

The
**Inuvialuit
Energy
Security
Project**

January 9, 2024

ENVIRONMENTAL PROTECTION PLAN REV 5.2

Inuvialuit Energy Security Project

Submitted to: Canada Energy Regulator
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Inuvik, Northwest Territories



CONTROLLED DOCUMENT

IESP Environmental Protection Plan

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Abbreviations, Acronyms, and Definitions

Abbreviations/Acronyms	Definition
ASMP	Archaeological Site Management Plan
CER	Canada Energy Regulator
EISC	Environmental Impact Screening Committee
ESCMP	Erosion and Sediment Control Management Plan
EMP	Environmental Management Plan
Energy Centre (EC)	<i>Energy Centre, Energy Facility, Facility, and Infrastructure are terms used interchangeably in the IESP documentation. The terms are used to describe the facilities and equipment that will process the gas and liquids from the M-18 well. The Energy Centre will be placed on a granular infrastructure pad that is termed "Energy Centre pad", "Facility pad", or "infrastructure pad"</i>
ENR	Environment and Natural Resources
EPP	Environmental Protection Plan
FFHPP	Fish and Fish Habitat Protection Plan
GNWT	Government of Northwest Territories
HSEQ	Health, Safety, Environment, and Quality
IESP	Inuvialuit Energy Security Project
IESPL	Inuvialuit Energy Security Project Limited
IGC	Intergovernmental Council
IHTC	Inuvik Hunters and Trappers Committee
ILA	Inuvialuit Land Administration
IMS	Integrated Management System
IPC	Inuvialuit Petroleum Corporation
ISR	Inuvialuit Settlement Region
ITH	Inuvik Tuktoyaktuk Highway
Kiggiak-EBA	Kiggiak-EBA Consulting Ltd.
OA	Operations Authorization
OGDPR	Oil and Gas Drilling and Production Regulations
PPMP	Permafrost Protection and Management Plan
THTC	Tuktoyaktuk Hunters and Trappers Committee
WMAC-NT	Wildlife Management Advisory Council
WMMP	Wildlife Management and Monitoring Plan
WMP	Waste Management Plan

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INTRODUCTION

Inuvialuit Energy Security Project LTD. (IESPL), a subsidiary of the Inuvialuit Petroleum Corporation (IPC) is seeking an Operations Authorization (OA) under the Northwest Territories Oil and Gas Operations Act (OGOA) Section 10 for work or activities related to the Installation and Operations of the IESP Energy Centre required for the Inuvialuit Energy Security Project (IESP).

In accordance with Section 9 of the Oil and Gas Drilling and Production Regulations (OGDPR), IESPL have developed an Environmental Protection Plan (EPP) specifically for the IESP to provide guidance and requirements for compliance and environmental protection.

Contact Information

For the purposes of the Inuvialuit Energy Security Project, IESPL has appointed Travis Balaski, P.Eng. as the Accountable Officer. Travis' contact information is:

Travis Balaski
President
Inuvialuit Energy Security Project LTD.
Calgary, Alberta
Email: tbalaski@inuvialuit.com
Mobile: + 1 403 461 6513

Implementation of the EPP will be the responsibility of Alan MacDonald. Alan's contact information is:

Alan MacDonald
Director, Regulatory Compliance
Inuvialuit Energy Security Project Ltd.
Calgary, Alberta
Email: alan.macdonald@iesp.ca
Mobile: +1 403 862 4905

The organizational reporting structures for the various phases of the IESP are provided in greater detail in the OA applications. There are materials in the Energy Centre OA application regarding the Project, the Regulatory Frameworks, linkages to the IESP Integrated Management System (IMS) that will not be repeated in this EPP.

Overview

IESP are providing a set of Environmental Management Plans (EMPs) as our overall Environmental Protection Plan (EPP). The EPP is applicable to all phases of the IESP. Some aspects of construction and operations are still in engineering phase and not complete. The EPP and subsequent stand alone EMPs will be updated accordingly and as needed, to reflect the final engineering plans and specifications as they become available.

We have chosen to split the EPP into six EMPs for two reasons: (1) Some of the EMPs have distinct review processes and schedules that include specific stakeholders (See Table 1); and (2) splitting the EMPs as stand-alone allows for issue-specific training opportunities.

The six EMPs making up the EPP, are specific to valued ecosystem components. Each plan has been developed by different authors and is reviewed by different groups throughout their development. As such, these plans that must stand alone may have some minor inconsistencies between each. As an example, the IESP “Energy Centre” may also be referred to as the “Energy Facility” or even the “Infrastructure Facility,” within each of the various plans. As noted in the Abbreviations, Acronyms and Definitions Table above, “Energy Centre,” is the term used interchangeably with “Energy Facility,” “Infrastructure Facility,” and the pad upon which the facility is built may be called the “Infrastructure Pad.”

The six EMPs and the parties responsible for each EMP are as follows in Table 1.

Table 1: EMP Responsibility Chart

Environmental Management Plan	Annual Review	Communicate Updates	Parties to Receive Updates
Archaeological Site Management Plan (ASMP)	Director, HSEQ	Director, HSEQ	ILA, CER
Wildlife Management and Monitoring Plan (WMMP)	WMMP Review Committee (see WMMP)	Director, HSEQ	IGC, THTC, IHTC, GNWT-ENR, WMAC-NT, ILA, CER
Permafrost Protection and Management Plan (PPMP)	Director, HSEQ	Director, HSEQ	ILA, CER
Fish and Fish Habitat Protection Plan (FFHPP)	Director, HSEQ	Director, HSEQ	ILA, CER, FJMC

Environmental Management Plan	Annual Review	Communicate Updates	Parties to Receive Updates
Waste Management Plan (WMP)	Director, HSEQ Director, Engineering	Director, HSEQ	ILA, CER
Erosion and Sediment Control Management Plan (ESCMP)	Director, HSEQ	Director, HSEQ	ILA, CER

Additional EMPs or revisions to EMPs may be developed for future phases of the Project, as needed.

Concordance

A concordance with the OGDPR Section 9 – Environmental Protection Plan is provided in Table 2.

Table 2: Concordance with OGDPR Section 9

Note: EC = Energy Centre

OGDPR Section #	OGDPR Requirement	IESPL Reference
9	The environmental protection plan must set out the procedures, practices, resources and monitoring necessary to manage hazards to and protect the environment from the proposed work or activity and must include:	Applies to all EMPs herein
9.(a)	a summary of and references to the management system that demonstrate how it will be applied to the proposed work or activity and how the duties set out in these regulations with regard to environmental protection will be fulfilled;	Refer to EC OA Application 3.0
9.(b)	a summary of the studies undertaken to identify environmental hazards and to evaluate environmental risks relating to the proposed work or activity;	Refer to Development Plan S.13
9.(c)	a description of the hazards that were identified and the results of the risk evaluation;	Refer to each EMP herein
9.(d)	a summary of the measures to avoid, prevent, reduce and manage environmental risks;	Refer to each EMP herein
9.(e)	a list of all structures, facilities, equipment and systems critical to environmental protection and a summary of the system in place for their inspection, testing and maintenance;	Refer to each EMP herein, also EPP Preface 2.0, 3.0 and 4.0
9.(f)(i)	a description of the organizational structure for the proposed work or activity and the command structure on the installation, which clearly explains: their relationship to each other, and	Refer to EC OA Application 1.3, 3.4, 3.5 and 4.3
9.(f)(ii)	the contact information and position of the person accountable for the environmental protection plan and the person responsible for implementing it;	See above in this introduction
9.(g)	the procedures for the selection, evaluation and use of chemical substances including process chemicals and drilling fluid ingredients;	Refer to EPP Preface Section 5.0 and 6.0, EC OA Application 9.14 and WMP
9.(h)	a description of equipment and procedures for the treatment, handling and disposal of waste material;	See EPP Preface Section WMP

OGDPR Section #	OGDPR Requirement	IESPL Reference
9.(i)	a description of all discharge streams and limits for any discharge into the natural environment including any waste material;	EPP Preface Section 7.0 and 8.0
9.(j)	a description of the system for monitoring compliance with the discharge limits identified in paragraph (i), including the sampling and analytical program to determine if those discharges are within the specified limits; and	EPP Preface Section 7.0 and 8.0
9.(k)	a description of the arrangements for monitoring compliance with the plan and for measuring performance in relation to its objectives.	Refer to each EMP herein

1.0 SUMMARY OF STUDIES

A summary of the studies undertaken to identify potential environmental impacts and environmental hazards, and to evaluate environmental risks relevant to the IESP, including the Well Workover, is provided in Table 3.

Note: In Table 3, LSA refers to the Local Study Area of the IESP, roughly 1 km either side of the access road and proposed facility. RSA refers to the Regional Study Area, defined in the IESP Project Description as an area of 10km radius from the TUK M-18 wellsite.

Table 3 Previous Environmental Assessments Relevant to the Project

Previous Environmental Assessments Relevant to the Project (updated to November 2022)						
Previous Project Descriptions that Overlap the Study Area	Year	Overlap	Proponent	Consultant	EISC File Number	Decision
EISC Project Description - 2022 Geotechnical Borehole Investigation	2022	LSA	IESPL	Kiggiak EBA	01/22-04	"Project qualifies for an exemption from environmental impact screening under Exclusion Item # 16 of the EISC Guidelines."
EISC Project Description - Inuvialuit Energy Security Project	2020	Both	Inuvialuit Petroleum Corporation	Various	[09/20-04]	"The development, if authorized subject to environmental terms and conditions recommended by the Screening Committee, will have no such significant negative impact and may proceed without environmental impact assessment and review under the Inuvialuit Final Agreement."

Previous Environmental Assessments Relevant to the Project (updated to November 2022)						
Previous Project Descriptions that Overlap the Study Area	Year	Overlap	Proponent	Consultant	EISC File Number	Decision
IESP Summer Field Studies	2021	LSA	Inuvialuit Petroleum Corporation	Kiggiak EBA	[07/21-04]	The EISC has reviewed your project summary and has determined that your project does meet the definition of development as defined under the Inuvialuit Final Agreement, but your project qualifies for an exemption from environmental impact screening under Exclusion Item # 10 of the EISC Guidelines. Exclusion Item # 10 reads: "Developments or 'other uses' deemed by the EISC to not be of consequence to the Inuvialuit Settlement Region in accordance with IFA s.13(7) and s.12(3)(b) and (c), and which would not have a significant impact on air, water, land or renewable resources, or negatively affect present or future wildlife harvesting."
IESP Archaeological Impact Assessment	2021	LSA	Inuvialuit Petroleum Corporation	Kiggiak EBA	[07/21-03]	As above.
EISC Project Description - South Tuktoyaktuk Feasibility Study - Geotechnical Investigation	2020	LSA	Inuvialuit Regional Corporation	Kiggiak EBA	[01/20-10]	"Project qualifies for an exemption from environmental impact screening under Exclusion Item # 16 of the EISC Guidelines."

