APPENDIX O DRAFT WETLAND MITIGATION PLAN

ALASKA LNG

DRAFT WETLAND MITIGATION PLAN

(USACE PERMIT APPLICATION POA-2015-329)

Plan Status

The following plan outlines the sections and preliminary information for the *Draft Wetland Mitigation Plan* (Plan) required for review by the U.S. Army Corps of Engineers (USACE). This draft Plan is being provided in the Federal Energy Regulatory Commission (FERC) application and initial USACE application. The Plan would be completed following finalization of the Project footprint, additional agency consultation, and completion of the aquatic site assessment. The final Plan would be approved by the USACE and incorporated into the individual permit by reference.

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1.0 INTRODUCTION

The Alaska Gasline Development Corporation plans to construct one integrated liquefied natural gas (LNG) Project (Project) with interdependent facilities for the purpose of liquefying supplies of natural gas from Alaska, in particular from the Point Thomson Unit and Prudhoe Bay Unit production fields on the Alaska North Slope (North Slope), for export in foreign commerce and for in-state deliveries of natural gas.

This draft *Mitigation Plan* (Plan) conceptually describes the strategies under consideration for the mitigation of projected impacts caused by the Project. The intent of this draft Plan is to provide conceptual framework for wetland mitigation; more detailed, site-specific plans will be developed in the course of permitting with the U.S. Army Corps of Engineers (USACE) and reviewing agencies.

The Plan also addresses avoidance and minimization, and introduces potential plans for offsetting impacts to waters of the United States (U.S.) through mitigation.

This Plan addresses potential compensatory mitigation consistent with the Final Rule (Rule), Compensatory Mitigation for Losses of Aquatic Resources, that was issued on April 10, 2008, as detailed in Section 332.4(c) of the Federal Register (Volume 73 Number 70). This Plan also provides appropriate mitigation for permanent loss of waters of the United States (U.S.) associated with construction and operation of the Project facilities. As required under the Rule, the following components are addressed in this Plan:

1. Preparation and Approval as per 33 Code of Federal Regulations (CFR) 332.4(c)(1).
2. Objectives as per 33 CFR 332.4(c)(2).
3. Site Selection as per 33 CFR 332.4(c)(3) and 33 CFR 332.4(d).
4. Site Protection Instrument as per 33 CFR 332.4(c)(4).
5. Baseline Information as per 33 CFR 332.4(c)(5).
6. Determination of Credits as per 33 CFR 332.4(c)(6).
7. Mitigation Work Plan as per 33 CFR 332.4(c)(7).
8. Maintenance Plan as per 33 CFR 332.4(c)(8).
9. Performance Standards as per 33 CFR 332.4(c)(9).
10. Monitoring Requirements as per 33 CFR 332.4(c)(10).
11. Long-Term Management Plan as per 33 CFR 332.4(c)(11).
12. Adaptive Management Plan as per 33 CFR 332.4(c)(12).
13. Financial Assurances as per 33 CFR 332.4(c)(13) and 33 CFR 332.3(n).
14. Other Information as per 33 CFR 332.4(c)(14).

2.0 AVOIDANCE

The State of Alaska encompasses an area of 403,247,700 acres and the total acreage of wetlands is estimated at 174,683,900 acres. This is 43.3 percent of Alaska's surface area. Alaska's wetlands are also concentrated along the coasts and between the mountain ranges found in the state and along all of the major natural corridors that could be used for siting linear facilities (e.g., rivers, mountain passes, valleys) and for this reason, it will not be practicable for the Project to completely avoid impacts to aquatic resources, including jurisdictional wetlands.

Efforts have been taken to avoid impacts to aquatic resources to the maximum extent practicable when siting each Project component (Liquefaction Facility, Mainline and associated facilities, Point Thomson Gas Transmission Line [PTTL], Prudhoe Bay Gas Transmission Line (PBTL), and Gas Treatment Plant [GTP]). Alternative methods, locations, and/or footprints are discussed in Resource Report 10 and Appendix D of Resource Report 10 (LEDPA analysis of Alternatives). In geographic areas where it would be impossible for a linear project to completely avoid waters of the U.S., including wetlands, measures would be taken to avoid higher value areas.

2.1 ROUTING & SITING

2.1.1 Liquefaction Facility

The Liquefaction Facility was sited to avoid impacts to waters of the U.S., including wetlands with the exception of the Marine Terminal and Materials Offloading Facility. Approximately 40-50 acres of jurisdictional wetlands were identified on the property near Nikiski, however, the Project has moved/oriented the facility to avoid these wetlands.

2.1.2 Pipelines

For example, on the North Slope where it is virtually impossible to avoid wetlands, between mileposts (MPs) 0 and 120, the proposed Mainline pipeline has been routed in an attempt to avoid potentially higher value wetlands in and around open water areas that provide nesting/rearing habitat for waterfowl and other migratory birds, including eiders (see Table 1).

Table 1: Lake Pond, Open Water Avoidance Locations for Mainline Mileposts 0 – 120

List of Lake, Pond, Open Water Avoidance Locations for Mainline Mileposts 0 - 120			
5.0	16.8	34.4	84.0
8.0	20.0	43.5	89.0
9.0	21.0	53.0	95.0
11.5	26.8	60.0	107.0
14.0	27.9	80.0	117.9

The Mainline avoids crossing the Minto Flats by skirting the eastern edge around MPs 430 to 470. This route stays in the foothills on the eastern edge of the State Game Refuge, but out of the flats to avoid wetlands to the extent practicable.

