Cover of Water

**Hydrophytic Vegetation Present (Y/N):** Y

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

Sphagnum 19
Feather Moss 70
Liverwort 7
Water 4

W105T1005

# WETLAND DETERMINATION DATA FORM

**SOIL** Date 5/28/16 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 | | | | | | | | |
| A | 3-5 | 10yr 2/1 | 100 | | | | | MKSIL | Saturated |
| Bw | 5-10 | 7.5yr 3/3 | 85 | 7.5yr 4/1 | 5 | Depl | PL | SIL | alpha alpha positive |
| | | | | 2.5yr 4/4 | 10 | Con | PL | | |
| Bg | 10-20+ | 7.5yr 4/2 | 85 | 2.5yr 4/4 | 15 | OX/Con | RC/PL | SIL | alpha alpha positive |

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

| HYDRIC SOIL INDICATORS | | INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3] |
|---|---|---|
| Histosol or Histel (A1) N | Alaska Gleyed (A13) N | Alaska Color Change (TA4)[4] N |
| Histic Epipedon (A2) 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 alpha alpha at 5" High water table |

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

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

**Hydric Soil Present (Y/N):** Y

Notes:

| HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient) | | SECONDARY INDICATORS (2 or more required) | |
|---|---|---|---|
| Surface Water (A1) Y | Surface Soil Cracks (B6) N | Water-stained Leaves (B9) N | Stunted or Stressed Plants (D1) N |
| High Water Table (A2) Y | Inundation Visible on Aerial Imagery (B7) N | Drainage Patterns (B10) N | Geomorphic Position (D2) Y |
| Saturation (A3) Y | Sparsely Vegetated Concave Surface (B8) N | Oxidized Rhizospheres along Living Roots (C3) Y | Shallow Aquitard (D3) N |
| Water Marks (B1) N | Marl Deposits (B15) N | Presence of Reduced Iron (C4) Y | Microtopographic Relief (D4) Y |
| 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): 4" | **Wetland Hydrology Present (Y/N):** Y |
| Water Table Present (Y/N): Y | Depth (in): 8 | |
| Saturation Present (Y/N): (includes capillary fringe) Y | Depth (in): 0 | EC: 36ms pH 7.2 — surface water |

Notes: 46ms pH 6.8 — soil pit

W105T1005

# AQUATIC SITE ASSESSMENT DATA FORM

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

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

**Percent Cover (P):** Tree (>5 dbh, >6m tall)_55_ Sapling (<5 dbh, <6m tall)_5_ Tall shrub (2-6m)_0_ Short shrub (0.5-2m)_5_ Dwarf shrub (<0.5m) _0_ Tall herb (≥1m) _0_ Short herb (<1m) _20_ Moss-Lichen_15_ Floating_0_ Submerged_0_

**Number of Wetland Types (M):** _4_ | **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even _X_

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

revie

**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** _7.2_

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

Crew Chief QA/QC check: Brian Shy

GPS Technician QA/QC check: Jerfin

## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W105T1005 Field Target: 182 Date: 5/23/15

*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 5/23/16

Wetland Scientist (print) Signature / Date

X Brian Strong X 5/23/16

Field Crew Chief (print) Signature / Date

# WETLAND DETERMINATION DATA FORM

| SITE DESCRIPTION | | | |
|---|---|---|---|
| Survey Type: Centerline___ Access Road (explain) X Other (explain)_____ | | Field Target: 179 | Map #: 124 Map Date: 5/20 |
| Date: 5/24/16 | Project Name: Alaska LNG | | Feature Id: W105T1006 |
| Investigators: BS, JA, VW | | | Team No.: W105 |
| State: Alaska | Region: Alaska | Milepost: 749 | |
| Latitude: 61° 19' 32.43" | Longitude: 151° 1' 40.0" | | Datum: WGS84 |
| Logbook No.: 1 | Logbook Page No.: 06 | Picture No.: W105T1006_veg_veg_pit_pl49 | |

| SITE PARAMETERS | |
|---|---|
| Subregion: Southcentral | Landform (hillslope, terrace, hummocks, etc.): Terrace - stream |
| Slope (%): 4-5% | Local relief (concave, convex, none): Undulating |
| Pre-mapped Alaska LNG/NWI classification: Upland | Evidence of Wildlife Use: moose, bear, + wolf scat along road |
| 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~~ Yes (If yes, explain in Notes.) Positive alpha alpha |

| 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 B2, III A2 |

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

Small upland inclusions, Mounds/Undulating

# 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 | 10 | Y | FAC |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| Total Cover: 10 | | | |
| 50% of total cover: 5 | 20% of total cover: 2 | | |

| Sapling/Shrub Stratum (26 dia) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Alnus viridis | 55 | Y | FAC |
| 2. Ribes triste/oonium | 1 | | FAC |
| 3. Oplopanax horridus | 3 | | Facu |
| 4. Picea glauca | 1 | | FACU |
| 5. Ribes triste | T | | FAC |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| Total Cover: 59 | | | |
| 50% of total cover: 29.5 | 20% of total cover: 11.8 | | |

**Dominance Test worksheet:**

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

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

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

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: |
|---|---|---|
| OBL species: | | X 1 = |
| FACW species: | | X 2 = |
| FAC species | 158 | X 3 = 474 |
| FACU species | 8 | X 4 = 32 |
| UPL species | | X 5 = |
| Column Totals: | 166 (A) | 506 (B) |

PI = B/A = 3.0

**VEGETATION** (use scientific names of plants)

| Herb Stratum (26 d.) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Calamagrostis canadensis | 35 | Y | FAC |
| 2. Equisetum arvense | 50 | Y | FAC |
| 3. Streptopus amplexifolius | 2 | | FACU |
| 4. Sanguisorba spp | T | | |
| 5. Viola spp | 1 | | |
| 6. Trientalis europaea | 1 | | Facu |
| 7. Dryopteris expansa | 1 | | FACU |
| 8. Urtica dioica | T | | FACU |
| 9. Athyrium cyclosorum | 7 | | FAC |
| 10. Impatiens noli-tangere | T | | FACW |
| Total Cover: 97 | | | |
| 50% of total cover: 48.5 | 20% of total cover: 19.4 | | |
| Gymnocarpium dryopteris | 1 | | FACU |

**Hydrophytic Vegetation Indicators:**

X Dominance Test is > 50%

X Prevalence Index is ≤ 3.0

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

____ Problematic Hydrophytic Vegetation[1] (Explain)

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

2 % Bare Ground

1 % Cover of Wetland Bryophytes Liverwort

____ Total Cover of Bryophytes

5 % Cover of Water

**Hydrophytic Vegetation Present (Y/N):** Y

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

W105T1006

# WETLAND DETERMINATION DATA FORM

**SOIL** Date 5/24/10 Feature ID W105T1006 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 |
|---|---|---|---|---|---|---|---|---|---|
| A1 | 0-2.5 | 10YR 3/2 | | | | | | silt loam | |
| A2 | 2.5-3.5 | 10YR 2/2 | | | | | | silt loam | |
| Bg | 3.5-11.5 | 10YR 4/2 | 95 | 5YR 3/4 | 5 | C | OX, PL | silt loam | alpha alpha positive |
| Bcg | 11.5-20 | 5Y 4/1 | 80 | 5YR 4/4 | 20 | C | PL | silt loam | alpha alpha positive |
| | | | | | | | | | stratified alluvium |
| | | | | | | | | | sand lenses (thin ~1/4") between |
| | | | | | | | | | silt loam alluvium - Oxidized |

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

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

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and 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): NA

**Hydric Soil Present (Y/N):** Y

Notes: weak alpha-alpha positive at 5 inches. Strong reaction to alpha alpha between 8-20 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) Y | Stunted or Stressed Plants (D1) N |
| High Water Table (A2) Y | Inundation Visible on Aerial Imagery (B7) N | Drainage Patterns (B10) | 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) N |
| Sediment Deposits (B2) Y | Hydrogen Sulfide Odor (C1) N | Salt Deposits (C5) N | FAC-Neutral Test (D5) |
| Drift Deposits (B3) Y | Dry-Season Water Table (C2) N | Notes: Standing water as small stream as well as in microlows | |
| 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): 10 | |
| Saturation Present (Y/N): (includes capillary fringe) Y | Depth (in): 5 | EC: 46 µS stream 55 µS soil pit |

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 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) 10 Sapling (<5 dbh, <6m tall) 0 Tall shrub (2-6m) 55 Short shrub (0.5-2m) 5 Dwarf shrub (<0.5m) 0 Tall herb (≥1m) 15 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___ <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___ 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___ 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___ Return Interval 2-5 yrs X Return Interval >5 yrs___

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

**Water pH (P):** No surface water___ Circumneutral (5.5-7.4) X Alkaline (>7.4)___ Acid (<5.5)___ **pH Reading** 7.25

**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)___ 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: W105T1006 Field Target: 179 Date: 5/24/15

*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] 5/24/16

Wetland Scientist (print) — Signature / Date

X Brian Strong — X [signature] 5/24/16

Field Crew Chief (print) — Signature / Date

# WETLAND DETERMINATION DATA FORM

| SITE DESCRIPTION | | | |
|---|---|---|---|
| Survey Type: Centerline___ Access Road (explain) X Other (explain)_____ | | Field Target: 178 | Map #: UV2 Map Date: 5/20/16 |
| Date: 5/24/16 | Project Name: Alaska LNG | Feature Id: W105T1007 | |
| Investigators: BS, SA, VW | | | Team No.: W105 |
| State: Alaska | Region: Alaska | Milepost: 751 | |
| Latitude: 61° 19' 6.64" | Longitude: 151° 3' 22.21" | | Datum: WGS84 |
| Logbook No.: 1 | Logbook Page No.: 8 | Picture No.: W105T1007_veg_veg_pit_plug | |

| SITE PARAMETERS | |
|---|---|
| Subregion: Southcentral | Landform (hillslope, terrace, hummocks, etc.): Undulating |
| Slope (%): 0-3 | Local relief (concave, convex, none): slightly concave |
| Pre-mapped Alaska LNG/NWI classification: Upland | Evidence of Wildlife Use: moose feces |
| Are climatic/hydrologic conditions on the site typical for this time of year? Yes α 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 Y (If yes, explain in Notes.) Positive alpha alpha |

| 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/FO1B |
| Wetland Hydrology Present? Yes X No_____ | Alaska Vegetation Classification (Viereck): I C 3, II B 2 |

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

Small upland inclusions on mounds rising 2-3' above more flat to slightly concave areas. Mostly wetland.

# WETLAND DETERMINATION DATA FORM

**VEGETATION** (use scientific names of plants)

| Tree Stratum (Plot sizes: 50 r ) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Betula neoalaskana | 12 | Y | Fac |
| 2. Picea glauca | 18 | Y | FacU |
| 3. | | | |
| 4. | | | |

*polygon = woodland not consistent w/ Data collected

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. Menziesia ferruginea | 15 | Y | FacU |
| 2. Viburnum edule | 4 | | FacU |
| 3. Oplopanax horridus | 1 | | FacU |
| 4. Alnus viridis | 10 | Y | Fac |
| 5. Vaccinium ovalifolium | 5 | | Fac |
| 6. Picea glauca | 1 | | Fac |
| 7. Betula neoalaskana | 1 | | Fac |
| 8. | | | |
| 9. | | | |

Total Cover: 37

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

**Dominance Test worksheet:**

No. of Dominant Species that are OBL, FACW, or FAC: 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: | 12 | X 2 = | 24 |
| FAC species | 82 | X 3 = | 246 |
| FACU species | 41 | X 4 = | 164 |
| UPL species | — | X 5 = | — |
| Column Totals: | 135 (A) | | 434 (B) |

PI = B/A = 3.2

**VEGETATION** (use scientific names of plants)

| Herb Stratum ( 26 ) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Equisetum arvense | 30 | Y | Fac |
| 2. Calamagrostis canadensis | 15 | Y | Fac |
| 3. Viola | 3 | | ~~FacW~~ |
| 4. Athyrium cyclosorum | 3 | | Fac |
| 5. gymnocarpium cyclosorum | 3/ | | Fac |
| 6. Geranium erianthum | 1/ | | FacU |
| 7. Streptopus amplexifolius | 2/ | | FacU |
| 8. Rubus pedatus | 4/ | | FacW |
| 9. Trientalis europea | T | | FacU |
| 10. Sanguisorba | 2 | | Fac |

~~Sanguisorba~~

Total Cover: 68

Pyrola sp. 4 50% of total cover: 34 20% of total cover: 13.6

Impatiens noli-tangere 3/ FacW

Angelica genuflexa 2/ FacW

Chamaenerion angustifolium T FacU

**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

5 % Cover of Wetland Bryophytes Sphagnum Liverwort

5 Total Cover of Bryophytes

0 % Cover of Water

**Hydrophytic Vegetation Present (Y/N):** Y

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

*Viola I.D. not concrete, but assuming FacW due to probable I.D.

*Sanguisorba I.D. not conc. but assumed Fac. since it could be FacW or Fac.

W10ST1007

# WETLAND DETERMINATION DATA FORM

5/24/16 Y

| SOIL | Date 5/24/16 | 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) | % | Type[1] | Loc[2] | Texture | Notes |
|---|---|---|---|---|---|---|---|---|---|
| A1 | 0-6 | 10yr 2/2 | 99 | 10yr 4/1 | 1 | D | | MicSil | alpha alpha positive |
| A2 | 6-10.5 | 10yr 2/2 | 90 | 5yr 4/6 | 8 | C | PL | MicSil | saturated, alpha alpha positive |
| | | | | 10yr 4/1 | 2 | D | PL | | |
| B1 | 10.5-13.5 | 10yr 3/1 | 97 | 10yr 4/1 | 2 | D | PL | MicSil | |
| | | | | 5yr 3/3 | 5 | C | PL | | |
| B2 | 13.5-18.5 | 10yr 5/4 | 100 | | | | | vfSal | massive-restrictive layer, alpha pos |
| B3 | 18.5-22+ | 2.4y 4/3 | 100 | | | | | vfSal | " " " " |

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

| HYDRIC SOIL INDICATORS | | INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3] |
|---|---|---|
| Histosol or Histel (A1) N | Alaska Gleyed (A13) N | Alaska Color Change (TA4)[4] N |
| Histic Epipedon (A2) N | Alaska Redox (A14) N | Alaska Alpine Swales (TA5) N |
| Black Histic (A3) N | Alaska Gleyed Pores (A15) N | Alaska Redox with 2.5Y Hue N |
| Hydrogen Sulfide (A4) N | | Alaska Gleyed without 5Y Hue or Redder Underlying Layer N |
| Thick Dark Surface (A12) N | | Other (Explain in Notes) Alpha alpha positive 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: Y massive, firm vfSal Depth (inches): 13.5

**Hydric Soil Present (Y/N):** _____

Notes: Water perching over massive, firm vfSal layer.

| HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient) | | SECONDARY INDICATORS (2 or more required) | |
|---|---|---|---|
| Surface Water (A1) N | Surface Soil Cracks (B6) N | Water-stained Leaves (B9) 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) N |
| Saturation (A3) Y | Sparsely Vegetated Concave Surface (B8) N | Oxidized Rhizospheres along Living Roots (C3) N | Shallow Aquitard (D3) Y |
| Water Marks (B1) N | Marl Deposits (B15) N | Presence of Reduced Iron (C4) Y | Microtopographic Relief (D4) 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: Epi saturated | |
| 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): 11 | | |
| Saturation Present (Y/N): (includes capillary fringe) Y | Depth (in): 6 | EC: 50 µS pH 6.1 | surface water just outside plot |

Notes: Surface water just outside of the plot. EC 42µS pH 6.0 soil pit

# 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)_30_ Sapling (<5 dbh, <6m tall)_5_ Tall shrub (2-6m)_25_ Short shrub (0.5-2m)_5_ Dwarf shrub (<0.5m) _0_ Tall herb (≥1m) _5_ Short herb (<1m) _30_ Moss-Lichen_0_ Floating_0_ Submerged_0_

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

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

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

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

**Presence of Islands (M):** Absent (none) _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_X_ Continuous Cover_____

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

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

**HGM Class (P):** Slope_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** _6.1_

**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%)_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: Brian S. W. GPS Technician QA/QC check:

## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W105T1007 Field Target: 178 Date: 5/24/16

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. **Photos**

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

X Jennifer Anderson X 5/24/16

Wetland Scientist (print) Signature / Date

X Bryan Strong X 5/24/16

Field Crew Chief (print) Signature / Date

# WETLAND DETERMINATION DATA FORM

| SITE DESCRIPTION | | | |
|---|---|---|---|
| Survey Type: Centerline X Access Road (explain)____ Other (explain)_____ | | Field Target: 273 | Map #: 50 Map Date: 6.9.16 |
| Date: 6/28/16 | Project Name: Alaska LNG | | Feature Id: W106AY001 |
| Investigators: Jessie Brownlee, Kaley Volper | | | Team No.: W106 |
| State: Alaska | Region: Alaska | Milepost: 348.3 | |
| Latitude: 65.9557853° | | Longitude: -149.9448173° | Datum: WGS84 |
| Logbook No.: 2 | Logbook Page No.: 11 | Picture No.: P_W106AY001_001 thru 004 | |

| SITE PARAMETERS | |
|---|---|
| Subregion: Ray Mountains | Landform (hillslope, terrace, hummocks, etc.): Lowland |
| Slope (%): 3-5 | Local relief (concave, convex, none): Flat |
| Pre-mapped Alaska LNG/NWI classification: PSS1/4B | 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: PSS4/1B |
| 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.

Stunted Black spruce open forest with thick feather moss and diverse shrub community. a few deep holes around w/ 3" water pooling. Soil saturated @ 7" w/ frost @ 9". Mineral soil and positive OX throughout. On transect from car, we passed a swale in the upland that needs to be corrected and is on map.

# WETLAND DETERMINATION DATA FORM

W106AY001

**VEGETATION** (use scientific names of plants)

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

Total Cover: _____

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

| Sapling/Shrub Stratum (26') | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Picea Mariana | 40 | Y | FACW |
| 2. vaccinium uliginosum | 20 | Y | FAC |
| 3. vaccinium vitis-idaea | 10 | | FAC |
| 4. Rhododendrum groenlandicum | 5 | | FAC |
| 5. Rosa acicularis | 2 | | FACU |
| 6. Dasiphora fruticosa | T | | FAC |
| 7. Arctous rubra | 3 | | FAC |
| 8. Salix ~~pulchra~~ glauca | 3 | | FAC |
| 9. Salix pulchra | T | | FACW |

Total Cover: 83

50% of total cover: 41.5 20% of total cover: 16.6

**Dominance Test worksheet:**

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

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

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

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: |
|---|---|---|
| OBL species: | 0 | X 1 = 0 |
| FACW species: | 40 | X 2 = 80 |
| FAC species | 56 | X 3 = 168 |
| FACU species | 2 | X 4 = 8 |
| UPL species | 0 | X 5 = 0 |
| Column Totals: | 98 (A) | 256 (B) |

PI = B/A = 2.6

| | | | | |
|---|---|---|---|---|
| Empetrum nigrum | S | T | | FAC |
| Equisetum scirpoides | F | T | | FACU |

**VEGETATION** (use scientific names of plants)

| Herb Stratum (26') | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Calamagrostis canadensis | 4 | Y | FAC |
| 2. Pyrola grandiflora | T | | FAC |
| 3. Carex bigelowii | 8 | Y | FAC |
| 4. Rubus chamaemorus | T | | FACW |
| 5. Calamagrostis lapponica | 2 | | FAC |
| 6. Petasites frigidus | T | | FACW |
| 7. mertensia paniculata | T | | FACU |
| 8. pyrola asarifolia | T | | FAC |
| 9. Saussurea angustifolia | T | | FAC |
| 10. | | | |

Total Cover: 15

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

**Hydrophytic Vegetation Indicators:**

Y Dominance Test is > 50%

Y Prevalence Index is ≤ 3.0

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

— Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

5 % Cover of Wetland Bryophytes

100 Total Cover of Bryophytes

0.5 % Cover of Water

**Hydrophytic Vegetation Present (Y/N):** Y

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

# WETLAND DETERMINATION DATA FORM

W106AY001

6.28.16

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

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

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox % | Type[1] | Loc[2] | Texture | Notes |
|---|---|---|---|---|---|---|---|---|
| Oi 0-5 | | | | | | | | Dry Feather mos' |
| Oe 5-7 | | | | | | | | Damp organics |
| Oa 7-9 | | | | | | | Muck | Saturated organic Oa |
| Bwf 9-+ | 10YR 3/2 | 90 | 7.5YR 4/4 | 10 | Con | M RC | Silt | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced 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) Y | Alaska Redox (A14) — | Alaska Alpine Swales (TA5) — |
| Black Histic (A3) — | Alaska Gleyed Pores (A15) — | Alaska Redox with 2.5Y Hue — |
| Hydrogen Sulfide (A4) — | | Alaska Gleyed without 5Y Hue or Redder Underlying Layer — |
| Thick Dark Surface (A12) — | | Other (Explain in Notes) X |

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

Restrictive Layer (if present): Type: Y Depth (inches): 9

**Hydric Soil Present (Y/N):** Y

Notes: Positive XX throughout mineral. Small pockets of Muck in the Oa horizon.

| HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient) | | SECONDARY INDICATORS (2 or more required) | |
|---|---|---|---|
| Surface Water (A1) Small pocket Y | Surface Soil Cracks (B6) N | Water-stained Leaves (B9) N | Stunted or Stressed Plants (D1) Y |
| High Water Table (A2) N | Inundation Visible on Aerial Imagery (B7) N | Drainage Patterns (B10) N | Geomorphic Position (D2) Y |
| Saturation (A3) Y | Sparsely Vegetated Concave Surface (B8) N | Oxidized Rhizospheres along Living Roots (C3) — | Shallow Aquitard (D3) Y |
| Water Marks (B1) N | Marl Deposits (B15) N | Presence of Reduced Iron (C4) Y | Microtopographic Relief (D4) Y |
| Sediment Deposits (B2) N | Hydrogen Sulfide Odor (C1) N | Salt Deposits (C5) N | FAC-Neutral Test (D5) 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): N | Depth (in): — | |
| Saturation Present (Y/N): (includes capillary fringe) Y | Depth (in): 7 | EC: 102 |

Notes:

W106AY001

# 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) 0 Sapling (<5 dbh, <6m tall) 40 Tall shrub (2-6m) 0 Short shrub (0.5-2m) 20 Dwarf shrub (<0.5m) 20 Tall herb (≥1m) 0 Short herb (<1m) 10 Moss-Lichen 10 Floating 0 Submerged 0

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

**Vegetation Density/Dominance (P)**: Sparse (0-20%)____ Low Density (20-40%)____ Medium Density (40-60%)____ 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____ 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.)____ 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** 5.58

**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%) 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: JBrownlee

GPS Technician QA/QC check: KN

## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106AY001 Field Target: 273 Date: 6-28-16

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. **Photos**

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

X Haley Volper X Haley Volper 6-30-16

Wetland Scientist (print) Signature / Date

X J Brownlee X 6.28.16

Field Crew Chief (print) Signature / Date

# WETLAND DETERMINATION DATA FORM

| SITE DESCRIPTION | | | |
|---|---|---|---|
| Survey Type: Centerline___ Access Road (explain) X Other (explain)___ | | Field Target: 274 | Map #: 49 Map Date: 6.9.16 |
| Date: 6.28.16 | Project Name: Alaska LNG | | Feature Id: W106AY002 |
| Investigators: Jessie Brownlee, Kaley Volper | | | Team No.: W106 |
| State: Alaska | Region: Alaska | Milepost: 3.45 | |
| Latitude: 65.988747 | | Longitude: -150.012992 | Datum: WGS84 |
| Logbook No.: 2 | Logbook Page No.: 12 | Picture No.: P_W106AY002_001 thru 004 | |

| SITE PARAMETERS | |
|---|---|
| Subregion: Raymountains | Landform (hillslope, terrace, hummocks, etc.): Hillside |
| Slope (%): 5-8 | Local relief (concave, convex, none): Convex |
| Pre-mapped Alaska LNG/NWI classification: U \| C1 | 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.) |

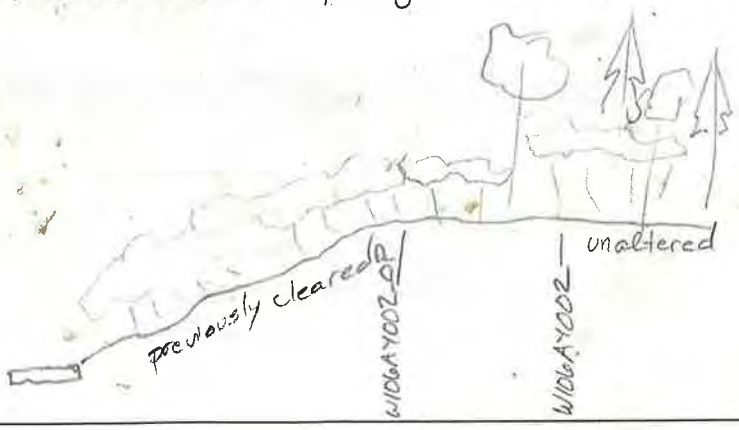
| SUMMARY OF FINDINGS | |
|---|---|
| Hydrophytic Vegetation Present? Yes___ No X | Is the Sampled Area within a Wetland? Yes___ No X |
| Hydric Soil Present? Yes___ No X | Wetland Type: U |
| Wetland Hydrology Present? Yes___ No X | Alaska Vegetation Classification (Viereck): 1C2, 11B2 |

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

FT was placed inbetween two signatures & therefor moved to capture the U:1C2, 11B2 ~~FT placed in the previously cleared U:11B~~

Site is dry hillside w/ open Betneo Pic Cola forest w/ Alder understory & Dense Equ Syl. Soil Dry, platey and lacking features. Frost @ 25"

~~Walked entire~~ All of area from Road to Target was Dry



# WETLAND DETERMINATION DATA FORM W106AY002

**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. Betula Neoalaskana | 30 | Y | FACU |
| 3. | | | |
| 4. | | | |
| Total Cover: 60 | | | |
| 50% of total cover: 30 | 20% of total cover: 12 | | |

| Sapling/Shrub Stratum (26) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. vaccinium vitis-idaea | 15 | Y | FAC |
| 2. Rosa acicularis | 15 | Y | FACU |
| 3. Spiraea stevenii | 2 | | FACU |
| 4. Linnaea borealis | 1 | | FACU |
| 5. Alnus viridis fruticosa | 30 | Y | FAC |
| 6. Ribes triste | T | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| Total Cover: 63 | | | |
| 50% of total cover: 31.5 | 20% of total cover: 12.6 | | |

**Dominance Test worksheet:**

No. of Dominant Species that are OBL, FACW, or FAC: 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: | 0 | X 2 = | 0 |
| FAC species | 80 | X 3 = | 240 |
| FACU species | 84 | X 4 = | 336 |
| UPL species | 0 | X 5 = | 0 |
| Column Totals: | 164 (A) | | 576 (B) |

PI = B/A = 3.5

**VEGETATION** (use scientific names of plants)

| Herb Stratum (26) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Equisetum sylvaticum | 35 | Y | FAC |
| 2. Mertensia paniculata | 3 | | FACU |
| 3. Geocaulon lividum | 2 | | FACU |
| 4. Spinulum annotinum | 1 | | FACU |
| 5. Grass sp | 1 | | — |
| 6. Stellaria sp | T | | — |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| Total Cover: 42 | | | |
| 50% of total cover: 21 | 20% of total cover: 8.4 | | |

**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

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

W106AY002

6.28.16

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

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

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox % | Type[1] | Loc[2] | Texture | Notes |
|---|---|---|---|---|---|---|---|---|
| Oi 0-6 | | | | | | | | Dry feathermoss |
| A 6-8 | 10YR 2/1 | 100 | | | | | Loam | |
| Bw 8-24 | 10YR 4/2 | 60 | | | | | Silt | |
| | 10YR 3/2 | 40 | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

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

| HYDRIC SOIL INDICATORS | | INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3] |
|---|---|---|
| Histosol or Histel (A1) 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: Frost @ 25"

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

WI06A4002

# 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: KN

JBrownlee

## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106AY002 Field Target: 274 Date: 6.28.16

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. **Photos**

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

X Haley Volper X Haley Volper 6-30-16

Wetland Scientist (print) Signature / Date

X JBrownlee X 6.28.18

Field Crew Chief (print) Signature / Date

# WETLAND DETERMINATION DATA FORM

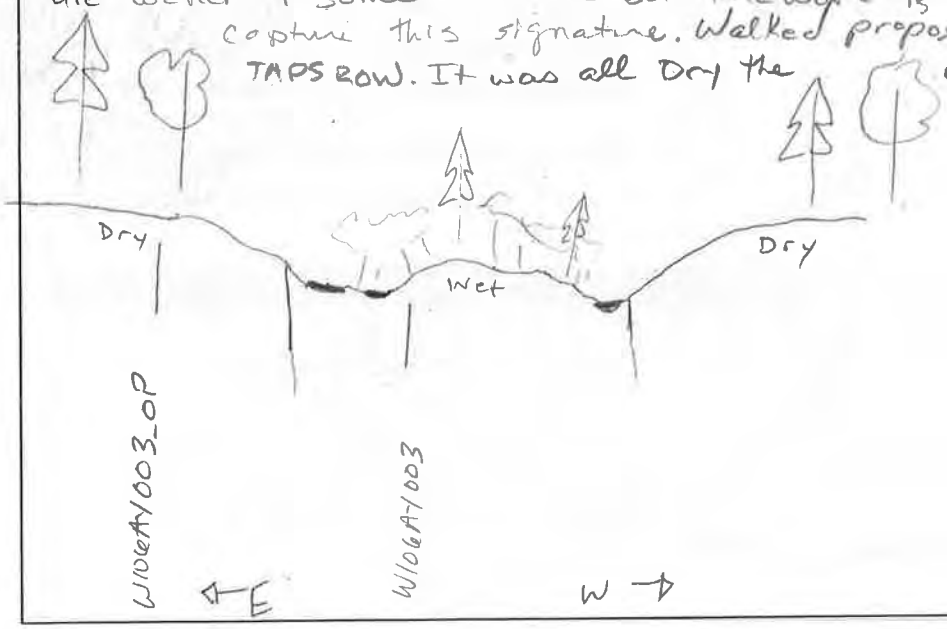
| SITE DESCRIPTION | | | |
|---|---|---|---|
| Survey Type: Centerline___ Access Road (explain) X Other (explain)_____ | | Field Target: 275 | Map #: 48 Map Date: 6.9.16 |
| Date: 6.29.~~30~~ 16 KV | Project Name: Alaska LNG | | Feature Id: W106AY003 |
| Investigators: Jessie Brownlee, Kaley Volper | | | Team No.: W106 |
| State: Alaska | Region: Alaska | Milepost: 344.8 | |
| Latitude: 65.999298° | | Longitude: -150.01083149° | Datum: WGS84 |
| Logbook No.: 2 | Logbook Page No.: 14 | Picture No.: P_W106AY003_001 thru 004 | |

| SITE PARAMETERS | |
|---|---|
| Subregion: Ray mountains | Landform (hillslope, terrace, hummocks, etc.): Swale |
| Slope (%): 10-15 | Local relief (concave, convex, none): concave |
| Pre-mapped Alaska LNG/NWI classification: PSS1/4B | Evidence of Wildlife Use: Moose hair + 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: PSS1/4B |
| Wetland Hydrology Present? Yes X No_____ | Alaska Vegetation Classification (Viereck): 1A3, 11B2 |

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

Long Walk in! Tiny stream channels that run through the polygon. Some areas in polygon are wetter + some are drier but line work is good. Plot size adjusted to capture this signature. Walked proposed road centerline back to TAPS ROW. It was all Dry the entire way on Center Line. Water in stream goes subsurface in plot and Not sure where it expresses again.



# WETLAND DETERMINATION DATA FORM

W106AY003

**VEGETATION** (use scientific names of plants)

| Tree Stratum (Plot sizes: 100') | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Picea Mariana | 5 | Y | FACW |
| 2. | | | |
| 3. | | | |
| 4. | | | |

Total Cover: 5

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

| Sapling/Shrub Stratum (26') | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Alnus viridis fruticosa | 24 | Y | FAC |
| 2. Vaccinium uliginosum | 20 | Y | FAC |
| 3. Dasiphora fruticosa | 2 | | FAC |
| 4. Empetrum nigrum | 4 | | FAC |
| 5. Rhododendrum groenlandicum | 8 | | FAC |
| 6. Betula ~~nana~~ glandulosa | 6 | | FAC |
| 7. Salix pulchra | 5 | | FACW |
| 8. Salix bebbiana | 8 | | FAC |
| 9. Picea Mariana | 10 | | FACW |

Total Cover: 87

50% of total cover: 43.5 20% of total cover: 17.4

**Dominance Test worksheet:**

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

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

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

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: |
|---|---|---|
| OBL species: | 0 | X 1 = 0 |
| FACW species: | 20 | X 2 = 40 |
| FAC species | 83 | X 3 = 249 |
| FACU species | – | X 4 = – |
| UPL species | 0 | X 5 = 0 |
| Column Totals: | 103 (A) | 289 (B) |

PI = B/A = 2.8

2.8
103 289.0
206
830
824

**VEGETATION** (use scientific names of plants)

| Herb Stratum (2') | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Equisetum sylvaticum | 8 | Y | FAC |
| 2. Dock | T | | – |
| 3. Carex | 1 | | – |
| 4. Calamagrostis canadensis | 3 | Y | FAC |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |

Total Cover: 12

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

**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.

5 % Bare Ground

5 % Cover of Wetland Bryophytes

30 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

6.29.30

W106A4003

**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 |
|---|---|---|---|---|---|---|---|---|
| C 0-10 | 10YR 4/2 | 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) 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: Neg AA. Ponded & flooded for >2 consecutive weeks in the growing season.

| 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) Y | Marl Deposits (B15) N | Presence of Reduced Iron (C4) N | Microtopographic Relief (D4) N |
| Sediment Deposits (B2) Y | Hydrogen Sulfide Odor (C1) N | Salt Deposits (C5) N | FAC-Neutral Test (D5) Y |
| Drift Deposits (B3) Y | Dry-Season Water Table (C2) N | Notes: | |
| Algal Mat or Crust (B4) ~~Y~~ N | Other (Explain in Notes): | | |
| Iron Deposits (B5) N | | | |

| | | | |
|---|---|---|---|
| Surface Water Present (Y/N): Y | Depth (in): ~~3~~ 4 | **Wetland Hydrology Present (Y/N):** Y | |
| Water Table Present (Y/N): Y | Depth (in): ~~3~~ Ø | | |
| Saturation Present (Y/N): (includes capillary fringe) Y | Depth (in): Ø | **EC:** 176 | |

Notes:

W1D6AY003

# AQUATIC SITE ASSESSMENT DATA FORM

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

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

**Percent Cover (P):** Tree (>5 dbh, >6m tall)_5_ Sapling (<5 dbh, <6m tall)_10_ Tall shrub (2-6m)_25_ Short shrub (0.5-2m)_20_ Dwarf shrub (<0.5m) _20_ Tall herb (≥1m)_0_ Short herb (<1m) _5_ Moss-Lichen_5_ Floating_0_ Submerged_0_

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

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

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

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

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

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

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

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

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

**SOIL VARIABLES**

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

**HYDROLOGIC VARIABLES**

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

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

**Evidence of Sedimentation (P):** No Evidence Observed_____ Sediment Observed on Wetland Substrate_X_ 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_X_

**Water pH (P):** No surface water_____ Circumneutral (5.5-7.4)_X_ Alkaline (>7.4)_____ Acid (<5.5)_____ **pH Reading** 6.47

**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)_✓_

**Watershed Land Use:** 0-5% Rural_✓_ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

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

Crew Chief QA/QC check: JBrownlee

GPS Technician QA/QC check: KV

## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106AY003 Field Target: 275 Date: 6.27.16

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. **Photos**

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

X Haley Valper — Wetland Scientist (print)

X Haley Valper 6-29-16 — Signature / Date

X JBrownlee — Field Crew Chief (print)

X [signature] 6.29.16 — Signature / Date

W106AY004

# WETLAND DETERMINATION DATA FORM

| SITE DESCRIPTION | | | |
|---|---|---|---|
| Survey Type: Centerline____ Access Road (explain)____ Other (explain) X | | Field Target: 276 | Map #: 47 Map Date: 6.9.16 |
| Date: 6.29.16 | Project Name: Alaska LNG | | Feature Id: W106AY004 |
| Investigators: Jessie Brownlee, Kaley Volper | | | Team No.: W106 |
| State: Alaska | Region: Alaska | Milepost: 342.4 | |
| Latitude: 66° 0' 54.497" N | Longitude: 150° 5' 38.227" W | | Datum: WGS84 |
| Logbook No.: 2 | Logbook Page No.: 14 | Picture No.: P_W106AY004_001 thru 004 | |

| SITE PARAMETERS | |
|---|---|
| Subregion: Ray mountains | Landform (hillslope, terrace, hummocks, etc.): Hillside |
| Slope (%): 10-15 | Local relief (concave, convex, none): ~~Slightly~~ undulating |
| Pre-mapped Alaska LNG/NWI classification: U 1/C/ | 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_____ No X |
| Hydric Soil Present? Yes_____ No X | Wetland Type: U |
| 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.