Previous Environmental Assessments Relevant to the Project (updated to November 2022)						
Previous Project Descriptions that Overlap the Study Area	Year	Overlap	Proponent	Consultant	EISC File Number	Decision
EISC Project Description - Gunghi Creek Crossing Replacement	2019	RSA	Government of the Northwest Territories Department of Infrastructure	Wood	[10/19-02]	"The development, if authorized subject to environmental terms and conditions recommended by the Screening Committee, will have no such significant negative impact and may proceed without environmental impact assessment and review under the Inuvialuit Final Agreement."
EISC Project Description - Mackenzie Beaufort Energy Pre-Feasibility Studies	2018	LSA	ATCO Midstream NWT Ltd. and IESPL	Kiggiak EBA	[06/18-04]	Project qualifies for an exemption from environmental impact screening under Exclusion Item #16
Project Description Report for Construction of the Inuvik to Tuktoyaktuk Highway, NWT	2010	LSA	Hamlet of Tuktoyaktuk, Town of Inuvik, Government of Northwest Territories	Kiggiak EBA	[02/10-05]	"The development could have significant negative impact on the environment and Inuvialuit wildlife harvesting in the Inuvialuit Settlement Region and is subject to further assessment and review."
EISC Project Description - Tuktoyaktuk to Granular Source 177 Access Road	2008	Both	Government of the Northwest Territories and Hamlet of Tuktoyaktuk	Kiggiak-EBA	not available	not available

Previous Environmental Assessments Relevant to the Project (updated to November 2022)						
Previous Project Descriptions that Overlap the Study Area	Year	Overlap	Proponent	Consultant	EISC File Number	Decision
EISC Project Description - Tuk 2 Winter 2001/2002 Drilling Program	2001	LSA	Anderson Resources Ltd.	Inuvialuit Environmental and Geotechnical Inc.	[08/01-10]	"The development will have no such significant negative environmental impact and may proceed without further environmental impact review and assessment under the Inuvialuit Final Agreement."
EISC Project Description - Tuk South Winter 2001/2002 3D Seismic Program	2001	LSA	Anderson Resources Ltd.	Inuvialuit Environmental and Geotechnical Inc.	[08/01-09]	"The development will have no such significant negative environmental impact and may proceed without further environmental impact review and assessment under the Inuvialuit Final Agreement."
EISC Project Description - Tuk 2 (Winter 2001/2002) Drilling Program Water Licence Application	2001	LSA	Anderson Resources Ltd.	Inuvialuit Environmental Inc.	[07/01-04]	"The development will have no such significant negative environmental impact and may proceed without further environmental impact review and assessment under the Inuvialuit Final Agreement."
EISC Project Description - Tuktoyaktuk Peninsula Winter 2000/2001 Seismic Program	2000	LSA	Anderson Resources Ltd.	Inuvialuit Environmental Inc.	[11/00-02]	"The development will have no such significant negative environmental impact and may proceed without further environmental impact review and assessment under the Inuvialuit Final Agreement."

Previous Environmental Assessments Relevant to the Project (updated to November 2022)						
Previous Project Descriptions that Overlap the Study Area	Year	Overlap	Proponent	Consultant	EISC File Number	Decision
Development Proposal - ESSO Winter Seismic Program 1991/92	1991	LSA	Esso Resources Canada Limited	none	[10/91-03]	"The development will not have significant negative environmental impact on the Inuvialuit Settlement Region and may proceed without further environmental impact review and assessment under the Inuvialuit Final Agreement."
Construction of the Inuvik to Tuktoyaktuk Highway, Northwest Territories	2010	Both	Hamlet of Tuktoyaktuk, Town of Inuvik, Government of Northwest Territories	Kiggiak EBA	EIRB: 2002-10-05	https://eirb.ca/projects/inuvik-tuk-highway/
Mackenzie Gas Project	2002	RSA	Imperial Oil Resources Ventures Limited	Tera-Golder-AMEC-Axys	NEB: GH-1-2004	https://www.cer-rec.gc.ca/pplctnflng/mjrpp/archive/mcknzgs/mcknzgs-eng.html

2.0 CRITICAL STRUCTURES, FACILITIES AND EQUIPMENT (ESW)

A single consolidated listing of all structures, facilities, equipment, and systems critical to environmental protection during ESW, including the systems in place for their inspection, testing, and maintenance is provided in this section.

Potential environmental impacts from the ESW Phase of the IESP include: (1) potential minor spills from equipment leakages or equipment re-fueling; (2) potential disturbance to wildlife and/or wildlife harvesting; and (3) potential for sediment to runoff into the creek bed and impact fisheries.

The primary system in place to protect the environment during ESW is the IESP integrated Management System, including the EPP, the Environmental Management Plans, Quality Management System, Contractor Management Processes, and numerous procedures for monitoring and mitigation. There are no specific structures or facilities critical to environmental protection during ESW. Specific equipment, systems and mitigation measures include the following:

2.1 Spills - Release of Fuel / Spill to the Environment

- a) Identify and evaluate equipment prior to mobilization and during operations,
- b) daily inspections for drips, leaks and hydraulic system conditions,
- c) no fuel storage or transfers on-site,
- d) Procedures and Training,
- e) Spill Response Equipment in each pick-up truck,
- f) Job Hazard Assessments at the beginning of each day and/or new job task.
- g) For additional mitigation measures see IESP Spill Response Plan.

2.2 Wildlife and Wildlife Harvesting

Disturbance/Mortality to Wildlife or Attraction of Wildlife

- a) Extensive community and regulator consultation,
- b) Wildlife Management and Monitoring Plan (WMMP),
- c) WMMP Review Committee,
- d) staff and contractor awareness and training,
- e) design aspects including fencing where appropriate, noise and light controls,
- f) following a previously disturbed alignment,
- g) long views,
- h) avoidance of water bodies,
- i) minimization of project footprint,
- j) use of off-site laydown areas as much as possible,

- k) management of wildlife attractants, including good housekeeping, waste management and light,
- l) deterrents around equipment or structures that could harm animals,
- m) timing restrictions (work in winter),
- n) setback distances as per GNWT guidelines,
- o) dust suppression in the summer following GNWT Guidelines,
- p) annual fall bear den screening and surveys, full-time wildlife monitoring, noise monitoring,
- q) ambient air (particulate matter) monitoring,
- r) mandatory wildlife sighting reports,
- s) adaptive management,
- t) monitored and enforced speed limits,
- u) restricted access on the private road,
- v) firearms restricted to authorized personnel only.

For additional mitigation measures see Section 4 of the WMMP.

2.3 Sediment Runoff

Melting of permafrost, ground settling and/or eroding, unnecessary removal or disturbance of vegetation.

- a) Erosion and Sediment Control Plan (ESCMP),
- b) Permafrost Protection and Management Plan (PPMP),
- c) training and awareness,
- d) ground temperature monitoring,
- e) visual monitoring,
- f) no ground disturbance outside of road and pad alignments,
- g) winter construction,
- h) use of geotextile or geogrid where needed to reinforce,
- i) no removal of the tundra,
- j) off-road travel, if necessary, restricted to snow mobiles or low-ground-pressure ATV in summer,
- k) drainage control and maintenance,
- l) management of runoff and use of erosion control methods,
- m) snow removal and management,
- n) design to CSA Guidelines,
- o) LiDAR and ground surveys,
- p) revegetation with native species.

For additional mitigation measures see Section 4.2, and 6.0 of the PPMP and Section 4.5 and 6.0 of the ESCMP.

2.4 Inspection, Testing and Maintenance of Equipment and Systems

Inspection, testing and maintenance of equipment and systems is part of the IESP Quality Management Plans and Procedures. Specific measures include monitoring of the location and movement of support craft, emergency drills and exercises, reporting of incidents and near-misses, and the management and prevention of waste. The IESP Quality Management System and associated procedures describe required processes to ensure records relating to operations are kept, including:

- a) Equipment Inspection records, which include:
 - i. Installation inspections,
 - ii. External inspections,
 - iii. Thorough (internal or equivalent) inspections,
 - iv. Condition monitoring activities needed to assure the continued safe operation of equipment, and
 - v. Resulting maintenance records.
- b) Calibration records for all operational equipment,
- c) Calibration records of testing equipment utilized to verify equipment integrity and operability (such as inspection equipment),
- d) Daily maintenance and operating activities, including any activity critical to the safety of persons at IESPL Facilities, the protection of the environment, and the prevention of waste,
- e) The status of equipment and systems critical to safety and protection of the environment, including any unsuccessful test result or equipment failure leading to an impairment of the system.

3.0 CRITICAL STRUCTURES, FACILITIES AND EQUIPMENT (WW)

A single consolidated listing of all structures, facilities, equipment, and systems critical to environmental protection during Well Workover (WW), including the systems in place for their inspection, testing, and maintenance is provided in this section.

The primary system in place to protect the environment during Well Workover is the IESP integrated Management System, including the EPP, the Environmental Management Plans, Quality Management System, Contractor Management Processes, and numerous procedures for monitoring and mitigation.

Specific equipment critical to environmental protection during Well Workover include the following:

- The blowout prevention system (BOP) of the service rig
- The service rig hoisting equipment
- The wireline units (specifically the BOP associated with this equipment)
- The well testing equipment (separator)
- Fluid storage ("200 barrel" tanks)

- Spill Response Trailer and Equipment

All of these items will be provided by third party contractors during the Well Workover. All will be visually inspected prior to and during rig up and daily thereafter (during daily “walkaround inspection”). The “walkaround inspection” will be documented in the daily report.

Additional information about the critical equipment is provided below.

3.1 Service Rig BOP

The BOP (and associated components) will be designed, maintained, and tested in accordance with the Oil and Gas Drilling and Production Regulations (OGDPR) section 37, CAOEC (formally CAODC) Recommended Practice 7.0, and the Alberta Energy Regulator’s Directive 037 – Service Rig Inspection manual.

Specifically,

- The BOP will be pressure tested prior to and after installation.
- The accumulator system will be tested after installation of the BOP and prior to drilling out of the existing wellbore plug(s).
- The BOP will be function tested daily and the results recorded in the tour book.
- Procedures for the above will be included in the Workover Program to be supplied to the on-site supervisor.

3.2 Service Rig Hoisting System

The service rig hoisting system does not in itself relate to environmental protection, but in that its failure could contribute to failure of other critical components. It is included here for that reason.