Between MPs 598 and 766, the Mainline pipeline route has been optimized to avoid wetlands in dozens of locations (see Appendix B). Appendix B provides approximate locations by MP ranges of areas where the Mainline was routed onto upland ridges to avoid adjacent wetlands or large wetland complexes.

Environmental, regulatory, and land evaluations were conducted for Mainline aboveground facilities and infrastructure. The evaluations included the presence of cultural sites, **wetlands**, anadromous streams, non-anadromous streams, sensitive wildlife habitats, special areas, land ownership, and in some cases noise sensitive areas. In most cases engineers provided draft locations for the evaluations, but in some instances broader areas were provided and areas to be avoided were first identified. The reviews often resulted in suggested re-locations due to one or more of the aforementioned considerations. Results of the evaluations were then considered by the engineers in selection of the final locations within the context of engineering constraints, safety/regulatory and multiple environmental resources considerations.

2.1.3 GTP

It was not possible to avoid impacts to waters of the US on the Arctic Coastal Plain of Alaska's North Slope. Therefore, the Project attempted to avoid open water areas to the maximum extent practicable when siting the GTP.

2.2 DESIGN

2.2.1 Liquefaction Facility

The original design of the Liquefaction Facility would have impacted more than 40 acres of wetlands, however, the design footprint was changed to avoid special aquatic sites, including wetlands. The Marine Terminal and MOF appear to be water dependent to the extent that they will accommodate sea-going vessels. These facilities were designed to avoid special aquatic sites to the maximum extent practicable.

2.2.2 Pipelines

2.2.2.1 Mainline

The Mainline cannot be located aboveground on VSMs due to technological and logistical concerns (see Section 10.4.5.1 of Resource Report 10 and Section 3.2 of Appendix D of Resource Report 10), so impacts to waters of the U.S. are avoided through siting of the route. Where not collocated near to or adjacent to existing linear Rights of Way (ROWs), the Mainline has been routed to avoid/minimize impacts to wetlands, to the extent practicable, by following ridges and crossing wetlands and water bodies at near 90° to minimize the length of each crossing.

The currently proposed route revision (Route Revision C2) was developed to minimize impacts and ensure the long-term integrity of the pipeline; comply with regulatory requirements; and to take into account constructability, safety, and cost considerations. Because the pipeline would be a high-pressure system and mostly buried, criteria that are used to route the Mainline are: 1) shortest possible length considering all the factors that follow; 2) cost of installation and operation; 3) practicality of constructing the pipeline in the chosen route; 4) operability of the pipeline once installed, and meeting design standards and Pipeline and Hazardous Materials Safety Administration (PHMSA) requirements, which is a high consideration (Note: both 3 and 4 relate to avoiding stresses on the pipeline, steep topography, narrow ravines, excessive side slopes, geotechnically unstable areas, and areas of landslides or unstable slopes); 5) avoidance of Native allotments, Wild and Scenic Rivers, National Parks, NWRs, and Wilderness areas; 6) avoidance of NRHP-eligible sites; 7) avoidance of creating new ROWs—maximizing collocation; 8) avoidance of sensitive environmental features (listed species habitat, high quality wetlands, known nesting locations of listed species, etc.); 9) high-density populated areas; 10) open water features (ponds, lakes, reservoirs), focusing on crossing the narrowest portion of a waterbody; and 11) minimizing social impacts. Detailed discussion of the routing considerations is provided in Section 10.4.2.1 of Resource Report 10.

2.2.2.2 PTTL

The PTTL is proposed to be primarily aboveground on vertical support members (VSMs) because it will run perpendicular to the hydrologic gradient. This will avoid blocking or impeding minor drainages and surface flows which could occur with a belowground (i.e., buried) pipeline and reduce/eliminate the need for ancillary facilities such as compressor stations. The remainder of the distance traverses the shortest route possible since there are no other existing linear infrastructure facilities to collocate with. Construction will be accomplished in the winter via ice

roads and ice pads to further reduce adverse impacts to aquatic resources and to reduce/avoid impacts to threatened and endangered species.

2.2.2.3 PBTL

The PBTL is proposed to be primarily aboveground on vertical support members (VSMs) to avoid impacts to waters of the U.S. This will avoid the loss of or impacts on wetlands, will prevent blocking or impeding minor drainages and surface flows which could occur with a belowground (i.e., buried) pipeline and reduce/eliminate the need for ancillary facilities such as compressor stations. The pipeline traverses the shortest route possible. Construction will be accomplished in the winter via ice roads and ice pads to further reduce adverse impacts to aquatic resources and to reduce/avoid impacts to threatened and endangered species.

2.2.3 GTP

The design of the GTP was altered by the Project to avoid the placement of fill into open water areas (creeks and tundra ponds), however, the flare area does include some open water under the flare.

3.0 MINIMIZATION

Measures to minimize damage to waters of the U.S., including wetlands, would be implemented throughout the Project, such as minimizing crossing widths, seasonal construction timing, construction methods, and operational practices (see Project *Restoration Plan*, other plans with mitigation measures in various appendices [see below], and best management practices).