Open Pic Mar forest w/ most being less than 3" DBH & under 20' tall. Thick moss covering & raindeer lichen.
Walked to 276 & did op which was dry. on transect to here we crossed the R4SB which was currently dry but showed evidence of seasonal flow. Dug a second hole @ toe slope above road and it was not much different. No Frost w/in 16" but thixosol w/ same colors & concentrations and saturated the way thixo soils always are.

# WETLAND DETERMINATION DATA FORM

W106AY004

**VEGETATION** (use scientific names of plants)

| Tree Stratum (Plot sizes: 100') | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Picea Mariana | 10 | Y | FACW |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| Total Cover: 10 | | | |
| 50% of total cover: 5 | 20% of total cover: 2 | | |

| Sapling/Shrub Stratum (26') | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Alnus viridis fruticosa 45' | 20 | Y | FAC |
| 2. Picea mariana | 20 | Y | FACW |
| 3. Rhododendron groenlandicum | 15 | | FAC |
| 4. Rhododendron tomentosum | 15 | | FAC |
| 5. Vaccinium uliginosum | 5 | | FAC |
| 6. Vaccinium vitis-idaea | 20 | Y | FAC |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| Total Cover: 95 | | | |
| 50% of total cover: 47.5 | 20% of total cover: 19 | | |

**Dominance Test worksheet:**

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

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

% Dominant Species that are OBL, FACW, or FAC: 85.7 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species: | 0 | X 1 = | 0 |
| FACW species: | 30 | X 2 = | 60 |
| FAC species | 81 | X 3 = | 243 |
| FACU species | 4 | X 4 = | 16 |
| UPL species | 0 | X 5 = | 0 |
| Column Totals: | 115 (A) | | 319 (B) |

PI = B/A = 2.77

**VEGETATION** (use scientific names of plants)

| Herb Stratum (26') | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Geocaulon lividum | 4 | Y | FACU |
| 2. Petasites frigidus | T | | FACW |
| 3. Equisetum sylvaticum | 3 | Y | FAC |
| 4. Carex | 1 | | |
| 5. Calamagrostis lapponica | 3 | Y | FAC |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| Total Cover: 11 | | | |
| 50% of total cover: 5.6 | 20% of total cover: 2.2 | | |

**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.

Ø % Bare Ground

30 % Cover of Wetland Bryophytes

100 Total Cover of Bryophytes + raindeer lichen

Ø % Cover of Water

**Hydrophytic Vegetation Present (Y/N):** Y

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

W10GAY004

# WETLAND DETERMINATION DATA FORM

6.29.14

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

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

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox % | Type[1] | Loc[2] | Texture | Notes |
|---|---|---|---|---|---|---|---|---|
| Oi 0-4 | | | | | | | | Dry feather moss |
| Aa 4-6 | | | | | | | | Damp organics |
| A 6-8 | 10YR 3/2 | 100 | | | | | silt loam | |
| Bwl 8-10 | 10YR 4/2 | 75 | 5Y 5/1 | 10 | Dep | M | gravelly silt | |
| | | | 7.5YR 5/6 | 15 | Con | M | | |
| Bwlf 10-+ | Same as Bwl | | | | | | | |
| | | | | | | | | |

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

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

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

Restrictive Layer (if present): Type: Frost Depth (inches): 10

**Hydric Soil Present (Y/N):** N

Notes: Major Ice lenses sitting Between A & Bwl horizons
Spotty positive ~~xx~~ only in the depletions of the 2" Bwl & Not in Bwlf or elsewhere. Not enough to apply reducing 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) 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) spotty in depletions only | Microtopographic Relief (D4) N |
| Sediment Deposits (B2) N | Hydrogen Sulfide Odor (C1) N | Salt Deposits (C5) N | FAC-Neutral Test (D5) Y |
| Drift Deposits (B3) N | Dry-Season Water Table (C2) N | Notes: | |
| Algal Mat or Crust (B4) N | Other (Explain in Notes): N | | |
| Iron Deposits (B5) N | | | |

| | | |
|---|---|---|
| Surface Water Present (Y/N): N | Depth (in): — | **Wetland Hydrology Present (Y/N):** Y |
| Water Table Present (Y/N): N | Depth (in): — | |
| Saturation Present (Y/N): (includes capillary fringe) Y | Depth (in): 7 | EC: — |

Notes:

W106A7D04

# 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: J Brownlee

GPS Technician QA/QC check: KV

## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106A-Y004 Field Target: 276 Date: 6.29.16

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. **Photos**

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

X Haley Volper — Wetland Scientist (print)

X Haley Volper 6-29-16 — Signature / Date

X JBrownlee — Field Crew Chief (print)

X [signature] 6-29-16 — Signature / Date

# WETLAND DETERMINATION DATA FORM

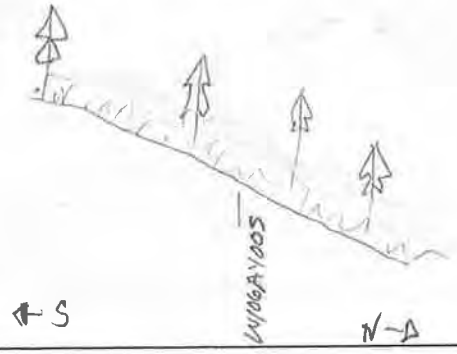
| SITE DESCRIPTION | | | |
|---|---|---|---|
| Survey Type: Centerline___ Access Road (explain)_____ Other (explain) X | | Field Target: 277 | Map #: 46 Map Date: 6.9.16 |
| Date: 6.30.16 | Project Name: Alaska LNG | | Feature Id: W106AY005 |
| Investigators: Jessie Brownlee Kaley Volper | | | Team No.: W106 |
| State: Alaska | Region: Alaska | Milepost: 299.5 | |
| Latitude: 66.5344977° | Longitude: -150.744985° | | Datum: WGS84 |
| Logbook No.: 2 | Logbook Page No.: 15 | Picture No.: P_W106AY005-001 thru 004 | |

| SITE PARAMETERS | |
|---|---|
| Subregion: Ray Mountains | Landform (hillslope, terrace, hummocks, etc.): Hillside |
| Slope (%): 15-20 | Local relief (concave, convex, none): slightly convex |
| Pre-mapped Alaska LNG/NWI classification: U | Evidence of Wildlife Use: ~~none~~ game bird droppings KV |
| Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes) | Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.) |
| Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed? | No X (If yes, explain in Notes) |
| Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic? | No X (If yes, explain in Notes.) |

| SUMMARY OF FINDINGS | |
|---|---|
| Hydrophytic Vegetation Present? Yes X No_____ | Is the Sampled Area within a Wetland? Yes X No_____ |
| Hydric Soil Present? Yes X No_____ | Wetland Type: PFO4/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.

Open Picea Mar forest w/ about ½ trees being saplings and other half ~20' tall. Low diversity of shrubs and forb/herbs. Thick pillows of feather moss & small pockets of sphagnum. Hillside w/ slope ~15-20% slight seeping down slope causes 8" organic on up slope side of pit & only 6" on down slope side. Bw1 from 6-8" shows evidence of being saturated w/ Band of depletions & strong concentrations. Bw2 is drier but 2.5Y page but very few & faint concentrations. only the depletions go positive αα but not enough to make indicator
Area is marginal but enough evidence to call wet



# WETLAND DETERMINATION DATA FORM

W106AY005

**VEGETATION** (use scientific names of plants)

| Tree Stratum (Plot sizes: 100) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Picea mariana tallest ~25' | 15 | Y | FACW |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| Total Cover: 15 | | | |
| 50% of total cover: 7.5 | 20% of total cover: 3 | | |

| Sapling/Shrub Stratum (26) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Picea mariana | 15 | Y | FACW |
| 2. Rhododendron tomentosum | 35 | Y | FACW |
| 3. Vaccinium uliginosum | 10 | | FAC |
| 4. Betula nana | 10 | | FAC |
| 5. Vaccinium vitis-idaea | 15 | Y | FAC |
| 6. Spiraea stevenii | 3 | | FACU |
| 7. Alnus viridis fruticosa | 4 | | FAC |
| 8. Betula neoalaskana (Hybrid) | 3 | | FAC |
| 9. Salix pulchra | 3 | | FACW |
| Total Cover: 100 | | | |
| 50% of total cover: 50 | 20% of total cover: 20 | | |

**Dominance Test worksheet:**

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

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

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

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species: | 0 | X 1 = | 0 |
| FACW species: | 72 | X 2 = | 144 |
| FAC species | 64 | X 3 = | 192 |
| FACU species | 3 | X 4 = | 12 |
| UPL species | 0 | X 5 = | 0 |
| Column Totals: | 139 (A) | | 348 (B) |

PI = B/A = 2.5

**VEGETATION** (use scientific names of plants)

| Herb Stratum (26) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Carex bigelowii | 20 | Y | FAC |
| 2. Rubus chamaemorus | 4 | | FACW |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| Total Cover: 24 | | | |
| 50% of total cover: 12 | 20% of total cover: 4.8 | | |

**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.

Ø % Bare Ground

6 % Cover of Wetland Bryophytes

100 Total Cover of Bryophytes

Ø % Cover of Water

**Hydrophytic Vegetation Present (Y/N):** Y

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

# WETLAND DETERMINATION DATA FORM

W106AY005

6-30-16

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

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

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox % | Type[1] | Loc[2] | Texture | Notes |
|---|---|---|---|---|---|---|---|---|
| Oi 0-5 | | | | | | | | Dry feather moss |
| Oe 5-6 | | | | | | | | Damp organics |
| Bw1 6-8 | 2.5Y 5/2 | 60 | 10YR 5/4 | 20 | con | M RC | extremely gravelly silt | Saturated |
| | | | 5Y 5/1 | 20 | Dep | M RL | | Depore formed in a 7" Band throughout |
| Bw2 8-16 | 2.5Y 4/2 | 92 | 10YR 5/3 | 8 | con | M | extremely gravelly silt | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced 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: N Depth (inches): –

**Hydric Soil Present (Y/N):** Y

Notes: Depth of organics varies around. 8" on side of slight seep & 6 on otherside thats drier. Very spotty &X Not 60% of 4". only positive in Depletions

| 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) N |
| Water Marks (B1) N | Marl Deposits (B15) N | Presence of Reduced Iron (C4) Marginal | Microtopographic Relief (D4) N |
| Sediment Deposits (B2) N | Hydrogen Sulfide Odor (C1) N | Salt Deposits (C5) N | FAC-Neutral Test (D5) Y |
| Drift Deposits (B3) N | Dry-Season Water Table (C2) N | Notes: | |
| Algal Mat or Crust (B4) N | Other (Explain in Notes): | | |
| Iron Deposits (B5) N | | | |

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

Notes:

# AQUATIC SITE ASSESSMENT DATA FORM

W10GAY005

## VEGETATION VARIABLES P= Plot, M= Matrix

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

**Percent Cover (P):** Tree (>5 dbh, >6m tall)__15__ Sapling (<5 dbh, <6m tall)__15__ Tall shrub (2-6m)__10__ Short shrub (0.5-2m)__15__ Dwarf shrub (<0.5m) __15__ Tall herb (≥1m) __0__ Short herb (<1m) __20__ Moss-Lichen__10__ Floating__0__ Submerged__0__

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

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

GPS Technician QA/QC check: KV

## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106AY005 Field Target: 277 Date: 6.30.16

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. **Photos**

- [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 — X Haley Volper 7-2-16

Wetland Scientist (print) — Signature / Date

X JBrownlee — X [illegible] 6.30.16

Field Crew Chief (print) — Signature / Date

# WETLAND DETERMINATION DATA FORM

| SITE DESCRIPTION | | | |
|---|---|---|---|
| Survey Type: Centerline___ Access Road (explain) X Other (explain)_____ | | Field Target: 282 | Map #: 41 Map Date: 6.9.16 |
| Date: 6.30.16 | Project Name: Alaska LNG | | Feature Id: W106AY006 |
| Investigators: Jessie Brownlee Kaley Volper | | | Team No.: W106 |
| State: Alaska | Region: Alaska | Milepost: 272.3 | |
| Latitude: 66.8850166° | | Longitude: -150.5186837° | Datum: WGS84 |
| Logbook No.: 2 | Logbook Page No.: 15 | Picture No.: 2_W106AY006_001 thru 004 | |

| SITE PARAMETERS | |
|---|---|
| Subregion: Ray Mountains | Landform (hillslope, terrace, hummocks, etc.): Terrace |
| Slope (%): 0-3% | Local relief (concave, convex, none): Flat |
| 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: PF04/SS1B |
| Wetland Hydrology Present? Yes X No_____ | Alaska Vegetation Classification (Viereck): 1A3, 11C2 |

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

Picea Mar woodland ~15-25' tall and Many saplings. Thick shrub community Dominated by Vac Uli. Thick moss w/ pillows of sphagnum.
Soil shows signs of saturation w/ a water expected to rise to 9".

# WETLAND DETERMINATION DATA FORM

W106AY006

**VEGETATION** (use scientific names of plants)

| Tree Stratum (Plot sizes: 100) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Picea Mariana | 15 | Y | FACW |
| 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. vaccinium uliginosum | 40 | Y | FAC |
| 2. Salix pulchra | 12 | | FACW |
| 3. Picea mariana | 8 | | FACW |
| 4. Betula nana | 8 | | FAC |
| 5. vaccinium vitis-idaea | 5 | | FAC |
| 6. Rhododendron tomentosum | 5 | | FACW |
| 7. Empetrum nigrum | T | | FAC |
| 8. | | | |
| 9. | | | |
| Total Cover: 78 | | | |
| 50% of total cover: 39 | 20% of total cover: 15.6 | | |

**Dominance Test worksheet:**

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

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

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

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species: | 0 | X 1 = | 0 |
| FACW species: | 52 | X 2 = | 104 |
| FAC species | 67 | X 3 = | 201 |
| FACU species | 0 | X 4 = | 0 |
| UPL species | 0 | X 5 = | 0 |
| Column Totals: | 119 (A) | | 305 (B) |

PI = B/A = 2.56

**VEGETATION** (use scientific names of plants)

| Herb Stratum (24) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Rubus chamaemorus | 4 | | FACW |
| 2. Eriophorum vaginatum | 8 | Y | FACW |
| 3. Carex bigelowii | 12 | Y | FAC |
| 4. Calamagrostis lapponica | 2 | | FAC |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| Total Cover: 26 | | | |
| 50% of total cover: 13 | 20% of total cover: 5.2 | | |

**Hydrophytic Vegetation Indicators:**

Y Dominance Test is > 50%

Y Prevalence Index is ≤ 3.0

— Morphological Adaptations[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

40 % Cover of Wetland Bryophytes

100 Total Cover of Bryophytes

Ø % Cover of Water

**Hydrophytic Vegetation Present (Y/N):** Y

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

# WETLAND DETERMINATION DATA FORM

W106AY006

6-30-16

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

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

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox % | Type[1] | Loc[2] | Texture | Notes |
|---|---|---|---|---|---|---|---|---|
| Oe 0-4 | | | | | | | | Damp sphagnum moss |
| Bw1 4-5 | 5YR 3/4 | 100 | | | | | very fine sandy loam | Band of concentrations |
| Bg 5-24 | 5Y 3/1 | 95 | 10YR 3/4 | 5 | con | M | " " | organic material 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) Yes 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 XX starting @ 8" depth and throughout
High in mica

| 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) — | Shallow Aquitard (D3) N |
| Water Marks (B1) N | Marl Deposits (B15) N | Presence of Reduced Iron (C4) Y | Microtopographic Relief (D4) — Didn't record in field.... |
| 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): — | Wetland Hydrology Present (Y/N): Y |
| Water Table Present (Y/N): Y | Depth (in): 9 | |
| Saturation Present (Y/N): (includes capillary fringe) Y | Depth (in): 5 | EC: 27 |

Notes:
water table expected to rise to 9" @ point of seepage but currently @ 14"

# AQUATIC SITE ASSESSMENT DATA FORM

W106AY006

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

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

**Percent Cover (P):** Tree (>5 dbh, >6m tall) 15 Sapling (<5 dbh, <6m tall) 0 Tall shrub (2-6m) 50 Short shrub (0.5-2m) 0 Dwarf shrub (<0.5m) 0 Tall herb (≥1m) 0 Short herb (<1m) 15 Moss-Lichen 20 Floating 0 Submerged 0

**Number of Wetland Types (M):** 3 | **Evenness of Wetland Type Distribution (M):** Even _____ Highly Uneven X Moderately even _____

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

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

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

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

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

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

**Vegetative Interspersion (P):** Low (large patches, concentric rings) 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.)_____ Pronounced (>18in.) X

**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 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** 5.35

**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%) 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: JBrownlee

GPS Technician QA/QC check: KV

## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106A4006 Field Target: 282 Date: 6/30/16

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. **Photos**

- [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 X Haley Volper 7-2-16

Wetland Scientist (print) Signature / Date

X JBrownlee X [illegible] 6.30.16

Field Crew Chief (print) Signature / Date

# WETLAND DETERMINATION DATA FORM

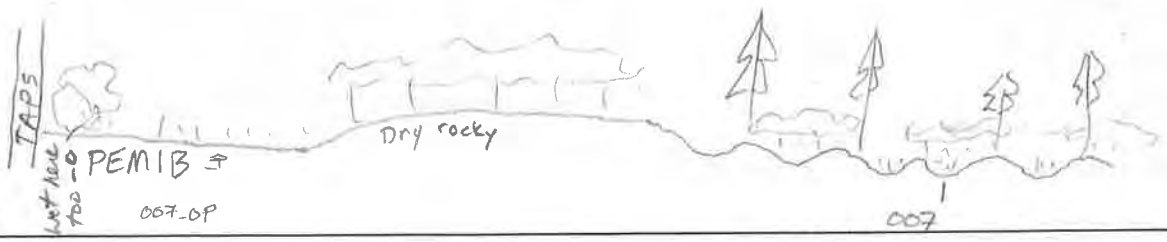
| SITE DESCRIPTION | | | |
|---|---|---|---|
| Survey Type: Centerline___ Access Road (explain)___ Other (explain) X | | Field Target: 286 | Map #: 37 Map Date: 6-9-16 |
| Date: 7-1-16 | Project Name: Alaska LNG | | Feature Id: W106AY007 |
| Investigators: Jessie Brownlee, Kaley Volper | | | Team No.: W106 |
| State: Alaska | Region: Alaska | Milepost: 243.5 | |
| Latitude: 67.2333837° | | Longitude: -150.22644° | Datum: WGS84 |
| Logbook No.: 2 | Logbook Page No.: 16 | Picture No.: P_W106AY007_001 thru 004 | |

| SITE PARAMETERS | |
|---|---|
| Subregion: Brooks Range | Landform (hillslope, terrace, hummocks, etc.): Lowland |
| Slope (%): ~~3~~ 0-3 | Local relief (concave, convex, none): Flat |
| Pre-mapped Alaska LNG/NWI classification: P F04/SS4B | 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): II B 2, I A 3 |

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

Pic Mar woodland w/ Bet Glo understory. Ground is very hummocky w/ plants showing preferential growth for higher ground. Marginal water stained leaves & other hydro indicators that show water ponds in depressions.
Coreat gleyed soil w/ pos XX @ top of mineral.



# WETLAND DETERMINATION DATA FORM

W106AY007

**VEGETATION** (use scientific names of plants)

| Tree Stratum (Plot sizes: 100') | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Picea mariana | 10 | Y | FACW |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| Total Cover: 10 | | | |
| 50% of total cover: 5 | 20% of total cover: 2 | | |

| Sapling/Shrub Stratum (26') | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Betula glandulosa | 40 | Y | FAC |
| 2. Salix pulchra | 5 | | FACW |
| 3. Vaccinium uliginosum | 20 | Y | FAC |
| 4. Chamaedaphne calyculata | T | | FACW |
| 5. Dasiphora fruticosa | 5 | | FAC |
| 6. Rhododendron groenlandicum | 8 | | FAC |
| 7. Picea mariana | 15 | | FAC |
| 8. Arctous rubra | 2 | | FAC |
| 9. Salix bebbiana | 8 | | FAC |
| Total Cover: 107 | | | |
| 50% of total cover: 53.5 | 20% of total cover: 21.4 | | |

**Dominance Test worksheet:**

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

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

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

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: |
|---|---|---|
| OBL species: | 5 | X 1 = 5 |
| FACW species: | 17 | X 2 = 34 |
| FAC species | 115 | X 3 = 345 |
| FACU species | — | X 4 = — |
| UPL species | — | X 5 = — |
| Column Totals: | 137 (A) | 384 (B) |

PI = B/A = 2.80

| | | | | |
|---|---|---|---|---|
| Salix reticulata | S | 2 | | FAC |
| Andromeda polifolia | S | 2 | | FACW |

**VEGETATION** (use scientific names of plants)

| Herb Stratum (26') | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Equisetum arvense | 15 | Y | FAC |
| 2. Carex Microglochin | 5 | Y | OBL |
| 3. Carex sp | 4 | | — |
| 4. Rubus arcticus | T | | FAC |
| 5. grass sp | T | | — |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| Total Cover: 24 | | | |
| 50% of total cover: 12 | 20% of total cover: 4.8 | | |

**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.

Ø % Bare Ground

30 % Cover of Wetland Bryophytes

100 Total Cover of Bryophytes

Ø % Cover of Water

**Hydrophytic Vegetation Present (Y/N):** Y

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

# WETLAND DETERMINATION DATA FORM

W106A1007

7-1-16

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

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

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox % | Type[1] | Loc[2] | Texture | Notes |
|---|---|---|---|---|---|---|---|---|
| Oi 0-2 | | | | | | | | Dry feather moss |
| C 2-25 | 2.5Y 4/1 | 100 | | | | | Silt | sediment deposited |
| Oe 25-5 | | | | | | | | damp organics |
| Bg 5-20 | 10Y 3/1 | 85 | 10YR 4/4 | 15 | con | mat RC | Silt | con also in Band @ interface w/Oe |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced 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) Yes |

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and 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 XX @ mineral surface & throughout
Color of parent material starts out @ 2.5Y or 5Y so feel uncomfortable
Calling A13.

| 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) M | 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) M | 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) 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): — | Wetland Hydrology Present (Y/N): Y |
| Water Table Present (Y/N): N | Depth (in): – | |
| Saturation Present (Y/N): (includes capillary fringe) Y | Depth (in): 8 | EC: — |

Notes:

W106A7007

# 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)_10_ Sapling (<5 dbh, <6m tall)_15_ Tall shrub (2-6m)_40_ Short shrub (0.5-2m)_0_ Dwarf shrub (<0.5m) _10_ Tall herb (≥1m) _0_ Short herb (<1m) _15_ Moss-Lichen_10_ Floating_0_ Submerged_0_

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

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

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

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

**Presence of Islands (M)**: Absent (none) _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.)_____ Pronounced (>18in.)_X_

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

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

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

**Surficial 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: J Brownlee

GPS Technician QA/QC check: KV

## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: IN106AY007 Field Target: 286 Date: 7.1.16

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. **Photos**

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

X Haley Volper X Haley Volper 7-2-16

Wetland Scientist (print) Signature / Date

X J Brownlee X 7.1.16

Field Crew Chief (print) Signature / Date

# WETLAND DETERMINATION DATA FORM

| SITE DESCRIPTION | | | |
|---|---|---|---|
| Survey Type: Centerline____ Access Road (explain)____ Other (explain) X | | Field Target: 285 | Map #: 38 Map Date: 6.9.16 |
| Date: 7-1-16 | Project Name: Alaska LNG | | Feature Id: W106AY008 |
| Investigators: Jessie Brownlee, Kaley Volper | | | Team No.: W106 |
| State: Alaska | Region: Alaska | Milepost: 243.5 | |
| Latitude: 67.229241° | | Longitude: -150.208057° | Datum: WGS84 |
| Logbook No.: 2 | Logbook Page No.: 17 | Picture No.: P_W106AY008_001 thru 004 | |

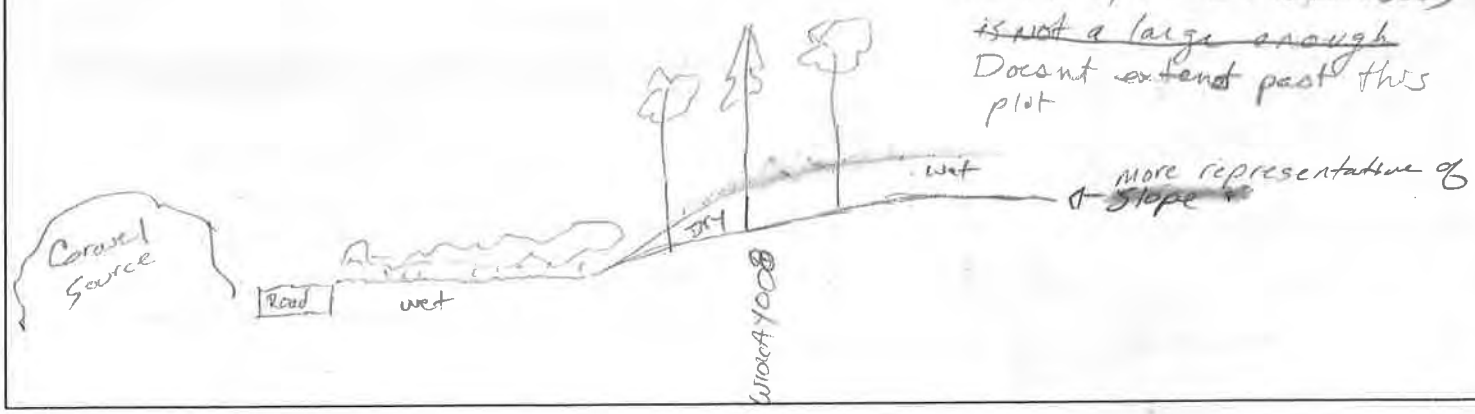
| SITE PARAMETERS | |
|---|---|
| Subregion: Brooks Range | Landform (hillslope, terrace, hummocks, etc.): Hillside |
| Slope (%): 5-10 | Local relief (concave, convex, none): convex |
| Pre-mapped Alaska LNG/NWI classification: PSS1/4B | Evidence of Wildlife Use: ~~NONE~~ KV moose droppings |
| Are 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_____ No X |
| Hydric Soil Present? Yes_____ No X | Wetland Type: U |
| 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.

Mixed woodland w/ Pic Mar & Pic Gla Pop Trem and Bet Neo. Diverse shrub understory
Site is on a Dry slope of ~10%.

NOTE: while 1C2, 11C2 is appropriate for this plot the larger upland polygone should be 1A2, 11C2. Deciduous ~~is not a large enough~~ Doesnt ~~extend~~ past this plot



# WETLAND DETERMINATION DATA FORM

W106AY008

**VEGETATION** (use scientific names of plants)

| Tree Stratum (Plot sizes: 100) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Populus tremuloides | 7 | Y | FACU |
| 2. Picea glauca | 5 | | FACU |
| 3. Picea mariana | 15 | Y | FACW |
| 4. Betula neoalaskana | 3 | | FACU |
| Total Cover: 30 | | | |
| 50% of total cover: 15 | 20% of total cover: 6 | | |

| Sapling/Shrub Stratum (24) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. vaccinium uliginosum | 25 | Y | FAC. |
| 2. vaccinium vitis-idaea | 25 | Y | FAC |
| 3. Rhododendrum tomentosum | 35 | Y | FACW |
| 4. Rhododendrum groenlandicum | 5 | | FAC |
| 5. Betula glandulosa/Nana hybrid | 30 | Y | FAC |
| 6. Salix pulchra | 3 | | FACW |
| 7. Salix glauca | 4 | | FAC |
| 8. Rosa acicularis | 1 | | FACU |
| 9. | | | |
| Total Cover: 128 | | | |
| 50% of total cover: 64 | 20% of total cover: 25.6 | | |

**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: | 0 | X 1 = | 0 |
| FACW species: | 53 | X 2 = | 106 |
| FAC species | 89 | X 3 = | 267 |
| FACU species | 16 | X 4 = | 64 |
| UPL species | 0 | X 5 = | 0 |
| Column Totals: | 158 (A) | | 437 (B) |

PI = B/A = 2.77

**VEGETATION** (use scientific names of plants)

| Herb Stratum (24) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Equisetum sylvaticum | T | | FAC |
| 2. Petasites frigidus | T | | FACW |
| 3. Carex sp | T | | — |
| 4. grass sp | T | | — |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| Total Cover: — | | | |
| 50% of total cover: — | 20% of total cover: — | | |

**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.

Ø % Bare Ground

Ø % Cover of Wetland Bryophytes

80 Total Cover of Bryophytes

Ø % Cover of Water

**Hydrophytic Vegetation Present (Y/N):** Y

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

W10GAY008

# WETLAND DETERMINATION DATA FORM

7.1

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

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

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox % | Type[1] | Loc[2] | Texture | Notes |
|---|---|---|---|---|---|---|---|---|
| Oi 0-4 | | | | | | | | Dry Feathermoss |
| A 4-5 | 10YR 2/2 | 100 | | | | | loam | |
| Bw1 5-6 | 10YR 4/2 | 95 | 2.5Y 4/1 | 5 | D | RC | very gravelly SiLt | |
| Bw2 6-16 | 10YR 4/2 | 97 | 10YR 5/3 | 3 | Con | M | ~~very~~ gravelly SiLt | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced 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: Frost Depth (inches): 16

**Hydric Soil Present (Y/N):** N

Notes: Neg DA 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) Y |
| Water Marks (B1) N | Marl Deposits (B15) N | Presence of Reduced Iron (C4) N | Microtopographic Relief (D4) N |
| Sediment Deposits (B2) N | Hydrogen Sulfide Odor (C1) N | Salt Deposits (C5) N | FAC-Neutral Test (D5) Y |
| Drift Deposits (B3) N | Dry-Season Water Table (C2) N | Notes: | |
| Algal Mat or Crust (B4) N | Other (Explain in Notes): | | |
| Iron Deposits (B5) N | | | |

| | | |
|---|---|---|
| Surface Water Present (Y/N): N | Depth (in): — | **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: 2 weak secondary indicators

# AQUATIC SITE ASSESSMENT DATA FORM

W106AY008

| 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: J Brownlee

GPS Technician QA/QC check: KV

## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106AY008 Field Target: 285 Date: 7/16

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. **Photos**

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

X Haley Volper — X Haley Volper — 7-2-16

Wetland Scientist (print) — Signature / Date

X J Brownlee — X [signature] — 7.1.16

Field Crew Chief (print) — Signature / Date

# WETLAND DETERMINATION DATA FORM

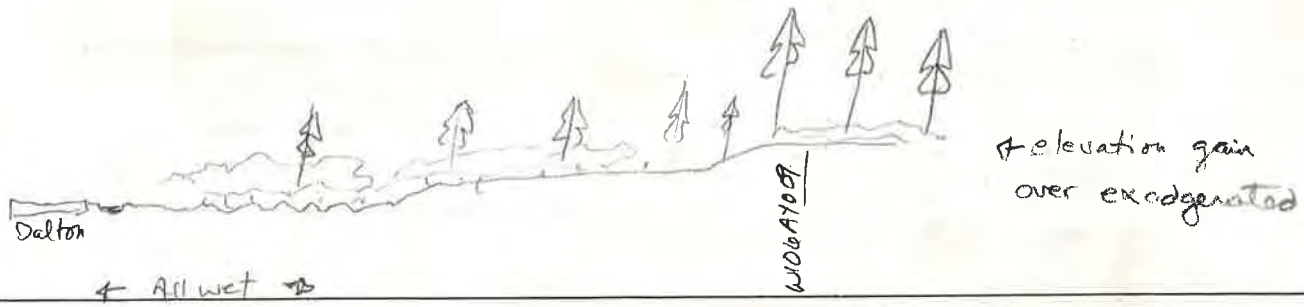
| SITE DESCRIPTION | | | |
|---|---|---|---|
| Survey Type: Centerline____ Access Road (explain)_____ Other (explain) X Facility | | Field Target: 288 | Map #: 3S Map Date: 6.9.16 |
| Date: 7.1.16 | Project Name: Alaska LNG | Feature Id: W106AY009 | |
| Investigators: Jessie Brownlee Kaley Volper | | | Team No.: W106 |
| State: Alaska | Region: Alaska | Milepost: 240.1 | |
| Latitude: 67.2688850° | Longitude: -150.1665678° | | Datum: WGS84 |
| Logbook No.: 2 | Logbook Page No.: 17 | Picture No.: P_W106AY009_001 thru 004 | |

| SITE PARAMETERS | |
|---|---|
| Subregion: Brooks Range | Landform (hillslope, terrace, hummocks, etc.): slight mound in lowland |
| Slope (%): 0-3 | Local relief (concave, convex, none): Flat |
| Pre-mapped Alaska LNG/NWI classification: PF04/55IR | Evidence of Wildlife Use: moose fecal matter, big game trail, moose tracks |
| 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: PF04/55IB |
| 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.