- As above, the service rig and its components will be visually inspected as part of the CAOEC Service Rig Inspection.
- The service rig components will be maintained in accordance with the CAOEC Recommended Practices 3.0, 3.-A, and 4.0.
- A CAOEC Rig Inspection will be performed after rigging up the service rig and prior to the commencement of rig operations.

3.3 Wireline Units

The BOPs associated with the wireline units are potentially “critical to environmental protection” in that they may form part of the well barrier system during certain operations.

- The BOPs associated with wireline operations will be tested and operated in accordance with OGDPR 37 and Energy Safety Canada IRP 13.
- Wireline BOPs and lubricator connections will be pressure tested prior to any situation where they will be exposed to wellbore pressure.

3.4 Well Testing Equipment

Failure of a component in the well testing equipment (separator(s), flare stack, etc.) could result in uncontrolled release of hydrocarbons and is thus critical to environmental protection.

- This equipment will be designed and operated in accordance with NWT OGDPR 34 (1).
- Pressure vessels and associated equipment (e.g. pressure safety valves - PSV) will be certified in accordance with the Alberta Boilers Safety Association (ABSA), the requirements of the NWT Boilers and Pressure Vessels Act and regulations, and the requirements of the Canadian Standards Association (where incorporated therein).

3.5 Fluid storage

Brine prepared for displacement into the well, diesel fuel circulated out of the well and produced fluids during testing will be stored in “200 barrel” tanks.

- Tanks and associated piping will be visually inspected before and after installation and during daily use.
- Storage tanks will be double walled design or placed in an impermeable berm containment enclosure. The enclosure (if used) will be sized to contain the volume of the largest tank plus 10% of the aggregate volume of the other tanks in the berm.

3.6 Spill Response Trailer and Equipment

A spill response trailer or sea container will be available on-site during the well workover. The equipment will be customized for a worst-case scenario (loss of well control) and will include equipment recommended by:

- Crown-Indian and Northern Affairs Canada (CIRNAC) Guidelines for Spill Contingency Planning
- Department of Infrastructure of the Government of the Northwest Territories (GNWT-INF) for the proposed Geotechnical Investigations for the Great Bear River Bridge (the Project)
- Western Canada Spill Services (WCSS)
- Can-Ross Environmental Services Ltd Spill Response Trailer Contents

- Prior Arctic Drilling Operations Spill Contingency Plan

The finalized equipment list will be available 90 days prior to project commencement. A “typical equipment list” was provided in the IESP Emergency Response Plan.

3.7 Inspection, Testing and Maintenance of Equipment and Systems

Inspection, testing and maintenance of equipment and systems is part of the IESP Quality Management Plans and Procedures. Specific measures include:

Monitoring of the location and movement of support craft, emergency drills and exercises, reporting of incidents and near-misses, and the management and prevention of waste. The IESP Quality Management System and associated procedures describe required processes to ensure records relating to operations are kept, including:

- Equipment inspection records, which include,
 - Installation inspections,
 - External inspections,
 - Thorough (internal or equivalent) inspections,
 - Condition monitoring activities needed to assure the continued safe operation of equipment, and
 - Resulting maintenance records.
- Calibration records for all operational equipment,
- Calibration records of testing equipment utilized to verify equipment integrity and operability (such as inspection equipment),
- Daily maintenance and operating activities, including any activity critical to the safety of persons at IESPL Facilities, the protection of the environment, and the prevention of waste,
- The status of equipment and systems critical to safety and protection of the environment, including any unsuccessful test result or equipment failure leading to an impairment of the system.

4.0 CRITICAL STRUCTURES, FACILITIES AND EQUIPMENT (EC)

The engineering of the Energy Center (EC) is still ongoing. However, our anticipated list of structures, facilities, and equipment critical to environmental protection and relevant to the Centre is the following:

- Diesel Product Loading system
- Diesel Product Storage

- Naptha Intermediate Product Storage
- Heavy Hydrocarbon Intermediate Product Storage
- Ethylene Glycol Storage
- Water Storage Tanks

For the diesel product loading system, pre-cast concrete pads will be installed over the area where the transport trailers will be loaded. This will keep any drips that happen with the hoses to an area where they can be cleaned up easily. The hose connections for transfer to the trailer will have drip trays where practical.

For all the other items mentioned above that are storage tanks, they will double-walled and have interstitial monitoring between the tank walls. Tanks will be inspected weekly or have electronic switches or transmitters as practical to ensure the tanks are functioning properly.

5.0 CHEMICAL SELECTION AND MANAGEMENT (WW)

There are no chemicals planned for the ESW Phase of the IESP. Chemical Selection and Management for the Energy Centre is provided in Section 6.0 below. With respect to the Well Workover (WW), the IESP WW is a workover of an existing wellbore using previously created perforations, and very few “chemical substances” will be used. Below are the planned products and the rationale for their selection.

5.1 Sodium Chloride

- A fluid of sufficient density to hydrostatically balance the reservoir pressure is required for the workover operations. The fluid must be solids free to ensure that well productivity is not impaired due to fluid lost to the formation.
- Aqueous sodium chloride (NaCl) brine will be used as a completion fluid, both to hydrostatically overbalance to formation pressure during the initial stages of the workover (prior to setting the permanent packer) and as a “packer fluid” in the annular space between the 178mm casing and the production tubing.
- The following is the rationale for selecting NaCl brine:
 - The wellbore currently contains 1175 kg/m³ brine (in addition to diesel fuel). The selection of NaCl brine as a workover/completion fluid means that limited additional quantities of NaCl will be required and very little brine (excess circulating volume only) will need to be trucked to disposal at the end of the project. This will minimize the risk of a spill during transportation and minimize environmental impact from transportation (emissions and wear on roads).

- NaCl will easily achieve the required density to overbalance the reservoir pressure (approximately 1130 kg/m³) with minimal additional material.
- The planned brine can be kept above its freezing point (-12°C) with limited heating – minimizing operational complexity and emissions from heating the solution.
- The toxicity of NaCl (both dry and in solution) is less hazardous to personnel than alternative brines.

5.2 Methanol

- As the well will be flowed from a “cold” condition with initial surface temperatures in the order of zero (0) degrees centigrade and flowing pressures will be reduced at surface resulting in further cooling due to the Joule-Thompson effect, there is a risk that wellbore fluids may create hydrates, causing flow reduction, hydrate plugs and possible equipment damage. A hydrate inhibitor is required to minimize this risk.

5.3 Nitrogen

- For safety reasons, it is necessary to pressure test the lubricator assembly used to run certain wireline tools into the well under pressure.
- Compressed nitrogen is usually used for this as it is non-toxic and relatively inert (non-corrosive) and readily available.
- Upon completion of the test and/or operation, the nitrogen can be vented to the atmosphere without any environmental concern.

5.4 Oxygen scavenger / Corrosion inhibitor

- The production casing and tubing need to be protected from corrosion due to the NaCl brine used as an annular fluid.
- A combination oxygen scavenger and filming corrosion inhibitor such as Di-corp Corinox™ will be used. This product was chosen due to a long and successful history of corrosion protection in downhole applications.
- This type of product is easily water dispersible and can be added to the fluid just before sealing the annulus. It will remain sealed and is not produced during well operations.
- Although the product is moderately toxic (ethylene glycol and sodium sulphite), the small volume (60 liters) and short duration of usage at surface (less than an hour) mean that the hazard can be easily managed with PPE and proper procedures.

5.5 Diesel Fuel

- Diesel fuel is not used as part of the planned operations, but the volume of diesel fuel previously left in the wellbore during suspension will be circulated out and disposed of to a licensed facility. The volume is estimated to be 42 m³.
- Standard PPE and spill prevention procedures will be in place to minimize any impact on personnel or the environment.

6.0 CHEMICAL SELECTION AND MANAGEMENT (EC)

The engineering of the Energy Center (EC) is still ongoing. However, our anticipated list of chemicals required for Energy Centre operations, by process, is provided in Section 6.1 below. A description of equipment and procedures for the management of waste material is provided in Section 6.2 and, in greater detail, in the Waste Management Plan attached as Attachment 5 to this EPP.

6.1 Chemical Selection by Process

6.1.1 Hydrate Control/Dehydration

IESPL anticipates, especially during the first year of operations, that there will be times when the temperature of the gas will be below the hydrate temperature and hydrates (solid hydrocarbon and water complex) could result.

IESP reviewed the common technologies available for hydrate control for well operations, as well as technologies for gas dehydration when chilling the gas for further processing in the Energy Centre.

The technology of heating the gas to keep it above hydrate temperature in the well bore was rejected due to the IESP requirement of minimizing heat transfer to the Permafrost surrounding the well bore. More details on permafrost depths are in the IESP Development Plan.

IESP needs to inhibit the formation of hydrates in the well bore and in those Energy Centre chilling facilities using chemical inhibition. Two proven technologies were reviewed:

- 1) Methanol injection.
- 2) Ethylene Glycol Injection.

Ethylene Glycol was selected over methanol for hydrate inhibition because it is easier to recover glycol for re-use. Methanol would largely be a consumed product with potential non-desirable combustion products or would have to be trucked off site for disposal in the south. There are no facilities within over 2000 km for disposal of products containing Methanol. IESPL has a corporate objective to minimize the waste products requiring off-site disposal and using Methanol would be counter to this goal. Ethylene Glycol can be recycled on site. Ethylene Glycol can also be used in the Cooling Water system that the Energy Centre requires for its operations, which would minimize the number of products that have to be trucked and stored at the Energy Centre.

6.1.2 Other Well Chemicals

The M-18 well production operations will require wax dispersant due to the composition of the gas.

Scale inhibitor is also under consideration for the well. Current chemistry is not known because IESPL is currently working with chemical suppliers for the best scale inhibitor solution that works with Ethylene Glycol. As the CER is aware from earlier submissions for the Well Workover, IESPL is using high chromium steel in the M-18 tubing so corrosion inhibitor is not expected to be required.

6.1.3 Surface Facilities Refrigeration

IESPL has elected to use Propane refrigeration for its chilling requirements.

6.1.4 Surface Facilities Cooling Water

IESPL will employ a cooling water system to reject heat where required, the majority of which comes from the Gas-to-Liquids (GTL) process. Ethylene Glycol will be employed to provide freeze protection for the system. Propylene glycol was also considered due to its less hazardous nature, however, IESPL chose Ethylene glycol because of its superior heat transfer and freeze protection properties (critical in a remote arctic environment) as well as the potential for recycling on-site.

6.1.5 Solid Chemicals and catalysts

The GTL process employs solid chemicals for removal of compounds and catalysts for converting other products. The four types of solid chemicals are:

- 1) Activated Carbon
- 2) ZincOxide for Sulfur removal (not expected to see sulfur but protection will be installed.)
- 3) Adsorbents for H₂ and NH₃ removal (H₂ is recycled and used as fuel.)