- Alaska LNG Project *Plan* (Resource Report No. 7, Appendix D);
- Alaska LNG Project *Procedures* (Appendix O);
- *Blasting Plan* (Resource Report No. 6, Appendix B);
- *Fugitive Dust Control Plan* (Resource Report No. 9, Appendix J);
- *Gravel Sourcing Plan and Reclamation Measures* (Resource Report No. 6, Appendix F);
- *HDD Inadvertent Release Plan* (Appendix M);
- *Waste Management Plan* (Resource Report No. 8, Appendix K);
- *Site-Specific Waterbody Crossing Plans* (Appendix J);
- *Spill Prevention, Control, and Countermeasure* (*SPCC*) *Plan* (Appendix N);
- *SWPPP* (Appendix K); and
- *Water Use Plan* (Appendix L).

The following BMPs are included in Appendix K:

1. Minimize disturbed area (phase construction activities).
2. Maintain natural buffer areas.
3. Control stormwater discharges and flow rates.
4. Protect steep slopes (20 percent or greater angle over a 30-foot horizontal difference) from erosion (BMP adequacy to be determined by a Geotechnical Engineer).
5. Storm drain inlet protection measures.
6. Waterbody protection measures.
7. Down-slope sediment controls.
8. Stabilized construction vehicle access and exit points.
9. Minimize dust generation and track-out from vehicles.
10. Soil stockpiles.
11. Sediment basins.
12. Dewatering through filter devices.
13. Soil stabilization during and after construction (BMP adequacy to be determined by a Geotechnical Engineer).
14. Treatment chemicals/Active treatment systems.
15. Good housekeeping measures.

The Project would also adhere to permit and approval requirements to minimize impacts to waters of the US, and other important aquatic resources such as wildlife and fish.

A detailed discussion of the alternatives considered, including further design and siting measures, is included in the Least Environmentally Damaging Practicable Alternatives Analysis, Appendix D of Resource Report 10.

3.1 LIQUEFACTION FACILITY

There are logistical and safety constraints that require a certain amount of space between or around individual components of the facility. The spacing requirements drive the size of the footprint

required for the facility. For example, the Project would adhere to all applicable regulatory and safety requirements including Occupational Safety and Health Administration (OSHA), Pipeline and Hazardous Materials Safety Administration (PHMSA), and FERC standards on equipment spacing and maintaining safety zones within the property boundaries. Building the facility using modules also drastically reduces the facility footprint because material isn't delivered, laid out, and then stick-built on site. Based on the facility throughput design, and planned construction execution shipping modules for most facility components (tanks have to be stick built), this places all the equipment and the required safety zones within a 900+ acre site. Logistically, the preferred site is also located to maximize existing roads and infrastructure to the extent practicable to avoid building new infrastructure into a site.

To minimize impacts to marine ecosystems in Cook Inlet, the Project has minimized the placement of fill by use of existing infrastructure where available and installation of pile-driven structures such as dolphins. The Project proposal also minimizes dredging to the extent necessary to complete the work.

3.2 PIPELINES

3.2.1 Mainline

The Mainline pipeline has been routed to minimize impacts to waters of the U.S. by orienting crossings at near 90 degrees in order to take the shortest route across the wetland or waterbody. Crossing a waterbody at near 90° minimizes the length by approximately 10 – 50% below the longer crossing length of a diagonal crossing.

The List of Waterbody Crossings provided as Appendix H to Resource Report 2 includes the major river crossings that are currently planned for aerial or trenchless (e.g., horizontal directional drill) crossing methods. These two crossing methods would minimize impacts by reducing the footprint of disturbance across waters of the U.S.

The number of miles of wetlands that will be crossed, the season of construction and the construction methodology (Modes) are shown in Table 2 (see also Resource Report 10, Appendix D, Section 3.2.1). Approximately 132 miles of construction ROW for the Mainline will be conducted on ice roads, ice pads, ice bridges or frost packed surfaces reducing the need for granular fill in wetlands by more than 1,760 acres.

Table 2: Construction ROW Modes and Seasons for Wetlands to be Crossed

Mode	Construction ROW Mode	Length (miles)	%	Winter Construction (miles)	Summer Construction (miles)
01	Ice Work Pad North Slope	**55.4**	14.5%	55.4	0.0
02	Winter Frost Packed	**40.7**	10.7%	40.7	0.0
03	Matted Summer Wetlands	**0.5**	0.1%	0.0	0.5
04	Granular Work Pad	**209.5**	55.0%	76.5	133.0
5A	Graded	**67.2**	17.6%	27.7	39.6
16	Water Crossings - Winter	**3.5**	0.9%	3.5	0.0
17	Water Crossings - Summer	**4.1**	1.1%	0.0	4.1
Total		**380.9**		**203.7**	**177.2**
				53%	47%

In order to minimize impact on wetlands from construction of the pipeline, ROW modes were selected on a preferential basis. The first preference is to apply Ice Work Pad (Mode 1) or Winter Frost Packed (Mode 2), which provide the least environmental impact during construction. For the small sections of inundated wetlands that cannot be crossed using Mode 1 (south of the Brooks

Range) or Mode 2 (water sources not adequate for frost packing), Matted Summer Wetlands (Mode 3) is applied. Graded (Mode 5A) is applied for remaining wetlands where the underlying ground conditions are stable. Finally, for other remaining wetlands, where the underlying ground is thaw-sensitive permafrost, granular work pad (Mode 4) is required to ensure safe construction and long-term pipeline integrity. The resulting balance of winter and summer construction consists of 204 miles, or 53 percent, of the wetlands being crossed during winter, while the remainder will take place during summer.