Driest veg signature & landscape position @ area & this is still wet.
Open Pic Mar forest w/ low diversity otherwise.
Soil shows signs of watertable fluxtuating to within 10 inches of surface as is evident by the band of concentrations.
Watertable present @ 18" where parent material changes to gravel.



# WETLAND DETERMINATION DATA FORM W106AY009

**VEGETATION** (use scientific names of plants)

| Tree Stratum (Plot sizes: 100) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Picea mariana | 20 | Y | FACW |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| Total Cover: 20 | | | |
| 50% of total cover: 10 | 20% of total cover: 4 | | |

| Sapling/Shrub Stratum (26) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Rhododendrum tomentosum | 35 | Y | FACU |
| 2. Vaccinium vitis-idaea | 15 | Y | FAC |
| 3. Vaccinium uliginosum | 15 | Y | FAC |
| 4. Picea mariana | 15 | Y | FACW |
| 5. Betula nana | 5 | | FAC |
| 6. Spiraea stevenii | 3 | | FACU |
| 7. Salix pulchra | T | | FACW |
| 8. | | | |
| 9. | | | |
| Total Cover: 88 | | | |
| 50% of total cover: 44 | 20% of total cover: 17.6 | | |

**Dominance Test worksheet:**

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

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

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

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species: | 0 | X 1 = | 0 |
| FACW species: | 78 | X 2 = | 156 |
| FAC species | 45 | X 3 = | 135 |
| FACU species | 3 | X 4 = | 12 |
| UPL species | 0 | X 5 = | 0 |
| Column Totals: | 126 (A) | | 303 (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 | 8 | Y | FACW |
| 2. Carex bigelowii | 10 | Y | FAC |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 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%

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.

Ø % Bare Ground

Ø % Cover of Wetland Bryophytes

100 Total Cover of Bryophytes

Ø % Cover of Water

**Hydrophytic Vegetation Present (Y/N):** Y

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

# WETLAND DETERMINATION DATA FORM

W106AY009

7.1.16

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

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

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox % | Type[1] | Loc[2] | Texture | Notes |
|---|---|---|---|---|---|---|---|---|
| Oi 0-4 | | | | | | | | Dry feathermoss |
| A 4-7 | 5YR 2.5/1 | | | | | | loam | |
| 7 | 5 | | | | | | | |
| Bw1 7-10 | 5Y 4/1 | 90 | 7.5YR 4/4 | 10 | | | silt | |
| Bw2 10-16 | 7.5YR 5/6 | 80 | | | | | silt | Band of concentrations |
| | 5YR 3/3 | 20 | | | | | | |
| C 16-24 | | | | | | | 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) Yes! | 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) Yes |

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and 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: All Horizons are wavy & varied in depth
Spotty orange material throughout
Positive αα in Bw1 & Bw2

| 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) 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) 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): 18 | |
| Saturation Present (Y/N): (includes capillary fringe) Y | Depth (in): 16 | EC: 25 pH 4.85 |

Notes:

# AQUATIC SITE ASSESSMENT DATA FORM

W106AY009

## 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)__20__ Sapling (<5 dbh, <6m tall)__15__ Tall shrub (2-6m)__0__ Short shrub (0.5-2m)__~~30~~ 45__ Dwarf shrub (<0.5m) __0__ Tall herb (≥1m) __0__ Short herb (<1m) __20__ Moss-Lichen__0__ Floating__0__ Submerged__0__

**Number of Wetland Types (M):** __2__ | **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even __✓__

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

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

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

**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__✓__ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

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

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

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

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

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

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

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

## LANDSCAPE VARIABLES (M)

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

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

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

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

Crew Chief QA/QC check: JBrownlee

GPS Technician QA/QC check: KV

## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: WIDUAY009 Field Target: 288 Date: 7.1.16

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. **Photos**

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

X Kaley Volper — Wetland Scientist (print)

X Kaley Volper — Signature / Date — 7-2-16

X J Brownlee — Field Crew Chief (print)

X J Brownlee — Signature / Date — 7.1.16

# WETLAND DETERMINATION DATA FORM

| SITE DESCRIPTION | | | |
|---|---|---|---|
| Survey Type: Centerline____ Access Road (explain)_____ Other (explain) Facility | | Field Target: 287 | Map #: 36 Map Date: 6.9.16 |
| Date: 7.1.16 | Project Name: Alaska LNG | Feature Id: ~~W106AY009~~ W106AY01.0 KV | |
| Investigators: Jessie Brownlee, Kaley Volper | | | Team No.: W106 |
| State: Alaska | Region: Alaska | Milepost: 241.1 | |
| Latitude: 67.253242 78° | Longitude: -150.167464 4° | | Datum: WGS84 |
| Logbook No.: 2 | Logbook Page No.: 17 | Picture No.: P_W106AY010_001 thru 004 | |

| SITE PARAMETERS | |
|---|---|
| Subregion: Brooks Range | Landform (hillslope, terrace, hummocks, etc.): Non-descript Cobbfoot Terrace |
| Slope (%): 3-5 | Local relief (concave, convex, none): Flat slightly convex |
| Pre-mapped Alaska LNG/NWI classification: PF04B | Evidence of Wildlife Use: Moose browse, porcupine or hare browse hare pellets. |
| Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes) | Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.) |
| Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed? | No X (If yes, explain in Notes) |
| Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic? | No X (If yes, explain in Notes.) |

| SUMMARY OF FINDINGS | |
|---|---|
| Hydrophytic Vegetation Present? Yes X No_____ | Is the Sampled Area within a Wetland? Yes_____ No X |
| Hydric Soil Present? Yes_____ No X | Wetland Type: U |
| Wetland Hydrology Present? Yes_____ No X | Alaska Vegetation Classification (Viereck): 1A2, 11C.2 |

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

Dry open Pic Mar forest. Various raindeer lichens throughout forest.
Walked length of Polygon 9 only found dry sites. An odd little swale boundens the Next PF04B to the North (which is also dry) and the 1C.2. Swale follows boundary of the two. (see map)

# WETLAND DETERMINATION DATA FORM

W106AY010

**VEGETATION** (use scientific names of plants)

| Tree Stratum (Plot sizes: 100) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Picea mariana | 20 | Y | FACW |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| Total Cover: 20 | | | |
| 50% of total cover: 10 | 20% of total cover: 4 | | |

| Sapling/Shrub Stratum (26) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Rhododendrum groenlandicum | 15 | | FAC |
| 2. vaccinium vitis-idaea | 25 | Y | FAC |
| 3. vaccinium uliginosum | 25 | Y | FAC |
| 4. Empetrum nigrum | 35 | Y | FAC |
| 5. Rhododendrum tomentosum | 15 | | FACW |
| 6. Betula nana | 8 | | FAC |
| 7. Picea mariana | 15 | | FACW |
| 8. Betula glandulosa | T | | FAC |
| 9. Salix glauca | T | | FAC |
| Total Cover: 138 | | | |
| 50% of total cover: 69 | 20% of total cover: 27.6 | | |

**Dominance Test worksheet:**

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

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

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

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: |
|---|---|---|
| OBL species: | 0 | X 1 = 0 |
| FACW species: | 50 | X 2 = 100 |
| FAC species | 108 | X 3 = 324 |
| FACU species | 0 | X 4 = 0 |
| UPL species | 0 | X 5 = 0 |
| Column Totals: | 158 (A) | 425 (B) |

PI = B/A = 2.6

| | | | | |
|---|---|---|---|---|
| Betula neoalaskana | 5 | T | | FACU |

**VEGETATION** (use scientific names of plants)

| Herb Stratum (26) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| Total Cover: | | | |
| 50% of total cover: | 20% of total cover: | | |

zero! wow!

**Hydrophytic Vegetation Indicators:**

Y Dominance Test is > 50%

Y Prevalence Index is ≤ 3.0

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

— Problematic Hydrophytic Vegetation[1] (Explain)

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

3 % Bare Ground

0 % Cover of Wetland Bryophytes

75 Total Cover of Bryophytes + lichen

0 % Cover of Water

**Hydrophytic Vegetation Present (Y/N):** Y

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

# WETLAND DETERMINATION DATA FORM

W106AY010

7.1.16

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

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

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox % | Type[1] | Loc[2] | Texture | Notes |
|---|---|---|---|---|---|---|---|---|
| Oi 0-2 | | | | | | | | Dry feather moss |
| Bw1 2-3 | 5Y 4/1 | 85 | 7.5YR 4/6 | 10 | con | m | very fine sand | color is parent material related |
| | | | 5YR 3/4 | 5 | con | m | | |
| Bw2 3-24 | 10YR 4/2 | 90 | 10YR 4/3 | 10 | con | m | gravely 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: clayer, denser, wetter material below the 24" depth, did not describe it however

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

| | | |
|---|---|---|
| Surface Water Present (Y/N): N | Depth (in): — | 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

W106AY010

## 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: JBrownlee

GPS Technician QA/QC check: KV

## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106AY010 Field Target: 287 Date: 7.1.16

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

**8. Photos**

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

X Haley Volper — Wetland Scientist (print)

X Haley Volper 7-2-16 — Signature / Date

X JBrownlee — Field Crew Chief (print)

X [signature] 7.1.16 — Signature / Date

# Part 17 of 18: Appendix G of Resource Report No. 2

# WETLAND DETERMINATION DATA FORM

| SITE DESCRIPTION | | | |
|---|---|---|---|
| Survey Type: Centerline____ Access Road (explain)____ Other (explain) Facility | | Field Target: 275 | Map #: 45 Map Date: 6.9.16 |
| Date: 7-2-16 | Project Name: Alaska LNG | | Feature Id: W106AY011 |
| Investigators: Jessie Brownlee, Kaley Volper | | | Team No.: W106 |
| State: Alaska | Region: Alaska | Milepost: 299 | |
| Latitude: 66.54331799° | | Longitude: -150.80330317° | Datum: WGS84 |
| Logbook No.: 2 | Logbook Page No.: 14 | Picture No.: P_W106AY011_001 thru 004 | |

| SITE PARAMETERS | |
|---|---|
| Subregion: Ray Mountains | Landform (hillslope, terrace, hummocks, etc.): Lowland |
| Slope (%): 0-3 | Local relief (concave, convex, none): Flat |
| Pre-mapped Alaska LNG/NWI classification: U ! / A Z | Evidence of Wildlife Use: Squirrel Midden |
| 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): 1 A Z |

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

Pic Mar open forest ~40' tall with little diversity and thick feathermoss throughout and various lichens.
No signs of hydrology

The PF04/SS4B to the North was Not wet. Dug 4 holes through out polygon. 2 were very dry & sandy to depth of 20" 1 was slightly dampand had a frost layer & the last was Not wet with no frost. All had deep Dry feathermoss and deep A horizons and were Neg OX throughout.

# WETLAND DETERMINATION DATA FORM

W106AY011

**VEGETATION** (use scientific names of plants)

| Tree Stratum (Plot sizes: 100) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Betula Neoalaskana | 5 | | FACU |
| 2. Picea Mariana | 25 | Y | FACW |
| 3. | | | |
| 4. | | | |
| Total Cover: 30 | | | |
| 50% of total cover: 15 | 20% of total cover: 6 | | |

| Sapling/Shrub Stratum (24) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Vaccinium oliginosum | 28 | Y | FAC |
| 2. Rhododendrum tomentosum | 18 | Y | FACW |
| 3. Vaccinium vitis-Idaea | 18 | Y | FAC |
| 4. Salix Glauca | 3 | | FAC |
| 5. Betula Nana | 5 | | FAC |
| 6. Picea Mariana | 20 | Y | FACW |
| 7. Rhododendrum groenlandicum | T | | FAC |
| 8. Empetrum nigrum | 8 | | FAC |
| 9. | | | |
| Total Cover: 92 | | | |
| 50% of total cover: 46 | 20% of total cover: 18.4 | | |

**Dominance Test worksheet:**

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

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

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

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species: | 0 | X 1 = | 0 |
| FACW species: | 63 | X 2 = | 126 |
| FAC species | 54 | X 3 = | 162 |
| FACU species | 5 | X 4 = | 20 |
| UPL species | 0 | X 5 = | 0 |
| Column Totals: | 122 (A) | | 308 (B) |

PI = B/A = 2.5

**VEGETATION** (use scientific names of plants)

| Herb Stratum (24) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. grass sp | T | | — |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| Total Cover: — | | | |
| 50% of total cover: — | 20% of total cover: — | | |

**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.

Ø % Bare Ground

Ø % Cover of Wetland Bryophytes

100 Total Cover of Bryophytes

Ø % Cover of Water

**Hydrophytic Vegetation Present (Y/N):** Y

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

# WETLAND DETERMINATION DATA FORM

W106AY011

7.2.16

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

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

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox % | Type[1] | Loc[2] | Texture | Notes |
|---|---|---|---|---|---|---|---|---|
| Oi 0-2 | | | | | | | | Dry Feathermoss |
| C 2-4 | 10YR 5/3 | 100 | | | | | Silt | |
| Ab 4-6 | 10YR 2/2 | 100 | | | | | loam | |
| Bw1 6-24 | 10YR 4/3 | 95 | 10YR 4/4 | 5 | Faint Con | M | Silt | 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) |

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and 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:
High in Mica, Pit is not homogenous throughout. Described side the pit picture was of

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

| | | |
|---|---|---|
| Surface Water Present (Y/N): N | Depth (in): — | 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

W106AY011

## 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: J. Brownlee

GPS Technician QA/QC check: LN

## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106AY011 Field Target: 278 Date: 7.2.16

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. **Photos**

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

X Kaley Volper X Kaley Volper 7-2-16

Wetland Scientist (print) Signature / Date

X J Brownlee X [signature] 7.2.16

Field Crew Chief (print) Signature / Date

# WETLAND DETERMINATION DATA FORM

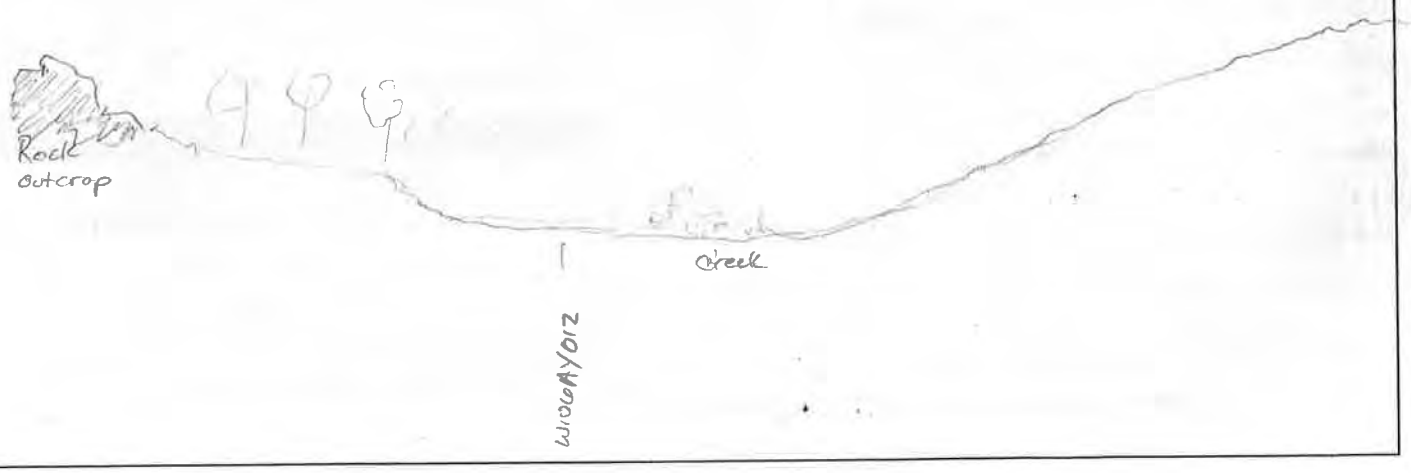
| SITE DESCRIPTION | | | |
|---|---|---|---|
| Survey Type: Centerline____ Access Road (explain)____ Other (explain) X | | Field Target: 279 | Map #: 44 Map Date: 6.9.16 |
| Date: 7-2-16 | Project Name: Alaska LNG | | Feature Id: W106AY012 |
| Investigators: Jessie Brownlee, Kaley Volper | | | Team No.: W106 |
| State: Alaska | Region: Alaska | Milepost: 286.1 | |
| Latitude: 66° 42' 45.771" N | | Longitude: 150° 38' 48.122" W | Datum: WGS84 |
| Logbook No.: 2 | Logbook Page No.: 18 | Picture No.: P_W106AY012_001 thru 004 | |

| SITE PARAMETERS | |
|---|---|
| Subregion: Ray Mountains | Landform (hillslope, terrace, hummocks, etc.): Lowland |
| Slope (%): 0-3 | Local relief (concave, convex, none): Concave |
| Pre-mapped Alaska LNG/NWI classification: PEM1/SS1B | 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/EM1B |
| Wetland Hydrology Present? Yes X No_____ | Alaska Vegetation Classification (Viereck): II B 2. III A 2 |

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

Dwarf shrub community w/ Car big. Site/Area previously burned. Thick moss layer is charred + dead in spots with uneven ground. This exact location is dominated by Rho tom but other signatures that make up this dwarf shrub, sphagnum + high lichen community include Bet Nan and smaller patches w/ higher carex component.



# WETLAND DETERMINATION DATA FORM

W106AY012

**VEGETATION** (use scientific names of plants)

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

Total Cover: _____

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

| Sapling/Shrub Stratum ( 26' ) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Vaccinium uliginosum | 20 | Y | FAC |
| 2. Empetrum nigrum | 30 | Y | FAC |
| 3. Vaccinium vitis-idaea | 20 | Y | FAC |
| 4. Rhododendrum tomentosum | 25 | Y | FACW |
| 5. Betula nana | 4 | | FAC |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |

Total Cover: 89

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

**Dominance Test worksheet:**

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

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

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

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species: | 0 | X 1 = | 0 |
| FACW species: | 45 | X 2 = | 90 |
| FAC species | 69 | X 3 = | 207 |
| FACU species | 0 | X 4 = | 0 |
| UPL species | 0 | X 5 = | 0 |
| Column Totals: | 114 (A) | | 297 (B) |

PI = B/A = 2.6

**VEGETATION** (use scientific names of plants)

| Herb Stratum ( 26' ) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Rubus chamaemorus | 15 | Y | FACW |
| 2. Carex bigelowii | 5 | Y | FAC |
| 3. Eriophorum vaginatum | 5 | Y | FACW |
| 4. Pedicularis sp | T | | - |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |

Total Cover: 25

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

**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.

Don't record in field

_____ % 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

W106AY012

7·2·16

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

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

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox % | Type[1] | Loc[2] | Texture | Notes |
|---|---|---|---|---|---|---|---|---|
| Oi 0-7 | | | | | | | | Damp Sphagnum |
| Oe 7-10 | | | | | | | | Wet Sphagnum |
| Oef 10-16+ | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced 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) YES | 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: Perma Frost Depth (inches): 10

**Hydric Soil Present (Y/N):** Y

Notes:

| HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient) | | SECONDARY INDICATORS (2 or more required) | |
|---|---|---|---|
| Surface Water (A1) Y on edge of plot | Surface Soil Cracks (B6) N | Water-stained Leaves (B9) N | Stunted or Stressed Plants (D1) N |
| High Water Table (A2) N | Inundation Visible on Aerial Imagery (B7) N | Drainage Patterns (B10) N | Geomorphic Position (D2) Y |
| Saturation (A3) Y | Sparsely Vegetated Concave Surface (B8) N | Oxidized Rhizospheres along Living Roots (C3) — | Shallow Aquitard (D3) Y |
| Water Marks (B1) N | Marl Deposits (B15) N | Presence of Reduced Iron (C4) — | 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): Edge | Depth (in): 2 | **Wetland Hydrology Present (Y/N):** Y |
| Water Table Present (Y/N): N | Depth (in): — | |
| Saturation Present (Y/N): (includes capillary fringe) Y | Depth (in): 6 | **EC:** 21 4.36 |

Notes:

# AQUATIC SITE ASSESSMENT DATA FORM

W106A7012

## VEGETATION VARIABLES P= Plot, M= Matrix

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

**Percent Cover (P):** Tree (>5 dbh, >6m tall)_Ø_ Sapling (<5 dbh, <6m tall)_Ø_ Tall shrub (2-6m)_Ø_ Short shrub (0.5-2m)_5_ Dwarf shrub (<0.5m) _50_ Tall herb (≥1m) _0_ Short herb (<1m) _25_ Moss-Lichen_20_ Floating_0_ Submerged_0_

**Number of Wetland Types (M):** _82_ | **Evenness of Wetland Type Distribution (M):** Even _____Highly Uneven _____Moderately even _X_

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

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

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

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

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

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

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

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

## SOIL VARIABLES

**Soil Factors (P):** Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_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.)_____ 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** _6.36_

**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: J Brownlee

GPS Technician QA/QC check: KV

## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106AYOR Field Target: 279 Date: 7.2.16

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

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 7-2-16 — Signature / Date

X JBrownlee — Field Crew Chief (print)

X JBrownlee 7-2-16 — Signature / Date

# WETLAND DETERMINATION DATA FORM

W106AY013

| SITE DESCRIPTION | | | |
|---|---|---|---|
| Survey Type: Centerline____ Access Road (explain)_____ Other (explain) Facility | | Field Target: 280 | Map #: 43 Map Date: 6-9-16 |
| Date: 7-2-16 | Project Name & No.: Alaska LNG 60418403 | | Feature Id: W106AY013 |
| Investigators: Jessie Brownlee, Kalen Volper | | | Team No.: W106 |
| State: Alaska | Region: Alaska | Milepost: 283.5 | |
| Latitude: 66.749294° | Longitude: -150.654041° | | Datum: WGS84 |
| Logbook No.: 2 | Logbook Page No.: 18 | Picture No.: P_W106AY013_001 thru 004 | |

| SITE PARAMETERS | |
|---|---|
| Subregion: Ray mountains | Landform (hillslope, terrace, hummocks, etc.): Hill top / Ridge |
| Slope (%): 5-80% | Local relief (concave, convex, none): convex |
| Pre-mapped Alaska LNG/NWI classification: PSS1/EM1B | Evidence of Wildlife Use: large + small animal 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_____ No X |
| Hydric Soil Present? Yes_____ No X | **Wetland Type:** U |
| Wetland Hydrology Present? Yes_____ No X | Alaska Vegetation Classification (Viereck): II D 2, III A 2 |

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

Dry rocky ridge top. Rocks @ surface. Soil dry + extremely gravelly + cobbly. Vegetation sparse + stunted. Soil surface showed signs of slight saturation w/ cons + depletions but very few + faint in the upper the upper 2 inches.

Dwarf shrub ericaceous community w/ carex bog

* Site rushed due to growing storm + our landscape position

# WETLAND DETERMINATION DATA FORM

W10GAY013

**VEGETATION** (use scientific names of plants)

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

| Sapling/Shrub Stratum (26') | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Choiseleuria procumbens | 10 | | FACU |
| 2. Rhododendrum tomentosum | 15 | Y | FAC |
| 3. Arctous alpina | 10 | | FACU |
| 4. Betula nana | 25 | Y | FAC |
| 5. Salix rotundifolia | 5 | | FAC |
| 6. Empetrum nigrum | 3 | | FAC |
| 7. Vaccinium uliginosum | 2 | | FAC |
| 8. | | | |
| 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: 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: | — | X 2 = — |
| FAC species | 58 | X 3 = 174 |
| FACU species | 22 | X 4 = 88 |
| UPL species | — | X 5 = — |
| Column Totals: | 80 (A) | 262 (B) |

PI = B/A = 3.275

**VEGETATION** (use scientific names of plants)

| Herb Stratum (26') | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. carex bigelowii | 8 | Y | FAC |
| 2. Pedicularis lanei | T | | UPL |
| 3. Tofieldia coccinea | T | | FAC |
| 4. Anemone narcissiflora | 1 | | FACU |
| 5. chamerion angustifolium | 1 | | FACU |
| 6. grass sp | 2 | | — |
| 7. Calamagrostis canadensis | T | | FAC |
| 8. poa sp | 1 | | — |
| 9. Campanula lasiocarpa | T | | UPL |
| 10. | | | |
| Total Cover: 13 | | | |
| 50% of total cover: 6.5 | 20% of total cover: 2.6 | | |

**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.

15 % Bare Ground

Ø % Cover of Wetland Bryophytes

35 Total Cover of Bryophytes

Ø % Cover of Water

**Hydrophytic Vegetation Present (Y/N):** Y

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

W1O6A4013

# WETLAND DETERMINATION DATA FORM

| SOIL | Date 7.2.14 | 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 0-5 | 10YR 3/2 | 100 | | | | | loam | |
| Bw .5-2 | 2.5Y 5/2 | 90 | 2.5Y 5/1 | 5 | D | M | silt | |
| C 2-20 | 10YR 4/2 | 100 | 10YR 6/3 | 5 | C | M | extremely gravely silt | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced 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: NO Depth (inches): —

**Hydric Soil Present (Y/N):** N

Notes: Very dry & rocky 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:

# WETLAND DETERMINATION DATA FORM

W106 AY 013

| 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: J. Brownlee

GPS Technician QA/QC check: KN

## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106A4013 Field Target: 280 Date: 7.2.16

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. **Photos**

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

X Haley Volper X Haley Volper 7-2-16

Wetland Scientist (print) Signature / Date

X J Brownlee X [illegible] 7-2-16

Field Crew Chief (print) Signature / Date

# WETLAND DETERMINATION DATA FORM

| SITE DESCRIPTION | | | |
|---|---|---|---|
| Survey Type: Centerline X Access Road (explain)____ Other (explain)____ | | Field Target: 318 | Map #: 33 Map Date: 6-9-16 |
| Date: 7-3-16 | Project Name & No.: Alaska LNG 60418403 | | Feature Id: W106AY014 |
| Investigators: Jessie Brownlee, Kaley Volper | | | Team No.: W106 |
| State: Alaska | Region: Alaska | Milepost: 234.5 | |
| Latitude: 67.3465886° | | Longitude: -150.13759° | Datum: WGS84 |
| Logbook No.: 2 | Logbook Page No.: 19 | Picture No.: P_W106AY014_001 thru 004 | |

| SITE PARAMETERS | |
|---|---|
| Subregion: Brooks Range | Landform (hillslope, terrace, hummocks, etc.): Hillside |
| Slope (%): 8-10 | Local relief (concave, convex, none): convex downslope |
| Pre-mapped Alaska LNG/NWI classification: PSS4/1B 11A2, 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 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): 11A2, 11C2 |

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

Stunted Pic Mar open Forest. Stunted trees are due to Frost & Cold & Not water. Soil was damp after a night of rain but not much, Soil Parent. Material is high in ~~Mica~~ schist & shuts out very light. Neg XX through out. Walked to the South on center line to taller Pic Mar and that sight was much drier w/ No Frost w/in 15" Up slope from FT 318 the slope Flattens out & there is a pond and ground is ~~much~~ wetter.

W106AY014_OP is point in wetland PSS4/1B. Boundary is hard to fine tune. thick Sphagnum pillows >8" Sat organics.

# WETLAND DETERMINATION DATA FORM

W106AY014

**VEGETATION** (use scientific names of plants)

| Tree Stratum (Plot sizes: 100') | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Picea mariana | 5 | Y | FACW |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| Total Cover: 5 | | | |
| 50% of total cover: 2.5 | 20% of total cover: 1 | | |

| Sapling/Shrub Stratum ( ) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Rosa acicularis | 1 | | FACU |
| 2. Shepherdia canadensis | T | | FACU |
| 3. vaccinium vitis-idaea | 5 | | FAC |
| 4. vaccinium uliginosum | 15 | Y | FAC |
| 5. Rhododendrum tomentosum | 3 | | FACW |
| 6. Salix pulchra | 3 | | FACW |
| 7. Picea mariana | 30 | Y | FACW |
| 8. Salix glauca | 5 | | FAC |
| 9. Betula nana | 5 | | FAC |
| Total Cover: 75 | | | |
| 50% of total cover: 37.5 | 20% of total cover: 15 | | |

**Dominance Test worksheet:**

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

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

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

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: |
|---|---|---|
| OBL species: | 0 | X 1 = 0 |
| FACW species: | 49 | X 2 = 98 |
| FAC species | 43 | X 3 = 129 |
| FACU species | 5 | X 4 = 20 |
| UPL species | 0 | X 5 = 0 |
| Column Totals: | 97 (A) | 247 (B) |

PI = B/A = 2.5

| | | | | |
|---|---|---|---|---|
| Arctous rubra | S | 3 | | FACU |
| Rhododendron groenlandicum | S | 4 | | FAC |
| Empetrum nigrum | S | 7 | | FAC |

**VEGETATION** (use scientific names of plants)

| Herb Stratum ( ) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Carex bigelowii | 8 | Y | FAC |
| 2. Petasites frigidus | 8 | Y | FACW |
| 3. Equisetum scirpoides | 1 | | FACW |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| Total Cover: 17 | | | |
| 50% of total cover: 8.5 | 20% of total cover: 3.4 | | |

**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.

Ø % Bare Ground

Ø % Cover of Wetland Bryophytes

100 Total Cover of Bryophytes

Ø % Cover of Water

**Hydrophytic Vegetation Present (Y/N):** Y

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

# WETLAND DETERMINATION DATA FORM

W10GAY014

7.3.16

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

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

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox % | Type[1] | Loc[2] | Texture | Notes |
|---|---|---|---|---|---|---|---|---|
| Oi 0-2 | | | | | | | | Dry feather moss |
| Oe 2-6 | | | | | | | | Damp organics |
| Bw1 6-8 | 10YR 4/2 | 92 | 7.5YR 3/4 | 8 | con | RC | Silt | |
| Bw2 8-9 | 2.5Y 5/2 | 93 | 5YR 4/6 | 2 | con | RC | Silt | Parent Material starts out very close to 2.5Y |
| | | | 10YR 6/4 | 5 | con | M | | |
| Bw2f 9-+ | Same as Bw2 | above | but frozen | | | | | |
| | | | | | | | | |

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

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

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

Restrictive Layer (if present): Type: Frost Depth (inches): 9

**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 see note |
| High Water Table (A2) N | Inundation Visible on Aerial Imagery (B7) N | Drainage Patterns (B10) N | Geomorphic Position (D2) N |
| Saturation (A3) Y slight | Sparsely Vegetated Concave Surface (B8) N | Oxidized Rhizospheres along Living Roots (C3) N | Shallow Aquitard (D3) Y |
| Water Marks (B1) N | Marl Deposits (B15) N | Presence of Reduced Iron (C4) N | Microtopographic Relief (D4) N |
| Sediment Deposits (B2) N | Hydrogen Sulfide Odor (C1) N | Salt Deposits (C5) N | FAC-Neutral Test (D5) Y |
| Drift Deposits (B3) N | Dry-Season Water Table (C2) N | Notes: | |
| Algal Mat or Crust (B4) N | Other (Explain in Notes): | | |
| Iron Deposits (B5) N | | | |

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

Notes:
Stunted Pic Mar but not due to water but frost and cold

# WETLAND DETERMINATION DATA FORM

W106AY014

## 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: J Brownlee

GPS Technician QA/QC check: LV

## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106AY014 Field Target: 318 Date: 7·3·16

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. **Photos**

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

X Haley Volper — X Haley Volper 7-6-16

Wetland Scientist (print) — Signature / Date

X JBrownlee — X [signature] 7.3.16

Field Crew Chief (print) — Signature / Date

# WETLAND DETERMINATION DATA FORM

| SITE DESCRIPTION | | | |
|---|---|---|---|
| Survey Type: Centerline____ Access Road (explain)____ Other (explain) Facility | | Field Target: 290 | Map #: 32 Map Date: 6.9.16 |
| Date: 7-3-16 | Project Name & No.: Alaska LNG 60418403 | Feature Id: W106AY015 | |
| Investigators: Jessie Brownlee, Kaley Volper | | | Team No.: W106 |
| State: Alaska | Region: Alaska | Milepost: 234.5 | |
| Latitude: 67.352780° | Longitude: -150.147051° | | Datum: WGS84 |
| Logbook No.: 2 | Logbook Page No.: 19 | Picture No.: P_W106AY015_001 thru 004 | |

| SITE PARAMETERS | |
|---|---|
| Subregion: Brooks Range | Landform (hillslope, terrace, hummocks, etc.): Lowland |
| Slope (%): 0-3 | Local relief (concave, convex, none): Flat |
| Pre-mapped Alaska LNG/NWI classification: PSS4/1B | Evidence of Wildlife Use: moose tracks, Moose droppings, squirrel midden |
| Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes) | Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.) |
| Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed? | No X (If yes, explain in Notes) |
| Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic? | No X (If yes, explain in Notes.) |

| SUMMARY OF FINDINGS | |
|---|---|
| Hydrophytic Vegetation Present? Yes X No_____ | **Is the Sampled Area within a Wetland?** Yes X No_____ |
| Hydric Soil Present? Yes X No_____ | **Wetland Type:** PFO4/SS4B |
| Wetland Hydrology Present? Yes X No_____ | Alaska Vegetation Classification (Viereck): 1A2, 11C2 |

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

Walked around polygon extensively (to the north). All areas that we saw were wet. Put OP in location of FT 290 in order to find more marginal spot to tease out.

This site Open Picea Mar Forest with low diversity and density of herb layer and low density shrub community.