- 4) Catalysts – catalysts are proprietary and contain metals including alumina, chromium, and other specialty metals.

6.2 Treatment and Handling of Energy Centre Waste Materials

The M-18 well is not expected to generate produced water due to the reservoir water level being significantly below the lower Kamik sands production perforations. The well is expected to have water of condensation since the gas is expected to have water levels up to saturation in the reservoir. (See 6.1.1 and the Well Workover AO application)

IESPL has an internal goal of minimizing the waste materials that leave the Energy Centre for off-site disposal. With this in mind, and using the GTL process, IESPL can send all water-containing hydrocarbons to the GTL unit. The GTL process can remove hydrocarbons from the water produced by the gas processing portion of the facility (either free or from Ethylene Glycol regeneration). The GTL process does produce excess water but with the hydrocarbon removal process mentioned above, contaminants are removed from the water. Water disposal will be either by Thermal Oxidizer or Vaporization, that decision is part of the current engineering effort.

IESPL has permission from the Hamlet of Tuktoyaktuk for the disposal of our domestic waste and sewage. Sewage will be disposed of at the Tuktoyaktuk sewage lagoon and domestic (non-industrial) waste to the Tuktoyaktuk landfill, as appropriate.

Industrial waste will be minimal. Since the gas contains no sulfur most of the waste materials will be non-hazardous. Any industrial waste that is not able to be disposed of locally, will be hauled to an appropriate licensed waste disposal facility in southern Canada.

The items below are the expected industrial waste:

- 1) Spent lube oil.
- 2) Contaminated filters, rags, and adsorbents
- 3) Solid spent catalyst

Contaminated filters, rags and adsorbents will be drained and disposed of off-site at an appropriate licensed landfill. There is the possibility in the near future that the Inuvik landfill could be licensed to take these contaminated materials. In the meantime, these wastes will be shipped south to a licensed waste disposal facility.

Any solid spent catalyst will be shipped to the catalyst suppliers for recycling since the metals in them are more valuable than simply sending them to landfill.

Gas turbine combustion products after waste heat is recovered for process use are and air and CO₂. The other source of CO₂ emissions is from the GTL furnace stack.

7.0 DISCHARGES TO THE ENVIRONMENT (WW)

As stated in the Operations Applications, IESPL does not expect any liquid or solid waste discharge to the environment. Air emissions from flaring are planned as part of the WW activity and are necessary for safety purposes in bringing the suspended well into production. The flaring will be a one-time emission at partial design flow rates with an expected duration of 24 to 72 hours.

The discharge limits for air emissions, in the form of Ambient Air Quality Standards (AAQS), are provided in the *Guidelines for Ambient Air Quality Standards in the Northwest Territories*. The GNWT Substances of Interest (SOIs) applicable to the IESP Well Workover include PM_{2.5}, TSP, VOC, and CO.

Compliance monitoring will include hand-held ambient monitoring at various distances downwind from the flare stack (500m, 1km and at the ITH intersection). We will also have a meteorology station for wind speed and direction.

The well has no sulphur and with a short flaring event for cleaning up the well, about 3 days, IESPL does not expect to exceed any AAQS limit.

8.0 DISCHARGES TO THE ENVIRONMENT (EC)

Anticipated Waste Discharge streams from the IESPL Energy Centre are:

- Gas Turbine vents from power generation and waste heat recovery
- GTL Stack emissions from combustion furnace
- Excess water from GTL (includes water from Gas Processing)
- Flare stack emission from unplanned events or shutdowns (should they take place)
- Human Waste
- Solid Industrial Waste

A description of each of these six waste streams is provided below.

8.1 Gas Turbine and GTL Stack Emissions

Gas Turbine and GTL stack emissions are estimated from Vendor Data (Gas Turbines) and/or from process simulations. Preliminary work at FEED stage engineering suggests that the project will be compliant with GNWT limits. An air emissions study will be completed upon finalization of detailed engineering to validate compliance and IESPL will complete air emissions testing on a regular basis to ensure compliance.

8.2 Excess Water from GTL

The excess water being vaporized via the GTL Process will have water samples collected and tested on-site for hydrocarbon contamination. Sample will be sent to an off-site accredited laboratory on a quarterly basis to verify on-site results. No water will be discharged directly to the environment.

8.3 Flare Stack Emissions

IESPL do not anticipate emissions from the flare stack other than in emergency shutdown scenarios. Appropriate post-event sampling will take place should such an event occur. In the case of long-duration flaring, IESPL will initiate ambient air monitoring and sampling.

8.4 Domestic Waste

As described in previous IR responses, IESPL have permission from the Hamlet of Tuktoyaktuk for the disposal of our domestic waste and sewage. Sewage will be disposed of at the Tuktoyaktuk sewage lagoon and domestic (non-industrial/Kitchen) waste to the Tuktoyaktuk landfill, as appropriate.

8.5 Solid Industrial Waste

IESPL have been told that the Inuvik Landfill will be licensed and available for the acceptance of solid (non-hazardous) industrial waste. As discussed in the applications, IESPL will be fabricating the Energy Centre in the south and does not expect significant quantities of industrial construction waste. IESPL will also employ the principles of Reduce, Re-use and Recycle to minimize waste to landfill. If the Inuvik landfill is not available during operations, waste that cannot be re-used or recycled locally will be transported to the next nearest available and licensed facility.

9.0 IMPLEMENTATION AND IMPROVEMENT

All contractors completing work on the Project will be contractually obligated to meet or exceed the requirements of the IESPL EPP. Specific work tasks may require the development of specific management or environmental work plans but will refer to the IESP EPP as foundational to specific work plans.

IESPL are committed to adaptive management and continual improvement. The EPP is a “living” document and will be regularly reviewed, updated, and used for communications and training materials for the IESP.

Attachment 1: Archaeological Site Management Plan



Archaeological Site Management Plan

IESP-HSEQ-EN-PLN-0010

Rev.	Date	Purpose	Created By	Checked By	Approved By
1	2022-03-28	Issue for Implementation	CA	TB	AM
2.0	2023-09-05	Issued for Use	CA	AM	AM

[illegible]

Abbreviations, Acronyms, and Definitions

Abbreviations/Acronyms	Definition
AIA	Archaeological Impact Assessment
AOA	Archaeological Overview Assessment
AOP	Area of Archaeological Potential
Energy Centre	<i>Energy Centre, Energy Facility, Infrastructure Facility, and Infrastructure are terms used interchangeably in the IESP documentation. The terms are used to describe the facilities and equipment that will process the gas and liquids from the M-18 well. The Energy Centre will be placed on a granular infrastructure pad that is termed "Energy Centre pad" or "infrastructure pad".</i>
GNWT	Government of the Northwest Territories
LSA	Local Study Area
NWT	Northwest Territories
PWNHC	Prince of Wales Northern Heritage Centre
RSA	Regional Study Area

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1.0 Purpose

The purpose of this plan is to provide guidance to all Inuvialuit Energy Security Project (IESP) employees and contractors in the event cultural material is encountered while conducting ground disturbing operations. This protocol, consisting of three parts, (1) outlines legislation that protect these sensitive areas from disturbance, (2) facilitates understanding of what cultural material may be encountered, and (3) provides procedural steps to follow in the event that a suspected heritage resource is encountered.

An Archaeological Chance Find Report Form is provided in Appendix A at the end of this document.

2.0 Introduction

The IESP intends to provide local communities with access to secure, affordable energy through the development and operation of a gas processing facility near the suspended TUK M-18 gas well (M-18). The facility will convert natural gas and condensate into Compressed Natural Gas (CNG), propane, diesel, and synthetic diesel. These products will be transported via the Inuvik to Tuktoyaktuk Highway (ITH) to provide customer with power, heat, and/or fuel. (IPC 2020).

The archaeological resource potential of the Local Study Area (LSA) and portions of the Regional Study Area (RSA) were previously studied as part of the following projects:

1. Anderson Exploration Ltd. Proposed 3D Seismic Program. (Inuvialuit Environmental Inc. 2000);
2. GNWT. Inuvik Tuktoyaktuk Highway Project. Approximately 1 km of terrain on the south side of the ITH was subject to previous Archaeological Impact Assessments. (Kiggiak EBA 2011, Prager 2010, Murphy 2011);
3. Soriak Consulting 2018 Archaeological Overview Assessment (AOA) - a desktop study of previous assessments, areas not previously assessed, and terrain specific to the LSA (Kiggiak EBA, 2019)
4. Soriak Consulting. 2021 Archaeological Impact Assessment (AIA). A field assessment of an area of elevated archaeological potential identified during the 2018 AOA that was in conflict with the proposed IESP access road alignment.

These studies included a review of previously recorded archaeological sites data within the region and assessed landscape characteristics to identify areas in which cultural material may be deposited in the Project. Such areas are referred to as areas of archaeological potential (AOP). In 2018, initial project planning included the completion of an AOA in which multiple AOPs within the LSA were identified. However, all but one is avoided by the selected road alignment. In-field assessment of this AOP was completed in 2021 during the AIA to fulfill the requirements of the Archaeological Sites Regulations. No surface or subsurface cultural material warranting protection was identified during the field assessment. As subsurface testing completed during an AIA does not include 100% coverage of a Project footprint, it is possible that cultural material may remain undiscovered in the AOP. Further, a designation of low

archaeological potential does not preclude cultural materials from being located within the remainder of the Project, rather it is predicted that these areas were not favoured for use by past populations. Due to the unpredictability of human nature, it is possible that cultural material could be recovered from areas designated to exhibit low archaeological potential.

2.1 Project Contacts

Table 1: Key project personnel

Key Project Personnel		
Role	Name	Contact Information
President, IESPL	Travis Balaski	(403) 461-6513
Director, Environment, Regulatory and IMS	Alan MacDonald	(403) 862-4905
Site Manager	Varies by Project Phase	Varies
Inuvialuit Land Administration	Dean Holman	(867) 977-7100
NWT Territorial Archaeologist	Glen MacKay	(867) 767-9347 Ext. 71251

3.0 Legislation

In the Northwest Territories (NWT), heritage resources are protected by the Archaeological Sites Regulations, pursuant to the Archaeological Sites Act, and apply to lands in the territory not under the control of the federal government. In these regulations an “archaeological artifact” refers to tangible evidence of human existence that is 50 years of age or older in which an unbroken chain of possession cannot be demonstrated. An ‘archaeological site’ refers to an area in which an artifact is identified. Some lands held by the Government of Canada were not included in the NWT Archaeological Sites Regulations and are subject to federal statutes such as the Canadian Environmental Assessment Act and the Cultural Property Export and Import Act.