Measures incorporated into the project design to minimize impacts on substrate include the prevention of permafrost thaw and substrate subsidence through the avoidance of ice rich permafrost, designing infrastructure to minimize water impoundments, insulating underlying permafrost through use of gravel pads, and the elevation of project infrastructure off the tundra surface, when possible.

Bridges were designed to maintain existing drainage patterns and minimize erosion. Erosion control and bank stabilization measures shall be employed, where practicable, to further minimize impacts to waters of the U.S.

3.2.2 PTTL

In addition to the applicable minimization measures described above for the Mainline, the PTTL was also designed to avoid placement of VSMs in stream channels to the maximum extent practicable.

3.2.3 PBTL

In addition to the applicable minimization measures described above for the Mainline, the PBTL was also designed to avoid placement of VSMs in stream channels to the maximum extent practicable.

3.3 GTP

Similar to the Liquefaction facility, the GTP was both designed and sited to minimize impacts to the extent practicable. The Project co-located the material site and the future water source reservoir as well as temporary work camps and future operations facilities. Additionally, there are logistical and safety constraints that require a certain amount of space between or around individual components of the facility. The spacing requirements drive the size of the footprint required for the facility. For example, the Project will adhere to all applicable regulatory and safety requirements including OSHA and PHMSA standards on equipment spacing and maintaining safety zones within the property boundaries. Using modules to construct the GTP also drastically reduces the facility footprint because material is not delivered, laid out, and then stick-built on site.

Measures incorporated into the project design to minimize impacts on substrate include the prevention of permafrost thaw and substrate subsidence through the avoidance of ice rich permafrost, designing infrastructure to minimize water impoundments, insulating underlying permafrost through use of gravel pads, and the elevation of project infrastructure off the tundra surface, when possible.

To minimize impacts to marine ecosystems in Prudhoe Bay, the Project proposes to utilize existing infrastructure at West Dock to the maximum extent practicable. The Project would use a barge bridge system over use of a solid fill causeway/dock for barge offloading and has minimized use of structures in marine. Further design optimizations have resulted in a change

from dredging to screeding at Dockhead 4. The applicant would minimize use of screeding to meet the Project need.

4.0 POTENTIAL OFFSETS

This section discusses current strategies under consideration for the mitigation of projected impacts and provides an outline for components to be developed as the strategies are more defined. More detailed plans will be developed in the course of permitting with the USACE and reviewing agencies.

4.1 CURRENT STRATEGIES UNDER CONSIDERATION

The scale and scope of the Alaska LNG Project is unprecedented in the State of Alaska since the establishment of the USACE permitting program. In order to address the unavoidable impacts to waters of the U.S., required compensatory mitigation must be practicable and capable of compensating for the aquatic functions that will be lost as a result of the permitted activity. Initial discussions have occurred with some resources such as federal and state agencies, and potential mitigation bank and in-lieu fee sponsors. The following are potential appropriate and practicable compensatory mitigation options under evaluation.

Options must be considered that are environmentally preferable in consideration of the likelihood of ecological success and sustainability, the location of the compensation site relative to the impact site and their significance within the watershed, and the costs of the compensatory mitigation project. While the compensatory mitigation regulations suggest a preference for mitigation banks and in-lieu fee programs, permitted impacts may not be within the service area of an approved mitigation program, sufficient credits may not be available, and permittee-responsible mitigation (PRM) options may be the environmental preference.

Restoration in the form of on-site and in-kind mitigation PRM is the primary and largest-scale option. The Project has proposed restoration along the Mainline pipeline trench, associated ROW, and possibly temporary work spaces such as access roads, yard sites, etc. For details on restoration goals, objectives, and methods see the Project Restoration Plan provided as Appendix A to this Plan (also provided as Appendix P to Resource Report 3). The Project has also proposed restoration for waterbody crossings including streams, rivers, ponds, and lakes. The Project entity plans to restore stream crossings to at least the same level of stability and habitat as pre-construction conditions. In some instances, equipment and personnel on site may be used to improve bank stability and/or habitat value upstream and/or downstream of Project impacts in order to gain (approved) mitigation credits where practicable. Information on the restoration efforts at waterbody crossings is also provided in the Project Restoration Plan.