# WETLAND DETERMINATION DATA FORM

W106AY015

**VEGETATION** (use scientific names of plants)

| Tree Stratum (Plot sizes: 100') | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Picea mariana | 20 | Y | FACW |
| 2. Picea glauca | T | | 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. vaccinium uliginosum | 20 | Y | FAC |
| 2. vaccinium vitis-idaea | 20 | Y | FAC |
| 3. Salix reticulata | 2 | | FAC |
| 4. Betula nana | 15 | | FAC |
| 5. Rhododendrum tomentosum | 1 | | FACW |
| 6. Dasiphora fruticosa | T | | FAC |
| 7. Empetrum nigrum | 1 | | FAC |
| 8. Arctous rubra | 2 | | FAC |
| 9. Picea mariana | 15 | | FACW |
| Total Cover: 78 | | | |
| 50% of total cover: 39 | 20% of total cover: 15.6 | | |

**Dominance Test worksheet:**

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

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

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

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: |
|---|---|---|
| OBL species: | — | X 1 = — |
| FACW species: | 41 | X 2 = 82 |
| FAC species | 63 | X 3 = 189 |
| FACU species | — | X 4 = — |
| UPL species | — | X 5 = — |
| Column Totals: | 104 (A) | 271 (B) |

PI = B/A = 2.60

Rhododendrum groenlandicum | S | 2 | | FAC

**VEGETATION** (use scientific names of plants)

| Herb Stratum (26') | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Rubus arcticus | T | | FAC |
| 2. Carex membranacea | 5 | Y | FACW |
| 3. Saussurea angustifolia | 1 | | FAC |
| 4. grass sp | T | | — |
| 5. valeriana capitata | T | | FAC |
| 6. Carex sp | T | | — |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| Total Cover: 6 | | | |
| 50% of total cover: 3 | 20% of total cover: 1.2 | | |

**Hydrophytic Vegetation Indicators:**

Y Dominance Test is > 50%

Y Prevalence Index is ≤3.0

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

— Problematic Hydrophytic Vegetation[1] (Explain)

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

0 % Bare Ground

0 % Cover of Wetland Bryophytes

100 Total Cover of Bryophytes + lichen

0 % Cover of Water

**Hydrophytic Vegetation Present (Y/N):** Y

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

# WETLAND DETERMINATION DATA FORM

W106AY015

7.3.15

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

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

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox % | Type[1] | Loc[2] | Texture | Notes |
|---|---|---|---|---|---|---|---|---|
| Oi 0-4 | | | | | | | | Dry Feather moss |
| Bg 4-10 | 2.5Y 5/2 | 60 | 7.5YR 5/6 | 20 | con | M | silt | |
| | N 4/1 | 10 | 2.5YR 5/1 | 10 | Dep | M | | |
| Bw 10-20 | 10YR 4/1 | 80 | 10YR 5/4 | 20 | con | M | fine sand | |
| | | | | | | | | |
| C 20-24 | | | | | | | 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) 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) Yes |

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and 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 αα starting @ mineral horizon

| 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) ~~X~~ N FB | 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) 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) 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): 22 | |
| Saturation Present (Y/N): (includes capillary fringe) Y | Depth (in): 18 | **EC:** — |

Notes:

# AQUATIC SITE ASSESSMENT DATA FORM

W106AY015

## 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)_20_ Sapling (<5 dbh, <6m tall)_15_ Tall shrub (2-6m)_0_ Short shrub (0.5-2m)_20_ Dwarf shrub (<0.5m)_20_ Tall herb (≥1m)_0_ Short herb (<1m)_25_ Moss-Lichen_0_ Floating_0_ Submerged_0_

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

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

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

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

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

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

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

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

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

## SOIL VARIABLES

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

## HYDROLOGIC VARIABLES

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

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

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

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

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

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

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

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

**Basin Topographic Gradient (M):** Low Gradient (<2%)_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: J Brownlee

GPS Technician QA/QC check: KV

## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106A-Y015 Field Target: 290 Date: 7.3.16

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. **Photos**

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

X Haley Volper — X Haley Volper 7-6-16

Wetland Scientist (print) — Signature / Date

X JBrownlee — X 7.3.6

Field Crew Chief (print) — Signature / Date

# WETLAND DETERMINATION DATA FORM

| SITE DESCRIPTION | | | |
|---|---|---|---|
| Survey Type: Centerline____ Access Road (explain) X Other (explain)_____ | | Field Target: 289 | Map #: 34 Map Date: 6.9.16 |
| Date: 7.3.16 | Project Name & No.: Alaska LNG 60418403 | | Feature Id: W106AY016 |
| Investigators: Jessie Brownlee, Kaley Volper | | | Team No.: W106 |
| State: Alaska | Region: Alaska ✓ | Milepost: 236.5 | |
| Latitude: 67.317259° | | Longitude: -150.123266° | Datum: WGS84 |
| Logbook No.: 2 | Logbook Page No.: 16 | Picture No.: P_W106AY016_001 thru 004 | |

| SITE PARAMETERS | |
|---|---|
| Subregion: Brooks Range | Landform (hillslope, terrace, hummocks, etc.): Terrace |
| Slope (%): 0-3 | Local relief (concave, convex, none): Flat |
| Pre-mapped Alaska LNG/NWI classification: PFO4B | 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_____ No X |
| Hydric Soil Present? Yes_____ No X | **Wetland Type:** ✓ |
| Wetland Hydrology Present? Yes_____ No X | Alaska Vegetation Classification (Viereck): 1A2, 11C2 |

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

Open Pic Mar forest w/ Low diversity. Thick Feather & sphagnum & lichen.
Site right next to road.
Seasonal frost 4" thick from 12-16" Depth that was easy to break through
Beneath Frost was all dry Sand. Soil 2.5Y color is parent material
related despite high concentrations. Soil & organics not wet.
While this site was dry, the portion closest to the road was wet.
This is boundary.

W1O6AY016

# WETLAND DETERMINATION DATA FORM

**VEGETATION** (use scientific names of plants)

| Tree Stratum (Plot sizes: 30') | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Picea Mariana | 25. | Y | FACW |
| 2. Picea glauca | T | | 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 |
|---|---|---|---|
| 1. Vaccinium vitis-idaea | 30 | Y | FAC |
| 2. Rhododendrum tomentosum | 30 | Y | FACW |
| 3. Spiraea stevenii | 5 | | FACU |
| 4. Betula nana | ~~10~~ 8 | | FAC |
| 5. Salix pulchra | 1 | | FACW |
| 6. Picea Mariana | 10 | | FACW |
| 7. vaccinium uliginosum | T | | FAC |
| 8. | | | |
| 9. | | | |
| Total Cover: 84 | | | |
| 50% of total cover: 42 | 20% of total cover: 16.8 | | |

**Dominance Test worksheet:**

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

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

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

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species: | 0 | X 1 = | 0 |
| FACW species: | 71 | X 2 = | 142 |
| FAC species | 44 | X 3 = | 132 |
| FACU species | 5 | X 4 = | 20 |
| UPL species | 0 | X 5 = | 0 |
| Column Totals: | 120 (A) | | 294 (B) |

PI = B/A = 2.45

**VEGETATION** (use scientific names of plants)

| Herb Stratum (26') | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Rubus chamaemorus | 5 | Y | FACW |
| 2. Carex bigelowii | 6 | Y | FAC |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| Total Cover: 11 | | | |
| 50% of total cover: 5.5 | 20% of total cover: 2.2 | | |

**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.

Ø % Bare Ground

25 % Cover of Wetland Bryophytes

100 Total Cover of Bryophytes & lichen

Ø % Cover of Water

**Hydrophytic Vegetation Present (Y/N):** Y

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

# WETLAND DETERMINATION DATA FORM

W1O6AY016

7.3.16

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

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

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox % | Type[1] | Loc[2] | Texture | Notes |
|---|---|---|---|---|---|---|---|---|
| Oi 0-8 | | | | | | | | Dry to moist sphagnum |
| Bw1 8-12 | 2.5Y 3/1 | 80 | 7.5YR 3/3 | 20 | con | RC | silt | |
| | | | | | | | | |
| Bw2f 12-16 | 2.5Y 4/1 | 85 | 5YR 4/6 | 10 | con | RC | silt | platey |
| | | | 7.5YR 3/3 | 5 | | | | |
| C 16-24 | 10YR 3/3 | 100 | | | | | fine sand | Dry - unfrozen |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced 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: Seasonal Frost Depth (inches): 12-16" or 4" thick

**Hydric Soil Present (Y/N):** N

Notes:
Neg OX throughout.
2.5Y color is Parent Material related (high in ~~mica~~ schist)

| 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) X NO |
| Saturation (A3) N | Sparsely Vegetated Concave Surface (B8) N | Oxidized Rhizospheres along Living Roots (C3) N | Shallow Aquitard (D3) X NO Seasonal |
| Water Marks (B1) N | Marl Deposits (B15) N | Presence of Reduced Iron (C4) N | Microtopographic Relief (D4) N |
| Sediment Deposits (B2) N | Hydrogen Sulfide Odor (C1) N | Salt Deposits (C5) N | FAC-Neutral Test (D5) Y |
| Drift Deposits (B3) N | Dry-Season Water Table (C2) N | Notes: | |
| Algal Mat or Crust (B4) N | Other (Explain in Notes): | | |
| Iron Deposits (B5) N | | | |

| | | |
|---|---|---|
| Surface Water Present (Y/N): N | Depth (in): — | **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:

W106AY016

# 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: JBrownlee

GPS Technician QA/QC check: KV

## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106AY016 Field Target: 289 Date: 7.3.16

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. **Photos**

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

X Haley Volper — X Haley Volper 7-6-16

Wetland Scientist (print) — Signature / Date

X J Brownlee — X [signature] 7.5.16

Field Crew Chief (print) — Signature / Date

# WETLAND DETERMINATION DATA FORM

| SITE DESCRIPTION | | | |
|---|---|---|---|
| **Survey Type:** Centerline X **Access Road** (explain)____ **Other** (explain) Facility | | **Field Target:** 284 | **Map #:** 39 **Map Date:** 6-9-16 |
| **Date:** 7-15-16 | **Project Name & No.:** Alaska LNG 60418403 | **Feature Id:** W106AY017 | |
| **Investigators:** Jessie Bramlee, Kalen Volper | | | **Team No.:** W106 |
| **State:** Alaska | **Region:** Alaska | **Milepost:** 260.8 | |
| **Latitude:** 67.0161478° | **Longitude:** -150.2832251° | | **Datum:** WGS84 |
| **Logbook No.:** 2 | **Logbook Page No.:** 20 | **Picture No.:** P_W106AY017_001 thru 004 | |

| SITE PARAMETERS | |
|---|---|
| Subregion: Ray Mountains | Landform (hillslope, terrace, hummocks, etc.): Lowland |
| Slope (%): 0-3 | Local relief (concave, convex, none): Flat |
| Pre-mapped Alaska LNG/NWI classification: PSS1/EM1B | 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/EM1B |
| Wetland Hydrology Present? Yes X No_____ | Alaska Vegetation Classification (Viereck): II C 2, III A 2 |

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

Area near road is much wetter than mapped w/ Active flow & deep ponds. FT was on slightly higher ground while just feet away at slightly lower elevation area is much wetter w/ standing water. Soil was coarse sand w/ a slight silt pick up & buried organics at 16". Water table @ 16".

# WETLAND DETERMINATION DATA FORM

W106AY017

**VEGETATION** (use scientific names of plants)

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

Total Cover:_____

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

| Sapling/Shrub Stratum ( 26' ) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Vaccinium Uliginosum | 30 | Y | FAC |
| 2. Salix Pulchra | 15 | | FACW |
| 3. Rhododendron tomentosum | 30 | Y | FACW |
| 4. Populus tremoloides | T | | FACU |
| 5. Betula Nana | 15 | | FAC |
| 6. Chamaedaphne Calyculata | 5 | | FACW |
| 7. Andromeda Polifolia | 1 | | FACW |
| 8. Salix Glauca | 4 | | FAC |
| 9. Picea Mariana | 5 | | FACW |

Total Cover: 105

50% of total cover: 52.5 20% of total cover: 21

**Dominance Test worksheet:**

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

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

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

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species: | 0 | X 1 = | 0 |
| FACW species: | 62 | X 2 = | 124 |
| FAC species | 63 | X 3 = | 189 |
| FACU species | 4 | X 4 = | 16 |
| UPL species | 0 | X 5 = | 0 |
| Column Totals: | 129 (A) | | 329 (B) |

PI = B/A = 2.5

**VEGETATION** (use scientific names of plants)

| Herb Stratum ( 26' ) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Equisetum Arvenes | 6 | Y | FAC |
| 2. Carex Aquatilis | T | | OBL |
| 3. Chamerion Angustifolium | 4 | | FACU |
| 4. Pedicularis labradorica | T | | FACW |
| 5. Eriophorum vaginatum | 6 | Y | FACW |
| 6. Carex Bigelowii | 8 | Y | FAC |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |

Total Cover: 24

50% of total cover: 12 20% of total cover: 4.8

**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

30 % Cover of Wetland Bryophytes

50 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

7-5-16

W106AY017

| 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 |
|---|---|---|---|---|---|---|---|---|
| O1 0-2 | | | | | | | | Organics heavily coated in |
| O2 2-4 | | | | | | | | concentrations / Iron |
| C1 4-15/16 | Sand | | | | | | Course Sand | |
| C2 16-24 | Sand | | | | | | Sandy Silt loam w/ organic matter | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced 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) Yes |

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and 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 XX w/in 12 of mineral

| HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient) | | SECONDARY INDICATORS (2 or more required) | |
|---|---|---|---|
| Surface Water (A1) Y on edge | 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) ~~X~~ 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 | 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) Y | 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): 16 | |
| Saturation Present (Y/N): (includes capillary fringe) Y | Depth (in): 14 | EC: 99 |

Notes:

# AQUATIC SITE ASSESSMENT DATA FORM

W10GA7017

## 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)_20_ Dwarf shrub (<0.5m) _50_ Tall herb (≥1m) _0_ Short herb (<1m) _25_ Moss-Lichen_5_ 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)_X_ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

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

## SOIL VARIABLES

**Soil Factors (P):** Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_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** 6.05

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

Crew Chief QA/QC check: JB Crownlee

GPS Technician QA/QC check: KV

## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106AY017 Field Target: 284 Date: 7.5.16

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. **Photos**

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

X Haley Valper — Wetland Scientist (print)

X Haley Valper — Signature / Date 7-6-16

X JBrownlee — Field Crew Chief (print)

X [signature] — Signature / Date 7.5.16

# WETLAND DETERMINATION DATA FORM

| SITE DESCRIPTION | | | |
|---|---|---|---|
| Survey Type: Centerline___ Access Road (explain)_____ Other (explain) Facility | | Field Target: 283 | Map #: 40 Map Date: 6-9-15 |
| Date: 7-5-16 | Project Name & No.: Alaska LNG 60418403 | | Feature Id: W106AY018 |
| Investigators: Jessie Brownlee, Kaley Volper | | | Team No.: W106 |
| State: Alaska | Region: Alaska | Milepost: 272 | |
| Latitude: 66.895975 | | Longitude: -150.5343059 | Datum: WGS84 |
| Logbook No.: 2 | Logbook Page No.: 20 | Picture No.: P. W106AY018_001 thru 004 | |

| SITE PARAMETERS | |
|---|---|
| Subregion: Ray mountains | Landform (hillslope, terrace, hummocks, etc.): Hillside |
| Slope (%): 5-8 | Local relief (concave, convex, none): slightly concave |
| Pre-mapped Alaska LNG/NWI classification: PSS4/1B | 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 Y No_____ | **Wetland Type:** PSS4/1B |
| Wetland Hydrology Present? Yes Y No_____ | Alaska Vegetation Classification (Viereck): IIA2, IIC2 |

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

Open picnar forest ~10-20' tall / thick Feather & sphagnum moss and lichen.
Diverse shrub community but somewhat sparse.
Small pockets of standing water throughout plot.

# WETLAND DETERMINATION DATA FORM

W10BAY018

**VEGETATION** (use scientific names of plants)

| Tree Stratum (Plot sizes: 100) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Picea mariana ~20' | 15 | Y | FACW |
| 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. Rhododendrum tomentosum | 15 | | FACW |
| 2. Empetrum nigrum | 10 | | FAC |
| 3. vaccinium vitis idaea | 20 | Y | FAC |
| 4. vaccinium uliginosum | 20 | Y | FAC |
| 5. Betula nana | 13 | | FAC |
| 6. Picea mariana ~10' | 20 | Y | FACW |
| 7. Salix pulchra | 4 | | FACW |
| 8. Vaccinium oxycoccus | 1 | | OBL |
| 9. | | | |
| Total Cover: 93 | | | |
| 50% of total cover: 46.5 | 20% of total cover: 18.6 | | |

**Dominance Test worksheet**:

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

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

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

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species: | 1 | X 1 = | 1 |
| FACW species: | 58 | X 2 = | 116 |
| FAC species | 88 | X 3 = | 264 |
| FACU species | 1 | X 4 = | 4 |
| UPL species | 0 | X 5 = | 0 |
| Column Totals: | 148 (A) | | 385 (B) |

PI = B/A = 2.6

**VEGETATION** (use scientific names of plants)

| Herb Stratum (26) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Carex Bigelowii | 35 | Y | FAC |
| 2. Petasites frigidus | 4 | | FACW |
| 3. Equisetum scirpoides | 1 | | FACW |
| 4. pyrola grandiflora | T | | FAC |
| 5. | ~~40~~ | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| Total Cover: 40 | | | |
| 50% of total cover: 20 | 20% of total cover: 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.

Ø % Bare Ground

35 % Cover of Wetland Bryophytes

100 Total Cover of Bryophytes & lichen

5 % Cover of Water

**Hydrophytic Vegetation Present (Y/N):** Y

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

# WETLAND DETERMINATION DATA FORM

W10GAY018

6.7.5.16

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

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

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox % | Type[1] | Loc[2] | Texture | Notes |
|---|---|---|---|---|---|---|---|---|
| Oe 0-10 | | | | | | | | Saturated organics |
| Oef 10-+ | | | | | | | | Frozen 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) — | Alaska Gleyed (A13) N | Alaska Color Change (TA4)[4] N |
| Histic Epipedon (A2) X | 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: Perma Frost Depth (inches): 10

**Hydric Soil Present (Y/N):** Y

Notes:

| HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient) | | SECONDARY INDICATORS (2 or more required) | |
|---|---|---|---|
| Surface Water (A1) 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) N |
| Saturation (A3) Y | Sparsely Vegetated Concave Surface (B8) N | Oxidized Rhizospheres along Living Roots (C3) — | Shallow Aquitard (D3) Y |
| Water Marks (B1) N | Marl Deposits (B15) N | Presence of Reduced Iron (C4) — | 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): 3 | **Wetland Hydrology Present (Y/N):** Y |
| Water Table Present (Y/N): Y | Depth (in): 9 | |
| Saturation Present (Y/N): (includes capillary fringe) Y | Depth (in): 6 | **EC:** 34 pH 6.9 |

Notes:

W106AY018

# 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)_15_ Sapling (<5 dbh, <6m tall)_20_ Tall shrub (2-6m)_0_ Short shrub (0.5-2m)_15_ Dwarf shrub (<0.5m) _10_ Tall herb (≥1m) _0_ Short herb (<1m) _20_ 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%)_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)_X_ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

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

**SOIL VARIABLES**

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

**HYDROLOGIC VARIABLES**

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

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

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

**Microrelief of Wetland Surface (P)**: Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)_____ 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** 6.9

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

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

**Evidence of Seeps and Springs (P)**: No Seeps or Springs_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: J Brownlee

GPS Technician QA/QC check: KV

## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106AY018 Field Target: 283 Date: 7.5.16

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

3. **Photos**

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

X Haley Volper — X Haley Volper 7-6-16

Wetland Scientist (print) — Signature / Date

X J Brownlee — X [signature] 7.5.16

Field Crew Chief (print) — Signature / Date

# WETLAND DETERMINATION DATA FORM

| SITE DESCRIPTION | | | |
|---|---|---|---|
| **Survey Type: Centerline**____ **Access Road** (explain)____ **Other** (explain) Facility | | **Field Target:** 281 | **Map #:** 42 **Map Date:** 6-9-16 |
| **Date:** 7-5-16 | **Project Name & No.: Alaska LNG 60418403** | | **Feature Id:** W106AY019 |
| **Investigators:** Jessie Brownlee, Kaley Volper | | | **Team No.:** W106 |
| **State: Alaska** | **Region: Alaska** | **Milepost:** ~278 | |
| **Latitude:** 66.822015° | | **Longitude:** -150.676322° | **Datum: WGS84** |
| **Logbook No.:** 2 | **Logbook Page No.:** 20 | **Picture No.:** P_W106AY019_001 Hummock | |

| SITE PARAMETERS | |
|---|---|
| Subregion: Ray mountains | Landform (hillslope, terrace, hummocks, etc.): valley bottom |
| Slope (%): 5-8 | Local relief (concave, convex, none): Convex |
| Pre-mapped Alaska LNG/NWI classification: U : 11C2, 111A2 | Evidence of Wildlife Use: have 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_____ No X |
| Hydric Soil Present? Yes_____ No X | **Wetland Type:** U |
| Wetland Hydrology Present? Yes_____ No X | Alaska Vegetation Classification (Viereck): 11B2, 11C2 |

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

Previously burned Pic Mar open forest w/ trees (now dead standing snags) ~ 30' tall
Now a dry shrub community of Sal Gela, Bet Nan. Lacking much of a Herb layer.
Dry moss throughout w/ pockets of Bare Burned moss mat as Bare ground

# WETLAND DETERMINATION DATA FORM

W106AY019

**VEGETATION** (use scientific names of plants)

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

Total Cover: _____

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

| Sapling/Shrub Stratum (26) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Populus tremuloides | 3 | | FACU |
| 2. Salix glauca | 20 | Y | FAC |
| 3. Betula neoalaskan | 3 | | FACU |
| 4. Betula nana | 15 | Y | FAC |
| 5. vaccinium vitis-idaea | 2 | | FAC |
| 6. vaccinium uliginosum | 3 | | FAC |
| 7. Rhododendrum tomentosum | 5 | | FACU |
| 8. Arctous Rubra | 2 | | FAC |
| 9. Rosa acicularis | T | | FACU |

Total Cover: 61

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

**Dominance Test worksheet:**

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

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

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

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species: | 0 | X 1 = | 0 |
| FACW species: | 9 | X 2 = | 18 |
| FAC species | 42 | X 3 = | 126 |
| FACU species | 10 | X 4 = | 40 |
| UPL species | 0 | X 5 = | 0 |
| Column Totals: | 61 | (A) | 184 (B) |

PI = B/A = 3.02

| | | | | |
|---|---|---|---|---|
| Picea Mariana | 4 | | | FACW |

**VEGETATION** (use scientific names of plants)

| Herb Stratum (26) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Chamerion angustifolium | 4 | | FACU |
| 2. Achillea millefolium | T | | FACU |
| 3. Forb sp | T | | — |
| 4. Equisetum scirpoides | T | | FACU |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |

Total Cover: —

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

**Hydrophytic Vegetation Indicators:**

Y Dominance Test is > 50%

N Prevalence Index is ≤ 3.0

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

— Problematic Hydrophytic Vegetation[1] (Explain)

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

10 % Bare Ground

Ø % Cover of Wetland Bryophytes

40 Total Cover of Bryophytes

Ø % Cover of Water

**Hydrophytic Vegetation Present (Y/N):** Y

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

W106AY019

# WETLAND DETERMINATION DATA FORM

7-5-16

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

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

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox % | Type[1] | Loc[2] | Texture | Notes |
|---|---|---|---|---|---|---|---|---|
| A 0-1 | 10YR 2/1 | 100 | | | | | loam | |
| Bw 1-2 | 10YR 3/3 | 100 | | | | | silt loam | |
| Bhs/E 2-9 | 10YR 4/3 | 75 | 10YR 2/2 | 15 | | | fine sand | |
| C 9-16 | SAND | | 10YR 2/1 | 10 | E horizon | | very cobbly | 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:

| 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:

# 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: Jessie Brownlee

GPS Technician QA/QC check: KV

## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106A1019 Field Target: 281 Date: 7.5.16

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. Photos

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

X Haley Volper — Wetland Scientist (print)

X Haley Volper 7-6-16 — Signature / Date

X JBrownlee — Field Crew Chief (print)

X [signature] 7-5-16 — Signature / Date

# WETLAND DETERMINATION DATA FORM

| SITE DESCRIPTION | | | |
|---|---|---|---|
| Survey Type: Centerline X Access Road (explain)____ Other (explain)____ | | Field Target: 293 | Map #: 29 Map Date: 6.9.16 |
| Date: 7.6.16 | Project Name & No.: Alaska LNG 60418403 | | Feature Id: W106AY020 |
| Investigators: Jessie Brownlee Kaley Volper | | | Team No.: W106 |
| State: Alaska | Region: Alaska | Milepost: 206.3 | |
| Latitude: 67.675483 | | Longitude: -149.721832 | Datum: WGS84 |
| Logbook No.: 2 | Logbook Page No.: 21 | Picture No.: P_W106AY020_001 thru_004 | |

| SITE PARAMETERS | |
|---|---|
| Subregion: Brooks Range | Landform (hillslope, terrace, hummocks, etc.): Valley |
| Slope (%): 5-8 | Local relief (concave, convex, none): convex |
| Pre-mapped Alaska LNG/NWI classification: U 1A3, 11C2 | Evidence of Wildlife Use: Bear signs |
| 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): 1A3, 11C2 |

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

From walk south to here was wet. Small upland inclusions that are driven by slight elevation gains that give ~~distance~~ Hieght from the watertable.

20' away from this point to the south is a watertable @ 6".

Calling the wet/Dry boundary within this and the wet OP. Trees & shrubs are preferentially growing on higher ground which would indicate wet conditions. Gravel @ 6" everywhere. Cant pop holes to verify watertable presents, so am calling entire polygon wet to the south from here.

W106AP020-OP:
Slight swaling feature running E/W. Soil 6" Sat organics over gravel. watertable @ 6"
7.17 pH EC 844. Several of these slight swaling features are present to the south

# WETLAND DETERMINATION DATA FORM

W106AY020 23 7/14/16

**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. Shepherdia canadensis | 1 | | FACU |
| 2. Vaccinium uliginosum | 15 | Y | FAC |
| 3. Salix reticulata | 3 | | FAC |
| 4. Rhododendron ~~tomentosum~~ groenlandicum | 6 | | FAC |
| 5. Dryas integrifolia | 15 | Y | FACU |
| 6. Betula nana | 3 | | FAC |
| 7. Arctous ruber | ~~8~~ 4 | | FAC |
| 8. Picea glauca | 3 | | FACU |
| 9. Dasiphora fruticosa | T | | FAC |
| Total Cover: 50 | | | |
| 50% of total cover: 25 | 20% of total cover: 10 | | |

**Dominance Test worksheet:**

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

Total Number of Dominant Species Across All Strata: 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 | 53 | X 3 = 159 |
| FACU species | 38 | X 4 = 152 |
| UPL species | 0 | X 5 = 0 |
| Column Totals: | 91 (A) | 311 (B) |

PI = B/A = 3.4

| | | | |
|---|---|---|---|
| Pedicularis interior | Forb | T | FACU |
| grass sp. | Forb | T | — |
| Spiranthes romanzoffiana (on edge of plot closer to the wet op.) | Forb | T | OBL |

**VEGETATION** (use scientific names of plants)

| Herb Stratum (24) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Equisetum Arvense | 18 | Y | FAC |
| 2. Tofieldia pusilla | 2 | | FAC |
| 3. Chamarica latifolium | 1 | | FAC |
| 4. Geocaulon lividum | T | | FACU |
| 5. Carex Scirpoidea | 3 | | FACU |
| 6. Saussurea angustifolia | 1 | | FAC |
| 7. Anemoni | T | | — |
| 8. Hedysarum alpinum | 1 | | FACU |
| 9. Bistorta viviparo | T | | FAC |
| 10. Pea 2 | 1 | | — |
| Total Cover: 27 | | | |
| 50% of total cover: 13.5 | 20% of total cover: 5.4 | | |

**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.

Not recorded % Bare Ground

Ø % Cover of Wetland Bryophytes

Not recorded 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

W06AY020

7.6.16

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

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

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox % | Type[1] | Loc[2] | Texture | Notes |
|---|---|---|---|---|---|---|---|---|
| A 0-4 | 7.5YR 2.5/1 | 100 | | | | | Loam | |
| C 4-14 | 10YR 3/2 | 100 | | | | | extremely gravelly 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: No 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:** 844 8.02 pH |

Notes:

W106AY020

# 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: J Brownlee

GPS Technician QA/QC check:

## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106AY020 Field Target: 293 Date: 7.6.16

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. **Photos**

- [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 Kaley Volper X Kaley Volper 7-8-16

Wetland Scientist (print) Signature / Date

X JBrownlee X 7-8-16

Field Crew Chief (print) Signature / Date

# WETLAND DETERMINATION DATA FORM

| SITE DESCRIPTION | | | |
|---|---|---|---|
| Survey Type: Centerline X Access Road (explain)____ Other (explain)____ | | Field Target: 294 | Map #: 29 Map Date: 6.9.16 |
| Date: 7-6-16 | Project Name & No.: Alaska LNG 60418403 | | Feature Id: W106AY021 |
| Investigators: Jessie Brownlee, Kaley Volper | | | Team No.: W106 |
| State: Alaska | Region: Alaska | Milepost: 206.4 | |
| Latitude: 67.6749943° | Longitude: -149.7138670° | | Datum: WGS84 |
| Logbook No.: 2 | Logbook Page No.: 21 | Picture No.: P_W106AY021_001 thru 004 | |

| SITE PARAMETERS | |
|---|---|
| Subregion: Brooks Range | Landform (hillslope, terrace, hummocks, etc.): Hillside |
| Slope (%): 10-15 | Local relief (concave, convex, none): flat to slightly convex |
| Pre-mapped Alaska LNG/NWI classification: UP | Evidence of Wildlife Use: critter 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_____ No X |
| Hydric Soil Present? Yes_____ No X | **Wetland Type:** U |
| Wetland Hydrology Present? Yes_____ No X | Alaska Vegetation Classification (Viereck): IA2, IIB2 |

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

Tall open Pic Gla Forest w/ thick moss + Dense Cover of Blueberries.
Soil thick dry OC over Cobbles + gravel.
No signs of hydrology. Signature appears dry as we walked in from Road

# WETLAND DETERMINATION DATA FORM

W106AY021

**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. vaccinium uliginosum | 20 | Y | FAC |
| 2. Arctous ruber | 2 | | FAC |
| 3. vaccinium vitis-idaea | 30 | Y | FAC |
| 4. Salix pulchra | 1 | | FACW |
| 5. Rhododendrum groenlandicum | 4 | | FAC |
| 6. Empetrum nigrum | 70 | Y | FAC |
| 7. Dryas integrifolia | 1 | | FACU |
| 8. Dasaphora fruticosa | T | | FAC |
| 9. Alnus viridis fruticosa | 2 | | FAC |
| Total Cover: 132 | | | |
| 50% of total cover: 66 | 20% of total cover: 26.4 | | |

**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: | 1 | X 2 = | 2 |
| FAC species | 128 | X 3 = | 384 |
| FACU species | 32 | X 4 = | 128 |
| UPL species | 0 | X 5 = | 0 |
| Column Totals: | 161 (A) | | 514 (B) |

PI = B/A = 3.19

**VEGETATION** (use scientific names of plants)

| Herb Stratum ( 26' ) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. pirola grandiflora | T | | FAC |
| 2. Carex scirpoidea | 1 | | FACU |
| 3. Dea sp | T | | — |
| 4. Carex 2 small | 1 | | — |
| 5. Equisetum scirpoides | T | | FACU |
| 6. | | | |
| 7. (Add to Shrub Layer. <5%) | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| Total Cover: — | | | |
| 50% of total cover: — | 20% of total cover: — | | |

**Hydrophytic Vegetation Indicators:**

Y Dominance Test is > 50%

N Prevalence Index is ≤ 3.0

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

— Problematic Hydrophytic Vegetation[1] (Explain)

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

Ø % Bare Ground

Ø % Cover of Wetland Bryophytes

100 Total Cover of Bryophytes

Ø % Cover of Water

**Hydrophytic Vegetation Present (Y/N):** Y

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

# WETLAND DETERMINATION DATA FORM

W106AY021

7-6-16

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

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

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox % | Type[1] | Loc[2] | Texture | Notes |
|---|---|---|---|---|---|---|---|---|
| Oe 0-9 | | | | | | | | Dry organics |
| C 9-15 | | | | | | | extremely gravelly sand w/large cobbles | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

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

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

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

Restrictive Layer (if present): Type: 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:

# WETLAND DETERMINATION DATA FORM

W106AY021

| 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

JBrown/a

## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106AY021 Field Target: 294 Date: 7-6-16

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. **Photos**

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

X Kaley Volper — Wetland Scientist (print)

X Kaley Volper — Signature / Date — 7-8-16

X JBrownlee — Field Crew Chief (print)

X — Signature / Date — 7.8.2016

# WETLAND DETERMINATION DATA FORM

| SITE DESCRIPTION | | | |
|---|---|---|---|
| **Survey Type:** Centerline___ **Access Road** (explain)___ **Other** (explain) X | | **Field Target:** 291 | **Map #:** 31 **Map Date:** 6.9.16 |
| **Date:** 7.6.16 | **Project Name & No.: Alaska LNG 60418403** | **Feature Id:** W106AY022 | |
| **Investigators:** Jessie Brownlee, Kaley Volpen | | | **Team No.:** W106 |
| **State: Alaska** | **Region: Alaska** | **Milepost:** 229.3 | |
| **Latitude:** 67°24'58.241" | **Longitude:** -150°04' 04.912" | | **Datum: WGS84** |
| **Logbook No.:** 2 | **Logbook Page No.:** 22 | **Picture No.:** P_W106AY022_001 thru _004 | |

| SITE PARAMETERS | |
|---|---|
| Subregion: Brooks Range | Landform (hillslope, terrace, hummocks, etc.): hillside, |
| Slope (%): 5 | Local relief (concave, convex, none): undulating |
| Pre-mapped Alaska LNG/NWI classification: PSS1/413 | Evidence of Wildlife Use: tracks. |
| Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes) | Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.) |
| Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed? | No X (If yes, explain in Notes) |
| Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic? | No X (If yes, explain in Notes.) |

| SUMMARY OF FINDINGS | |
|---|---|
| Hydrophytic Vegetation Present? Yes X No_____ | **Is the Sampled Area within a Wetland?** Yes X No_____ |
| Hydric Soil Present? Yes X No_____ | **Wetland Type:** PSS4/1B |
| Wetland Hydrology Present? Yes X No_____ | Alaska Vegetation Classification (Viereck): 11A3, 11C2 |

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

Raining @ time of survey.
Pic Mar Woodland. Tree range from 1' saplings to 3.0' but most are < 3" DBH and under 10' Thick feathers & sphagnum moss w/ lots of Lichen
got very wet just down slope w/ large pockets of standing water.
No additional OP's were collected due to rain & tablet acting up. But Map was updated extensively.
See that. #31.