Inuvialuit Land Administration Rules and Procedures apply to Inuvialuit private lands. The Inuvialuit Settlement Region (ISR) is the area of land and water subject to the land claims agreement known as the Inuvialuit Final Agreement (IFA), settled between the Inuvialuit and the Government of Canada. The legislation implementing the IFA is the Western Arctic (Inuvialuit) Claims Settlement Act, 1984. Section 19(9) stipulates that the course of an operation, a suspected archaeological site or burial ground is unearthed or otherwise discovered, the Holder shall immediately: (a) suspend the operation on the site;

and (b) notify the Administrator or an Inspector of the location of the site and the nature of any unearthed materials, structures, or artifacts.

Development activities near archaeological sites are regulated by the NWT Oil and Gas Operations Act (OGOA) and Regulations as administered by the Canada Energy Regulator (CER).

The Conservation Manual for Northern Archaeologists outlines procedures to be followed in the event Archaeological materials are recovered.

4.0 Artifact Identification


While no previously recorded archaeological sites will be impacted by the project, there are five previously recorded archaeological Inuvialuit sites within 5 km of the project. These include evidence of extended habitation (e.g., prehistoric campsites) and resource utilization (e.g., fishing). The sites are associated with significant water bodies to the east and west of the Project. Tiktaq Lake, located to the east of the study area, is an important water body used for a considerable period. High landforms in the area that provide excellent vistas were likely used as part of a travel route towards the Mackenzie Delta to the northwest (Prager 2010).

Cultural material is generally found in both surface and subsurface contexts in areas favorable to the needs of the region's earliest inhabitants (e.g., the high ground near rivers or lakes, sheltered terrain, high and dry ground).

The discovery of a site that might be immediately visible to a non-archaeologist includes the examples in the table below.

Table 2: Examples of archaeological sites

Type:	Description
Stone Tools	<p>These were made for hunting or fishing. They can be formed from a variety of materials and can come in many different colours. Examples include projectile points, hide scrapers, fishhooks, as well as the material cast off when they are manufactured (lithic debitage). Concentrations of these materials often are associated with features such as workshops or quarries.</p>   
Surface Features Indicative of Habitation	<p>This category of cultural material reflects early daily life. Often these features include concentrated stone materials associated with communication and navigation (e.g., inuksuit), housing (e.g., tipi rings, rock shelters, house pits), food storage (e.g., cache pits, depressions), cooking (e.g., hearths, concentrations of fire broken rock, ash), and refuse (e.g., middens, refuse pits).</p>   
Historic Period Materials	<p>Historic objects identified during construction should be inspected/documented; however, depending on their antiquity, they may or may not be protected. Examples of these types of sites include log cabins, toboggans, snowshoes, and stoves.</p> 

Type:	Description
Burials	<p>Unmarked burials may meet the definition of an archaeological site in the NWT.</p> <p>Unusual rock piles or soil depressions may be indicative that a burial is present. These locations may be fenced. Burials traditionally occurred in elevated areas overlooking water.</p> 

Erosion or recent land-altering activities may result in the uncovering of subsurface anomalies that could contain a variety of materials such as stone, bone, antler, wood, or shell.

Other cultural material types and features not outlined above may be encountered in areas with environmental conditions that support preservation. Wet, frozen, or high-altitude environments can foster excellent preservation of more delicate materials that normally do not survive (e.g., clothing, fishing nets, baskets, fish traps).

Irregularities in soil condition and deposition (e.g., colours, textures, layers, rock clusters at depth) may also be the result of past human occupation.

5.0 Discovery Protocol

Table 3: Response measures for cultural resource encounters

Response Measures for Cultural Resource Encounters		
If you discover an artifact or site in the course of your work that you suspect may be a possible archaeological artifact or site (more than 50 years old):		
Actions		Explanation
1	Stop Work	Work in the area must halt to avoid damaging the site. All employees should safely retreat from the area. Do not disturb any archaeological remains that you may encounter.
2	Report	Report your discovery to your supervisor. The supervisor will report to the Site Manager and the ILA Environmental Monitor.

Response Measures for Cultural Resource Encounters		
3	Protect Area and Create Buffer Zone	Isolate and protect the area. Establish a protective buffer of at least 30m around the extent of the find area and demarcate the buffer in a highly visible and clear manner (e.g., with “No Work Zone” flagging). No work is to occur within this buffer zone.
4	Document Location	Record the GPS location, take photographs and leave all discoveries in place. Prepare an Archaeological Chance Find Report Form (attached).
5	Await further instruction	The Site Manager will contact the Director, ER&IMS, the Inuvialuit Land Administration (867-977-7100). The Director will contact the NWT Territorial Archaeologist and the President IESPL. All personnel will await further instruction. The ILA may need to attend the site to document and recover the item.
If you discover what you suspect may be possible human remains in the course of your work:		
Actions		Explanation
1	Stop Work	Stop all work in the area to avoid damaging the site. Do not disturb any possible human remains that you may encounter.
2	Report	Report your discovery to your supervisor or, if they are unavailable, the Site Manager who will provide further instructions.
3	RCMP Involvement	Site Manager will contact the local RCMP (867-977-2558) and the President IESPL. The following steps will generally be followed:
3.1		The RCMP are notified and the RCMP and/or Coroner's Office determines whether the matter is of contemporary forensic concern.
3.2		If the remains are not of forensic concern, the Inuvialuit Land Administration will attempt to facilitate the disposition of the remains.
3.3		Generally, if remains are still buried and are under no immediate threat of further disturbance, they will not be excavated or removed. If the remains have been partially or completely removed, the Inuvialuit Land Administration will facilitate disposition.

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Attachment 1 – Archaeological Chance Find Report Form

CONTROLLED DOCUMENT**Archaeological Chance Find Report Form**

Document Number	IESP-HSEQ-EN-FRM-0033
Document Revision	1.0
Document Status	Issued for Use
Document Type	Form / Template
Division	Health & Safety, Security, Environment & Quality
Discipline	Environment Management
Document Owner	Alan MacDonald
Revision Date	2023-06-28
Security Classification	CONTROLLED DOCUMENT

Revision Control Page

Revision Status				Approval	
Rev.	Rev. Date	Document Status	Originator	Reviewer(s)	Approver
1.0	2023-06-28	Issued for Use	CA	TB / AM	AM
	Click or tap to enter a date.	Choose an item.			
	Click or tap to enter a date.	Choose an item.			
	Click or tap to enter a date.	Choose an item.			
	Click or tap to enter a date.	Choose an item.			

Summary of Changes					
Rev.	Date	Section	Summary of Changes	Prepared By	Change(s) App'd By
	Click or tap to enter a date.				
	Click or tap to enter a date.				
	Click or tap to enter a date.				

Archaeological Chance Find Report Form

1. Reporting Party Details			
Name, job title and affiliation:			
Contact Information: (Cell, email)			
Location of Reporting Party: (office, camp, hotel)			
Other on-site Parties Contact information:	Name	Affiliation	Contact Info (cell)
2. Archaeological Chance Find Details			
Date:	Time:	Location of Discovery: (UTM coordinates, depth below surface)	
Description of Find:			
Description of Location: (terrain, snow cover, proximity to water, vegetation, etc.)			

Methods Used to Mark and Protect Find:			
Is the Location and 30 m Avoidance Buffer Flagged?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	Details:
3. Documentation & Photograph Summary			
Picture #:	Direction:	Description:	
Picture #:	Direction:	Description:	
Picture #:	Direction:	Description:	
Picture #:	Direction:	Description:	
Picture #:	Direction:	Description:	
4. Communication Record			
Forward all information, pictures, maps, and communication to the Director ER&IMS:	<input type="checkbox"/> Yes	<input type="checkbox"/> No	Date:
Contact Inuvialuit Land Administration:	<input type="checkbox"/> Yes	<input type="checkbox"/> No	Date:

Attachment 2: Wildlife Management and Monitoring Plan



Wildlife Management and Monitoring Plan

IESP-HSEQ-EN-PLN-0011

Rev.	Date	Purpose	Created By	Checked By	Approved By
3.0	2022-03-28	Issue for Implementation	AM	MM	AM
3.1	2023-01-26	Issue for Regulatory Review	AM	AM	AM
3.2	2023-04-05	Issue for Regulatory Review	AM	TM	AM
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4.0	2023-09-05	Issued for Use	AM	AM	AM
4.1	2023-10-30	Issued for Use	AM	AM	AM
4.2	2024-01-09	Issued for Use	TWK	AM	AM

Revision History					
Rev.	Date	Section	Summary of Changes	Prepared by	Change Approved by
1.0	28SEP2020	ALL	Submitted to the EISC as Appendix 2 of the IESP Project Description	Alan MacDonald	n/a
2.0	14DEC2021	ALL	Rev 2.0 includes recommendations and comments from EISC, IGC, GNWT-ENR, WMAC (NWT), THTC and IHTC	AM	AM
3.0	28JUN2022	ALL	Rev. 3.0 includes recommendations and comments from IGC, GNWT-ENR, WMAC (NWT), IHTC and THTC Also includes updates on project, name change from IPC to IESPL, and a revision concordance	Michael Muller	AM
3.1	2023-01-26	Header	Updated Document Code; added References as per CER IR No.2	AM	TWK
3.2	2023-04-05	1.5.1 and 10.0	Updated 1998 GNWT Guideline for Dust Suppression to 2013 version and updated References as per CER IR No.3	Theresa McCaffrey	AM
3.3	2023-09-05	ABB / Definition Table; Table 2; Appendix B – Wildlife Mitigations; Appendix F – EMP Concordance Table	Update Energy Centre Definition as per CER IR No.6 under Abbreviations / Definitions Table, and Table 2 “Project phase descriptions, under “re-Commissioning, Site (Civil Works) to revert Energy Facility to Energy Centre; Wildlife Mitigations Table reference to 2013 Dust Suppression; General clean up of Appendices (renaming from 1,2,3 to A,B,C) and using Attachments and corporate document cover pages where applicable	TWK	AM
4.0	2023-09-05	Headers	Preparation for IFU	TWK	AM
4.1	2023-10-30	Sec. 2	CER IF 7	TWK	AM
4.2	2024-01-09	Pg. 16 / Table 3	CER IR 8 – Level1 Sched Update	TWK	AM

