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To	Nicola Cook, Project Manager, Pacific and Yukon Region
From	Cedar LNG Partners LP
Date	May 8, 2024
Subject	Marine Water Quality Follow-up Program, EAC#23-01 Condition 3.10
Document No.	PC21258A-EV-MEM-00005
Revision	0

Introduction

Cedar LNG Partners LP, by its general partner Cedar LNG Partners (GP) Ltd. (Cedar), a Haisla Nation-led partnership with Pembina Pipeline Corporation (Pembina), is planning to construct and operate a liquefied natural gas (LNG) export facility within the District of Kitimat, British Columbia (BC) (the Project). The Project is subject to the requirements of the provincial *Environmental Assessment Act* and federal *Impact Assessment Act* and underwent a comprehensive environmental assessment from 2019 to 2023. Cedar received an environmental assessment certificate (EAC #E23-01) under the *Environmental Assessment Act* (EAC #23-01) on March 13, 2023 and a positive Decision Statement under the *Impact Assessment Act* (IAA) on March 15, 2023.

The Decision Statement issued under the *Impact Assessment Act* includes conditions of approval that Cedar must address. Condition 3.10 requires Cedar to develop and implement a follow-up program with respect to adverse federal effects on fish and fish habitat from changes to marine water quality. In developing this plan, Cedar is required to "*take into account BC's Marine Monitoring Guidance[1] when developing and implementing the follow-up program"* and *"identify the substances that will be monitored as part of the follow-up program, with a focus on potential contaminants of concern expected to be present in effluents from the Designated Project*". This memorandum outlines Cedar's approach to meeting the requirements of this condition.

Condition 3.10.1: Baseline Marine Water Quality Monitoring

Sub-condition 3.10.1 of the Decision Statement requires that Cedar "*sample, prior to the start of operation, concentrations of metals, anions, nutrients and hydrocarbons identified during the development of the follow-up program, at both ebbing tides and flooding tides and during summer and winter.*

The Proponent shall conduct each sampling at locations immediately adjacent to planned outfalls, mid-field locations, far-field locations and reference locations not expected to be impacted by the Designated Project, and at the following depths:

- *one metre below surface;*
- *approximately 12 metres below the surface; and*
- *one metre above bottom sediments."*

Six water quality sampling locations were selected and distributed within the Project's footprint and in the surrounding waters of Kitimat Arm (Table 1; Figure 1). The locations of the monitoring sites were identified in consideration of the expected discharges that will be permitted through the provincial *Environmental Management Act* and in accordance with BC's *Marine Monitoring Guidance*[1]. Sampling will occur approximately quarterly until sampling has been conducted to capture variability in water quality parameters in all four seasons. During each sampling period, five sampling events will be conducted within a 30-day period (i.e., 5-in-30 sampling) as outlined in BC's *Marine Monitoring Guidance*.

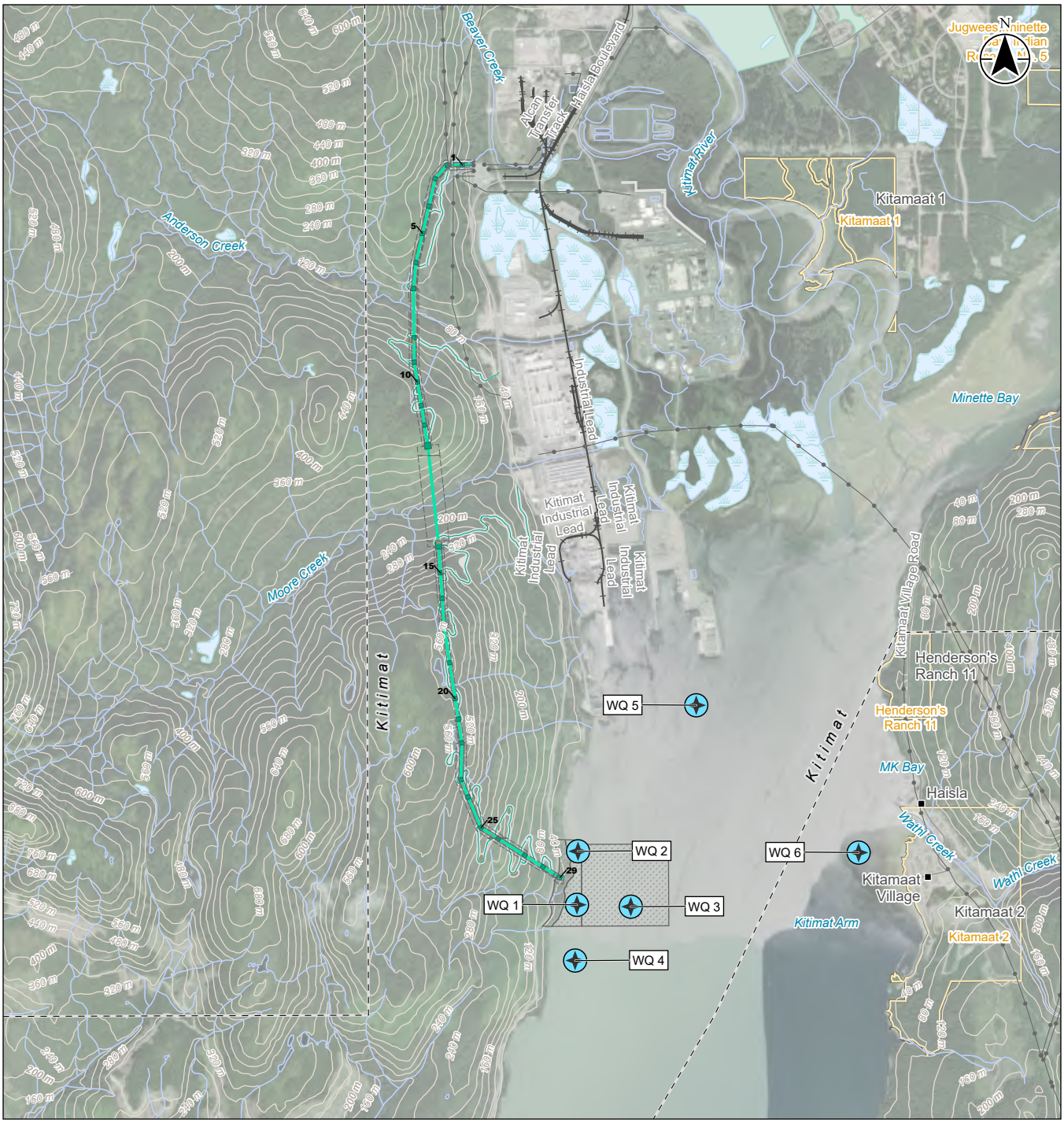
Table 1 Water Quality Sampling Locations