# WETLAND DETERMINATION DATA FORM

W106AY022

**VEGETATION** (use scientific names of plants)

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

| Sapling/Shrub Stratum (26) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Vaccinium uliginosum | 8 | Y | FAC |
| 2. Arctous rubra | 4 | | FAC |
| 3. Dryas integrifolia | 3 | | FACU |
| 4. Vaccinium vitis-idaea | 8 | Y | FAC |
| 5. Picea mariana | 25 | Y | FACW |
| 6. Rhododendrum tomentosum | 5 | | FACW |
| 7. Empetrum nigrum | 5 | | FAC |
| 8. Dasiphora fruticosa | T | | FAC |
| 9. Andromeda polifolia | T | | FACW |
| Total Cover: 65 | | | |
| 50% of total cover: 32.5 | 20% of total cover: 13 | | |

**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: | 33 | X 2 = 66 |
| FAC species | 29 | X 3 = 87 |
| FACU species | 3 | X 4 = 12 |
| UPL species | 0 | X 5 = 0 |
| Column Totals: | 65 (A) | 165 (B) |

PI = B/A = 2.5

| | | | |
|---|---|---|---|
| Vaccinium oxycoccos | S | T | OBL |
| Salix pulchra | S | 3 | FACW |
| Betula nana | S | T | FAC |

**VEGETATION** (use scientific names of plants)

| Herb Stratum (26) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Carex bigelowii | 4 | | FAC |
| 2. Carex aquatilis | T | | OBL |
| 3. Equisetum scirpoides | T | | FACW |
| 4. Pyrola grandiflora | T | | FAC |
| 5. Sauseria angustifolium | T | | FAC |
| 6. Tofieldia pusilla | T | | FAC |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| Total Cover: — | | | |
| 50% of total cover: — | 20% of total cover: | | |

**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.

Ø % Bare Ground

50 % Cover of Wetland Bryophytes

100 Total Cover of Bryophytes

0.5 % Cover of Water

**Hydrophytic Vegetation Present (Y/N):** Y

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

# WETLAND DETERMINATION DATA FORM

W106AY022

7.6.16

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

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

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox % | Type[1] | Loc[2] | Texture | Notes |
|---|---|---|---|---|---|---|---|---|
| Oi 0-3 | | | | | | | | Dense organics |
| Oe 3-5 | | | | | | | | " " |
| Bw1 5-11 | 5Y 5/1 | 85 | 10YR 4/4 | 10 | con | M,RC | gravelly fine sandy loam | |
| | | | 5Y 6/1 | 5 | Dep | M,RC | | |
| Bw1f 11-18 | Same as Bw1 but frozen | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

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

| HYDRIC SOIL INDICATORS | | INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3] |
|---|---|---|
| Histosol or Histel (A1) N | Alaska Gleyed (A13) N | Alaska Color Change (TA4)[4] N |
| Histic Epipedon (A2) N | Alaska Redox (A14) 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) 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): 11

**Hydric Soil Present (Y/N):** Y

Notes:
Neg XX. Soil thixotrophic & ozzing into hole

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

| | | |
|---|---|---|
| Surface Water Present (Y/N): Y | Depth (in): 2 | **Wetland Hydrology Present (Y/N):** Y |
| Water Table Present (Y/N): N | Depth (in): — | |
| Saturation Present (Y/N): (includes capillary fringe) Y | Depth (in): 3 | **EC:** 73 pH 7.4 |

Notes:

# AQUATIC SITE ASSESSMENT DATA FORM

W106AY022

## 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)_0_ Sapling (<5 dbh, <6m tall)_25_ Tall shrub (2-6m)_0_ Short shrub (0.5-2m)_0_ Dwarf shrub (<0.5m)_30_ Tall herb (≥1m)_0_ Short herb (<1m)_15_ Moss-Lichen_30_ 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_____ 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.)_____ 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_____

EC 73

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

**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: JBrownke

GPS Technician QA/QC check:

## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106AY022 Field Target: 291 Date: 7-6-16

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. **Photos**

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

X Haley Volper X Haley Volper 7-8-16

Wetland Scientist (print) Signature / Date

X J Brownlee X 7.6.15

Field Crew Chief (print) Signature / Date

# WETLAND DETERMINATION DATA FORM

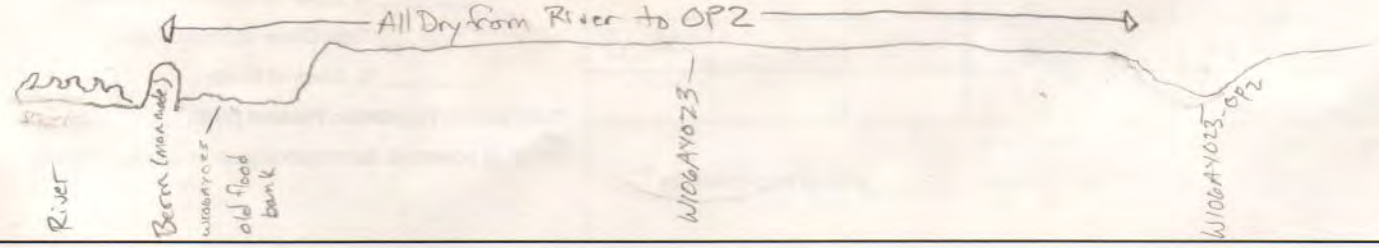
| SITE DESCRIPTION | | | |
|---|---|---|---|
| **Survey Type: Centerline** X **Access Road** (explain) X **Other** (explain)_____ | | **Field Target:** 295 | **Map #:** 27 **Map Date:** 6.9.16 |
| **Date:** 7-7-16 | **Project Name & No.: Alaska LNG 60418403** | | **Feature Id:** W106AY023 |
| **Investigators:** Jessie Brownlee, Kaley Volper | | | **Team No.:** W106 |
| **State: Alaska** | **Region: Alaska** | **Milepost:** 201.7 | |
| **Latitude:** 67°44'20.801" N | | **Longitude:** 149°45' 13.294" W | **Datum: WGS84** |
| **Logbook No.:** 2 | **Logbook Page No.:** 23 | **Picture No.:** P_W106AY023_001 thru 004 | |

| SITE PARAMETERS | |
|---|---|
| Subregion: Brooks Range | Landform (hillslope, terrace, hummocks, etc.): Hillside/terrace |
| Slope (%): 5 | Local relief (concave, convex, none): Flat to slightly convex |
| Pre-mapped Alaska LNG/NWI classification: PSS1/4B | Evidence of Wildlife Use: hares, robins, possible bear scratches |
| 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): 1A3, 11C2 |

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

Pic Celaue Woodland w/ trees up to 40' tall. Diverse short shrub & herb community
Site is historic River terrace w/ extremely gravelly sand @ 15" and repeated
bands of silt and fine Loamy sand above the C horizon.
No signs of hydrology.
all Dry on walk over to OP2
OP2 info. swale feature: PSS1/4B 11A3, 11C2 Slope
EC 490 pH 7.57



# WETLAND DETERMINATION DATA FORM

W106AY023

**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. Dryas integrifolia | 35 | Y | FACU |
| 2. vaccinium uliginosum | 20 | Y | FAC |
| 3. Arctous rubra | 4 | | FAC |
| 4. Picea Glauca | 10 | | FACU |
| 5. Salix reticulata | T | | FAC |
| 6. Rhododendrum groenlandicum ~~tomentosum~~ | 1 | | FACW |
| 7. Empetrum nigrum | T | | FAC |
| 8. Alnus viridis fruticosa | 1 | | FAC |
| 9. Salix glauca | 2 | | FAC |
| 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: 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: | — | X 1 = — |
| FACW species: | — | X 2 = — |
| FAC species | 28 | X 3 = 84 |
| FACU species | 64 | X 4 = 256 |
| UPL species | 4 | X 5 = 20 |
| Column Totals: | 96 (A) | 360 (B) |

PI = B/A = 3.75

| | | | |
|---|---|---|---|
| grass sp ? | H | T | — |
| Equisetum Scirpoides | H | T | FACU |

**VEGETATION** (use scientific names of plants)

| Herb Stratum (26') | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Hedysarum alpinum | T | | FAC |
| 2. Anthoxanthum monticda alpinum | 2 | Y | UPL |
| 3. Pedicularis lanata | T | | FAC |
| 4. Bistorta vivipara | T | | FAC |
| 5. Oxytropis campestris | 2 | Y | UPL |
| 6. Saussurea angustifolia | T | | FAC |
| 7. Carex Scirpoidea | 4 | Y | FACU |
| 8. Carex sp | T | | — |
| 9. Gentiana propinqua | T | | FACU |
| 10. Forb sp | T | | — |
| Total Cover: 8 | | | |
| 50% of total cover: 4 | 20% of total cover: 1.6 | | |

**Hydrophytic Vegetation Indicators:**

N Dominance Test is > 50%

N Prevalence Index is ≤ 3.0

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

— Problematic Hydrophytic Vegetation[1] (Explain)

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

4 % Bare Ground

Ø % Cover of Wetland Bryophytes

65 Total Cover of Bryophytes

Ø % Cover of Water

**Hydrophytic Vegetation Present (Y/N):** N

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

W106AY023

# WETLAND DETERMINATION DATA FORM

7.7.16

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

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

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox % | Type[1] | Loc[2] | Texture | Notes |
|---|---|---|---|---|---|---|---|---|
| Oi 0-2 | | | | | | | | |
| Oe 2-5 | | | | | | | | |
| Bw1 5-7 | 10YR 4/2 | 90 | 7.5YR 4/4 | 3 | con | m | Fine loamy sand | 7.5YR con @ interface w/ organics |
| | | | 10YR 5/4 | 7 | con | M | | |
| Bw2 7-9 | 2.5Y 4/1 | 95 | 10YR 5/3 | 5 | con | m | Silt | very faint |
| C 15-24 | — | | | | | | extremely gravelly sand | |
| | | | | | | | | |

see note

[1]Type: C=Concentration, D=Depletion, RM=Reduced 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: NO Depth (inches): —

**Hydric Soil Present (Y/N):** N

Notes: Bw1 + Bw2 repeat to a depth of 15" where the C material starts.

| 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:

W106AY023

# 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: JBrownlee

GPS Technician QA/QC check:

## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106AY023 Field Target: 295 Date: 7-7-16

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. **Photos**

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

X Haley Volper — X Haley Volper 7-8-16

Wetland Scientist (print) — Signature / Date

X JBrownlee — X [signature] 7.7.16

Field Crew Chief (print) — Signature / Date

# WETLAND DETERMINATION DATA FORM

| SITE DESCRIPTION | | | |
|---|---|---|---|
| Survey Type: Centerline X Access Road (explain) ( Other (explain) | | Field Target: 296 | Map #: 26 Map Date: 6.9.12 |
| Date: 7.7.16 | Project Name & No.: Alaska LNG 60418403 | | Feature Id: W106AY024 |
| Investigators: Jessie Brownlee Kaley Volper | | | Team No.: W106 |
| State: Alaska | Region: Alaska | Milepost: 197.8 | |
| Latitude: 67.79278098° | | Longitude: -149.80469697° | Datum: WGS84 |
| Logbook No.: 2 | Logbook Page No.: 23 | Picture No.: P_W106AY024-001 thru 004 | |

| SITE PARAMETERS | |
|---|---|
| Subregion: Brooks Range | Landform (hillslope, terrace, hummocks, etc.): Terrace, Flood bank |
| Slope (%): 10-15 | Local relief (concave, convex, none): convex |
| Pre-mapped Alaska LNG/NWI classification: U 1C2, 11B2 | Evidence of Wildlife Use: Hare 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 X No_____ (If no, explain in Notes.) |
| Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed? | No X (If yes, explain in Notes) |
| Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic? | No X (If yes, explain in Notes.) |

| SUMMARY OF FINDINGS | |
|---|---|
| Hydrophytic Vegetation Present? Yes_____ No X | **Is the Sampled Area within a Wetland?** Yes_____ No X |
| Hydric Soil Present? Yes_____ No X | **Wetland Type:** U |
| Wetland Hydrology Present? Yes_____ No X | Alaska Vegetation Classification (Viereck): 1A2, 11B2 |

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

Flood bank to nearby river. Site shows evidence of occational flooding but infrequently @ this particular spot. w/ silt deposited on ground scattered throughout Pic Glauca woodland w/ dense tall Salix Glauca + Alnus viridis understory w/ very sparse vegetation otherwise.

# WETLAND DETERMINATION DATA FORM

W106AY024

**VEGETATION** (use scientific names of plants)

| Tree Stratum (Plot sizes: 26) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Picea glauca | 10 | Y | FACU |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| Total Cover: 10 | | | |
| 50% of total cover: 5 | 20% of total cover: 2 | | |

| Sapling/Shrub Stratum (26) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Alnus viridis fruticosa | 25 | Y | FAC |
| 2. Arctous ruber | 1 | | FAC |
| 3. Salix glauca | 50 | Y | FAC |
| 4. Picea glauca | 10 | | FACU |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| Total Cover: 86 | | | |
| 50% of total cover: 43 | 20% of total cover: 17.2 | | |

**Dominance Test worksheet:**

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

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

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

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species: | – | X 1 = | – |
| FACW species: | – | X 2 = | – |
| FAC species | 76 | X 3 = | 228 |
| FACU species | 23 | X 4 = | 92 |
| UPL species | 2 | X 5 = | 10 |
| Column Totals: | 101 (A) | | 330 (B) |

PI = B/A = 3.26

**VEGETATION** (use scientific names of plants)

| Herb Stratum (26) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Pyrola asarifolia | 1 | Y | FACU |
| 2. Pyrola grandiflora | T | | FAC |
| 3. ~~Rubus Arcticus~~ | | | ~~FAC~~ |
| 4. Aster sibiricus | 2 | Y | UPL |
| 5. anemone parviflora | 1 | Y | FACU |
| 6. Calamagrostis canadensis | T | | FAC |
| 7. grass sp | T | | — |
| 8. artemisia tilesii | 1 | Y | FACU |
| 9. | | | |
| 10. | | | |
| Total Cover: 5 | | | |
| 50% of total cover: 2.5 | 20% of total cover: 1 | | |

**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.

30 % Bare Ground

Ø % Cover of Wetland Bryophytes

30 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

W106AY024

7.7.16

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

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

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox % | Type[1] | Loc[2] | Texture | Notes |
|---|---|---|---|---|---|---|---|---|
| C1 0-3.5 | 10YR 4/2 | 100 | | | | | silt | |
| Ab 3.5-4 | 10YR 2/2 | 100 | | | | | Loam | |
| C2 4-20 | 10YR 4/2 | 100 | | | | | Extremely gravelly silt | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced 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) Y | Geomorphic Position (D2) Y |
| Saturation (A3) N | Sparsely Vegetated Concave Surface (B8) N | Oxidized Rhizospheres along Living Roots (C3) N | Shallow Aquitard (D3) N |
| Water Marks (B1) N | Marl Deposits (B15) N | Presence of Reduced Iron (C4) N | Microtopographic Relief (D4) N |
| Sediment Deposits (B2) Y | Hydrogen Sulfide Odor (C1) N | Salt Deposits (C5) N | FAC-Neutral Test (D5) N |
| Drift Deposits (B3) 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:

# 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: J Brownlee

GPS Technician QA/QC check: KV

## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106A/024 Field Target: 296 Date: 7.7.16

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

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

8. **Photos**

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

X Haley Volper X Haley Volper 7-8-16

Wetland Scientist (print) Signature / Date

X J Brownlee X 7-7-16

Field Crew Chief (print) Signature / Date

# WETLAND DETERMINATION DATA FORM

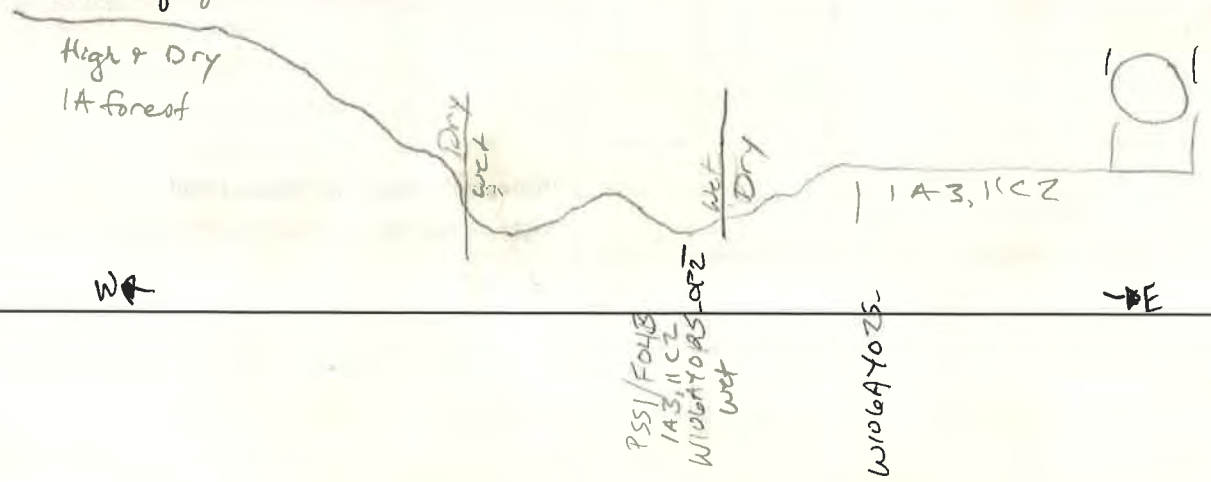
| SITE DESCRIPTION | | | |
|---|---|---|---|
| Survey Type: Centerline ✓ Access Road (explain)____ Other (explain)____ | | Field Target: 297 | Map #: 25 Map Date: 6-9-16 |
| Date: 7-7-16 | Project Name & No.: Alaska LNG 60418403 | | Feature Id: W106AY025 |
| Investigators: Jessie Brownlee, Kaley Volper | | | Team No.: W106 |
| State: Alaska | Region: Alaska | Milepost: | |
| Latitude: 67.8408147° | | Longitude: -149.835169° | Datum: WGS84 |
| Logbook No.: 2 | Logbook Page No.: 24 | Picture No.: P_W106AY025_001 thru 004 | |

| SITE PARAMETERS | |
|---|---|
| Subregion: Brooks Range | Landform (hillslope, terrace, hummocks, etc.): Hillside |
| Slope (%): 5-8 to W 0-3 to E | Local relief (concave, convex, none): Convex |
| Pre-mapped Alaska LNG/NWI classification: PSS4/1B | Evidence of Wildlife Use: bear scratches, |
| 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): 1A3, 11C2 |

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

On walk from road the area is all dry. Soil @ this spot are very thixotropic & soil looks wet upon first disturbance but reabsorbs the water in a minute. (Not calling saturation)
Site is on edge of several different polygons.
Between here & the upland polygon to the north is a slight swaling feature which is causing some Erosion & uneven ground. Swale is currently dry.
Soil Color is parent material related and therefore not calling 2.5Y indicator. Also, Neg XX throughout.
No signs of hydrology
OP info: Same in swale reg sign. use contours to cut out polygon. its not extensive ie wide, Positive XX at swale OP



# WETLAND DETERMINATION DATA FORM

W106A4025

**VEGETATION** (use scientific names of plants)

| Tree Stratum (Plot sizes: 100' ) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Picea Glauca 40' | 20 | Y | FACU |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| Total Cover: 20 | | | |
| 50% of total cover: 10 | 20% of total cover: 4 | | |

| Sapling/Shrub Stratum ( 26' ) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Vaccinium vitis-idaea | 7 | | FAC |
| 2. Arctous ruber | 4 | | FAC |
| 3. Vaccinium uliginosum | 20 | Y | FAC |
| 4. Dryas integrifolia | 15 | Y | FACU |
| 5. Empetrum nigrum | 5 | | FAC |
| 6. Salix glauca | 6 | | FAC |
| 7. Rhododendrum groenlandicum | 1 | | FAC |
| 8. Salix reticulata | T | | FAC |
| 9. Picea glauca | 5 | | FACU |
| Total Cover: 63 | | | |
| 50% of total cover: 31.5 | 20% of total cover: 12.6 | | |

**Dominance Test worksheet:**

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

Total Number of Dominant Species Across All Strata: 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 = | 0 |
| FACW species: | 0 | X 2 = | 0 |
| FAC species | 44 | X 3 = | 132 |
| FACU species | 45 | X 4 = | 180 |
| UPL species | 0 | X 5 = | 0 |
| Column Totals: | 89 (A) | | 312 (B) |

PI = B/A = 3.5

**VEGETATION** (use scientific names of plants)

| Herb Stratum ( 26' ) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Coeocaulon lividum | 1 | | FACU |
| 2. Hedysarum alpinum | 1 | | FACU |
| 3. Saussurea angustifolia | 1 | | FAC |
| 4. carex scirpoidea | 3 | Y | FACU |
| 5. Bistorta vivipara | T | | FAC |
| 6. Equisetum scirpoides | T | | FACU |
| 7. Yellow flower | T | | |
| 8. green sp | T | | |
| 9. | | | |
| 10. | | | |
| Total Cover: 6 | | | |
| 50% of total cover: 3 | 20% of total cover: 1.2 | | |

**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

90 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

W10WA1025

7.7.15

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

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

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox % | Type[1] | Loc[2] | Texture | Notes |
|---|---|---|---|---|---|---|---|---|
| Oe 0-3 | | | | | | | | Dry organics |
| Bw1 3-5 | 2.5Y 4/1 | 95 | 10YR 5/3 | 5 | con | m | fine loamy sand | |
| Bw2 5-14 | 2.5Y 3/1 | 90 | 10YR 5/3 | 10 | con | m | silt | |
| Ab 14-15 | 10YR 2/2 | 100 | | | | | | |
| Bw3 15-24 | 2.5Y 4/1 | 95 | 10YR 5/3 | 5 | con | m | very fine 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: ND 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:

# 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: JBrownlee

GPS Technician QA/QC check: LV

## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W10WAY025 Field Target: 297 Date: 7.7.16

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

1. **Site Description**

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

2. **Vegetation**

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

3. **Soil**

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

4. **Hydrology**

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

5. **Functions and Values**

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

6. **Field Logbook**

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

7. **Maps**

   - ☒ Wetland boundaries have been corrected if necessary?
   - ☒ Maps are initialed and dated?

8. **Photos**

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Haley Volper X Haley Volper 7-8-16

Wetland Scientist (print) Signature / Date

X J Brownlee X 7.7.16

Field Crew Chief (print) Signature / Date

# WETLAND DETERMINATION DATA FORM

| SITE DESCRIPTION | | | |
|---|---|---|---|
| Survey Type: Centerline____ Access Road (explain)____ Other (explain) A | | Field Target: 292 | Map #: 30 Map Date: 6-9-16 |
| Date: 7-7-16 | Project Name & No.: Alaska LNG 60418403 | Feature Id: W106AY026 | |
| Investigators: Jessie Brownlee, Kaley Volper | | | Team No.: W106 |
| State: Alaska | Region: Alaska | Milepost: 218.6 | |
| Latitude: 67.5184783 7° | Longitude: -149.8383046° | | Datum: WGS84 |
| Logbook No.: 2 | Logbook Page No.: 25 | Picture No.: P-W106AY026-001 thru 004 | |

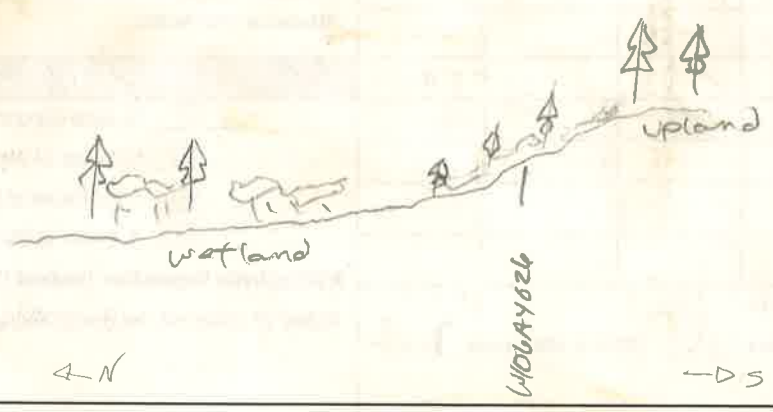
| SITE PARAMETERS | |
|---|---|
| Subregion: Brooks Range | Landform (hillslope, terrace, hummocks, etc.): Hillside side of mound |
| Slope (%): 5-8 | Local relief (concave, convex, none): Flat to slightly convex |
| Pre-mapped Alaska LNG/NWI classification: PSS4/1B | Evidence of Wildlife Use: Bear signs |
| 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.) transitional veg |

| SUMMARY OF FINDINGS | |
|---|---|
| Hydrophytic Vegetation Present? Yes X See Note Below No ~~X~~ | Is the Sampled Area within a Wetland? Yes X No_____ |
| Hydric Soil Present? Yes X No_____ | Wetland Type: PSS4/1B |
| Wetland Hydrology Present? Yes X No_____ | Alaska Vegetation Classification (Viereck): 1A3, 11C2 |

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

FT placed in middle of 4 different signatures in a transition zone from upland to wetland. Site is marginal but still wet. Confirmed various signatures around. Due to transition & being close to upland to the South Veg does Not Pass but still Calling wetland due to water seeping in @ 5" (slowly) & Positive KK & proximity to strong wetland features ~15' away.

W106AY026-0P2. Watertable @ 6" PSS4/1B 1A3, 11C2



# WETLAND DETERMINATION DATA FORM

W106AY026

**VEGETATION** (use scientific names of plants)

| Tree Stratum (Plot sizes: 100' ) | 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 ( 26' ) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Vaccinium uliginosum | 15 | Y | FAC |
| 2. Arctous ruber | 1 | | FAC |
| 3. Rhododendrum groenlandicum | 4 | | FAC |
| 4. Salix reticulata | 2 | | FAC |
| 5. Betula nana | 10 | | FAC |
| 6. Picea glauca | 15 | Y | FACU |
| 7. Vaccinium vitis-idaea | 5 | | FAC |
| 8. Empetrum Nigrum | 5 | | FAC |
| 9. Dasiphora fruticosa | T | | FAC |
| Total Cover: 77 | | | |
| 50% of total cover: 38.5 | 20% of total cover: 15.4 | | |

**Dominance Test worksheet:**

No. of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 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 | 51 | X 3 = | 153 |
| FACU species | 42 | X 4 = | 168 |
| UPL species | 0 | X 5 = | 0 |
| Column Totals: | 93 (A) | | 321 (B) |

PI = B/A = 3.45

| | | | | |
|---|---|---|---|---|
| Rhododendrum tomentusum | S | T | | FACU |
| Pedicularis labradorica | F | T | | FACW |
| Rhododendrum lapponicum | S | T | | FAC |
| Dryas integrifolia | S | 90 | Y | FACU |
| Shepherdia canadensis | S | T | | FACU |

**VEGETATION** (use scientific names of plants)

| Herb Stratum ( 26' ) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Carex bigelowii | 8 | Y | FAC |
| 2. Carex scirpoidea | 2 | | FACU |
| 3. Saussurea angustifolia | 1 | | FAC |
| 4. crazy plantain | T | | — |
| 5. pea sp | T | | — |
| 6. Tofieldia pusilla | T | | FAC |
| 7. Equisetum scirpoides | T | | FACU |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| Total Cover: 11 | | | |
| 50% of total cover: 5.5 | 20% of total cover: 2.2 | | |

**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

60 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

W10KAY0Z4

7/7/16

**SOIL** Date_____ Feature ID_____ Soil Pit Required (Y/N)_____

**SOIL PROFILE DESCRIPTION:** (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox % | Type[1] | Loc[2] | Texture | Notes |
|---|---|---|---|---|---|---|---|---|
| Oe 0-5 | | | | | | | | Saturated @ 5" |
| Bwl 5-10 | 10YR3/2 | 90 | 5Y 5/1 | 5 | Dep | M RC | Gravelly silt | Cobbles @ O & Bw interface |
| | | | 10YR 4/4 | 5 | Con | M RC | | |
| Bwlf 10-+ | same as Bwl | but | frozen | | | | " " | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

| HYDRIC SOIL INDICATORS | | INDICATORS FOR PROBLEMATIC HYDRIC SOILS[3] |
|---|---|---|
| Histosol or Histel (A1) N | Alaska Gleyed (A13) N | Alaska Color Change (TA4)[4] N |
| Histic Epipedon (A2) N | Alaska Redox (A14) N | Alaska Alpine Swales (TA5) N |
| Black Histic (A3) N | Alaska Gleyed Pores (A15) N | Alaska Redox with 2.5Y Hue N |
| Hydrogen Sulfide (A4) N | | Alaska Gleyed without 5Y Hue or Redder Underlying Layer N |
| Thick Dark Surface (A12) N | | Other (Explain in Notes) ✓ |

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: Frost (Permanent) Depth (inches): 10

**Hydric Soil Present (Y/N):** Y

Notes: Positive XX @ 10" @ interface between Bwl & Bwlf
Thixo soil was seperating from organics creating void space when it was oozing out

| 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) 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): — | Wetland Hydrology Present (Y/N): Y | |
| Water Table Present (Y/N): N | Depth (in): — | | |
| Saturation Present (Y/N): (includes capillary fringe) Y | Depth (in): 5 | EC: — | |

Notes: Slight seeping ~~bow~~ @ 5"

# AQUATIC SITE ASSESSMENT DATA FORM

W106A4026

**VEGETATION VARIABLES** **P= Plot, M= Matrix**

**Primary Vegetation Type (P)**: Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_X_ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

**Percent Cover (P)**: Tree (>5 dbh, >6m tall)_5_ Sapling (<5 dbh, <6m tall)_15_ Tall shrub (2-6m)_0_ Short shrub (0.5-2m)_30_ Dwarf shrub (<0.5m) _10_ Tall herb (≥1m) _0_ Short herb (<1m) _20_ Moss-Lichen_20_ Floating_0_ Submerged_0_

**Number of Wetland Types (M)**: _3_ | **Evenness of Wetland Type Distribution (M)**: Even _____Highly Uneven _X_Moderately even _____

**Vegetation Density/Dominance (P)**: Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_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)_X_ Moderate (broken irregular rings)_____ High (small groupings, diverse and interspersed)_____

**HGM Class (P)**: Slope_X_ Flat_X_ Lacustrine Fringe_____ Depressional _____ Riverine _____ Estaurine Fringe_____

**SOIL VARIABLES**

**Soil Factors (P)**: Soil Lacking_____ Histosol:Fibric_____ Histosol:Hemic_____ Histosol: Sapric_____ Mineral: Gravelly_____ Mineral: Sandy_____ Mineral: Silty_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_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: JBrownlee

GPS Technician QA/QC check: KV

## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106A4026 Field Target: 292 Date: 7.7.16

*For all items not checked, please provide detailed explanation in the notes section of data form.*

1. **Site Description**

   - ☒ Site description, site parameters and summary of findings are complete?
   - ☒ A detailed site sketch is included in logbook?

2. **Vegetation**

   - ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
   - ☒ Vegetation names are entered legibly for all strata present?
   - ☒ Cover calculations are complete and correct?
   - ☒ All dominant species have been determined and recorded per strata?
   - ☒ Indicator status is correct for each species?
   - ☒ Dominance Test and Prevalence Index have been completed?

3. **Soil**

   - ☒ Soil profile is complete?
   - ☒ Appropriate hydric soil indicators are marked?

4. **Hydrology**

   - ☒ Appropriate hydrology indicators are marked?
   - ☒ Surface water, water table, and saturation depths are recorded if present?

5. **Functions and Values**

   - ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. **Field Logbook**

   - ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
   - ☒ Each logbook page is initialed and dated?

7. **Maps**

   - ☒ Wetland boundaries have been corrected if necessary?
   - ☒ Maps are initialed and dated?

8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Kaley Volper X Kaley Volper 7-8-16

Wetland Scientist (print) Signature / Date

X J Brownlee X 7.7.16

Field Crew Chief (print) Signature / Date

# WETLAND DETERMINATION DATA FORM

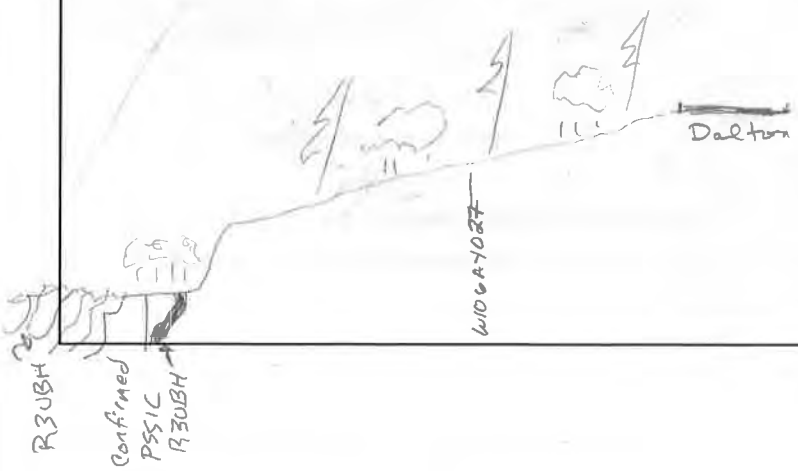
| SITE DESCRIPTION | | | |
|---|---|---|---|
| Survey Type: Centerline___ Access Road (explain)___ Other (explain) X | | Field Target: 298 | Map #: 24 Map Date: 6.9.16 |
| Date: 7-8-1 | Project Name & No.: Alaska LNG 60418403 | | Feature Id: W106AY027 |
| Investigators: Jessie Brannlee, Haley Vohner | | | Team No.: W106 |
| State: Alaska | Region: Alaska | Milepost: | |
| Latitude: 67.8845934° | Longitude: -149.825144° | | Datum: WGS84 |
| Logbook No.: 2 | Logbook Page No.: 24 | Picture No.: P_W106AY027_001 thru 004 | |

| SITE PARAMETERS | |
|---|---|
| Subregion: Brooks Range | Landform (hillslope, terrace, hummocks, etc.): Hillside |
| Slope (%): 5-8 | Local relief (concave, convex, none): slightly convex |
| Pre-mapped Alaska LNG/NWI classification: PSS1/F04B | Evidence of Wildlife Use: grandsquirrel 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): 1A3, 11B2 |

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Mature Picea woodland with Alder and diverse short shrubs. Thick feather moss abound. From Vehicle we walked down a slight swaling feature that was Dry & followed it to a dry forest down slope (map has been updated)
Finally found wet floodplain with R3UBH running along Elevation break down near the River.
Area is drier than previously mapped



# WETLAND DETERMINATION DATA FORM

W106AY027

**VEGETATION** (use scientific names of plants)

| Tree Stratum (Plot sizes: 100') | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Picea Glauca | 15 | Y | FACW |
| 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. Dryas integrifolia | 15 | | FACU |
| 2. Vaccinium uliginosum | 60 | Y | FAC |
| 3. Arctous rubra | 20 | Y | FAC |
| 4. Picea Glauca | 5 | | FACU |
| 5. Vaccinium vitis-idaea | 7 | | FAC |
| 6. Empetrum nigrum | 5 | | FAC |
| 7. Alnus viridis fruticosa | 10 | | FAC |
| 8. Salix glauca | 5 | | FAC |
| 9. Shepherdia canadensis | T | | FACU |
| Total Cover: 128 | | | |
| 50% of total cover: 64 | 20% of total cover: 25.6 | | |

**Dominance Test worksheet:**

No. of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

% Dominant Species that are OBL, FACW, or FAC: 50 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: |
|---|---|---|
| OBL species: | 0 | X 1 = 0 |
| FACW species: | 1 | X 2 = 2 |
| FAC species | 107 | X 3 = 321 |
| FACU species | 40 | X 4 = 160 |
| UPL species | 0 | X 5 = 0 |
| Column Totals: | 148 (A) | 483 (B) |

PI = B/A = 3.26

| | | | | |
|---|---|---|---|---|
| Rhododendron tomentosum | S | 1 | | FACU |

**VEGETATION** (use scientific names of plants)

| Herb Stratum (26') | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Chamerion latifolium | T | | FAC |
| 2. Poa sp | T | | |
| 3. Geocaulon lividium | T | | FACU |
| 4. Boschniakia rossica | T | | FACU |
| 5. Saussurea angustifolia | T | | FAC |
| 6. Pedicularis sp | T | | — |
| 7. Hedysarum alpinum | 5 | Y | FACU |
| 8. Tofieldia pusilla | T | | FAC |
| 9. Carex Scirpoidea | T | | FACU |
| 10. Pyrola grandiflora | T | | FAC |
| Total Cover: 5 | | | |
| 50% of total cover: 2.5 | 20% of total cover: 1 | | |

**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

90 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

W10GAY027

7·8·16

| SOIL | Date_____ Feature ID_____ | Soil Pit Required (Y/N)_____ |
|---|---|---|

**SOIL PROFILE DESCRIPTION**: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox % | Type[1] | Loc[2] | Texture | Notes |
|---|---|---|---|---|---|---|---|---|
| Oe 0-3 | | | | | | | | Dry organics |
| A 3-4 | 10YR 2/2 | 100 | | | | | Sandy loam | |
| Bwl 4-8 | 2.5Y 4/1 | 100 | | | | | gravely silt | |
| C 8-20 | NA | 100 | | | | | Cobbly 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: No 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:

W106AY027

# 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: JBrownlee

GPS Technician QA/QC check: KV

## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W10GAY027 Field Target: 298 Date: 6-8-16

*For all items not checked, please provide detailed explanation in the notes section of data form.*

1. **Site Description**

   - ☐ Site description, site parameters and summary of findings are complete?
   - ☐ A detailed site sketch is included in logbook?