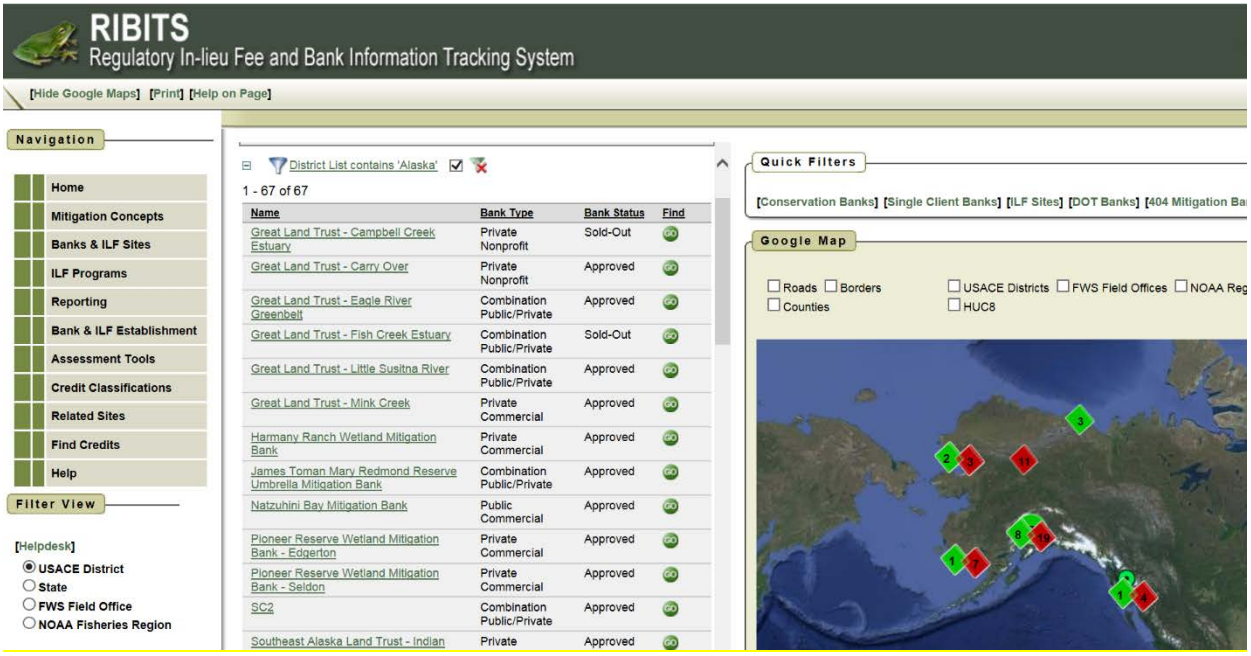
Site-specific restoration plans for on-site and in-kind or out-of-kind mitigation would also be developed for material mine sites in waters of the U.S. utilizing the appropriate reclamation measures described in the Gravel Sourcing Plan and Reclamation Measures (provided as Appendix F to Resource Report 6). The Gravel Sourcing Plan and Reclamation Measures would be further developed as the Project progresses.

PRM opportunities under a watershed approach are also being considered. If opportunities exist within the same watershed as the impacts, blockages in anadromous fish streams may be removed (or funded to be removed) and fish (salmon) habitat enhanced or created.

Also, a significant quantity of native seed (or non-invasive annuals) would be required that is certified to be free of invasive species. Another possible source of mitigation credits may be to provide funding for a “Seed Bank” that could be used not only for this Project, but other future projects in the state. The Project entity could partner with the Plant Material Center in Palmer, Alaska, to provide a seed source, start a seed bank in Alaska, and possibly initiate an intern program to provide an avenue for education and training in this field.

Mitigation bank and/or in-lieu fee credits may be available as an option where the project is within the program service area. Due to the dynamic nature in the number of available credits shown on the Regulatory In-Lieu Fee and Bank Information Tracking System (RIBITS) website at any point in time (e.g., credits being sold to other project proponents or the addition of new mitigation sites/credits), a snapshot of what is currently available is included in the figure below for discussion purposes.

Figure 1: Alaska District Available Credits as of April 2017



4.2 OBJECTIVES

A description of the resource type(s) and amount(s) that will be provided, the method of compensation (i.e., restoration, establishment, enhancement, and/or preservation), and the manner in which the resource functions of the compensatory mitigation project will address the needs of the watershed, ecoregion, physiographic province, or other geographic area of interest. See 33 CFR 332.4(c)(2).

This section would address potential measures identified, in consultation with the USACE and other reviewing agencies, to offset the unavoidable permanent loss of waters of the U.S. associated with Project construction and operation. The following types of mitigation described in the 2008 Rule were considered in selection of a mitigation solution:

1. Purchasing credits from an operational mitigation bank.
2. Purchasing credits from an approved in-lieu fee program.
3. Permittee-responsible mitigation (PRM) using a:
   A. Watershed approach.
   B. Onsite, in-kind mitigation.
   C. Offsite and/or out-of-kind mitigation.

4.3 SITE SELECTION

A description of the factors considered during the site selection process. This should include consideration of watershed needs, onsite alternatives where applicable, and the practicability of accomplishing ecologically self-sustaining aquatic resource restoration, establishment, enhancement, and/or preservation at the compensatory mitigation project site. See 33 CFR 332.3(c)(3).

4.3.1 Property Location

To be provided.

4.3.2 Property Ownership

Table will be provided.

4.4 SITE PROTECTION INSTRUMENT

A description of the legal arrangements and instrument (including site ownership) that will be used to ensure the long term protection of the compensatory mitigation project site. See 33 CFR 332.4(c)(4).

4.5 BASELINE INFORMATION

A description of the ecological characteristics of the proposed compensatory mitigation project site and, in the case of an application for a DA permit, the impact site. This may include descriptions of historic and existing plant communities, historic and existing hydrology, soil conditions, a map showing the locations of the impact and mitigation site(s) or the geographic coordinates for those site(s), and other site characteristics appropriate to the type of resource proposed as compensation. The baseline information should also include a delineation of Waters of the United States on the proposed compensatory mitigation project site. A prospective permittee planning to secure credits from an approved mitigation bank or in-lieu fee program only needs to provide baseline information about the impact site, not the mitigation bank or in-lieu fee project site. See 33 CFR 332.4(c)(5).

Details on the type of waters of the U.S. and acreage of impact by Project component/facility are shown in Table 2.4.2-2 in Resource Report 2 and Appendix E of Resource Report 2.

4.5.1 Mitigation Project Site Baseline Conditions

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4.5.2 Impact Site (Project Facility) Baseline Conditions

[_]

4.6 DETERMINATION OF CREDITS

A description of the number of credits to be provided, including a brief explanation of the rationale for this determination. For permittee-responsible mitigation, this should include an explanation of how the compensatory mitigation project will provide the required compensation for unavoidable impacts to aquatic resources resulting from the permitted activity. See 33 CFR 332.4(c)(6).