Abbreviations, Acronyms, and Definitions

Abbreviations/Acronyms	Definition
CCP	Community Conservation Plan
CER	Canada Energy Regulator
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CWS	Canada Wildlife Service
DFO	Department of Fisheries and Oceans Canada
ECCC	Environment and Climate Change Canada
EISC	Environmental Impact Screening Committee
Energy Centre	<i>Energy Centre, Energy Facility, Infrastructure Facility, and Infrastructure are terms used interchangeably in the IESP documentation. The terms are used to describe the facilities and equipment that will process the gas and liquids from the M-18 well. The Energy Centre will be placed on a granular infrastructure pad that is termed "Energy Centre pad" or "infrastructure pad".</i>
ENR	NWT Department of Environment and Natural Resources
FJMC	Fisheries Joint Management Committee
GNWT	Government of Northwest Territories
IESP	Inuvialuit Energy Security Project
IESPL	Inuvialuit Energy Security Project Limited
IFA	Inuvialuit Final Agreement
IGC	Inuvialuit Game Council
IHTC	Inuvik Hunters and Trappers Committee
ILA	Inuvialuit Land Administration
ISR	Inuvialuit Settlement Region
ITH	Inuvik Tuktoyaktuk Highway
LSA	Local Study Area
NWT	Northwest Territories
OROGO	NWT Office of the Regulator of Oil and Gas Operations
PD	EISC Project Description
RSA	Regional Study Area
SARA	Species at Risk Act
SARC	NWT Species at Risk Committee
THTC	Tuktoyaktuk Hunters and Trappers Committee
WMAC-NT	Wildlife Management Advisory Council
WMMP	Wildlife Management and Monitoring Plan
VECs	Valued Ecosystem Components

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Acknowledgements

The Inuvialuit Petroleum Corporation (IPC), an Inuvialuit corporation established under the Inuvialuit Final Agreement (IFA), is proposing to develop and operate the Inuvialuit Energy Security Project (IESP) under the subsidiary Inuvialuit Energy Security Project Ltd (IESPL). The first revision of the IESP Wildlife Management and Monitoring Plan (WMMP) was provided as part of the IESP Project Description in a regulatory review process to the Environmental Impact Screening Committee (EISC). The IESP Project Description (PD) benefitted from the contributions of more than 60 engineers, scientists, planners, local harvesters, local elders, and community members as well as field studies and the detailed Community Conservation Plans from Inuvik and Tuktoyaktuk. The PD was reviewed by the EISC and was provided for a six-week review period to a distribution list of more than 80 individuals. The review resulted in a positive Decision Letter with recommendations, issued by the EISC on January 25, 2021. IESPL wish to recognize the efforts of all involved in the review process to date.

Revision 2.0 of the WMMP benefitted from input provided by the EISC, the Inuvialuit Game Council (information requests and meetings during the EISC process); the Inuvik/Tuktoyaktuk Hunters and Trappers Committees (HTC) (meetings and consultation prior to submission of the PD and during meetings on December 1, 2021); the Wildlife Management Advisory Council (WMAC NWT) (comment letter provided December 16 2020 to EISC and a review of the DRAFT IESP Bear Encounter Protocol received December 6, 2021); and the Government of the Northwest Territories (GNWT) Department of Environment and Natural Resources (ENR) (comment letters provided Dec 18, 2020, meeting held February 18, 2021, and comments provided by email February 19, 2021), as well as other knowledge holders. IESP updated the WMMP to Revision 2.0 to address the questions and comments of these stakeholders as well as the Environmental Impact Screening Committee (EISC) and the requirements of the NWT Wildlife Management and Monitoring Plan (WMMP) Process and Content Guidelines (2021).

This Revision 3.0 of the WMMP benefits from input on Revision 2.0 provided by the WMAC NWT (letter dated February 3, 2022); and the GNWT-ENR (letter dated 26 January 2022) as well as verbal input from IGC, and the HTCs during our regular monthly meetings. Revision 3.0 of the WMMP addresses the comments provided and provides a Concordance and Revision Tracking Table (Appendix F) summarizing these revisions.

Per EISC recommendation 6(c), IESPL have engaged five organizations (listed below) in the development of the WMMP. At the invitation of IESP, these organizations have agreed to continue to be involved in the regular review and continual improvement of the WMMP. For this purpose, going forward, these bodies are referred to as the IESP WMMP Review Committee and include:

- Inuvialuit Energy Security Project Ltd. (Chair)
- Tuktoyaktuk Hunters and Trappers Committee (THTC)
- Inuvik Hunters and Trappers Committee (IHTC)
- Inuvialuit Game Council (IGC)

- Wildlife Management Advisory Council (WMAC NWT)
- Government of the Northwest Territories, Environment and Natural Resources (GNWT-ENR, ENR)

1.0 Introduction

1.1 Purpose and Objectives of the WMMP

IESPL is committed to the protection and conservation of wildlife and wildlife habitat within the area of any of our operating projects, and as needed, mitigating any impacts that result from the development or operation of our projects, particularly the Inuvialuit Energy Security Project (IESP). This Wildlife Management and Monitoring Plan (WMMP) is an important tool for achieving this commitment for the IESP.

The purposes and objectives of the WMMP are to:

- Aid in the protection and conservation of wildlife and wildlife habitat in the Project region
- Demonstrate how IESPL will mitigate the impacts of the IESP on wildlife and wildlife habitat
- Ensure compliance with the Inuvialuit Final Agreement (IFA), as well as Federal and Government of the Northwest Territories (GNWT) regulations and,
- Provide a written plan as a basis for discussion for the ongoing input and collaboration with IESPL and the Inuvialuit Game Council (IGC), Inuvik and Tuktoyaktuk Hunters and Trappers Committees (HTCs), the Wildlife Management Advisory Council NWT (WMAC- NWT), and the GNWT Department of Environment and Natural Resources (GNWT-ENR, ENR).

1.2 Scope of the WMMP

The WMMP describes how IESPL will mitigate potential impacts of the IESP and provide protection measures to wildlife and wildlife habitat for the entire IESP Project Area; and monitor to better understand impacts and impact mitigations.

This WMMP includes:

- A description of the impacts of the IESP development on wildlife and wildlife habitat (Section 3).
- A description of how those impacts will be mitigated (Section 4).
- A description of relevant mitigation monitoring programs (Section 5).
- A description of our adaptive management process (Section 6).

The WMMP applies through the Pre-Commissioning, Module Fabrication and Transport, and Installation, Commissioning and Operations phases of the Project. It is expected that the WMMP will be reviewed as needed, and at a minimum annually, by the IESP WMMP Review Committee, to ensure adaptive management and compliance with any updates to the Community Conservation Plans, government regulations, and/or co-management/community feedback.

This WMMP has been produced consistent with direction provided in the Annotated Table of Contents – Wildlife Management and Monitoring Plans (GNWT 2019) and the Wildlife Management and Monitoring Plan (WMMP) Process and Content Guidelines (GNWT 2021). The Table of Contents and content of this WMMP are compliant with the requirements for a Tier 1 WMMP.

This WMMP includes adaptive management commitments (Section 6). If IESP encounter potential Project impacts on wildlife, IESP is committed to work with Inuvialuit wildlife co-management organizations and GNWT-ENR to avoid or minimize impacts in the future.

1.3 IESPL Wildlife Policy

IESPL is committed to preventing, reducing, and/or mitigating impacts to wildlife and wildlife habitat that could result from the development or operation of the IESP. To help meet this commitment, IESPL will utilize an Integrated Management System (IMS) and a series of Management Plans and Procedures related to specific aspects of the Project to ensure and maintain the integrity of all facilities, structures, installations, equipment, and operations to ensure quality, safety, environmental protection, and waste prevention. The IESP Integrated Management System is based upon the ISO PLAN-DO-CHECK-ACT cycle of continual improvement and includes ISO 9001:2015 (Quality), ISO 14001:2015 (Environment and Sustainability), ISO 45001:2018 (Occupational Health and Safety), and CSA-Z246.2-14 (Emergency Preparedness and Response).

1.4 IESP Related Management Plans

Per ISO and CSA Standards, our Integrated Management System planning (PLAN) includes impact assessment, stakeholder and community consultations, regulatory review, and risk, hazard, and opportunity assessments. Our implementation (DO) procedures include procedures for training and awareness, documentation, standardized processes, contingency (emergency) planning, and methods and mitigation measures to reduce or prevent direct impacts from the implementation of the project, including on wildlife and wildlife habitat. IESPL will CHECK on the effectiveness of our implementation through regular reporting, monitoring, audits, and management review. Finally, IESPL will ACT on the results of our checking using an adaptive approach to continual improvement to reflect changing site conditions, activity levels or lessons learned, to continue to mitigate potential effects on wildlife and wildlife habitat.

As part of our IMS, and as required by Section 5 of the NWT Oil and Gas Operations Act (OGOA) Drilling and Production Regulations (DPR), IESPL have developed a Management System and a series of Environmental Protection Plans (EPPs). This current version of the IESP Wildlife Management and Monitoring Plan (WMMP) is part of our overall EPP required by OGOA DPR. Under the 2019 NWT WMMP Guidelines, the IESP requires a Tier 1 WMMP. The Table of Contents and content of this WMMP are compliant with the requirements for a Tier 1 WMMP and the OGOA DPR.

Documents in the IESP EPP will include:

- Wildlife Management and Monitoring Plan (WMMP)
- Permafrost Protection and Management Plan (PPMP)
- Erosion and Sediment Control Management Plan (ESCMP)
- Waste Management Plan (WMP)
- Archaeological Site Management Plan (ASMP)
- Fish and Fish Habitat Protection Plan (FFHPP)

1.5 IESP Commitments

The IESP has received a review and approval to proceed (January 25, 2021) from the Environmental Impact Screening Committee. The process included submission of a Project Description, including a first revision of the WMMP; responses to Information Requests, and comments from interested parties; and recommendations from the EISC as part of the Decision.

IESPL has assembled all commitments from the EISC Process, as well as commitments made during consultations, into an internal commitment register for the Project. In addition, the IESP WMMP goals and commitments have considered the Inuvialuit Final Agreement (IFA), the updated Tuktoyaktuk and Inuvik Community Conservation Plans (CCPs) (TCCP 2016; ICCP 2016), the WMMP Process and Guidelines (ENR 2021), local traditional knowledge acquired by IESPL from interviews in 2020 and 2021, recommendations from the various environmental and geotechnical baseline studies completed for the Project, and numerous regulations, guidelines, and best practices.

During winter Pre-Commissioning (site (civil) works and well workover) activities, IESP will avoid effects to nesting birds, and be focussing on managing potential localized impacts to denning grizzly bears and wolverines, and on barren-ground caribou in their winter range. During Commissioning and Operations, managing and monitoring potential localized effects related to sensory disturbance of wildlife from site facilities/operations, and potential effects from project traffic on the access road are a priority.