2. **Vegetation**

   - ☐ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
   - ☐ Vegetation names are entered legibly for all strata present?
   - ☐ Cover calculations are complete and correct?
   - ☐ All dominant species have been determined and recorded per strata?
   - ☐ Indicator status is correct for each species?
   - ☐ Dominance Test and Prevalence Index have been completed?

3. **Soil**

   - ☑ Soil profile is complete?
   - ☑ Appropriate hydric soil indicators are marked?

4. **Hydrology**

   - ☑ Appropriate hydrology indicators are marked?
   - ☑ Surface water, water table, and saturation depths are recorded if present?

5. **Functions and Values**

   - ☑ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. **Field Logbook**

   - ☑ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
   - ☑ Each logbook page is initialed and dated?

7. **Maps**

   - ☑ Wetland boundaries have been corrected if necessary?
   - ☑ Maps are initialed and dated?

3. **Photos**

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Haley Volper X Haley Volper 7-8-16

Wetland Scientist (print) Signature / Date

X JBrownlee X 7.8.16

Field Crew Chief (print) Signature / Date

# WETLAND DETERMINATION DATA FORM

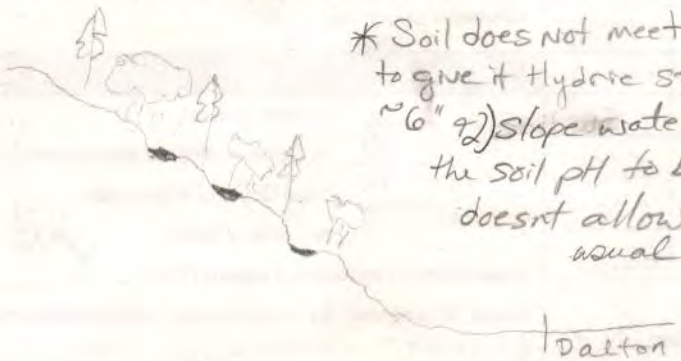
| SITE DESCRIPTION | | | |
|---|---|---|---|
| Survey Type: Centerline____ Access Road (explain)____ Other (explain)_____ | | Field Target: 299 | Map #: 23 Map Date: 6-9 |
| Date: 7-8-16 | Project Name & No.: Alaska LNG 60418403 | | Feature Id: W106AY028 |
| Investigators: Jessie Brownlee, Kaley Volper | | | Team No.: W106 |
| State: Alaska | Region: Alaska | Milepost: 187.8 | |
| Latitude: 67° 55' 52.33" | | Longitude: -149° 49' 18.093" | Datum: WGS84 |
| Logbook No.: 2 | Logbook Page No.: 27 | Picture No.: P_W106AY028-001 thru 004 | |

| SITE PARAMETERS | |
|---|---|
| Subregion: Brook Range | Landform (hillslope, terrace, hummocks, etc.): Hillside |
| Slope (%): ~30+ | Local relief (concave, convex, none): convex, undulating |
| Pre-mapped Alaska LNG/NWI classification: U: 1A2 | Evidence of Wildlife Use: NON |
| 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 see note No_____ | **Wetland Type:** 1A3 11B2 |
| Wetland Hydrology Present? Yes X No_____ | Alaska Vegetation Classification (Viereck): PF04/SS1B |

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Most awesome Hillslope ever!
Mature Pic Gla woodland. Springs and seeps expressing throughout area.
Dry areas are scattered about but too small and discontinuous to pull them out. Springs + seeps are creating pocket pools. Sediment patches are on ground throughout hillside
Wet all way to road, from OP2




* Soil does not meet an indicator, however I'm using BPJ to give it Hydric status due to 1) Water filled hole to depth of ~6" 2) Slope water is 8.9 pH which I am taking to assume the soil pH to be very high... higher than 7.2 which doesn't allow Iron to go into solution to give usual indicators.
"Soils w/ pH of 7.2 or Higher"
USACOE 07 Supplement

# WETLAND DETERMINATION DATA FORM

W106AY028

**VEGETATION** (use scientific names of plants)

| Tree Stratum (Plot sizes: 100' ) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Picea glauca | 20 | Y | FACU |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| Total Cover: 20 | | | |
| 50% of total cover: 10 | 20% of total cover: 4 | | |

| Sapling/Shrub Stratum ( 26' ) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Arctous rubera | 5 | | FAC |
| 2. Rhododendrum groenlandicum | 60 | Y | FAC |
| 3. Cassiope tetragona | 70 | Y | FACU |
| 4. vaccinium uliginosum | 20 | Y | FAC |
| 5. Alnus viridis fruticosa | 30 | Y | FAC |
| 6. Salix arbusculoides | 10 | | FACW |
| 7. Dryas integrifolia | 2 | | FACU |
| 8. Salix bebbiana | 15 | | FAC |
| 9. picea glauca | 1 | | FACU |
| Total Cover: 218 | | | |
| 50% of total cover: 109 | 20% of total cover: 43.6 | | |

**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: | 18 | X 2 = 36 |
| FAC species | 137 | X 3 = 411 |
| FACU species | 97 | X 4 = 388 |
| UPL species | 0 | X 5 = 0 |
| Column Totals: | 252 (A) | 835 (B) |

PI = B/A = 3.31

| | | | | |
|---|---|---|---|---|
| Vaccinium vitis idaea | S | 5 | | FAC |
| Carex sp | F | 2 | | — |

**VEGETATION** (use scientific names of plants)

| Herb Stratum ( 26' ) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. grass | 2 | | — |
| 2. Equisetum pratense | 5 | Y | FACW |
| 3. Boschniakia rossica | T | | FACU |
| 4. Equisetum scirpoides | T | | FACU |
| 5. Boykinia richardsonii | 10 | Y | NI |
| 6. Equisetum palustre | 3 | | FACW |
| 7. carex rotundata | T | | OBL |
| 8. Saussurea angustifolia | T | | FAC |
| 9. pyrola grandiflora | 2 | | FAC |
| 10. pyrola asarifolia | 4 | | FACU |
| Total Cover: 24 | | | |
| 50% of total cover: 14 | 20% of total cover: 5.6 | | |

**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.

4 % Bare Ground

0 % Cover of Wetland Bryophytes

70 Total Cover of Bryophytes

5 % Cover of Water

**Hydrophytic Vegetation Present (Y/N):** Y

Notes: (If observed, list morphological adaptations below):

Boykinia richardsonii not included in PI math.

# WETLAND DETERMINATION DATA FORM

W106AY028

| 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 0-5 | 10YR 3/1 | 100 | | | | | loam | |
| Bw 5-13 | 2.5Y 3/1 | 98 | 10YR 4/4 | 2 | con | RC | very 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) _____ | Alaska Color Change (TA4)[4] N |
| Histic Epipedon (A2) N | Alaska Redox (A14) _____ | Alaska Alpine Swales (TA5) _____ |
| Black Histic (A3) N | Alaska Gleyed Pores (A15) _____ | Alaska Redox with 2.5Y Hue _____ |
| Hydrogen Sulfide (A4) N | | Alaska Gleyed without 5Y Hue or Redder Underlying Layer_____ |
| 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 See Note on Front page

Notes: Neg αα

| HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient) | | SECONDARY INDICATORS (2 or more required) | |
|---|---|---|---|
| Surface Water (A1) Y | Surface Soil Cracks (B6) N | Water-stained Leaves (B9) Y | Stunted or Stressed Plants (D1) N |
| High Water Table (A2) N see Note | 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) — | Shallow Aquitard (D3) N |
| Water Marks (B1) ~~X~~ N | Marl Deposits (B15) N | Presence of Reduced Iron (C4) N | Microtopographic Relief (D4) N |
| Sediment Deposits (B2) Y | Hydrogen Sulfide Odor (C1) N | Salt Deposits (C5) N | FAC-Neutral Test (D5) N |
| Drift Deposits (B3) N | Dry-Season Water Table (C2) N | Notes: | |
| Algal Mat or Crust (B4) N | Other (Explain in Notes): | | |
| Iron Deposits (B5) N | | | |

| | | |
|---|---|---|
| Surface Water Present (Y/N): Y | Depth (in): | Wetland Hydrology Present (Y/N): Y |
| Water Table Present (Y/N): N | Depth (in): — | |
| Saturation Present (Y/N): (includes capillary fringe) Y | Depth (in): Ø | EC: 231 PH 8.9 |

Notes:
Not calling a water table as soil pit was saturated & the surface water poured into hole.

W106AY028

# 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) 20 Sapling (<5 dbh, <6m tall) 0 Tall shrub (2-6m) 40 Short shrub (0.5-2m) 0 Dwarf shrub (<0.5m) 20 Tall herb (≥1m) 0 Short herb (<1m) 20 Moss-Lichen 0 Floating 0 Submerged 0

**Number of Wetland Types (M)**: 2 | **Evenness of Wetland Type Distribution (M):** Even ____ Highly Uneven X Moderately even ____

**Vegetation Density/Dominance (P)**: Sparse (0-20%)____ Low Density (20-40%)____ Medium Density (40-60%)____ High Density (60-80%)____ Very High Density (80-100%) X

**Interspersion of Cover & Open Water (P)**: 100% Cover or Open Water____ <25% Scattered/Peripheral Cover____ 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____ No Inlet/Intermittent Outlet____ No Inlet/Perennial Outlet____ Intermittent Inlet/No Outlet____ Intermittent Inlet/Intermittent Outlet____ Intermittent Inlet/Perennial Outlet____ Perennial Inlet/No Outlet____ Perennial Inlet/Intermittent Outlet____ Perennial Inlet/Perennial Outlet X

**Wetland Water Regime (P)**: Drier: Seasonally Flooded, Temporarily Flooded, Saturated X Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded ____

**Evidence of Sedimentation (P)**: No Evidence Observed____ Sediment Observed on Wetland Substrate X Fluvaquent Soils Sediment Created____

**Microrelief of Wetland Surface (P)**: Absent____ Poorly Developed (6in.)____ Well Developed (6-18in.)____ Pronounced (>18in.) X

**Frequency of Overbank Flooding (P)**: No Overbank Flooding X Return Interval 1-2 yrs____ Return Interval 2-5 yrs____ Return Interval >5 yrs____

**Degree of Outlet Restriction (P)**: No Outflow____ Restricted Outflow____ Unrestricted Outflow X

**Water pH (P)**: No surface water____ Circumneutral (5.5-7.4)____ Alkaline (>7.4) X Acid (<5.5)____ **pH Reading** 8.9

**Surficial Geologic Deposit Under Wetland (P)**: High Permeability Stratified Deposits____ Low Permeability Stratified Deposits X Glacial Till/Not Permeable____

**Basin Topographic Gradient (M)**: Low Gradient (<2%)____ High Gradient (≥2%) X

**Evidence of Seeps and Springs (P)**: No Seeps or Springs____ Seeps Observed X Intermittent Spring____ Perennial Spring X

**LANDSCAPE VARIABLES (M)**

**Wetland Juxtaposition**: Wetland Isolated____ Wetlands within 400m, Not Connected____ Only Connected Below____ Only Connected Above____ Connected Upstream & Downstream X Unknown____

**Wetland Land Use**: High Intensity (i.e., ag.)____ Moderate Intensity (i.e., forestry)____ Low Intensity (i.e. open space) X

**Watershed Land Use**: 0-5% Rural X 5-25% Urbanized____ 25-50% Urbanized____ >50% Urbanized____

**Size**: Small (<10 acres)____ Medium (10-100 acres) X Large (>100 acres)____

Crew Chief QA/QC check: J Brownlee

GPS Technician QA/QC check: KV

## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106AY028 Field Target: 299 Date: 7-8-16

*For all items not checked, please provide detailed explanation in the notes section of data form.*

1. **Site Description**

   - ☒ Site description, site parameters and summary of findings are complete?
   - ☒ A detailed site sketch is included in logbook?

2. **Vegetation**

   - ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
   - ☒ Vegetation names are entered legibly for all strata present?
   - ☒ Cover calculations are complete and correct?
   - ☒ All dominant species have been determined and recorded per strata?
   - ☒ Indicator status is correct for each species?
   - ☒ Dominance Test and Prevalence Index have been completed?

3. **Soil**

   - ☒ Soil profile is complete?
   - ☒ Appropriate hydric soil indicators are marked?

4. **Hydrology**

   - ☒ Appropriate hydrology indicators are marked?
   - ☒ Surface water, water table, and saturation depths are recorded if present?

5. **Functions and Values**

   - ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. **Field Logbook**

   - ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
   - ☒ Each logbook page is initialed and dated?

7. **Maps**

   - ☒ Wetland boundaries have been corrected if necessary?
   - ☒ Maps are initialed and dated?

8. **Photos**

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Haley Volper — Wetland Scientist (print)

X Haley Volper — Signature / Date — 7-8-16

X J Brownlee — Field Crew Chief (print)

X [signature] — Signature / Date — 7.8.16

# WETLAND DETERMINATION DATA FORM

| SITE DESCRIPTION | | | |
|---|---|---|---|
| Survey Type: Centerline____ Access Road (explain)____ Other (explain)_____ | | Field Target: 300 | Map #: 22 Map Date: 6.9.16 |
| Date: 7-8-16 | Project Name & No.: Alaska LNG 60418403 | | Feature Id: W106AY029 |
| Investigators: Jessie Brownlee, Kaley Volper, Kim Holmes | | | Team No.: W106 |
| State: Alaska | Region: Alaska | Milepost: 185.8 | |
| Latitude: 67°57' 9.263" N | Longitude: 149°46' 34.243" W | | Datum: WGS84 |
| Logbook No.: 2 | Logbook Page No.: 28 | Picture No.: P-W106AY029-001 thru 004 | |

| SITE PARAMETERS | |
|---|---|
| Subregion: Brooks Range | Landform (hillslope, terrace, hummocks, etc.): Toeslope. |
| Slope (%): <30 | Local relief (concave, convex, none): convex, undulating |
| Pre-mapped Alaska LNG/NWI classification: PSS1/4B 1A3, 1C2 | Evidence of Wildlife Use: have droppings + burrows |
| 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 see note No_____ | Wetland Type: PSS1/F04B |
| Wetland Hydrology Present? Yes X No_____ | Alaska Vegetation Classification (Viereck): 1A3, 11B2 |

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Complex site. Walk around to confirm Wetland status. AT location of FT300 it is wet with a R3UBH but W106AY029-OP is the wet/Dry boundary. There are small inclusions of uplands around hillside but for most part the springs are popping up too erratically to cut out dry ground.

W106AY029 is on boundary of two different vegetation signatures. As it dries up to the West in the 1C2, 11B1 which already has a pt in it, I'll describe the 1A3, 11B2 signature up slope + that continues to the South.

* Soil doesn't meet an indicator, however I'm using BPJ to give it Hydric status due to 1) water filling hole to depth of ~3" + 2) Slope water is 9.1 ph which I am taking to assume the soil pH is high too which doesn't allow iron to go into solution to give usual indicators. using "Soils w/pH of 7.2 of higher" USACOE OT Supplement.

W106AY029

# WETLAND DETERMINATION DATA FORM

W106AY029

**VEGETATION** (use scientific names of plants)

| Tree Stratum (Plot sizes: 100') | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Picea Glauca | 15 | Y | FACW |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| Total Cover: 15 | | | |
| 50% of total cover: 7.5 | 20% of total cover: 3 | | |

| Sapling/Shrub Stratum (26') | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Picea glauca | 5 | | FACU |
| 2. Alnus fruticosa | 25 | Y | FAC |
| 3. Arctous rubra | 7 | | FAC |
| 4. Salix reticulata | 7 | | FAC |
| 5. Cassiope tetragona | 5 | | FACU |
| 6. Dryas integrifolia | 30 | Y | FAC |
| 7. Rhododendrum tomentosum | 2 | | FACW |
| 8. Vaccinium uliginosum | 10 | | FAC |
| 9. Salix polchra | T | | FACW |
| Total Cover: 113 | | | |
| 50% of total cover: 57 | 20% of total cover: 22.8 | | |

**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: | 2 | X 2 = 8 |
| FAC species | 97 | X 3 = 291 |
| FACU species | 25 | X 4 = 100 |
| UPL species | — | X 5 = — |
| Column Totals: | 124 (A) | 399 (B) |

PI = B/A = 3.21

| | | | | |
|---|---|---|---|---|
| Salix bebbiana | S | 3 | | FAC |
| Vaccinium vitis-idaea | S | 15 | | FAC |

**VEGETATION** (use scientific names of plants)

| Herb Stratum (26') | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Pyrola aserifolia | T | | FACU |
| 2. Boykinia richardsonii | 4 | | NI |
| 3. Saussurea angustifola | T | | FAC |
| 4. Hedysarum alpinum | T | | FACU |
| 5. Bistorta vivipara | T | | FAC |
| 6. Pyrola grandiflora | T | | FAC |
| 7. Carex sp | T | | |
| 8. Grass sp | T | | |
| 9. Equisetum sp | T | | |
| 10. | | | |
| Total Cover: — | | | |
| 50% of total cover: — | 20% of total cover: — | | |

Added into shrub layer b/c <5%

Not counted in the PI calculations due to NI status.

**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

90 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

W106AY029

7·8·96

| 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 |
|---|---|---|---|---|---|---|---|---|
| Bw1 1-24 | 5Y 3/1 | 100 | | | | | gravelly 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) Yes |

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and 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 See note on front page

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) N see note | Inundation Visible on Aerial Imagery (B7) N | Drainage Patterns (B10) Y | Geomorphic Position (D2) Y |
| Saturation (A3) Y | Sparsely Vegetated Concave Surface (B8) N | Oxidized Rhizospheres along Living Roots (C3) — | Shallow Aquitard (D3) N |
| Water Marks (B1) N | Marl Deposits (B15) N | Presence of Reduced Iron (C4) N | Microtopographic Relief (D4) N |
| Sediment Deposits (B2) Y | Hydrogen Sulfide Odor (C1) N | Salt Deposits (C5) N | FAC-Neutral Test (D5) N |
| Drift Deposits (B3) N | Dry-Season Water Table (C2) N | Notes: | |
| Algal Mat or Crust (B4) N | Other (Explain in Notes): N | | |
| Iron Deposits (B5) N | | | |

| | | |
|---|---|---|
| Surface Water Present (Y/N): Y | Depth (in): 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): Ø | **EC:** 450 pH 9.1 |

Notes: not calling Watertable b/c soil was saturated but water posred in the hole from ground water.

W106AY029

# 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)_15_ Sapling (<5 dbh, <6m tall)_5_ Tall shrub (2-6m)_35_ Short shrub (0.5-2m)_0_ Dwarf shrub (<0.5m) _25_ Tall herb (≥1m) _0_ Short herb (<1m) _10_ Moss-Lichen_10_ Floating_0_ Submerged_0_

**Number of Wetland Types (M)**: _2_ | **Evenness of Wetland Type Distribution (M)**: Even _____ Highly Uneven _X_ Moderately even _____

**Vegetation Density/Dominance (P)**: Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)_X_

**Interspersion of Cover & Open Water (P)**: 100% Cover or Open Water_____ <25% Scattered/Peripheral Cover_____ 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_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_____ Sediment Observed on Wetland Substrate_X_ Fluvaquent Soils Sediment Created

**Microrelief of Wetland Surface (P)**: Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)_____ Pronounced (>18in.)_X_

**Frequency of Overbank Flooding (P)**: No Overbank Flooding_X_ Return Interval 1-2 yrs_____ Return Interval 2-5 yrs_____ Return Interval >5 yrs_____

**Degree of Outlet Restriction (P)**: No Outflow_____ Restricted Outflow_____ Unrestricted Outflow_X_

**Water pH (P)**: No surface water_____ Circumneutral (5.5-7.4)_____ Alkaline (>7.4)_X_ Acid (<5.5)_____ **pH Reading** _9.1_

**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_____ Seeps Observed_X_ Intermittent Spring_____ Perennial Spring_____

## LANDSCAPE VARIABLES (M)

**Wetland Juxtaposition**: Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_X_ Unknown_____

**Wetland Land Use**: High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space)_X_

**Watershed Land Use**: 0-5% Rural_X_ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

**Size**: Small (<10 acres)_____ Medium (10-100 acres)_X_ Large (>100 acres)_____

Crew Chief QA/QC check: GPS Technician QA/QC check: KV

JBrownlee

## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106AY029 Field Target: 300 Date: 7-8-16

*For all items not checked, please provide detailed explanation in the notes section of data form.*

1. **Site Description**

   - ☑ Site description, site parameters and summary of findings are complete?
   - ☑ A detailed site sketch is included in logbook?

2. **Vegetation**

   - ☑ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
   - ☑ Vegetation names are entered legibly for all strata present?
   - ☑ Cover calculations are complete and correct?
   - ☑ All dominant species have been determined and recorded per strata?
   - ☑ Indicator status is correct for each species?
   - ☑ Dominance Test and Prevalence Index have been completed?

3. **Soil**

   - ☑ Soil profile is complete?
   - ☑ Appropriate hydric soil indicators are marked?

4. **Hydrology**

   - ☑ Appropriate hydrology indicators are marked?
   - ☑ Surface water, water table, and saturation depths are recorded if present?

5. **Functions and Values**

   - ☑ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. **Field Logbook**

   - ☑ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
   - ☑ Each logbook page is initialed and dated?

7. **Maps**

   - ☑ Wetland boundaries have been corrected if necessary?
   - ☑ Maps are initialed and dated?

8. **Photos**

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Haley Volper X Haley Volper 7-8-16

Wetland Scientist (print) Signature / Date

X JBrownlee X 7.8.16

Field Crew Chief (print) Signature / Date

# WETLAND DETERMINATION DATA FORM

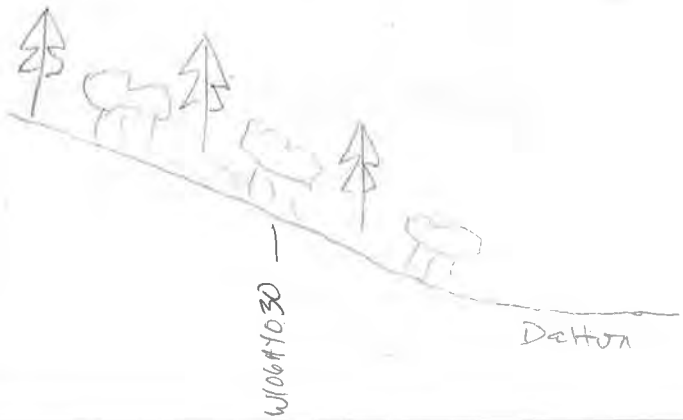
| SITE DESCRIPTION | | | |
|---|---|---|---|
| Survey Type: Centerline____ Access Road (explain) X Other (explain) X | | Field Target: 301 | Map #: 21 Map Date: 6.9 |
| Date: 7.9.16 | Project Name & No.: Alaska LNG 60418403 | Feature Id: W106AY030 | |
| Investigators: Jessie Brownlee, Kalen Volper | | | Team No.: W106 |
| State: Alaska | Region: Alaska | Milepost: 184.6 | |
| Latitude: 67.9699066° | Longitude: -149.7679069° | | Datum: WGS84 |
| Logbook No.: 2 | Logbook Page No.: 28 | Picture No.: P-W106AY030-001 thru 004 | |

| SITE PARAMETERS | |
|---|---|
| Subregion: Brooks Range | Landform (hillslope, terrace, hummocks, etc.): Hillside |
| Slope (%): 5-8 | Local relief (concave, convex, none): undulating to slightly convex |
| Pre-mapped Alaska LNG/NWI classification: U 1AZ | Evidence of Wildlife Use: Hare & 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_____ No X |
| Hydric Soil Present? Yes_____ No X | **Wetland Type:** U |
| Wetland Hydrology Present? Yes X No_____ | Alaska Vegetation Classification (Viereck): 1 A 2 |

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Mature Pic Gla open forest with Alder & willow shrub understory and few herbs/forbs. Microrelief is undulating with large rocks scattered about and sediment & bare ground present. A dry R4SB is ~20' from pit that occasionally over topr its bank & floods area scattering rocks & silt.
Soil is dry & rocky w/cobble pulled out of pit.



W1D6A4030

# 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 | 29 | Y | FACU |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| Total Cover: 29 | | | |
| 50% of total cover: 14.5 | 20% of total cover: 5.8 | | |

| Sapling/Shrub Stratum (26) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Dryas integrifolia | 10 | | FACU |
| 2. Arctous Rubra | 8 | | FAC |
| 3. Salix reticulata | 4 | | FAC |
| 4. Vaccinium uliginosum | T | | FAC |
| 5. vaccinium vitis-idaea | 6 | | FAC |
| 6. Alnus viridis fruticosa | 20 | Y | FAC |
| 7. Empetrum nigrum | 12 | Y | FAC |
| 8. Salix hebblana | 15 | Y | FAC |
| 9. Shepherdia canadensis | T | | FACU |
| Total Cover: 76 | | | |
| 50% of total cover: 38 | 20% of total cover: 15.2 | | |

**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: | 0 | X 1 = 0 |
| FACW species: | 0 | X 2 = 0 |
| FAC species | 65 | X 3 = 195 |
| FACU species | 40 | X 4 = 160 |
| UPL species | 0 | X 5 = 0 |
| Column Totals: | 105 (A) | 355 (B) |

PI = B/A = 3.38

| | | | | |
|---|---|---|---|---|
| Picea Glauca | S | T | | FACU |

**VEGETATION** (use scientific names of plants)

| Herb Stratum (26) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Pyrola asarifolia | 1 | | FACU |
| 2. Tofieldia pusilla | T | | FAC |
| 3. pea sp | T | | |
| 4. Carex sp | T | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| Total Cover: — | | | |
| 50% of total cover: — | 20% of total cover: — | | |

**Hydrophytic Vegetation Indicators:**

Y Dominance Test is > 50%

N Prevalence Index is ≤3.0

— Morphological Adaptations[1] (Provide supporting data in Notes)

— Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

15 % Bare Ground

Ø % Cover of Wetland Bryophytes

40 Total Cover of Bryophytes

Ø % Cover of Water

**Hydrophytic Vegetation Present (Y/N):** Y

Notes: (If observed, list morphological adaptations below):

# WETLAND DETERMINATION DATA FORM

W106AY030

7.9.16

**SOIL** Date_____ Feature ID_____ Soil Pit Required (Y/N)_____

**SOIL PROFILE DESCRIPTION:** (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox % | Type[1] | Loc[2] | Texture | Notes |
|---|---|---|---|---|---|---|---|---|
| O1 0-1 | | | | | | | | Dry feathermoss |
| C1 1-3 | 2.5Y 4/1 | 100 | | | | | Silt | Color is Parent material related |
| Deb 3-5 | | | | | | | | |
| C2 5-18 | 2.5Y 4/1 | 100 | | | | | extremely gravelly silt | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced 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: NO Depth (inches): –

**Hydric Soil Present (Y/N):** N

Notes:
very large cobble excavated from under O1

| 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) 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) Y | 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:

W106AY030

# 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: JBrownlee

GPS Technician QA/QC check: KV

## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106AY030 Field Target: 301 Date: 7.9.16

*For all items not checked, please provide detailed explanation in the notes section of data form.*

1. **Site Description**

   - ☒ Site description, site parameters and summary of findings are complete?
   - ☒ A detailed site sketch is included in logbook?

2. **Vegetation**

   - ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
   - ☒ Vegetation names are entered legibly for all strata present?
   - ☒ Cover calculations are complete and correct?
   - ☒ All dominant species have been determined and recorded per strata?
   - ☒ Indicator status is correct for each species?
   - ☒ Dominance Test and Prevalence Index have been completed?

3. **Soil**

   - ☒ Soil profile is complete?
   - ☒ Appropriate hydric soil indicators are marked?

4. **Hydrology**

   - ☒ Appropriate hydrology indicators are marked?
   - ☒ Surface water, water table, and saturation depths are recorded if present?

5. **Functions and Values**

   - ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. **Field Logbook**

   - ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
   - ☒ Each logbook page is initialed and dated?

7. **Maps**

   - ☒ Wetland boundaries have been corrected if necessary?
   - ☒ Maps are initialed and dated?

## 8. Photos

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

| | |
|---|---|
| X | X |
| Wetland Scientist (print) | Signature / Date |
| X Jessie Brownlee | X 8.30.16 |
| Field Crew Chief (print) | Signature / Date |

# WETLAND DETERMINATION DATA FORM

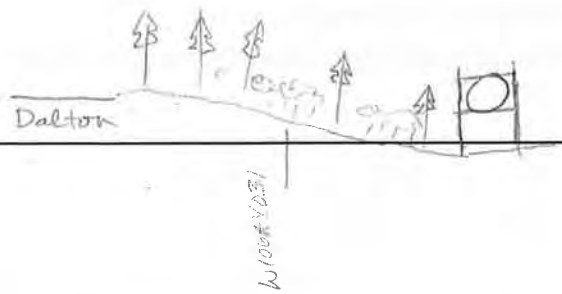
| SITE DESCRIPTION | | | |
|---|---|---|---|
| **Survey Type:** Centerline____ **Access Road** (explain)_____ **Other** (explain) X | | **Field Target:** 302 | **Map #:** 20 **Map Date:** 6.9.16 |
| **Date:** 7.9.16 | **Project Name & No.:** Alaska LNG 60418403 | | **Feature Id:** W106AY031 |
| **Investigators:** Jessie Brownlee Kaley Volper | | | **Team No.:** W106 |
| **State:** Alaska | **Region:** Alaska | **Milepost:** 182 | |
| **Latitude:** 68.00426151° | **Longitude:** -149.74397° | | **Datum:** WGS84 |
| **Logbook No.:** 2 | **Logbook Page No.:** 28 | **Picture No.:** P_W106AY031_001 thru 004 | |

| SITE PARAMETERS | |
|---|---|
| Subregion: Brooks Range | Landform (hillslope, terrace, hummocks, etc.): Hillside |
| Slope (%): 5-8 | Local relief (concave, convex, none): slightly convex |
| Pre-mapped Alaska LNG/NWI classification: U 1A2, 11B2 | Evidence of Wildlife Use: Bear scat/trail, vole evidence, have ground squirrels |
| Are climatic/hydrologic conditions on the site typical for this time of year? Yes_____ No_____ (if no explain in Notes) | Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.) |
| Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed? | No X (If yes, explain in Notes) |
| Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic? | No X (If yes, explain in Notes.) |

| SUMMARY OF FINDINGS | |
|---|---|
| Hydrophytic Vegetation Present? Yes X No_____ | **Is the Sampled Area within a Wetland?** Yes_____ No X |
| Hydric Soil Present? Yes_____ No X | **Wetland Type:** U |
| Wetland Hydrology Present? Yes_____ No X | Alaska Vegetation Classification (Viereck): 1A2, 11C2 |

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Mature open Pic Gla forest w/ Alden, Bet Nan & Sal Cala tall shrub & emp Nig, voc dwarf shrub community.
Area is very undulating in microtopography. Lots of squirrel holes & vole holes.
Dry stony soil w/ no signs of hydrology



WIOGAY031

# 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 | 29 | Y | FACU |
| 2. | | | |
| 3. | | | |
| 4. | | | |

Total Cover: 29

50% of total cover: 14.5 20% of total cover: 5.8

| Sapling/Shrub Stratum (26) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. vaccinium uliginosum | 15 | Y | FAC |
| 2. vaccinium vitis-idaea | 15 | Y | FAC |
| 3. Empetrum nigrum | 25 | Y | FAC |
| 4. Rhododendron tomentosum | 5 | | FACW |
| 5. Alnus viridis fruticosa | 8 | | FAC |
| 6. Betula nana | 30 | Y | FAC |
| 7. Picea Glauca | 1 | | FACU |
| 8. Salix Glauca | 8 | | FAC |
| 9. Dryas integrifolia | 8 | | FACU |

Total Cover: 117

50% of total cover: 58.5 20% of total cover: 23.4

**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: | 5 | X 2 = 10 |
| FAC species | 103 | X 3 = 309 |
| FACU species | 38 | X 4 = 152 |
| UPL species | 0 | X 5 = 0 |
| Column Totals: | 146 (A) | 471 (B) |

PI = B/A = 3.23

| | | | | |
|---|---|---|---|---|
| Ribes triste | S | 1 | | FAC |
| Salix bebbiana | S | 1 | | FAC |

**VEGETATION** (use scientific names of plants)

| Herb Stratum (26) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Grass sp | T | | — |
| 2. Equisetum scirpoides | T | | FACU |
| 3. Carex sp | T | | — |
| 4. Chamerion latifolium | T | | FAC |
| 5. Chamerion angustifolium | T | | FACU |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |

Total Cover: —

50% of total cover: — 20% of total cover: —

**Hydrophytic Vegetation Indicators:**

Y Dominance Test is > 50%

N Prevalence Index is ≤ 3.0

— Morphological Adaptations[1] (Provide supporting data in Notes)

— Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

0 % Bare Ground

0 % Cover of Wetland Bryophytes

45 Total Cover of Bryophytes

0 % Cover of Water

**Hydrophytic Vegetation Present (Y/N):** Y

Notes: (If observed, list morphological adaptations below):

W106AY031

# WETLAND DETERMINATION DATA FORM

7-9-16

**SOIL** **Date**_____ **Feature ID**_____ **Soil Pit Required (Y/N)**_____

**SOIL PROFILE DESCRIPTION**: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox % | Type[1] | Loc[2] | Texture | Notes |
|---|---|---|---|---|---|---|---|---|
| Oe 0-2 | | | | | | | | Dry organics |
| C 2-18 | | | | | | | gravelly sand | (slate parent 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:

| 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:

W06A1031

# 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: Jessie Brownlee

GPS Technician QA/QC check: KV

## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: WI06AY031 Field Target: 302 Date: 7·9·16

*For all items not checked, please provide detailed explanation in the notes section of data form.*

1. **Site Description**

   - ☒ Site description, site parameters and summary of findings are complete?
   - ☒ A detailed site sketch is included in logbook?