Determination of credits would be accomplished by applying an approved Aquatic Site Assessment (ASA) to the acreage of impacts associated with the wetlands and waterbodies impacted by the Project and then applying the USACE optional debit/credit methodology or similar approved method for any PRM. An obvious exception to this determination of credits may be during the use of existing mitigation banks or ILFs where the amount and type of credits at the mitigation sites are already established. In these cases, the USACE will determine the number of credits necessary to offset those debits associated with portions of the Project that are located within the service areas of the mitigation bank or ILF being used.

4.7 MITIGATION WORK PLAN

Detailed written specifications and work descriptions for the compensatory mitigation project, including, but not limited to, the geographic boundaries of the Project; construction methods, timing, and sequence; source(s) of water, including connections to existing waters and uplands; methods for establishing the desired plant community; plans to control invasive plant species; the proposed grading plan, including elevations and slopes of the substrate; soil management; and erosion control measures. For stream compensatory mitigation projects, the mitigation work plan may also include other relevant information, such as planform geometry, channel form (e.g., typical channel cross-sections), watershed size, design discharge, and riparian area plantings. See 33 CFR 332.4(c)(7)

4.7.1 ___Facility

[_]

4.7.2 ___Facility

[_]

4.8 MAINTENANCE AND MANAGEMENT PLAN

A description and schedule of maintenance requirements to ensure the continued viability of the resource once initial construction is completed. See 33 CFR 332.4(c)(8).

4.9 PERFORMANCE STANDARDS

Ecologically-based standards that will be used to determine whether the compensatory mitigation project is achieving its objectives. See 33 CFR 332.4(c)(9).

Development of performance standards and a performance period (i.e., monitoring) are key elements of a mitigation plan and would be developed in consultation with federal, state, and local regulatory agencies, relying on lessons learned from previous practices in Alaska. The standards and monitoring efforts would vary by ecoregion and site activities to address site-specific climatic and soil conditions and degrees of disturbance. As with previous efforts in Alaska, the monitoring effort would require adaptive management because the response to restoration efforts would be an iterative process (see the attached Project *Restoration Plan* for a bibliography of studies and summary of results).

Based on the results of previous restoration research conducted in Alaska (see Section 1.2 of the *Restoration Plan*), preliminary vegetation performance standards have been developed for each construction mode. For previous North Slope wetland restoration projects, studies have found that if the total live indigenous (native) vascular cover can reach a minimum of 10–15 percent,

depending on site characteristics (e.g., quality of the substrate), the site would develop a plant community that is productive and sustainable over the long term (Figures 1–2 in the Restoration Plan). Adding the requirement that the site includes a variety of species (and growth forms, diversity standard) helps ensure the plant community can adapt to potential changes in site conditions that may occur during the first few years following completion of construction and restoration. Site response varies, but most sites can meet the performance standards in 10 years.

For areas south of the Brooks Range, a higher percent total live vascular cover is warranted, because climatic conditions are more favorable (warmer summer temperatures and higher precipitation) for plant establishment and growth. At the Washington Creek trenching test site 28 miles north of Fairbanks, a performance standard of 30 percent was established, which was achieved at the end of the 10-year performance period (Figure 3 in the Restoration Plan). Revegetation of a gravel pit at MP 105 of the Dalton Highway also appears to have good vegetation cover after seven years (Figure 4 in the Restoration Plan).

Vegetation performance criteria for Southcentral Alaska are not available, but for the Hecla Green Creek Mine in Southeast Alaska near Juneau, a performance standard of 30 percent vegetation cover that included native trees and/or shrubs, and/or naturally colonizing native trees, shrubs, herbaceous species, or organic material (duff) in five years was established. This standard is probably also achievable in Southcentral Alaska from MP 640 south of the Alaska Mountain Range to the Liquefaction Facility at Nikiski.

4.10 MONITORING AND REPORTING PROTOCOLS

A description of parameters to be monitored to determine if the compensatory mitigation project is on track to meet performance standards and if adaptive management is needed. A schedule for monitoring and reporting on monitoring results to the district engineer must be included. See 33 CFR 332.4(c)(10).

4.10.1 As-built Report

An As-built Report would be provided to the USACE post-construction providing a description of the final disposition of the waters of the U.S. impacted during construction, and the restoration measures implemented and the parameters to be monitored to determine if the compensatory mitigation project is on track to meet performance standards and/or if adaptive management is required.

4.10.2 Monitoring Report

[_]

4.11 LONG-TERM MANAGEMENT PLAN

A description of how the compensatory mitigation project will be managed after performance standards have been achieved to ensure the long-term sustainability of the resource, including long-term financing mechanisms and the party responsible for long-term management. See 33 33 CFR 332.4(c)(11).

The Project entity would work with landowners/managers to determine how the compensatory mitigation project would be managed after the performance standards have been achieved to ensure the long-term sustainability of the resource, including long-term financing mechanisms and the party responsible for long-term management and to the satisfaction of the USACE.

4.12 ADAPTIVE MANAGEMENT PLAN

A management strategy to address unforeseen changes in site conditions or other components of the compensatory mitigation project, including the party or parties responsible for implementing adaptive management measures. The adaptive management plan will guide decisions for revising compensatory mitigation plans and implementing measures to address both foreseeable and unforeseen circumstances that adversely affect compensatory mitigation success. See 33 CFR 332.4(c)(12).