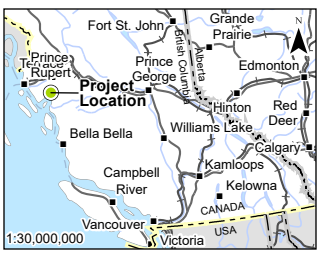
Site ID	Exposure Type	Coordinates (UTM Zone 9)		Sample Collection Type	
		Easting	Northing	In Situ	Chemical Analysis
WQ1	Outfall	519811	5980467	✓	✓
WQ2	Mid-field	519821	5980962	✓	✓
WQ3	Mid-field	520309	5980450	✓	✓
WQ4	Mid-field	519794	5979952	✓	✓
WQ5	Far-field	520914	5982312	✓	✓
WQ6	Reference	522415	5980950	✓	✓

The 5-in-30 water quality samples will be collected using a water sampling device at two tidal stages (i.e., ebbing and flooding) and from three water depths as conditions permit:

- 1 m below the surface
- Approximately 12 m below the surface (the expected depth where the outfall will be located)
- 1 m above the seafloor to a maximum depth of 90 m below the surface

[1] LGL (LGL Limited Environmental Research Associates) and BC ENV (British Columbia Ministry of Environment and Climate Change Strategy). 2019. Marine Monitoring Guidance. Ministry of Environment and Climate Change Strategy, Victoria, British Columbia. Available at: https://www2.gov.bc.ca/assets/gov/environment/waste-management/waste-discharge-authorization/guides/forms/2021-01-05-marine_monitoring_guidance.pdf. Accessed November 2023.





Notes
1. Coordinate System: NAD 1983 UTM Zone 9N
2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada
World Imagery: Earthstar Geographics
World Imagery: Maxar

- Road
- Local Street
- Resource Road
- Railway
- Transmission Line
- Topographic Contour
- Watercourse
- Wetland
- Local Greenspace
- Municipal Boundary
- First Nations Reserve

- Marine Water Quality Field Sampling Station
- Transmission Line
- Access Road
- Terminal Area
- Tower Pad
- Spoil Pile
- Clearing Extent
- Transmission Line Right-of-Way

0 0.5 1 1.5 2 km

1:55,000 (at original document size of 8.5x11)

Stantec

CEDAR LNG

Project Location:
Kitimat,
British Columbia

Project Number: 123222394

Client/Project/Report
Cedar LNG Partners LP
Cedar LNG Project
Cedar Marine Water Quality Follow Up Program

Figure No.
1

Title
Water Quality Sampling Locations

Water quality samples will be shipped to a Canadian Association for Laboratory Accreditation certified laboratory and analyzed for the following parameters to provide a comprehensive overview for the monitoring program:

- Conventional parameters (total alkalinity, total and dissolved hardness, and total suspended solids)
- Anions and nutrients (total ammonia, chloride, nitrate, nitrite, and total phosphorus)
- Microbiological samples (*Escherichia coli,* fecal coliforms, total coliforms, and *Enterococcus*)
- Total and dissolved metals (aluminum, antimony, arsenic, barium, beryllium, bismuth, boron, cadmium, calcium, cesium, chromium, cobalt, copper, gallium, iron, lead, lithium, magnesium, manganese, mercury, molybdenum, nickel, phosphorus, potassium, rhenium, rubidium, selenium, silicon, silver, sodium, strontium, sulfur, tellurium, thallium, thorium, tin, titanium, tungsten, uranium, vanadium, yttrium, zinc, and zirconium)
- Aggregate organics (biochemical oxygen demand and chemical oxygen demand)
- Volatile organic compounds (benzene, ethylbenzene, methyl-tert-butyl ether, styrene, toluene, xylene)
- Hydrocarbons (extractable petroleum hydrocarbons, light extractable petroleum hydrocarbons, heavy extractable petroleum hydrocarbons)
- Polycyclic aromatic hydrocarbons (acenaphthene, acenaphthylene, acridine, anthracene, benz(a)anthracene, benzo(a)pyrene, benzo(b+j)fluoranthene, benzo(b+j+k)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-c,d)pyrene, 1-methylnaphthalene, 2-methylnaphthalene, naphthalene, phenanthrene, pyrene, and quinoline)

Quality assurance and quality control (QA/QC) management and technical practices will also be implemented during each of the survey periods following the BC's *Field Sampling Manual for QA/QC*[2] and BC's *Environmental Laboratory Manual for QA/QC*[3], including the collection of quality control samples (e.g., travel blank, field blank, and/or field duplicate samples) and meeting laboratory hold times wherever possible.

[2] British Columbia Ministry of the Environment and Climate Change Strategy (BC ENV). 2013. British Columbia Field Sampling Manual. Part A: Quality Control and Quality Assurance. Available at: bc_field_sampling_manual_part_a.pdf (gov.bc.ca). Accessed November 2023.
[3] BC ENV. 2023. British Columbia Environmental Laboratory Manual. Section A: Laboratory Quality Assurance/ Quality Control. Available at: 2023-09-18-bc-elm-2022-section-a.pdf (gov.bc.ca). Accessed November 2023.

Condition 3.10.2: In-Situ Water Profiles

Condition 3.10.2 requires that Cedar *"undertake in situ depth profile measurements of temperature, dissolved oxygen, oxidation reduction potential, pH, specific conductivity and turbidity when conducting the sampling activities referred to in condition 3.10.1."*

In situ water profiles will be collected during each of the four baseline 5-in-30 sampling events at each water quality station using a water quality multiparameter metre (e.g., YSI EXO2 sonde). The water quality meter will be lowered to 1 m above the seafloor (or a maximum depth of 90 m below the surface) and retrieved at a rate of approximately 1 m/s while continuously logging data. Parameters measured will be temperature, dissolved oxygen, oxidation reduction potential, pH, specific conductivity, and turbidity.

Condition 3.10.3: Operation Phase Marine Water Quality Monitoring

Condition 3.10.3 requires that Cedar *"monitor, at least annually during the first five years of operation, water quality in a manner comparable to the sampling and measurement requirements set out in conditions 3.10.1 and 3.10.2, except for the sampling depth referred to in condition 3.10.1.2, which shall be mid-plume."*

To comply with Condition 3.10.3, Cedar will monitor water quality annually during the first five years of operation in a manner comparable to the sampling and measurement requirements set out in conditions 3.10.1 and 3.10.2, except for the sampling depth referred to in condition 3.10.1.2, which shall be mid-plume.

Condition 3.10.4: Comparison to Guidelines

Condition 3.10.4 of the Decision Statement requires that Cedar "*develop and implement modified or additional mitigation measures if the results of the monitoring referred to in condition 3.10.3 demonstrate that modified or additional mitigation measures are required in accordance with condition 2.8 to mitigate adverse federal effects on fish and fish habitat from changes to marine water quality. The Proponent shall compare the results of the monitoring referred to in condition 3.10.3 with the information collected in accordance with conditions 3.10.1 and 3.10.2 and with the Canadian Council of Ministers of the Environment's Canadian Water Quality Guidelines for the Protection of Aquatic Life and the British Columbia's Water Quality Guidelines and Working Sediment Quality Guidelines to determine whether modified or additional mitigation measures are required*."

The results of the survey will be presented in an annual marine water quality data report. Water quality results will be compared to British Columbia and Canadian Council of Ministers of the Environment (CCME) Water Quality Guidelines for the protection of Marine Aquatic Life, BC and CCME Recreational Water Quality Guidelines, and Health Canada Guidelines for Recreational Water Quality.

Raw data from the water profiles and laboratory results for the water quality samples will be provided in appendices to the report. During monitoring in the first five years of operation, the annual marine water quality data report will be used to inform the need for modified or additional mitigation measures. For example, exceedances of marine water quality guidelines for applicable parameters of potential concern outside of the initial dilution zone may necessitate modified or additional mitigation measures. Any such changes to mitigation measures would involve input from applicable permitting agencies and Haisla Nation.