2. **Vegetation**

   - ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
   - ☒ Vegetation names are entered legibly for all strata present?
   - ☒ Cover calculations are complete and correct?
   - ☒ All dominant species have been determined and recorded per strata?
   - ☒ Indicator status is correct for each species?
   - ☒ Dominance Test and Prevalence Index have been completed?

3. **Soil**

   - ☒ Soil profile is complete?
   - ☒ Appropriate hydric soil indicators are marked?

4. **Hydrology**

   - ☒ Appropriate hydrology indicators are marked?
   - ☒ Surface water, water table, and saturation depths are recorded if present?

5. **Functions and Values**

   - ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. **Field Logbook**

   - ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
   - ☒ Each logbook page is initialed and dated?

7. **Maps**

   - ☒ Wetland boundaries have been corrected if necessary?
   - ☒ Maps are initialed and dated?

8. **Photos**

- [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 X Haley Volper 7-17-16

Wetland Scientist (print) Signature / Date

X J Brownlee X 7/17/16

Field Crew Chief (print) Signature / Date

# WETLAND DETERMINATION DATA FORM

| SITE DESCRIPTION | | | |
|---|---|---|---|
| Survey Type: Centerline___ Access Road (explain) X Other (explain)_____ | | Field Target: 303 | Map #: 19 Map Date: 6.9.16 |
| Date: 7-9-16 | Project Name & No.: Alaska LNG 60418403 | | Feature Id: W106AY032 |
| Investigators: Jessie Brownlee, Kaley Volper | | | Team No.: W106 |
| State: Alaska | Region: Alaska | Milepost: 181.6 | |
| Latitude: 68.0096709° | | Longitude: -149.781184° | Datum: WGS84 |
| Logbook No.: 2 | Logbook Page No.: 28 | Picture No.: P-W106AY032-001 thru 004 | |

| SITE PARAMETERS | |
|---|---|
| Subregion: Brooks Range | Landform (hillslope, terrace, hummocks, etc.): River terrace |
| Slope (%): 0-3 | Local relief (concave, convex, none): slightly convex |
| Pre-mapped Alaska LNG/NWI classification: U / C2, 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_____ No X |
| Hydric Soil Present? Yes_____ No X | **Wetland Type:** U : 1 |
| Wetland Hydrology Present? Yes X No_____ | Alaska Vegetation Classification (Viereck): 1C2, 11B2 |

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

FT on slight mound on a Flood Plain River terrace. Site is tall Pic Cola open forest w/ Salix + Alder
Soil is same slatey dry gravelly sand as other site in area.
Surrounding forest is coated in several inches of silt, A dry R4SB is directly to the east of mound.
Slightly Lower elevations on landscape have slight tussucking, hummocking but are still same rocky
Soil underneath several inches of silt.
River to the West Floods this otherwise dry forest. Signature is better coded 1C2, 11B2
But this spot specifically had a higher P.C Cola component.

# WETLAND DETERMINATION DATA FORM

W106AY032

**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. Populus balsamifera | 2 | + | FACU |
| 3. | | | |
| 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. Empetrum nigrum | 10 | Y | FAC |
| 2. vaccinium vitis-idaea | 10 | Y | FAC |
| 3. Arctous ruber | 2 | | FAC |
| 4. Salix Glauca | 15 | Y | FAC |
| 5. Dryas octopetala | T | | Upl. |
| 6. Picea Glauca | 2 | | FACU |
| 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: 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: | 0 | X 2 = | 0 |
| FAC species | 38 | X 3 = | 114 |
| FACU species | 39 | X 4 = | 156 |
| UPL species | 0 | X 5 = | 0 |
| Column Totals: | 77 (A) | | 270 (B) |

PI = B/A = 3.5

**VEGETATION** (use scientific names of plants)

| Herb Stratum (26) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. pyrola asarifolia | T | | FACU |
| 2. pyrola grandiflora | T | | FAC |
| 3. Artemisia tilesii | T | | FACU |
| 4. Grass sp. | T | | — |
| 5. Hedysarum alpinum | 1 | | FAC |
| 6. pea | T | | — |
| 7. moneses uniflora | T | | FACU |
| 8. Gentianella propinqua | T | | FACU |
| 9. Chamerion angustifolium | T | | FACU |
| 10. | | | |
| Total Cover: — | | | |
| 50% of total cover: — | 20% of total cover: — | | |

**Hydrophytic Vegetation Indicators:**

Y Dominance Test is > 50%

N Prevalence Index is ≤ 3.0

— Morphological Adaptations[1] (Provide supporting data in Notes)

— Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

5 % Bare Ground

Ø % Cover of Wetland Bryophytes

40 Total Cover of Bryophytes

Ø % Cover of Water

**Hydrophytic Vegetation Present (Y/N):** Y

Notes: (If observed, list morphological adaptations below):

W106A4032

# WETLAND DETERMINATION DATA FORM

7.9.16

**SOIL** **Date**_____ **Feature ID**_____ **Soil Pit Required (Y/N)**_____

**SOIL PROFILE DESCRIPTION:** (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox % | Type[1] | Loc[2] | Texture | Notes |
|---|---|---|---|---|---|---|---|---|
| O1 0-3 | | | | | | | | Dry organics |
| C 3-20 | 5Y 4/1 | 100 | | | | | gravelly slate | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced 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: NO 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) _____ | Stunted or Stressed Plants (D1) N |
| High Water Table (A2) N | Inundation Visible on Aerial Imagery (B7) N | Drainage Patterns (B10) Y | Geomorphic Position (D2) Y |
| Saturation (A3) N | Sparsely Vegetated Concave Surface (B8) N | Oxidized Rhizospheres along Living Roots (C3) N | Shallow Aquitard (D3) N |
| Water Marks (B1) N | Marl Deposits (B15) N | Presence of Reduced Iron (C4) N | Microtopographic Relief (D4) N |
| Sediment Deposits (B2) Y | Hydrogen Sulfide Odor (C1) N | Salt Deposits (C5) N | FAC-Neutral Test (D5) N |
| Drift Deposits (B3) 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:

# 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: J Brownlee

GPS Technician QA/QC check: KN

## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106AY032 Field Target: 303 Date: 7.9.16

*For all items not checked, please provide detailed explanation in the notes section of data form.*

1. **Site Description**

   - [x] Site description, site parameters and summary of findings are complete?
   - [x] A detailed site sketch is included in logbook?

2. **Vegetation**

   - [x] At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
   - [x] Vegetation names are entered legibly for all strata present?
   - [x] Cover calculations are complete and correct?
   - [x] All dominant species have been determined and recorded per strata?
   - [x] Indicator status is correct for each species?
   - [x] Dominance Test and Prevalence Index have been completed?

3. **Soil**

   - [x] Soil profile is complete?
   - [x] Appropriate hydric soil indicators are marked?

4. **Hydrology**

   - [x] Appropriate hydrology indicators are marked?
   - [x] Surface water, water table, and saturation depths are recorded if present?

5. **Functions and Values**

   - [x] Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. **Field Logbook**

   - [x] Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
   - [x] Each logbook page is initialed and dated?

7. **Maps**

   - [x] Wetland boundaries have been corrected if necessary?
   - [x] Maps are initialed and dated?

8. **Photos**

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Haley Volper X Haley Volper 7-17-16

Wetland Scientist (print) Signature / Date

X J Brownlee X 7.17.16

Field Crew Chief (print) Signature / Date

# WETLAND DETERMINATION DATA FORM

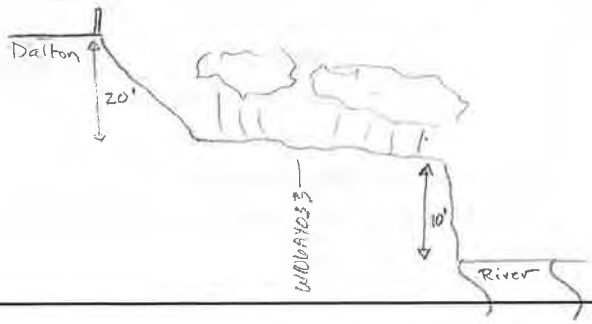
| SITE DESCRIPTION | | | |
|---|---|---|---|
| Survey Type: Centerline X Access Road (explain)____ Other (explain) X | | Field Target: 306 | Map #: 16 Map Date: 6.9.16 |
| Date: 7-10-16 | Project Name & No.: Alaska LNG 60418403 | Feature Id: W106AY033 | |
| Investigators: Jessie Brownlee, Kaley Volper | | | Team No.: W106 |
| State: Alaska | Region: Alaska U | Milepost: 178.5 | |
| Latitude: 68.03611677° | Longitude: -149.6527490° | | Datum: WGS84 |
| Logbook No.: 2 | Logbook Page No.: 29 | Picture No.: P_W106AY033_001 thru 004 | |

| SITE PARAMETERS | |
|---|---|
| Subregion: Brooks Range | Landform (hillslope, terrace, hummocks, etc.): River terrace |
| Slope (%): 8-10 | Local relief (concave, convex, none): slightly convex |
| Pre-mapped Alaska LNG/NWI classification: PSS1B | Evidence of Wildlife Use: Moose browse Hare 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_____ No X |
| Hydric Soil Present? Yes_____ No X | **Wetland Type:** U |
| Wetland Hydrology Present? Yes_____ No X | Alaska Vegetation Classification (Viereck): II B2, II C2 |

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Upland tall willow & alder community. Parent Material in the area is shale & ~~trees~~ colors on the gley page but not b/c its wet. Site gets run off from the road and the ground + veg are covered in silt from the road but after walking the area & popping 4 holes am convinced it's upland. A marginal micro wetland inclusion is present ~20' away but its too-small to pull out of the otherwise dry area.



# WETLAND DETERMINATION DATA FORM

W10GAY033

**VEGETATION** (use scientific names of plants)

| Tree Stratum (Plot sizes: 100') | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Populus balsamifera | 3 | | FACU |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 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 | 2 | | FAC |
| 2. Arctous Ruber | 25 | Y | FAC |
| 3. Alnus viridis fruticosa | 50 | Y | FAC |
| 4. Salix glauca | 8 | | FAC |
| 5. vaccinium vitis-idaea | T | | FAC |
| 6. Salix bebbiana | 4 | | FAC |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| Total Cover: 92 | | | |
| 50% of total cover: 46 | 20% of total cover: 18.4 | | |

**Dominance Test worksheet:**

No. of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

% Dominant Species that are OBL, FACW, or FAC: 67 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species: | 0 | X 1 = | 0 |
| FACW species: | 5 | X 2 = | 10 |
| FAC species | 90 | X 3 = | 270 |
| FACU species | 23 | X 4 = | 92 |
| UPL species | 0 | X 5 = | 0 |
| Column Totals: | 118 (A) | | 372 (B) |

PI = B/A = 3.15

**VEGETATION** (use scientific names of plants)

| Herb Stratum (26') | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Artemisia tilesii | 5 | | FACU |
| 2. Chamerion angustifolium | 15 | Y | FACU |
| 3. Petasites frigidus | 5 | | FACW |
| 4. Valariana capitata | T | | FAC |
| 5. Aconitum delphinifolium | T | | FAC |
| 6. pyrola aseriflia | T | | FACU |
| 7. Polemonium acutiflorum | 1 | | FAC |
| 8. Forb sp | T | | — |
| 9. | | | |
| 10. | | | |
| Total Cover: 26 | | | |
| 50% of total cover: 13 | 20% of total cover: 5.2 | | |

**Hydrophytic Vegetation Indicators:**

Y Dominance Test is > 50%

N Prevalence Index is ≤ 3.0

— Morphological Adaptations[1] (Provide supporting data in Notes)

— Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

8 % Bare Ground

0 % Cover of Wetland Bryophytes

20 Total Cover of Bryophytes

0 % Cover of Water

**Hydrophytic Vegetation Present (Y/N):** Y

Notes: (If observed, list morphological adaptations below):

# WETLAND DETERMINATION DATA FORM

W106AY033

7-10-16

**SOIL** Date_____ Feature ID_____ **Soil Pit Required (Y/N)**_____

**SOIL PROFILE DESCRIPTION**: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox % | Type[1] | Loc[2] | Texture | Notes |
|---|---|---|---|---|---|---|---|---|
| O1 0-4 | | | | | | | | Dry organics |
| C1 4-6 | N 3/ | 100 | | | | | Silt | weathered soft slate |
| C2 6-17 | N 4/ | 100 | | | | | gravelly silt | |
| C3 17-24 | N 4/6 | 100 | | | | | Silt | " " |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced 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) M on edge | 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:

W106AY033

# 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: JBrownlee

GPS Technician QA/QC check: KN

## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: WI06AY033 Field Target: 306 Date: 7.10.16

*For all items not checked, please provide detailed explanation in the notes section of data form.*

1. **Site Description**

   - ☒ Site description, site parameters and summary of findings are complete?
   - ☒ A detailed site sketch is included in logbook?

2. **Vegetation**

   - ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
   - ☒ Vegetation names are entered legibly for all strata present?
   - ☒ Cover calculations are complete and correct?
   - ☒ All dominant species have been determined and recorded per strata?
   - ☒ Indicator status is correct for each species?
   - ☒ Dominance Test and Prevalence Index have been completed?

3. **Soil**

   - ☒ Soil profile is complete?
   - ☒ Appropriate hydric soil indicators are marked?

4. **Hydrology**

   - ☒ Appropriate hydrology indicators are marked?
   - ☒ Surface water, water table, and saturation depths are recorded if present?

5. **Functions and Values**

   - ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. **Field Logbook**

   - ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
   - ☒ Each logbook page is initialed and dated?

7. **Maps**

   - ☒ Wetland boundaries have been corrected if necessary?
   - ☒ Maps are initialed and dated?

8. **Photos**

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

| | |
|---|---|
| X | X |
| Wetland Scientist (print) | Signature / Date |
| X Jessie Brownlee | X Jessie Brownlee 8·30·16 |
| Field Crew Chief (print) | Signature / Date |

# WETLAND DETERMINATION DATA FORM

| SITE DESCRIPTION | | | |
|---|---|---|---|
| Survey Type: Centerline X Access Road (explain)____ Other (explain) X | | Field Target: 307 | Map #: 13 Map Date: 6.9.16 |
| Date: 7-10-16 | Project Name & No.: Alaska LNG 60418403 | | Feature Id: W106AY034 |
| Investigators: Jessie Brownlee, Kaley Volper | | | Team No.: W106 |
| State: Alaska | Region: Alaska | Milepost: 176.9 | |
| Latitude: 68.053659° | | Longitude: -149.6160317° | Datum: WGS84 |
| Logbook No.: 2 | Logbook Page No.: 29 | Picture No.: P_W106AY034_001 thru 004 | |

| SITE PARAMETERS | |
|---|---|
| Subregion: Brooks Range | Landform (hillslope, terrace, hummocks, etc.): Hill side |
| Slope (%): 5-8 | Local relief (concave, convex, none): Convex |
| Pre-mapped Alaska LNG/NWI classification: PSS1/EM1B | Evidence of Wildlife Use: hare 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:** PSS1/EM1B |
| Wetland Hydrology Present? Yes X No_____ | Alaska Vegetation Classification (Viereck): II C 2, III A 2 |

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Shrub + Emergent hillside. Thick moss throughout. Small pocket of surface water on edge of plot. This site is not very wet but other spots are more wet.

# WETLAND DETERMINATION DATA FORM

W106AY034

**VEGETATION** (use scientific names of plants)

| Tree Stratum (Plot sizes: 100) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| Total Cover: | | | |
| 50% of total cover: | 20% of total cover: | | |

| Sapling/Shrub Stratum (26') | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Betula nana | 7 | | FAC |
| 2. Salix pulchra | 5 | | FACW |
| 3. Empetrum nigrum | 8 | Y | FAC |
| 4. vaccinium vitis-idaea | 9 | Y | FAC |
| 5. Rhododendron tomentosum | ~~10~~ 5 | | FACW |
| 6. vaccinium uliginosum | 10 | Y | FAC |
| 7. Cassiope tetragona | 3 | | FACU |
| 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: 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: | 11 | X 2 = 22 |
| FAC species | 52 | X 3 = 156 |
| FACU species | 3 | X 4 = 12 |
| UPL species | 0 | X 5 = 0 |
| Column Totals: | 66 (A) | 190 (B) |

PI = B/A = 2.88

**VEGETATION** (use scientific names of plants)

| Herb Stratum (26') | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Carex bigelowii | 18 | Y | FAC |
| 2. Petasites frigidus | 1 | | FACW |
| 3. Bistorta sp. | 1 | | — |
| 4. Pedicularis | T | | — |
| 5. Calamagrostis canadensis | T | | FAC |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| Total Cover: 20 | | | |
| 50% of total cover: 10 | 20% of total cover: 4 | | |

**Hydrophytic Vegetation Indicators:**

Y Dominance Test is > 50%

Y Prevalence Index is ≤3.0

— Morphological Adaptations[1] (Provide supporting data in Notes)

— Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

Ø % Bare Ground

30 % 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):

WI06AY034

# WETLAND DETERMINATION DATA FORM

7·10·16

**SOIL** Date_____ Feature ID_____ Soil Pit Required (Y/N)_____

**SOIL PROFILE DESCRIPTION:** (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox % | Type[1] | Loc[2] | Texture | Notes |
|---|---|---|---|---|---|---|---|---|
| Oi 0-4 | | | | | | | | Dry organics |
| Oe 4-8 | | | | | | | | " " |
| Oa 8-9 | | | | | | | | saturated organics |
| Bw 9-10 | 2.5Y 4/2 | 100 | | | | | Silt loam | |
| Bwf 10-13 | 2.5Y 4/2 | 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) 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: Y Depth (inches): 10

**Hydric Soil Present (Y/N):** Y

Notes:

| HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient) | | SECONDARY INDICATORS (2 or more required) | |
|---|---|---|---|
| Surface Water (A1) Y | Surface Soil Cracks (B6) N | Water-stained Leaves (B9) N | Stunted or Stressed Plants (D1) N |
| High Water Table (A2) N | Inundation Visible on Aerial Imagery (B7) N | Drainage Patterns (B10) N | Geomorphic Position (D2) N |
| Saturation (A3) Y | Sparsely Vegetated Concave Surface (B8) N | Oxidized Rhizospheres along Living Roots (C3) – | Shallow Aquitard (D3) Y |
| 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): 4 | **Wetland Hydrology Present (Y/N):** Y |
| Water Table Present (Y/N): N | Depth (in): – | |
| Saturation Present (Y/N): (includes capillary fringe) Y | Depth (in): 8 | **EC:** 235 8.9 |

Notes:

# AQUATIC SITE ASSESSMENT DATA FORM

W10WM1039

**VEGETATION VARIABLES** **P= Plot, M= Matrix**

**Primary Vegetation Type (P)**: Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_X_ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

**Percent Cover (P)**: Tree (>5 dbh, >6m tall)_Ø_ Sapling (<5 dbh, <6m tall)_Ø_ Tall shrub (2-6m)_Ø_ Short shrub (0.5-2m)_15_ Dwarf shrub (<0.5m) _30_ Tall herb (≥1m) _Ø_ Short herb (<1m) _20_ Moss-Lichen_35_ Floating_0_ Submerged_0_

**Number of Wetland Types (M)**: _1_ | **Evenness of Wetland Type Distribution (M):** Even _X_ Highly Uneven _____ Moderately even _____

**Vegetation Density/Dominance (P)**: Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%)_____ High Density (60-80%)_____ Very High Density (80-100%)_X_

**Interspersion of Cover & Open Water (P)**: 100% Cover or Open Water_____ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_X_ N/A_____

**Plant Species Diversity (P)**: Low (< 5 plant species) _____ Medium (5-25 species) _X_ High (>25) _____

**Presence of Islands (M)**: Absent (none) _X_ One or Few_____ Several to Many _____ N/A_____

**Cover Distribution of Dominant Layer (P)**: No Veg._____ Solitary, Scattered Stems_____ 1 or More Large Patches; Parts of Site Open_____ Small Scattered Patches_____ Continuous Cover_X_

**Dead Woody Material (P)**: Low Abundance (0-25% of surface) _X_ Moderately Abundant (25-50% of surface) _____ Abundant (>50% of surface) _____

**Vegetative Interspersion (P)**: Low (large patches, concentric rings)_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)_X_ Acid (<5.5)_____ **pH Reading** 8.9

**Surficial Geologic Deposit Under Wetland (P)**: High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_X_ Glacial Till/Not Permeable_____

**Basin Topographic Gradient (M)**: Low Gradient (<2%)_____ High Gradient (≥2%)_X_

**Evidence of Seeps and Springs (P)**: No Seeps or Springs_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: J Brownlee

GPS Technician QA/QC check: KV

## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W1016AY034 Field Target: ~~7-10-16~~ 307 Date: 7.10.16

*For all items not checked, please provide detailed explanation in the notes section of data form.*

1. **Site Description**

   - [x] Site description, site parameters and summary of findings are complete?
   - [x] A detailed site sketch is included in logbook?

2. **Vegetation**

   - [x] At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
   - [x] Vegetation names are entered legibly for all strata present?
   - [x] Cover calculations are complete and correct?
   - [x] All dominant species have been determined and recorded per strata?
   - [x] Indicator status is correct for each species?
   - [x] Dominance Test and Prevalence Index have been completed?

3. **Soil**

   - [x] Soil profile is complete?
   - [x] Appropriate hydric soil indicators are marked?

4. **Hydrology**

   - [x] Appropriate hydrology indicators are marked?
   - [x] Surface water, water table, and saturation depths are recorded if present?

5. **Functions and Values**

   - [x] Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. **Field Logbook**

   - [x] Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
   - [x] Each logbook page is initialed and dated?

7. **Maps**

   - [x] Wetland boundaries have been corrected if necessary?
   - [x] Maps are initialed and dated?

8. **Photos**

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

| | |
|---|---|
| X | X |
| Wetland Scientist (print) | Signature / Date |
| X Jessie Brownlee | X 8.30.16 |
| Field Crew Chief (print) | Signature / Date |

# WETLAND DETERMINATION DATA FORM

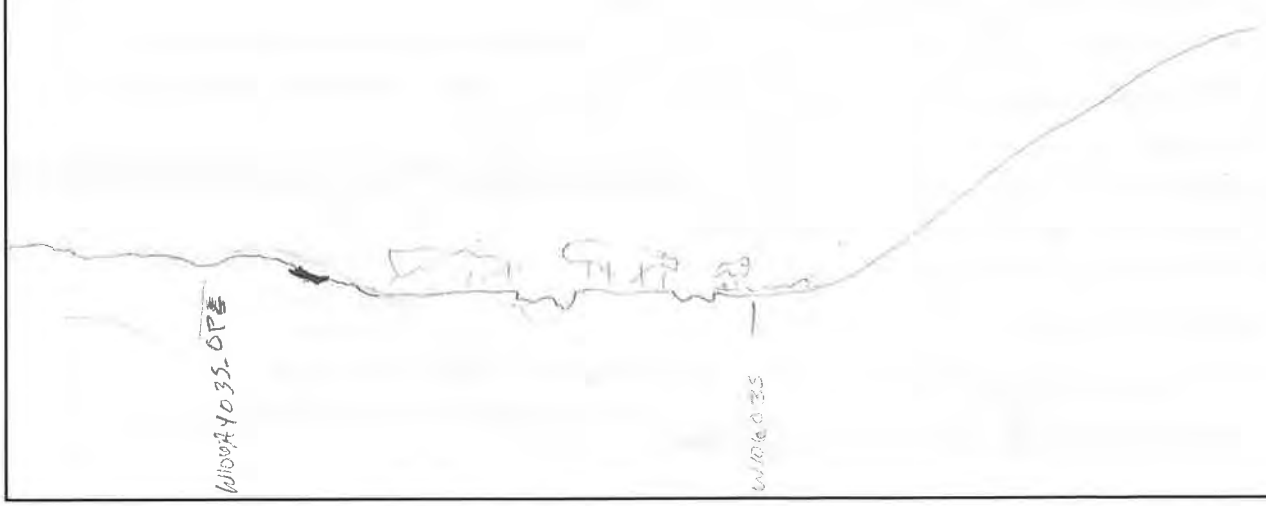
| SITE DESCRIPTION | | | |
|---|---|---|---|
| Survey Type: Centerline____ Access Road (explain)____ Other (explain) X | | Field Target: 308 | Map #: 14 Map Date: 6-9-16 |
| Date: 7-10-16 | Project Name & No.: Alaska LNG 60418403 | | Feature Id: W106AY035 |
| Investigators: Jessie Brownlee, Kaley Volper | | | Team No.: W106 |
| State: Alaska | Region: Alaska | Milepost: 175.2 | |
| Latitude: 68.07074454° | | Longitude: -149.5721799° | Datum: WGS84 |
| Logbook No.: 2 | Logbook Page No.: 29 | Picture No.: P_W106AY035-001 thru 004 | |

| SITE PARAMETERS | |
|---|---|
| Subregion: Brooks Range | Landform (hillslope, terrace, hummocks, etc.): valley bottom |
| Slope (%): 0-5 | Local relief (concave, convex, none): slightly concave |
| Pre-mapped Alaska LNG/NWI classification: PSS1/EM1C | Evidence of Wildlife Use: Micro poops, Rare poop goose 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:** PSS1/EM1C |
| Wetland Hydrology Present? Yes X No_____ | Alaska Vegetation Classification (Viereck): II C 2. III A 2 |

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Willow & dwarf shrub + diverse forb community. Many R3UBH (small) flow to the West
Site is fairly flat w/ large pools of water. Bubbles of likely methane escaping.
Neat site, great day!



# WETLAND DETERMINATION DATA FORM

W106AY035

**VEGETATION** (use scientific names of plants)

| Tree Stratum (Plot sizes: 100) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| Total Cover: | | | |
| 50% of total cover: | 20% of total cover: | | |

| Sapling/Shrub Stratum (26') | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Salix reticulata | 8 | Y | FAC |
| 2. Dryas octipetala | 4 | | UPL |
| 3. vaccinium uliginosum | 7 | Y | FAC |
| 4. Cassiope tetragona | 2 | | FACU |
| 5. Salix glauca | 5 | Y | FAC |
| 6. Salix pulchra | T | | FACW |
| 7. Betula nana | T | | FAC |
| 8. Empetrum nigrum | T | | FAC |
| 9. Salix richardsonii | 5 | Y | FACW |
| Total Cover: 35 | | | |
| 50% of total cover: 17.5 | 20% of total cover: 7 | | |

**Dominance Test worksheet:**

No. of Dominant Species that are OBL, FACW, or FAC: 7 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

% Dominant Species that are OBL, FACW, or FAC: 100 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: |
|---|---|---|
| OBL species: | 4 | X 1 = 4 |
| FACW species: | 6 | X 2 = 12 |
| FAC species | 31 | X 3 = 93 |
| FACU species | 6 | X 4 = 16 |
| UPL species | 4 | X 5 = 20 |
| Column Totals: | 51 (A) | 145 (B) |

PI = B/A = 2.84

| | | | | |
|---|---|---|---|---|
| Carex sp | F | T | | — |
| Petasites frigidus | F | T | | FACU |
| Carex bigelowii | F | 4 | Y | FAC |
| Tofieldia pusilla | F | T | | FAC |
| Dryas integrifolia | S | 4 | | FACU |
| Forb sp | F | T | | — |
| Carex ~~colonodolpha~~ Rotundata | F | 4 | Y | OBL |

**VEGETATION** (use scientific names of plants)

| Herb Stratum (26') | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Chamerion latifolium | 4 | Y | FAC |
| 2. Bistorta vivipara | T | | FAC |
| 3. Equisetum scirpoides | T | | FACW |
| 4. Pedicularis interior | T | | FACW |
| 5. Equisetum arvense | 1 | | FAC |
| 6. Calamagrostis canadensis | 1 | | FAC |
| 7. Carex garberi | T | | — |
| 8. Polygonum bistorta | 1 | | FACW |
| 9. Saussurea angustifolium | 1 | | FAC |
| 10. Forb sp | T | | — |
| Total Cover: 16 | | | |
| 50% of total cover: 8 | 20% of total cover: 3.2 | | |

**Hydrophytic Vegetation Indicators:**

Y Dominance Test is > 50%

Y Prevalence Index is ≤ 3.0

— Morphological Adaptations[1] (Provide supporting data in Notes)

— Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

5 % Bare Ground

35 % Cover of Wetland Bryophytes

50 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

W10GA4035

7-10-16

| SOIL | Date_____ Feature ID_____ | Soil Pit Required (Y/N)_____ |
|---|---|---|

**SOIL PROFILE DESCRIPTION:** (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox % | Type[1] | Loc[2] | Texture | Notes |
|---|---|---|---|---|---|---|---|---|
| Oa 0-3 | | | | | | | mucky | Saturated muck |
| C 3-+ | | | | | | | extremely gravelly 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) Yes 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: NO Depth (inches): –

**Hydric Soil Present (Y/N):** Y

Notes: A10 (Muck)

| 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) – | 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) Y | Other (Explain in Notes): N | | |
| Iron Deposits (B5) N | | | |

| | | |
|---|---|---|
| Surface Water Present (Y/N): Y | Depth (in): 3" | **Wetland Hydrology Present (Y/N):** Y |
| Water Table Present (Y/N): Y | Depth (in): 3" | |
| Saturation Present (Y/N): (includes capillary fringe) Y | Depth (in): Ø | **EC:** 226 pH 8.95 |

Notes:

# AQUATIC SITE ASSESSMENT DATA FORM W106AY035

**VEGETATION VARIABLES** **P= Plot, M= Matrix**

**Primary Vegetation Type (P)**: Vegetation Lacking_____ Forested-Deciduous-Needle-leaved_____ Forested-Deciduous-Broad-leaved_____ Forested-Evergreen-Needle-leaved_____ Scrub Shrub-Deciduous-Needle-leaved_____ Scrub Shrub-Deciduous-Broad-leaved_X_____ Scrub Shrub-Evergreen-Broad-leaved _____ Scrub Shrub-Evergreen-Needle-leaved_____ Emergent-Non-persistent_____ Emergent-Persistent_____ Aquatic Bed_____

**Percent Cover (P)**: Tree (>5 dbh, >6m tall)_—_ Sapling (<5 dbh, <6m tall)_—_ Tall shrub (2-6m)_—_ Short shrub (0.5-2m)_20_ Dwarf shrub (<0.5m) _15_ Tall herb (≥1m) _—_ Short herb (<1m) _20_ 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%)_X_ Very High Density (80-100%)_____

**Interspersion of Cover & Open Water (P)**: 100% Cover or Open Water_____ <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_X_ >75% Scattered or Peripheral Cover_____ 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_____ No Inlet/Intermittent Outlet_____ No Inlet/Perennial Outlet_____ Intermittent Inlet/No Outlet_____ Intermittent Inlet/Intermittent Outlet_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet_X_

**Wetland Water Regime (P)**: Drier: Seasonally Flooded, Temporarily Flooded, Saturated_____ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _X_

**Evidence of Sedimentation (P)**: No Evidence Observed_X_ Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

**Microrelief of Wetland Surface (P)**: Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.)_X_ Pronounced (>18in.)_____

**Frequency of Overbank Flooding (P)**: No Overbank Flooding_____ 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)_X_ Acid (<5.5)_____ **pH Reading** _8.9_

**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_____ 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: JBrownlee

GPS Technician QA/QC check: KN

## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106A-Y035 Field Target: 308 Date: 7·10·16

*For all items not checked, please provide detailed explanation in the notes section of data form.*

1. **Site Description**

   - [x] Site description, site parameters and summary of findings are complete?
   - [x] A detailed site sketch is included in logbook?

2. **Vegetation**

   - [x] At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
   - [x] Vegetation names are entered legibly for all strata present?
   - [x] Cover calculations are complete and correct?
   - [x] All dominant species have been determined and recorded per strata?
   - [x] Indicator status is correct for each species?
   - [x] Dominance Test and Prevalence Index have been completed?

3. **Soil**

   - [x] Soil profile is complete?
   - [x] Appropriate hydric soil indicators are marked?

4. **Hydrology**

   - [x] Appropriate hydrology indicators are marked?
   - [x] Surface water, water table, and saturation depths are recorded if present?

5. **Functions and Values**

   - [x] Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. **Field Logbook**

   - [x] Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
   - [x] Each logbook page is initialed and dated?

7. **Maps**

   - [x] Wetland boundaries have been corrected if necessary?
   - [x] Maps are initialed and dated?