The Project entity would implement adaptive management to address unforeseen changes in site conditions or other components of the compensatory mitigation program, including parties responsible for implementing adaptive management measures.

4.13 FINANCIAL ASSURANCES

A description of financial assurances that will be provided and how they are sufficient to ensure a high level of confidence that the compensatory mitigation project will be successfully completed, in accordance with its performance standards. See 33 CFR 332.4(c)(13).

The Project entity would provide the necessary financial assurances to ensure a high level of confidence that the compensatory mitigation project would be successfully completed. This could be in the form of a performance bond, escrow account, or letter of credit. The bond, account, or letter can be held by an approved Bank, ILF or Non-Government Organization (NGO) that could assist in either seeing that the work is completed or used to purchase appropriate credits.

5.0 ACRONYMS AND TERMS

Term	Definition
ASA	Aquatic Site Assessment
ATWS	Additional Temporary Workspace
CFR	Code of Federal Regulations
FERC	Federal Energy Regulatory Commission
GTP	Gas Treatment Plant
ILF	In-Lieu Fee
MLBV	Mainline block valve
MOF	Material Offloading Facility
NGO	Non-governmental organization
NWI	National Wetlands Inventory
PBTL	Prudhoe Bay Gas Transmission Line
Plan	Draft Wetland Mitigation Plan
PLF	Product Loading Facility
PRM	permittee-responsible mitigation
Project	Alaska LNG Project
PTTL	Point Thomson Gas Transmission Line
RIBITS	Regulatory In-Lieu Fee and Bank Information Tracking System
ROW	right-of-way
U.S.	United States
USACE	United States Army Corps of Engineers
VSM	vertical support member

APPENDIX A: PROJECT RESTORATION PLAN

See Appendix P of Resource Report 3

APPENDIX B: EXAMPLES OF WETLAND AVOIDANCE FOR MAINLINE MP 598 – 766

Mainline Wetland Avoidance Locations, Methods, and Distance

Begin MP	End MP	Avoidance Method (Use of)	Linear Feet
598.54	599.60	UPLANDS	5588
599.76	600.10	UPLANDS	1766
600.11	601.53	UPLANDS	7528
601.75	602.05	UPLANDS	1536
602.05	602.29	UPLANDS	1264
602.63	603.19	UPLANDS	2962
603.50	603.70	UPLANDS	1070
604.13	605.58	UPLANDS	7653
605.58	605.82	UPLANDS	1237
606.00	606.21	UPLANDS	1095
606.22	606.43	UPLANDS	1111
606.44	607.16	UPLANDS	3808
607.37	607.91	UPLANDS	2889
607.95	608.37	UPLANDS	2197
608.37	608.79	UPLANDS	2204
609.53	610.04	UPLANDS	2659
610.22	611.01	UPLANDS	4203
611.16	611.38	UPLANDS	1205
611.69	612.28	UPLANDS	3122
612.41	612.82	UPLANDS	2155
613.09	613.43	UPLANDS	1782
613.51	613.72	UPLANDS	1091
613.79	614.59	UPLANDS	4235
614.60	615.85	UPLANDS	6561
616.19	616.69	UPLANDS	2638
616.87	618.11	UPLANDS	6554
618.12	619.21	UPLANDS	5762
619.31	619.69	UPLANDS	2049
619.95	621.33	UPLANDS	7317
621.70	622.31	UPLANDS	3218
623.18	623.63	UPLANDS	2335
623.64	623.88	UPLANDS	1300
625.37	628.29	UPLANDS	15436
628.58	629.36	UPLANDS	4084

Begin MP	End MP	Avoidance Method (Use of)	Linear Feet
629.36	630.04	UPLANDS	3588
630.14	631.58	UPLANDS	7590
631.59	632.26	UPLANDS	3578
632.29	632.93	UPLANDS	3394
632.94	634.05	UPLANDS	5859
634.22	635.34	UPLANDS	5921
635.37	638.26	UPLANDS	15282
638.30	639.39	UPLANDS	5744
639.40	640.82	UPLANDS	7498
644.37	644.55	UPLANDS	6737
645.65	646.45	UPLANDS	4194
646.55	646.78	UPLANDS	1226
646.81	647.22	UPLANDS	2159
647.64	647.85	UPLANDS	1141
647.92	648.70	UPLANDS	4086
648.77	650.75	UPLANDS	10477
650.78	651.14	UPLANDS	1916
651.16	651.37	UPLANDS	1081
651.41	652.03	UPLANDS	3260
652.28	653.04	UPLANDS	4022
653.06	653.31	UPLANDS	1306
653.35	654.77	UPLANDS	7492
655.16	655.43	UPLANDS	1437
655.51	656.03	UPLANDS	2713
656.06	656.50	UPLANDS	2274
656.62	658.27	UPLANDS	8704
658.63	659.11	UPLANDS	2513
659.27	659.50	UPLANDS	1184
659.85	660.07	UPLANDS	1173
660.30	660.60	UPLANDS	1610
660.80	661.04	UPLANDS	1290
661.41	661.78	UPLANDS	1992
661.90	662.53	UPLANDS	3372
662.58	662.75	UPLANDS	905
662.85	663.10	UPLANDS	1331
663.12	663.48	UPLANDS	1895
663.69	663.88	UPLANDS	983