A summary of commitments relevant to wildlife, wildlife habitat and wildlife monitoring are provided in Appendix B of this WMMP.

1.5.1 Wildlife Best Practices and Guidelines

The key wildlife guidelines that are relevant to wildlife in the Project Area and were considered in this WMMP are:

- Bear Encounter Response Guidelines (GNWT ENR 2008)
- Co-management Plan for Grizzly Bears in the Inuvialuit Settlement Region, Yukon Territory and Northwest Territories (Wildlife Management Advisory Council (North Slope) and Wildlife Management Advisory Council (Northwest Territories) 1998)
- Environmental Impact Screening Guidelines (EISC 2021)

- Guideline for Dust Suppression (GNWT 2013)
- Inuvik to Tuktoyaktuk Highway Wildlife and Wildlife Habitat Protection Plan: (1) Construction (Kavik-Stantec 2013)
- Inuvik to Tuktoyaktuk Highway Wildlife and Wildlife Habitat Protection Plan: Operations (GNWT 2018)
- Inuvik to Tuktoyaktuk Highway Wildlife Effects Monitoring Program (WEMP) (GNWT 2017)
- Northern Land Use Guidelines for Access Roads and Trail. (Indian and Northern Affairs Canada 2010)
- Northwest Territories Operational Statement: Ice Bridges and Snow Fills, Version 3.0 (Fisheries and Oceans Canada. 2013)
- One People One Plan – Inuvialuit Plan for Fishing on the Inuvik to Tuktoyaktuk Highway (Communities of Inuvik and Tuktoyaktuk 2017)
- Taking Care of Caribou - the Cape Bathurst, Bluenose-West, and Bluenose East Barren-ground Caribou Herds Management Plan (Advisory Committee for Cooperation on Wildlife Management, ACCWM 2014)
- Safe Work Practices for Fuelling Equipment and Handling Petroleum (GNWT Highways and Ferries 2013)
- Safety in Grizzly and Black Bear Country Brochure (GNWT ENR 2017)
- Statutory Requirements for Wildlife in the NWT (GNWT 2020)
- Tuktoyaktuk and Inuvik Community Conservation Plans (2016)

1.5.2 Regulatory Requirements

Several federal and territorial acts and regulations apply to wildlife and wildlife habitat, or include other regulatory requirements, in relation to the Project. These are summarized in Table 1.

Table 1: Wildlife protection regulatory requirements

Regulator & Guidelines	Applicability to WMMP
ECCC ¹ , CWS ² Species at Risk (SARA)	SARA was created to prevent wildlife species from becoming extinct. It requires Canada to provide for the recovery of species at risk as a result of human activity and to manage species of special concern. SARA governs all species listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and legally designated under SARA. Under SARA it is an offence to kill, harm, harass, damage or destroy habitats of, or capture or take an individual of a listed species that is extirpated, endangered or threatened on federally-regulated lands (Sections 32 and 33), or territorial lands (Section 34 [1]).
ECCC, CWS Migratory Birds Convention Act (MBCA) and Migratory Birds Regulations	The MBCA prohibits the taking of nests or eggs of migratory birds. It also prohibits the deposition of substances that maybe harmful to migratory birds in waters or other areas frequented by migratory birds. The regulations prohibit hunting, disturbing or destroying nests and keeping birds in migratory bird sanctuaries, except by subsistence hunters. Carrying out any activity that is harmful to migratory birds, their eggs, or their nests is also prohibited without a permit.

Regulator & Guidelines	Applicability to WMMP
ECCC, DFO ³ Fisheries Act Pollution Prevention Provisions	The Fisheries Act was amended in 2019 and provides protection of all fish and fish habitat and prohibits the “harmful alteration, disruption or destruction of fish habitat.”
ECCC, CWS Canada Wildlife Act	The Canada Wildlife Act outlines the controls of the federal government, in collaboration with the territories, to protect wildlife. This Act enables the ECCC and CWS, in cooperation with territorial governments, to take measures to protect endangered wildlife and to acquire lands for wildlife research, conservation and interpretation. This Act sets down the powers that wildlife officers have to manage wildlife offences and associated punishments.
GNWT-ENR ⁴ NWT Wildlife Act	The NWT Wildlife Act pertains to all wildlife harvesting and management within the NWT. It identifies the authority of the Wildlife Management Advisory Council (WMAC-NWT) in the ISR; and acknowledges that the Inuvialuit Game Council (IGC) and HTC's will provide advice related to wildlife management. The Act states that no person will, without a permit, chase, disturb or harass wildlife. It prohibits the destruction, disturbance or taking of the eggs or nests or birds identified in the list of prescribed wildlife. Permits may be issued by ENR under the Act to haze/herd wildlife, engage in activity that may result in disturbance to an animal or destroy or damage a den, dam or lodge, or eggs or nests of birds. The Act also states that a person is permitted to kill wildlife in defense of human life or property.
GNWT-ENR Species at Risk (NWT) Act	This Act applies to public and private lands throughout the NWT, and includes private lands owned under land claims agreements. The Act applies to any wild animal, plant, or other species managed by the GNWT. The Species at Risk (NWT) Act is intended to be complementary to the federal Species at Risk Act and addresses concerns at the territorial level.
IGC, WMAC NWT Inuvialuit Final Agreement	The IFA acknowledges the right of Inuvialuit to hunt, fish, trap, and carry out commercial activities within the Inuvialuit Settlement Region. It also establishes processes to protect and preserve arctic wildlife, environment, and biological productivity through the application of conservation principles and practices.
ILA ILA Rules and Procedures	The Inuvialuit Land Administration Rules & Procedures provide rules, information, format, policy, and procedures governing access to and across Inuvialuit Lands, and any activities which may be performed on Inuvialuit Lands.

Sources:

1. Environment and Climate Change Canada
2. Canada Wildlife Service
3. Department of Fisheries and Oceans Canada
4. Government of the Northwest Territories – Environment and Natural Resources

1.6 Engagement Activity

This WMMP has benefitted from input and knowledge from many organizations and experts including the Inuvialuit Game Council, the Inuvik/Tuktoyaktuk Hunters and Trappers Committees (HTCs), the

Wildlife Management Advisory Council (NWT, WMAC(NWT), and the Government of the Northwest Territories (GNWT) Department of Environment and Natural Resources (ENR).

As part of the development of the EISC Project Description, IESPL provided our project plans to numerous bodies. Appendix E provides a list of organizations consulted to date and their current positions on the project.

Per EISC recommendation 6(c), IESPL have engaged five organizations (listed below) in the development of the WMMP. IESP propose that these organizations will continue to be involved in the regular annual review / continual improvement of the WMMP. For this purpose, going forward, these bodies are referred to as the IESP WMMP Review Committee and include:

- Inuvialuit Petroleum Corporation (Chair)
- GNWT Environment and Natural Resources (GNWT-ENR)
- Inuvialuit Game Council (IGC)
- Tuktoyaktuk Hunters and Trappers Committee (THTC)
- Inuvik Hunters and Trappers Committee (IHTC)
- Wildlife Management Advisory Council (NWT)

IESPL have heard how important potential project impacts to fish and fish habitat would be to the Inuvialuit. Our commitments for management and monitoring of potential Project effects on fish and fish habitat will be described in a separate Fish and Fish Habitat Protection Plan.

2.0 Project Overview

2.1 Scope of the Project

IESPL is a subsidiary of the Inuvialuit Petroleum Corporation (IESPL), which is a subsidiary of the Inuvialuit Regional Corporation (IRC). IESPL was created and subsequently included as a key entity under the Inuvialuit Final Agreement (IFA) in 1985. IESPL has as a principal objective facilitating the engagement of Inuvialuit in the energy and resources sector. Since the late 1990s, Inuvialuit leadership have focused the efforts of IESPL on northern oil and gas opportunities.

As a subsidiary of IESPL, IESPL is committed to the spirit, intent, and implementation of the Inuvialuit Final Agreement (IFA). The objectives of the IFA are to:

- Preserve Inuvialuit cultural identity and values within a changing northern society.
- Enable Inuvialuit to be equal and meaningful participants in the northern and national economy and society.
- Protect and preserve Arctic wildlife, environment, and biological productivity.

The IESPL is proposing to develop and produce energy resources from the suspended TUK M-18 well (M-18) as the Inuvialuit Energy Security Project (IESP). The Project would involve the construction and operation of a small gas plant at the M-18 wellsite that will convert natural gas and condensate into Compressed Natural Gas (CNG), propane, and Synthetic Diesel. The hydrocarbon products will then be transported by truck on the Inuvik-Tuktoyaktuk Highway (ITH) to local customers for power, heat, and fuel. The IESP is located entirely on Inuvialuit 7(1)(a) Private Lands.

The proposed work scope includes four phases and ten main parts (detailed in Table 2):

2.1.1 Phase 1 – Pre-Commissioning

1. Remediate the existing drilling waste sump at the M-18 site.
2. Site Works: Construct and maintain a four (4) kilometre all-weather access road from the ITH to the site.
3. Site Works: Construct and maintain gravel pads and piles at the site.
4. Complete the suspended M-18 well.

2.1.2 Phase 2 – Module Fabrication and Transport

1. Fabricate the gas plant modules (off-site).
2. Transport the gas plant modules and support buildings to the site.

2.1.3 Phase 3 – Installation, Commissioning, and Operations

1. Installation of modules and plant infrastructure onsite.
2. Commission and operate the gas plant for 50+ years.
3. Transport CNG and other fuels by truck to regional users.

2.1.4 Phase 4 - Decommissioning

1. Decommission the facility and reclaim the site.

A separate plan for decommissioning and reclamation was provided in the EISC Project Description Application and in the Development Plan Application to CER. This WMMP will focus on the activities involved in Phases 1, 2, and 3 of the Project.