8. **Photos**

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Haley Volper X Haley Volper 7-17-16

Wetland Scientist (print) Signature / Date

X J Brownlee X 7:17:16

Field Crew Chief (print) Signature / Date

# WETLAND DETERMINATION DATA FORM

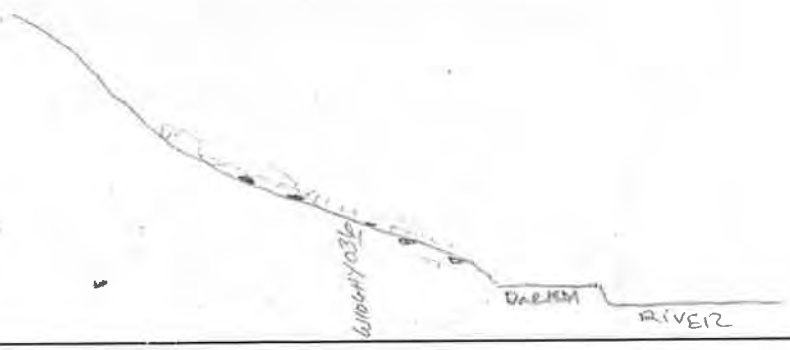
| SITE DESCRIPTION | | | |
|---|---|---|---|
| Survey Type: Centerline X Access Road (explain)____ Other (explain) X | | Field Target: 309 | Map #: 13 Map Date: 6-9-16 |
| Date: 7-11-16 | Project Name & No.: Alaska LNG 60418403 | | Feature Id: ~~W10GAY037~~ W10GAY036 |
| Investigators: Jessie Brownlee, Kaley Volper | | | Team No.: W10G |
| State: Alaska | Region: Alaska | Milepost: 172 | |
| Latitude: 68.1115174388° | | Longitude: -149.53619423° | Datum: WGS84 |
| Logbook No.: 2 | Logbook Page No.: 31 | Picture No.: P_W10GAY036_001 thru 004 | |

| SITE PARAMETERS | |
|---|---|
| Subregion: Brooks Range | Landform (hillslope, terrace, hummocks, etc.): Toeslope |
| Slope (%): 10 | Local relief (concave, convex, none): Slightly convex |
| Pre-mapped Alaska LNG/NWI classification: PSS1/EM1B | Evidence of Wildlife Use: Squirrel hole |
| Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No_____ (if no explain in Notes) | Are "Normal Circumstances" present: Yes X No_____ (If no, explain in Notes.) |
| Are Vegetation_____, Soil_____, or Hydrology_____ Significantly Disturbed? | No X (If yes, explain in Notes) |
| Are Vegetation_____, Soil_____, or Hydrology_____ Naturally Problematic? | No X (If yes, explain in Notes.) |

| SUMMARY OF FINDINGS | |
|---|---|
| Hydrophytic Vegetation Present? Yes X No_____ | Is the Sampled Area within a Wetland? Yes X No_____ |
| Hydric Soil Present? Yes X No_____ | Wetland Type: PSS1/EM1B |
| Wetland Hydrology Present? Yes X No_____ | Alaska Vegetation Classification (Viereck): II C 2, III A 2 |

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Dwarf Salix shrub community w/ Car Big dominated forb community.
Hillside is all wet w/ small scattered pockets of water and tussocking carex.
Walked up & over to North to confirm wet/dry boundaries which were good.



16 .2 32

W106AY036 ~~W106AY037~~

EV

# 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. NONE | | | |
| 3. | | | |
| 4. | | | |
| Total Cover: | | | |
| 50% of total cover: | 20% of total cover: | | |

| Sapling/Shrub Stratum (24') | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Salix reticulata | 18 | Y | FAC |
| 2. Salix richardsonii | 8 | Y | FACW |
| 3. Dryas integrifolia | 5 | | FACU |
| 4. Dryas octopetala | 5 | | UPL |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| Total Cover: 36 | | | |
| 50% of total cover: 18 | 20% of total cover: 7.2 | | |

**Dominance Test worksheet:**

No. of Dominant Species that are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 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: | 11 | X 2 = 22 |
| FAC species | 53 | X 3 = 159 |
| FACU species | 5 | X 4 = 20 |
| UPL species | 5 | X 5 = 25 |
| Column Totals: | 74 (A) | 176 (B) |

PI = B/A = 2.37

| | | | | |
|---|---|---|---|---|
| ~~Forb sp 3~~ | ~~Forb~~ | 1 | | |
| Forb sp 1 | | T | | — |
| Forb sp 2 | | T | | — |

**VEGETATION** (use scientific names of plants)

| Herb Stratum (20') | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Carex bigelowii | 35 | Y | FAC |
| 2. Pedicularis interior | T | | FACW |
| 3. Calamagrostis canadensis | T | | FAC |
| 4. Bistorta officinalis | T | | NL(UP) |
| 5. Saxifraga hirculus | T | | OBL |
| 6. Boykinia richardsonii | T | | NL(UP) |
| 7. ~~Equisetum variegatum~~ | T | | FACW |
| 8. Bistorta vivipara | T | | FAC |
| 9. Carex sp | 1 | | — |
| 10. Eriophorum vaginatum | 2 | | FACW |
| Total Cover: 39 | | | |
| 50% of total cover: 19.5 | 20% of total cover: 7.8 | | |

**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

40 % Cover of Wetland Bryophytes

95 Total Cover of Bryophytes

5 % Cover of Water

**Hydrophytic Vegetation Present (Y/N):** Y

Notes: (If observed, list morphological adaptations below):

# WETLAND DETERMINATION DATA FORM

WICGAY036

7-11-16

**SOIL** Date_____ Feature ID_____ Soil Pit Required (Y/N)_____

**SOIL PROFILE DESCRIPTION:** (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox % | Type[1] | Loc[2] | Texture | Notes |
|---|---|---|---|---|---|---|---|---|
| Oi 0-5 | | | | | | | | Damp Feather moss w/some mineral |
| Oe 5-8 | | | | | | | | Saturated organics |
| Oa 8-9 | | | | | | | | Saturated muck |
| Bwf 9-16 | 10YR 4/1 | 100 | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced 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) N |

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Notes.

Restrictive Layer (if present): Type: Permafrost Depth (inches): 9

**Hydric Soil Present (Y/N):** Y

Notes:

| HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient) | | SECONDARY INDICATORS (2 or more required) | |
|---|---|---|---|
| Surface Water (A1) 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) — | Shallow Aquitard (D3) Y |
| 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) Y | Other (Explain in Notes): N | | |
| Iron Deposits (B5) N | | | |

| | | |
|---|---|---|
| Surface Water Present (Y/N): Y | Depth (in): 2 | **Wetland Hydrology Present (Y/N):** Y |
| Water Table Present (Y/N): Y | Depth (in): 7 | |
| Saturation Present (Y/N): (includes capillary fringe) Y | Depth (in): 4 | **EC:** 231 pH 9.28 |

Notes:

WIOWHY036

# 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)_10_ Dwarf shrub (<0.5m) _30_ Tall herb (≥1m)_0_ Short herb (<1m) _40_ 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%)_____ 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_____ 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)_____ Alkaline (>7.4)_X_ Acid (<5.5)_____ **pH Reading** _9.25_

**Surficial Geologic Deposit Under Wetland (P):** High Permeability Stratified Deposits_____ Low Permeability Stratified Deposits_X_ Glacial Till/Not Permeable_____

**Basin Topographic Gradient (M):** Low Gradient (<2%)_____ High Gradient (≥2%)_X_

**Evidence of Seeps and Springs (P):** No Seeps or Springs_____ Seeps Observed_X_ Intermittent Spring_____ Perennial Spring_____

**LANDSCAPE VARIABLES (M)**

**Wetland Juxtaposition:** Wetland Isolated_____ Wetlands within 400m, Not Connected_____ Only Connected Below_____ Only Connected Above_____ Connected Upstream & Downstream_X_ Unknown_____

**Wetland Land Use:** High Intensity (i.e., ag.)_____ Moderate Intensity (i.e., forestry)_____ Low Intensity (i.e. open space)_X_

**Watershed Land Use:** 0-5% Rural_X_ 5-25% Urbanized_____ 25-50% Urbanized_____ >50% Urbanized_____

**Size:** Small (<10 acres)_____ Medium (10-100 acres)_X_ Large (>100 acres)_____

Crew Chief QA/QC check: JBrewake

GPS Technician QA/QC check: KV

## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: L1106AY036 Field Target: 309 Date: 7.11.16

*For all items not checked, please provide detailed explanation in the notes section of data form.*

1. **Site Description**

   - ☒ Site description, site parameters and summary of findings are complete?
   - ☒ A detailed site sketch is included in logbook?

2. **Vegetation**

   - ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
   - ☒ Vegetation names are entered legibly for all strata present?
   - ☒ Cover calculations are complete and correct?
   - ☒ All dominant species have been determined and recorded per strata?
   - ☒ Indicator status is correct for each species?
   - ☒ Dominance Test and Prevalence Index have been completed?

3. **Soil**

   - ☒ Soil profile is complete?
   - ☒ Appropriate hydric soil indicators are marked?

4. **Hydrology**

   - ☒ Appropriate hydrology indicators are marked?
   - ☒ Surface water, water table, and saturation depths are recorded if present?

5. **Functions and Values**

   - ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. **Field Logbook**

   - ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
   - ☒ Each logbook page is initialed and dated?

7. **Maps**

   - ☒ Wetland boundaries have been corrected if necessary?
   - ☒ Maps are initialed and dated?

8. **Photos**

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Haley Volper X Haley Volper 7-17-16

Wetland Scientist (print) Signature / Date

X J Brownlee X 7.17.16

Field Crew Chief (print) Signature / Date

# WETLAND DETERMINATION DATA FORM

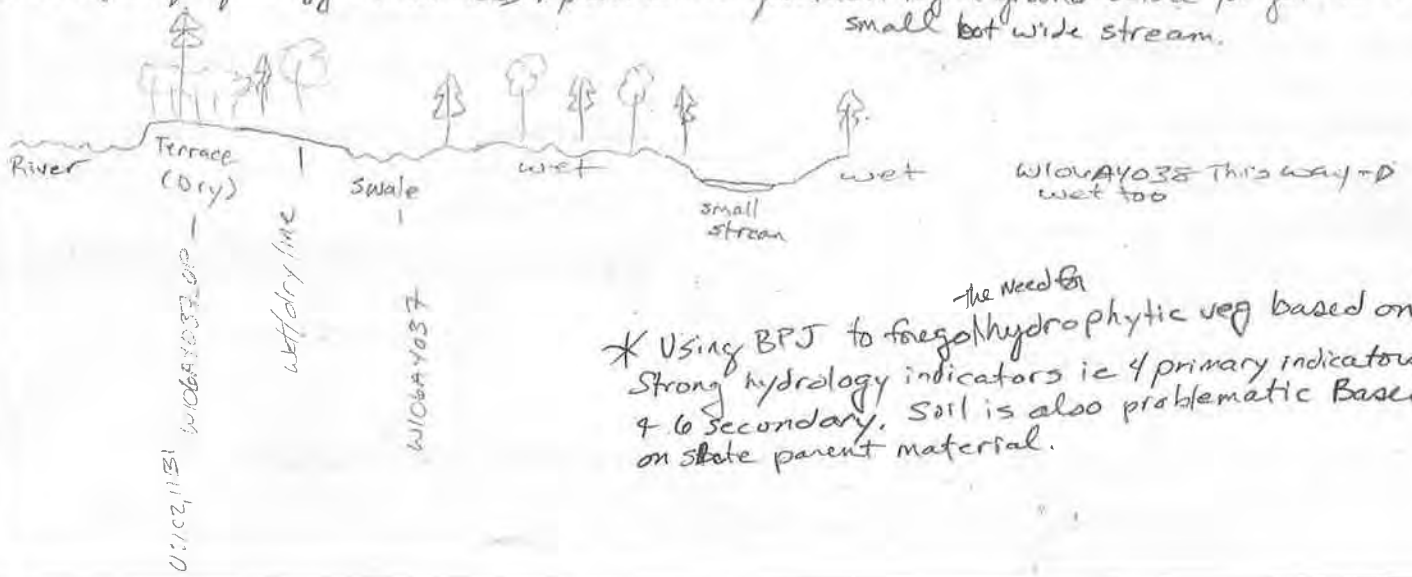
| SITE DESCRIPTION | | | |
|---|---|---|---|
| **Survey Type:** Centerline X **Access Road** (explain)____ **Other** (explain) X | | **Field Target:** 304 | **Map #:** 18 **Map Date:** 6.9.16 |
| **Date:** 7-11-16 | **Project Name & No.:** Alaska LNG 60418403 | **Feature Id:** W106AY037 | |
| **Investigators:** Jessie Brownlee, Kaley Volper | | | **Team No.:** W106 |
| **State:** Alaska | **Region:** Alaska | **Milepost:** 180.3 | |
| **Latitude:** 68.024448° | **Longitude:** -149.710472° | | **Datum:** WGS84 |
| **Logbook No.:** 2 | **Logbook Page No.:** 31 | **Picture No.:** P_W106AY037 | |

| SITE PARAMETERS | |
|---|---|
| Subregion: Brooks Range | Landform (hillslope, terrace, hummocks, etc.): Swale |
| Slope (%): 0-3 | Local relief (concave, convex, none): concave |
| Pre-mapped Alaska LNG/NWI classification: PFO1/4A IC2, IIB2 | Evidence of Wildlife Use: hare 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 X, Soil X, or Hydrology____ Naturally Problematic? | No X (If yes, explain in Notes.) |

| SUMMARY OF FINDINGS | |
|---|---|
| Hydrophytic Vegetation Present? Yes See Note No X | **Is the Sampled Area within a Wetland?** Yes X No____ |
| Hydric Soil Present? Yes X No____ | **Wetland Type:** PFO1/4C |
| Wetland Hydrology Present? Yes X No____ | Alaska Vegetation Classification (Viereck): IC2, IIB2 |

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Terrace closest to river is dry where W037_OP was taken Dug to 24" No sign of hydrology Soil had some con/Redox in the silt in pockets but otherwise lacked soil indicators Dom veg was Pop Bal and dense alder. The wet dry line is at midpoint of these 2 points, site raises up slightly to the west from paper form but still shows signs of hydrology w/ hummocks & preferential growth on higher ground before you get to a small but wide stream.




* Using BPJ to forego the need for hydrophytic veg based on strong hydrology indicators ie 4 primary indicators & 6 secondary. Soil is also problematic based on state parent material.

# WETLAND DETERMINATION DATA FORM

W106AY037

**VEGETATION** (use scientific names of plants)

| Tree Stratum (Plot sizes: 100' ) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Populus balsamifera | 5 | Y | FACW |
| 2. Picea glauca | 8 | Y | FACW |
| 3. | | | |
| 4. | | | |
| Total Cover: 13 | | | |
| 50% of total cover: 6.5 | 20% of total cover: 2.6 | | |

| Sapling/Shrub Stratum ( 26' ) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Vaccinium uliginosum | 3 | | FAC |
| 2. Dasiphora fruticosa | 4 | | FAC |
| 3. Salix pulchra | 5 | | FACW |
| 4. Alnus viridis fruticosa | 15 | Y | FAC |
| 5. Salix reticulata | T | | FACW |
| 6. Picea glauca | 14 | | FACU |
| 7. Salix glauca | 30 | Y | FAC |
| 8. Arctous ruber | 1 | | FAC |
| 9. Empetrum nigrum | T | | FAC |
| Total Cover: 78 | | | |
| 50% of total cover: 39 | 20% of total cover: 15.6 | | |

**Dominance Test worksheet:**

No. of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

% Dominant Species that are OBL, FACW, or FAC: 50 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: |
|---|---|---|
| OBL species: | 0 | X 1 = 0 |
| FACW species: | 5 | X 2 = 10 |
| FAC species | 53 | X 3 = 159 |
| FACU species | 33 | X 4 = 132 |
| UPL species | 0 | X 5 = 0 |
| Column Totals: | 91 (A) | 301 (B) |

PI = B/A = 3.3

Populus balsamifera | 5 | 3 | | FACW

**VEGETATION** (use scientific names of plants)

| Herb Stratum ( 26' ) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Equisetum variegatum | T | | FACW |
| 2. Carex sp | T | | |
| 3. Moneses uniflora | T | | FACU |
| 4. ~~pea sp~~ | | | |
| 5. grass sp. small | T | | |
| 6. Equisetum arvense | T | | FAC |
| 7. Hedysarum alpinum | 3 | | FACU |
| 8. Calamagrostis lapponica | T | | FAC |
| 9. | | | |
| 10. | | | |
| Total Cover: — | | | |
| 50% of total cover: — | 20% of total cover: — | | |

**Hydrophytic Vegetation Indicators:**

N Dominance Test is > 50%

N Prevalence Index is ≤ 3.0

Y Morphological Adaptations[1] (Provide supporting data in Notes)

Y Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

20 % 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): Plants growing preferentially on higher ground & hummocking

7-11-16 W106AY037

# 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 |
|---|---|---|---|---|---|---|---|---|
| Bw 0-9 | 2.5Y 4/1 | 90 | 7.5YR 3/3 | 5 | con | m RC | fine loamy sand | (pockets of silty material throughout) |
| | | | 10YR 4/6 | 5 | con | m RC | | |
| C1 9-12 | 2.5Y 4/1 | 100 | | | | | loamy sand | |
| | | | | | | | | |
| C2 12-18 | 5Y 4/1 | 100 | | | | | gravelly 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) Yes |

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and 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 α-α in the silty material in Bw1. weathering slate parent Material

| HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient) | | SECONDARY INDICATORS (2 or more required) | |
|---|---|---|---|
| Surface Water (A1) N (edge of pit) | Surface Soil Cracks (B6) N | Water-stained Leaves (B9) Y | Stunted or Stressed Plants (D1) N |
| High Water Table (A2) Y | Inundation Visible on Aerial Imagery (B7) N | Drainage Patterns (B10) Y | Geomorphic Position (D2) Y |
| Saturation (A3) Y | Sparsely Vegetated Concave Surface (B8) Y | Oxidized Rhizospheres along Living Roots (C3) — | Shallow Aquitard (D3) Y |
| 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): N | Depth (in): — | **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): 9 | EC: 842 pH 8.50 |

Notes:

# AQUATIC SITE ASSESSMENT DATA FORM

W10604037

## 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) 10 Sapling (<5 dbh, <6m tall) 15 Tall shrub (2-6m) 30 Short shrub (0.5-2m) 0 Dwarf shrub (<0.5m) 5 Tall herb (≥1m) 0 Short herb (<1m) 5 Moss-Lichen 35 Floating 0 Submerged 0

**Number of Wetland Types (M)**: 1 | **Evenness of Wetland Type Distribution (M)**: Even X Highly Uneven _____ Moderately even _____

**Vegetation Density/Dominance (P)**: Sparse (0-20%)_____ Low Density (20-40%)_____ Medium Density (40-60%) X High Density (60-80%)_____ Very High Density (80-100%)_____

**Interspersion of Cover & Open Water (P)**: 100% Cover or Open Water X <25% Scattered/Peripheral Cover_____ 26-75% Scattered or Peripheral Cover_____ >75% Scattered or Peripheral Cover_____ N/A_____

**Plant Species Diversity (P)**: Low (< 5 plant species) _____ Medium (5-25 species) X High (>25) _____

**Presence of Islands (M)**: Absent (none) 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_____ Intermittent Inlet/Perennial Outlet_____ Perennial Inlet/No Outlet_____ Perennial Inlet/Intermittent Outlet_____ Perennial Inlet/Perennial Outlet X

**Wetland Water Regime (P)**: Drier: Seasonally Flooded, Temporarily Flooded, Saturated ^ Wet: Perm. Flooded, Intermittently Exposed, Semiperm. Flooded _____

**Evidence of Sedimentation (P)**: No Evidence Observed X Sediment Observed on Wetland Substrate_____ Fluvaquent Soils Sediment Created_____

**Microrelief of Wetland Surface (P)**: Absent_____ Poorly Developed (6in.)_____ Well Developed (6-18in.) ^ Pronounced (>18in.)_____

**Frequency of Overbank Flooding (P)**: No Overbank Flooding_____ Return Interval 1-2 yrs X Return Interval 2-5 yrs_____ Return Interval >5 yrs_____ Closer, smaller creek to the east

**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) X Acid (<5.5)_____ **pH Reading** 8.5

**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)_____ Medium (10-100 acres) X Large (>100 acres)_____

Crew Chief QA/QC check: JBrownlee

GPS Technician QA/QC check: KN

## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106AY057 Field Target: 304 Date: 7.11.16

*For all items not checked, please provide detailed explanation in the notes section of data form.*

1. **Site Description**

   - ☒ Site description, site parameters and summary of findings are complete?
   - ☒ A detailed site sketch is included in logbook?

2. **Vegetation**

   - ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
   - ☒ Vegetation names are entered legibly for all strata present?
   - ☒ Cover calculations are complete and correct?
   - ☒ All dominant species have been determined and recorded per strata?
   - ☒ Indicator status is correct for each species?
   - ☒ Dominance Test and Prevalence Index have been completed?

3. **Soil**

   - ☒ Soil profile is complete?
   - ☒ Appropriate hydric soil indicators are marked?

4. **Hydrology**

   - ☒ Appropriate hydrology indicators are marked?
   - ☒ Surface water, water table, and saturation depths are recorded if present?

5. **Functions and Values**

   - ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. **Field Logbook**

   - ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
   - ☒ Each logbook page is initialed and dated?

7. **Maps**

   - ☒ Wetland boundaries have been corrected if necessary?
   - ☒ Maps are initialed and dated?

8. **Photos**

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Kaley Volper — Wetland Scientist (print)

X Kaley Volper 7-17-16 — Signature / Date

X JBrownlee — Field Crew Chief (print)

X [signature] 7.17.16 — Signature / Date

# WETLAND DETERMINATION DATA FORM

| SITE DESCRIPTION | | | |
|---|---|---|---|
| **Survey Type:** Centerline X **Access Road** (explain)____ **Other** (explain) X | | **Field Target:** 305 | **Map #:** 17 **Map Date:** 6-8-16 |
| **Date:** 7-11-16 | **Project Name & No.:** Alaska LNG 60418403 | **Feature Id:** W106AY038 | |
| **Investigators:** Jessie Brownlee, Kaley Volper | | | **Team No.:** W106 |
| **State:** Alaska | **Region:** Alaska | **Milepost:** 180.3 | |
| **Latitude:** 68°1.5012' or 68°01' 30.072" | **Longitude:** 149° 42.7209' or 149° 42' 43.7" | | **Datum:** WGS84 |
| **Logbook No.:** 2 | **Logbook Page No.:** 31 | **Picture No.:** P-W106AY038_001 thru 004 | |

| SITE PARAMETERS | |
|---|---|
| Subregion: Brooks Range | Landform (hillslope, terrace, hummocks, etc.): Swale |
| Slope (%): 0-3 | Local relief (concave, convex, none): concave |
| Pre-mapped Alaska LNG/NWI classification: U 1A2, 11C2 | Evidence of Wildlife Use: Squirrel caches Bear & Hare & Moose, Squirell 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 X, Soil X, or Hydrology_____ Naturally Problematic? | No_____ (If yes, explain in Notes.) |

| SUMMARY OF FINDINGS | |
|---|---|
| Hydrophytic Vegetation Present? Yes See note No X | **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, 11B2 |

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

Complex landscape w/ many swaling features running from NE to SW. I believe the wetland mapped up slope connects down slope via several swales w/ uplands inclusions in between. Site is a mature 90' tall Pic Gla open forest w/ Alder understory.

*Using BPJ to forego Hydrophytic veg requirement based on strong hydrology indicators ie water etc. table @ 2". Soil is problematic as well given the slate parent material. It's still a wetland though.

~~Original location of FT~~

Table meant working, I was wrong on this after reviewing photo

# WETLAND DETERMINATION DATA FORM

W106AY038

**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 (30') | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Alnus fruticosa | 45 | Y | FAC |
| 2. Empetrum nigrum | 4 | | FAC |
| 3. vaccinium uliginosum | 15 | | FAC |
| 4. Dasiphora fruticosa | T | | FAC |
| 5. Arctous ruber | 4 | | FAC |
| 6. Salix pulchra | 5 | | FACW |
| 7. vaccinium vitis-idaea | 2 | | FAC |
| 8. Salix glauca | 2 | | FAC |
| 9. | | | |
| Total Cover: 80 | | | |
| 50% of total cover: 40 | 20% of total cover: 16 | | |

**Dominance Test worksheet:**

No. of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

% Dominant Species that are OBL, FACW, or FAC: 50 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: |
|---|---|---|
| OBL species: | 0 | X 1 = 0 |
| FACW species: | 5 | X 2 = 10 |
| FAC species | 73 | X 3 = 219 |
| FACU species | 37 | X 4 = 148 |
| UPL species | 0 | X 5 = 0 |
| Column Totals: | 115 (A) | 377 (B) |

PI = B/A = 3.28

Plants growing preferentially on higher ground and hummocking

**VEGETATION** (use scientific names of plants)

| Herb Stratum (26') | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Moneses uniflora | 1 | | FACU |
| 2. pyrola aserifolia | 1 | | FACU |
| 3. Hedysarum alpinum | T | | FACU |
| 4. grass sp | T | | |
| 5. Calamagrostis canadensis | 1 | | FAC |
| 6. Artemesia tilesia | T | | FACU |
| 7. Equisetum variegatum | T | | FACW |
| 8. grass fine lat. leaf | T | | |
| 9. * Add to Shrub layer * | | | |
| 10. Pea sp | T | | |
| Total Cover: — | | | |
| 50% of total cover: — | 20% of total cover: — | | |

**Hydrophytic Vegetation Indicators:**

N Dominance Test is > 50%

N Prevalence Index is ≤3.0

Y Morphological Adaptations[1] (Provide supporting data in Notes)

Y Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

15 % Bare Ground

0 % Cover of Wetland Bryophytes

45 Total Cover of Bryophytes

10 % Cover of Water

**Hydrophytic Vegetation Present (Y/N):** N

Notes: (If observed, list morphological adaptations below):

W1061Y038

# WETLAND DETERMINATION DATA FORM

7/11/16

| SOIL | Date_____ Feature ID_____ | Soil Pit Required (Y/N)_____ |
|---|---|---|

**SOIL PROFILE DESCRIPTION:** (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox % | Type[1] | Loc[2] | Texture | Notes |
|---|---|---|---|---|---|---|---|---|
| A 0-1 | 10YR 4/1 | 90 | 5YR 3/4 | 10 | con | RC | sandy loam | |
| Bg | 5Y 4/1 | 98 | 10YR 4/4 | 2 | con | RC | | |
| Oeb | saturated organics | 100 | | | | | | buried sat 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) 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) yes |

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and 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 XX throughout Bg in pockets of silticr material.
↳ faint

| HYDROLOGY PRIMARY INDICATORS (any one indicator is sufficient) | | SECONDARY INDICATORS (2 or more required) | |
|---|---|---|---|
| Surface Water (A1) Y | Surface Soil Cracks (B6) N | Water-stained Leaves (B9) Y | Stunted or Stressed Plants (D1) N |
| High Water Table (A2) Y | Inundation Visible on Aerial Imagery (B7) N | Drainage Patterns (B10) Y | Geomorphic Position (D2) Y |
| Saturation (A3) Y | Sparsely Vegetated Concave Surface (B8) Y | Oxidized Rhizospheres along Living Roots (C3) Y | Shallow Aquitard (D3) N |
| Water Marks (B1) Y | 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) 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~~ 2 came up to | |
| Saturation Present (Y/N): (includes capillary fringe) Y | Depth (in): Ø | **EC:** 780 pH 8.11 |

Notes:

# AQUATIC SITE ASSESSMENT DATA FORM

W106A1038

## 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)__~~70~~__ Tall shrub (2-6m)__40__ Short shrub (0.5-2m)__15__ Dwarf shrub (<0.5m) __10__ Tall herb (≥1m) __—__ Short herb (<1m) __—__ 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_____ <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_____ 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__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)__X__ Acid (<5.5)_____ **pH Reading** __8.11__

**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: JBrownlee

GPS Technician QA/QC check: KV

## Wetland Determination Form QA/QC Checklist

This form to be completed before leaving the field site.

Feature ID: W106AY038 Field Target: 305 Date: 7.11.16

*For all items not checked, please provide detailed explanation in the notes section of data form.*

1. **Site Description**

   - ☒ Site description, site parameters and summary of findings are complete?
   - ☒ A detailed site sketch is included in logbook?

2. **Vegetation**

   - ☒ At least 80% of onsite vegetation has been keyed to species, or collected for later identification?
   - ☒ Vegetation names are entered legibly for all strata present?
   - ☒ Cover calculations are complete and correct?
   - ☒ All dominant species have been determined and recorded per strata?
   - ☒ Indicator status is correct for each species?
   - ☒ Dominance Test and Prevalence Index have been completed?

3. **Soil**

   - ☒ Soil profile is complete?
   - ☒ Appropriate hydric soil indicators are marked?

4. **Hydrology**

   - ☒ Appropriate hydrology indicators are marked?
   - ☒ Surface water, water table, and saturation depths are recorded if present?

5. **Functions and Values**

   - ☒ Vegetation, soil, hydrologic variables, and landscape variables complete if site is a wetland?

6. **Field Logbook**

   - ☒ Notes have been recorded at each site, including general description, sketch, and accuracy of pre-mapped wetland boundary as appropriate?
   - ☒ Each logbook page is initialed and dated?

7. **Maps**

   - ☒ Wetland boundaries have been corrected if necessary?
   - ☒ Maps are initialed and dated?

8. **Photos**

- ☒ Four photos were taken for each Wetland Determination Data Form (2 vegetation, 1 soil pit, 1 soil plug)?
- ☒ Two photos were taken for each Observation Point (vegetation/site overview)?

X Haley Volper X Haley Volper 7-17-16

Wetland Scientist (print) Signature / Date

X JBrownlee X [illegible] 7.17.16

Field Crew Chief (print) Signature / Date

# WETLAND DETERMINATION DATA FORM

New Coldfoot FT #2

| SITE DESCRIPTION | | | |
|---|---|---|---|
| Survey Type: Centerline___ Access Road (explain)_____ Other (explain) X | | Field Target:_____ | Map #: 2 Map Date: 7.15.16 |
| Date: 7.17.16 | Project Name: Alaska LNG | | Feature Id: W106AY039 |
| Investigators: Jessie Brownlee | | | Team No.: W106 |
| State: Alaska | Region: Alaska | Milepost: 230 | |
| Latitude: 67.4109910 | | Longitude: -150.0716754 | Datum: WGS84 |
| Logbook No.: 2 | Logbook Page No.: 37 | Picture No.: P_W106AY039-001-004 | |

| SITE PARAMETERS | |
|---|---|
| Subregion: Brooks Range | Landform (hillslope, terrace, hummocks, etc.): Base of mound |
| Slope (%): ~10 | Local relief (concave, convex, none): slightly convex |
| Pre-mapped Alaska LNG/NWI classification: U 1A3, 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 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): 1A3, 11C2 |

Notes and Site Sketch: Please include Directional & North Arrow, Centerline, Length of feature, Distances from Centerline, Photo Locations, and Survey corridor.

FT is located in between 2 boundaries. Form + plot describe the up slope upland and not the PSS4/8B down slope to the W/NW.
This site: dry mixed spruce woodland w/trees averaging ~30' tall.
Site is boardered by wetlands on 2/3 of it. The wetland over the mound comes down & curvers around and feeds into the wetland just 10' away from plot. See map for updates.

W106AY039

# WETLAND DETERMINATION DATA FORM

W106RY039

**VEGETATION** (use scientific names of plants)

| Tree Stratum (Plot sizes: 100) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Picea Glauca | 6 | Y | FACW |
| 2. Picea Mariana | 10 | Y | FACW |
| 3. | | | |
| 4. | | | |
| Total Cover: 16 | | | |
| 50% of total cover: 8 | 20% of total cover: 3.2 | | |

| Sapling/Shrub Stratum (26) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Picea glauca | 4 | | FACW |
| 2. Betula nana | 5 | Y | FAC |
| 3. Dryas integrifolia | 8 | Y | FACW |
| 4. Vaccinium vitis-idaea | 7 | Y | FAC |
| 5. Vaccinium uliginosum | 6 | Y | FAC |
| 6. Rhododendrum groenlandicum | 5 | Y | FAC |
| 7. Dasiphora fruticosa | T | | FAC |
| 8. Shepherdia canadensis | T | | FACU |
| 9. Arctous ruber | 4 | | FAC |
| Total Cover: 46 | | | |
| 50% of total cover: 23 | 20% of total cover: 9.2 | | |

**Dominance Test worksheet:**

No. of Dominant Species that are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 9 (B)

% Dominant Species that are OBL, FACW, or FAC: 55 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: |
|---|---|---|
| OBL species: | – | X 1 = – |
| FACW species: | 13 | X 2 = 26 |
| FAC species | 31 | X 3 = 93 |
| FACU species | 23 | X 4 = 92 |
| UPL species | – | X 5 = – |
| Column Totals: | 67 (A) | 211 (B) |

PI = B/A = 3.14

| | | | |
|---|---|---|---|
| Salix reticulata | S | 2 | FAC |
| Salix pilchra | S | 3 | FACW |
| Salix bebbiana | S | 2 | FAC |

**VEGETATION** (use scientific names of plants)

| Herb Stratum (26) | Absolute % Cover | Dominant Species? (Y/N) | Indicator Status |
|---|---|---|---|
| 1. Chamarion latifolium | T | | FAC |
| 2. Saussaria angustifolium | T | | FAC |
| 3. Hedysarum alpinum | 2 | Y | FACU |
| 4. Carex Scirpoidea | 3 | Y | FACW |
| 5. Carex sp | T | | – |
| 6. poa sp | T | | – |
| 7. grass sp | T | | – |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| Total Cover: 5 | | | |
| 50% of total cover: 2.5 | 20% of total cover: 1 | | |

**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

Ø % Cover of Wetland Bryophytes

80 Total Cover of Bryophytes

Ø % Cover of Water

**Hydrophytic Vegetation Present (Y/N):** Y

Notes: (If observed, list morphological adaptations below):

# WETLAND DETERMINATION DATA FORM

W106AY039

7.17.16

| SOIL | Date | Feature ID | Soil Pit Required (Y/N) |
|---|---|---|---|

**SOIL PROFILE DESCRIPTION:** (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox % | Type[1] | Loc[2] | Texture | Notes |
|---|---|---|---|---|---|---|---|---|
| Oi 0-2 | | | | | | | | Dry organics |
| Oe 2-5 | | | | | | | | Dry " " |
| Bw1 5-9 | 10YR 4/2 | 100 | | | | | vgravelly fine sandy loam | |
| Ab1 9-11 | Black | | | | | | | |
| Bw2 11-13 | 2.5Y 4/2 | 100 | | | | | gravelly silt loam | |
| Ab2 13-16 | 10YR 2/1 | 100 | | | | | gravelly loam | |
| C 16-24 | 2.5Y 4/2 | 100 | | | | | vgravelly 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) 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: Depths vary for horizons. Much mixing of horizons. No clear cuts. Seems like Hillside sloughs off. Pit profile described same as picture was taken of

| 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: