APPENDIX C WATER WELL MONITORING PLAN

ALASKA LNG

WATER WELL MONITORING PLAN

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1.0 INTRODUCTION

The following *Water Well Monitoring Plan* (Plan) is draft template to be used by construction contractors to address potential impacts of water wells near the Alaska LNG Project (Project) construction footprint. This template is relatively complete with the exception of specific well testing procedures (i.e., well flow test, well yield test, well drawdown test). Specific well testing procedures will be provided prior to construction when the footprint is finalized and information from existing wells is known. Finalization of this plan will take place prior to construction.

1.1 REGULATORY REQUIREMENTS

Drinking water resources are protected in the State of Alaska by the following regulations:

- 18 Alaska Administrative Code 80: Drinking Water.
- 40 Code of Federal Regulations (CFR) 141: National Primary Drinking Water Regulations.

The Alaska Department of Conservation (ADEC) has oversight of the drinking water program and works with public water systems to help them remain in compliance with state and federal drinking water regulations to prevent waterborne disease outbreaks and exposure to other drinking water contaminants. The drinking water program does not sample, test, or regulate the construction of private drinking water wells.

1.2 SCOPE AND APPLICABILITY

Federal Energy Regulatory Commission (FERC) regulations in 18 CFR §§ 380.12(d) (5) and 380.12(d) (9) require applicants to identify aquifers within excavation depth in the project area, including the depth of the aquifer, current and projected use, water quality and average yield, and known or suspected contamination problems; and identify the location of known public and private groundwater supply wells or springs within 150 feet of proposed construction areas or more as determined by FERC on a *case-by-case* basis. The required radius of well monitoring from the project construction footprint typically depends on the type of construction activity and potential to impact public and private groundwater supply wells or springs. Potential sources of construction impacts are discussed in the following section.

In addition to the FERC requirements listed, ADEC has requested that the Project increase the radius of identification of known public and private groundwater supply wells or springs to 500 feet of the Project construction footprint. According to ADEC, the 500-foot source protection radius is required to allow for adequate evaluation of risk to public health due to contamination and in order to properly evaluate the presence/absence of extraordinary contamination risk that would require a larger separation distance for the purpose of protecting public health.

Specific concerns associated with construction impacts in the vicinity of active water wells focus on two parameters:

- Decreased water yield.
- Impaired water quality.

1.3 SOURCES OF POTENTIAL IMPACT

Examples of potential sources of construction impacts to water wells may include:

- Vibrations from blasting or vibrations from heavy equipment operation.
- Contamination of the local aquifer from spills or sediment introduction.
- Effects from Horizontal Directional Drilling operations.

- Vibrations affecting aquifer porosity or permeability from heavy equipment operation or blasting.
- Activities that draw on aquifers.
- Activities that disturb the recharge area for an aquifer, impact infiltration rates, volume, or groundwater movement rates.
- Activities that dewater and discharge shallow groundwater, or that contact shallow groundwater directly and allow surface material to enter the groundwater system.
- Activities that result in the release of materials that are carried into the soil and infiltrate to the water table, or activities that draw and discharge contaminated groundwater.

2.0 WELL TESTING AND MONITORING PROTOCOLS

Included in Draft 2 of Resource Report No. 2 (Appendix A) is a list of public and private water supply wells within 500 feet of the Project footprint that were identified using the Alaska Department of Natural Resources' Well Log Tracking System. Although the database may not be complete, field surveys also were conducted along the Project footprint to confirm the presence of public and private drinking water wells proximate to the construction area. Also, during easement negotiation, landowners would be queried about the potential locations of any undocumented water supply sources. This information would be updated prior to construction when this Plan would be finalized.

For any well included in the testing and monitoring program described in this Plan, it is imperative that baseline conditions be established prior to the onset of construction activities. At all locations where the landowner or municipality express concerns about potential impacts to their water supply, the Project entity would implement well testing and monitoring. This testing would be performed by a qualified water well testing consultant.

2.1 WATER QUALITY TESTING AND MONITORING

Prior to pump testing to confirm water yield, water quality samples would be obtained from the well for biological and chemical analysis by a water quality testing laboratory. Although there are no State of Alaska requirements to sample private water wells, the following contaminants naturally occur throughout Alaska and are recommended for sampling for by ADEC (ADEC, 2015):

- Arsenic.
- Iron.
- Nitrates.
- Pathogens.
- Radon.

In addition, compounds used in blasting (if blasting has occurred nearby) should be sampled. Based on U.S. Environmental Protection Agency (EPA) recommendations, other parameters that may be tested, at land owner request, are pH, lead, copper, and volatile organic compounds.

2.2 WATER YIELD TESTING AND MONITORING

The Project entity would monitor such water quantity parameters including water column height, flow rate of existing equipment, water column drawdown, and rebound time. A qualified water well testing firm would be retained to perform water well yield tests and well monitoring.

2.2.1 Well Flow Test

The well flow test procedure would be developed by the qualified well testing firm.

2.2.2 Well Yield Test

The well yield test procedure would be developed by the qualified well testing firm.

2.2.3 Well Drawdown Test

The well drawdown test procedure would be developed by the qualified well testing firm.

3.0 PROVISIONS FOR DOCUMENTED IMPACTS TO WATER WELLS

In the event that it is determined that the Project has adversely impacted any water well, the Project entity would, in consultation with the landowner, identify measures, if any, that would be required to address the impact, including:

- Providing a temporary or permanent alternative water source.
- Repairing the well.
- Compensating the owner for a new, comparable well.

4.0 ACRONYMS AND TERMS

Term	Definition
ADEC	Alaska Department of Environmental Conservation
CFR	Code of Federal Regulations
EPA	United States Environmental Protection Agency
FERC	Federal Energy Regulatory Commission
LNG	Liquefied Natural Gas
Project	Alaska LNG Project

5.0 REFERENCES

Alaska Department of Environmental Conservation, Division of Environmental Health, Drinking Water Program. 2015. Existing Well Owners. Available online at: http://dec.alaska.gov/eh/dw/DWP/DWP_PrivateWells.html#test.