Begin MP	End MP	Avoidance Method (Use of)	Linear Feet
663.94	664.82	UPLANDS	4635
664.83	666.52	UPLANDS	8942
666.71	667.25	UPLANDS	2838
667.79	668.12	UPLANDS	1705
668.45	669.93	UPLANDS	7807
670.76	671.48	UPLANDS	3779
671.64	672.26	UPLANDS	3298
672.34	672.55	UPLANDS	1103
672.64	673.62	UPLANDS	5138
673.87	674.12	UPLANDS	1333
674.53	675.18	UPLANDS	3445
675.22	675.42	UPLANDS	1086
676.05	676.36	UPLANDS	1623
676.47	676.69	UPLANDS	1117
676.70	677.59	UPLANDS	4710
677.77	677.91	UPLANDS	741
678.74	678.94	UPLANDS	1061
678.95	679.45	UPLANDS	2649
679.57	679.92	UPLANDS	1850
680.19	680.66	UPLANDS	2497
680.70	680.87	UPLANDS	866
680.93	681.62	UPLANDS	3654
681.73	682.11	UPLANDS	2003
682.14	682.37	UPLANDS	1195
683.28	683.56	UPLANDS	1466
683.75	683.90	UPLANDS	807
684.19	684.39	UPLANDS	1051
684.41	684.67	UPLANDS	1370
685.00	685.51	UPLANDS	2698
685.52	686.01	UPLANDS	2570
686.18	686.37	UPLANDS	1002
686.71	687.26	UPLANDS	2906
687.28	688.77	UPLANDS	7882
688.96	689.21	UPLANDS	1338
690.03	690.28	UPLANDS	1340
691.94	692.29	UPLANDS	1877
692.35	692.49	UPLANDS	757

Begin MP	End MP	Avoidance Method (Use of)	Linear Feet
692.59	693.97	UPLANDS	7296
693.98	702.58	UPLANDS	45379
703.43	704.71	UPLANDS	6742
705.25	705.60	UPLANDS	1897
705.62	705.98	UPLANDS	1856
705.99	706.29	UPLANDS	1632
706.32	706.66	UPLANDS	1831
706.74	707.03	UPLANDS	1533
707.04	707.69	UPLANDS	3442
707.71	708.03	UPLANDS	1693
708.04	708.83	UPLANDS	4188
708.84	709.05	UPLANDS	1111
709.08	709.81	UPLANDS	3872
711.23	711.76	UPLANDS	2825
711.89	712.14	UPLANDS	1364
712.30	712.50	UPLANDS	1041
712.62	713.06	UPLANDS	2342
713.09	713.84	UPLANDS	3992
713.94	714.11	UPLANDS	876
714.23	714.46	UPLANDS	1248
714.49	714.88	UPLANDS	2049
714.90	715.95	UPLANDS	5522
716.25	716.48	UPLANDS	1185
716.51	716.79	UPLANDS	1483
717.15	717.83	UPLANDS	3628
717.87	718.42	UPLANDS	2889
718.46	719.59	UPLANDS	5963
719.61	720.07	UPLANDS	2410
720.62	720.79	UPLANDS	915
721.05	721.39	UPLANDS	1810
721.95	722.10	UPLANDS	752
722.24	722.44	UPLANDS	1090
722.60	722.81	UPLANDS	1117
722.94	724.65	UPLANDS	9039
724.69	724.85	UPLANDS	833
725.75	727.53	UPLANDS	9393
727.57	727.81	UPLANDS	1242

Begin MP	End MP	Avoidance Method (Use of)	Linear Feet
727.89	728.18	UPLANDS	1556
728.24	728.74	UPLANDS	2613
728.82	730.91	UPLANDS	11058
730.97	731.34	UPLANDS	1972
731.38	731.67	UPLANDS	1552
731.69	732.57	UPLANDS	4662
733.59	734.11	UPLANDS	2772
734.66	734.86	UPLANDS	1082
735.69	736.01	UPLANDS	1674
736.21	737.29	UPLANDS	4234
737.04	737.29	UPLANDS	1301
737.38	737.63	UPLANDS	1337
740.19	740.47	UPLANDS	1480
740.48	740.64	UPLANDS	867
740.86	741.03	UPLANDS	858
741.06	741.35	UPLANDS	1487
741.49	741.92	UPLANDS	2256
742.04	742.76	UPLANDS	3822
743.72	744.03	UPLANDS	1646
744.12	744.31	UPLANDS	980
744.82	745.56	UPLANDS	3936
745.58	745.73	UPLANDS	794
746.79	747.05	UPLANDS	1377
748.08	748.44	UPLANDS	1873
748.92	749.24	UPLANDS	1683
749.47	749.65	UPLANDS	982
750.07	750.24	UPLANDS	922
750.68	751.09	UPLANDS	2144
751.23	751.49	UPLANDS	1371
752.12	752.59	UPLANDS	2491
752.63	752.63	UPLANDS	5301
753.64	754.07	UPLANDS	2293
754.13	754.93	UPLANDS	4220
755.21	755.46	UPLANDS	1337
755.61	755.98	UPLANDS	1957
756.41	756.66	UPLANDS	1358
757.38	757.75	UPLANDS	1968

Begin MP	End MP	Avoidance Method (Use of)	Linear Feet
757.78	762.38	UPLANDS	24260
762.39	762.63	UPLANDS	1258
762.65	763.06	UPLANDS	2172
763.39	763.94	UPLANDS	2883
764.12	764.43	UPLANDS	1619
764.88	766.04	UPLANDS	6153