Table 2: Project phase descriptions

Phase	Project Phase Description
Pre-commissioning	Remediation Permitted through the Inuvialuit Land Administration (ILA), the existing drilling mud sump adjacent to the M-18 well was remediated to prevent the contents from contacting the environment and to prevent surface water drainage from pooling at the cap and disturbing the permafrost. The scope included construction of a temporary winter access trail and snow bridge, removal of ponded water (as ice) from the sump edges for legal disposal, addition of borrow (fill) material from Borrow Source 177 on the existing sump cap, and recontouring the existing drainage to flow around the sump cap. The cap will eventually be keyed into the new well pad built on undisturbed ground north of the wellhead for purposes of well workover and future well servicing.
	Site (Civil) Works will involve winter construction of a four (4) kilometer all-weather access road from KM 128.7 on the ITH to the wellsite and the facility pad area; winter construction of gravel pads for the energy centre; installation of piles, and winter construction of a bridge to cross the unnamed creek at the 2.6km post. The scope will include borrow excavation and transport to the site from local borrow sources; ground preparatory work, such as laying down willows and brush, installation of temporary construction trailers, construction activities and cleanup per Northern Land Use Guidelines for Access Roads and Trails. (Indian and Northern Affairs Canada 2010)
	Well Workover Permitted by the Canada Energy Regulator, well workover includes nine steps: complete the wellpad, extend the cellar and wellhead to elevation, install blowout prevention equipment; drill out existing cement and plugs; circulate the well to remove debris; install production tubing; insulate gas production from the permafrost; cap the well with a new wellhead; pressure test the wellhead and secure for future tie-in with the gas plant.
Module Fabrication and Transportation	Fabrication involves the building of facility modules on transportable skids in the south at an established fabrication facility. The completed modules will be tested and then prepared for shipment to the north.
	Transportation of Modules The completed modules will be delivered to a staging area in Inuvik or Tuktoyaktuk via the Dempster Highway or via Barge from Hay River. Transportation logistics will involve approvals from the appropriate authorities for highway, barge or rail use. Final delivery from the staging area(s) to the project site will occur via truck along the ITH from Inuvik or Tuktoyaktuk.
Installation, Commissioning and Operations	Installation of Modules and Plant Infrastructure will involve setting of Plant Modules and off-module equipment (such as tanks, SynGas Generator, FT Reactor) onto the pile foundations, and assembly and installation of interconnecting pipe ways and electrical systems. Plant Infrastructure such as office/control room and warehouse will also be installed.
	Commissioning includes activities associated with the start-up of the facility. Preliminary activities undertaken to test the equipment, connections, etc.; and completion activities to validate construction per design, demonstration of strength and integrity of the piping /mechanical systems and communication / function of the control systems.

Phase	Project Phase Description
	Operations will involve a Federally (CER to 2034), then Territorially (OROGO) regulated, fully operational facility. Operational activities include natural gas treatment and natural gas liquids extraction, CNG production, synthetic diesel production, fuel loading, waste management, and supporting infrastructure and equipment.
	Transportation of Fuels will be contracted to other parties. The activity includes trucking CNG, propane, and synthetic diesel to local commercial and residential consumers. The primary route of transport is the ITH to the communities of Tuktoyaktuk and to Inuvik in compliance with Transportation of Dangerous Goods Regulations.
Decommissioning	Decommissioning will involve cleanup, removal of all structures and equipment, remediation, reclamation, revegetation and monitoring to meet the standards of a future time in 50+ years. A separate Cleanup, Decommissioning and Remediation plan is provided in Section 17 of the EISC Project Description and as part of the ESW Operations Authorization Application.

Activities related to the sump remediation were completed during the winter of 2021-22. Pending authorisation, access road and site construction activities are expected to begin in Q3 2022, well workover in March or April of 2023, and commissioning is scheduled for early 2026. No Pre-Commissioning construction activities will occur between May 15 and August 15, annually.

The Project is expected to be operational for 50+ years. A summary of the development schedule, season, and duration is provided in Table 3.

Table 3: Development schedule and duration

Major Activity	Duration	Timing
Early Site Works (ESW)	Less than six months total	Between Oct 2023 and Apr 2026 (over winter seasons)
Well Workover	Less than one month	Q1 2024
Transport of Modules to Tuk	Less than three months	Summer 2025
Installation and Commissioning	Less than three months	2025 and 2026
Facility Operations (incl transportation)	Greater than 50 years	All Seasons, after 2025
Facility Decommissioning	Less than three years	Undetermined

2.2 Project Location and Regional Development

The IESP is located approximately 16 kilometres south of Tuktoyaktuk, Northwest Territories, Canada, in the Inuvialuit Settlement Region. It is located about four kilometres south-west of the Tuktoyaktuk municipal boundary and four kilometres west of the ITH in the Gunghi Creek watershed. The M-18 well is located at 69°17'50.6"N latitude and 133°04'34.6"W longitude in the TUK 2 concession block. The M-18 well and proposed project infrastructure, including the access road, will be located entirely on Inuvialuit 7(1)(a) Private Lands. The footprint of the project has been defined in the Project Description submitted to the Environmental Impact Screening Committee (EISC). For the purposes of impact screening, the Local Study Area (LSA) was an area of 736 ha located 12 to 16 km south of Tuktoyaktuk

and west of the Inuvik-Tuktoyaktuk Highway; and the Regional Study Area (RSA) was a 10 km radius circle from the M-18 Gas Well location. These areas will be considered as the Project Area and the Regional Area, respectively, during construction and operations. The Zone of Influence of the Project includes the Inuvik to Tuktoyaktuk Highway (ITH), the communities of Tuktoyaktuk and Inuvik, and the western portion of Husky Lakes where the ITH routes within one kilometre of Husky Lakes. Figure 1 provides a map of the Project location and the Local and Regional Areas, including the Project footprint, and other existing development and infrastructure in the area. Figure 2 focusses on the LSA and shows the site location and access road routing across the landscape.

Recent land use in the RSA and the LSA has mostly involved oil and gas exploration. Several dozen seismic and drilling programs have occurred over the past five decades within the LSA and RSA. There are 18 abandoned oil or gas wells within a 15 km radius of M-18. The wells were drilled between December 1968 and February 2002. Eleven of the wells were drilled in 1985-1986. Seventeen of the wells are owned by Imperial Oil and the most recent two wells (TUK M-18 and TUK B-02) were recently acquired by IESPL. All of the wells with the exception of TUK B-02 had drilling waste sumps, currently in various states of repair.

The other primary modern land use in the area is the Inuvik to Tuktoyaktuk Highway (ITH). The ITH is a new 138-kilometre gravel-based highway which extended the Dempster Highway from Inuvik to the Arctic Ocean at Tuktoyaktuk. The ITH was opened on November 15, 2017, after four years of construction. Previously, Tuktoyaktuk was accessible only by air or by winter ice road. The highway is the first in Canada to reach the Arctic Ocean.

The IESP LSA is less than one kilometer from the Municipal Boundary of Tuktoyaktuk. The next closest community to the Project is Inuvik, which is approximately 130 km from the Project site. The closest resident to the Project is located in the southern portion of Tuktoyaktuk known as Reindeer Point, approximately 12 km from the M-18 wellsite. There are no cabins in use within the RSA.

Although the residents of Tuktoyaktuk are not located in the Project LSA nor the RSA, the Hamlet is within the broader Zone of Influence of the Project. It is expected that project workers will live in Tuktoyaktuk during operations; and that workers during pre-commissioning will utilize local camps or accommodations. Obviously, the residents and businesses of Tuktoyaktuk will also be potential customers for energy from the IESP.

The Local Study Area (LSA) is located within the Tuktoyaktuk and Inuvik traditional harvesting regions. Section 3.0 of this WMMP provides additional information about traditional harvesting in the area.

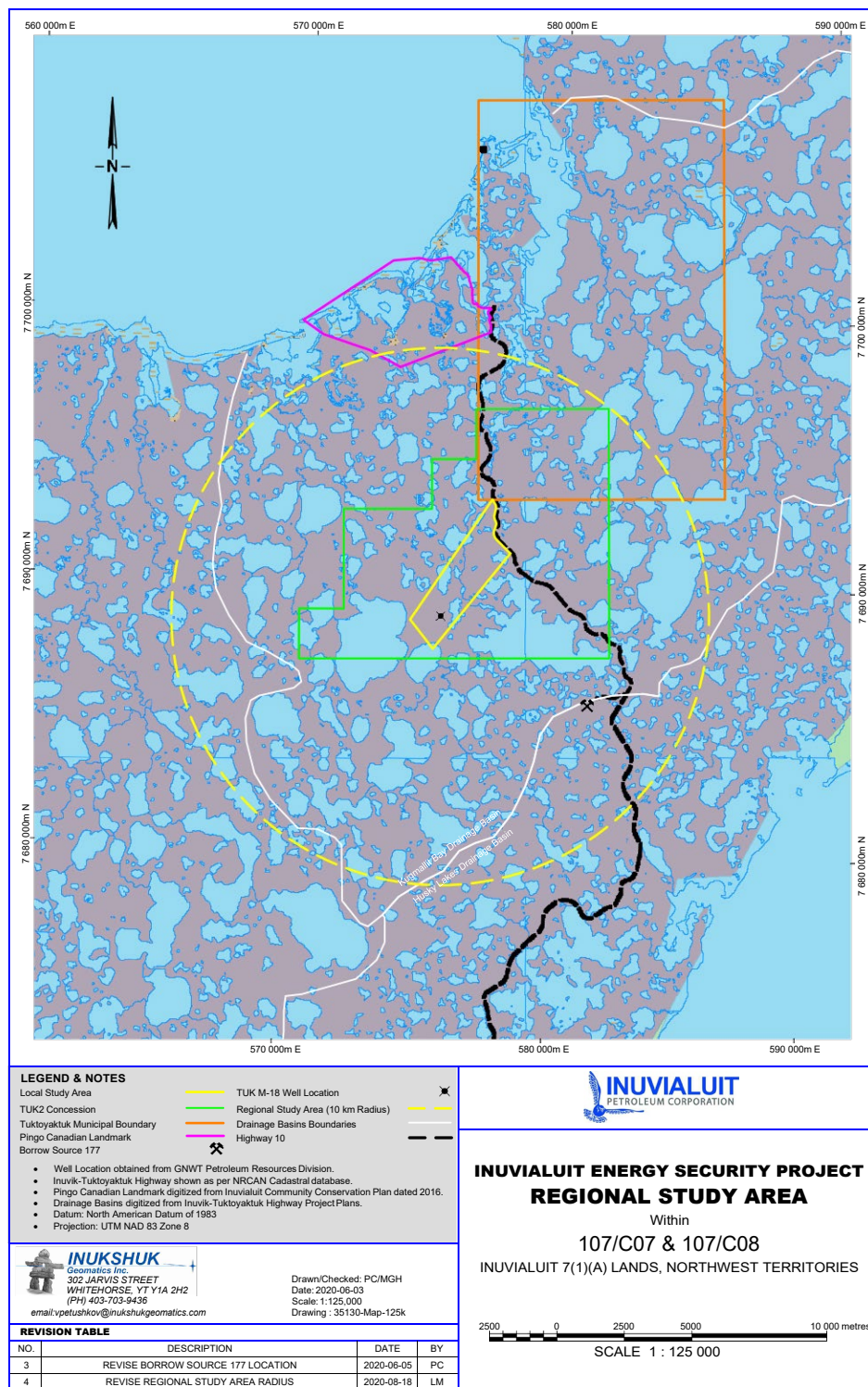


Figure 1: IESP location and study areas

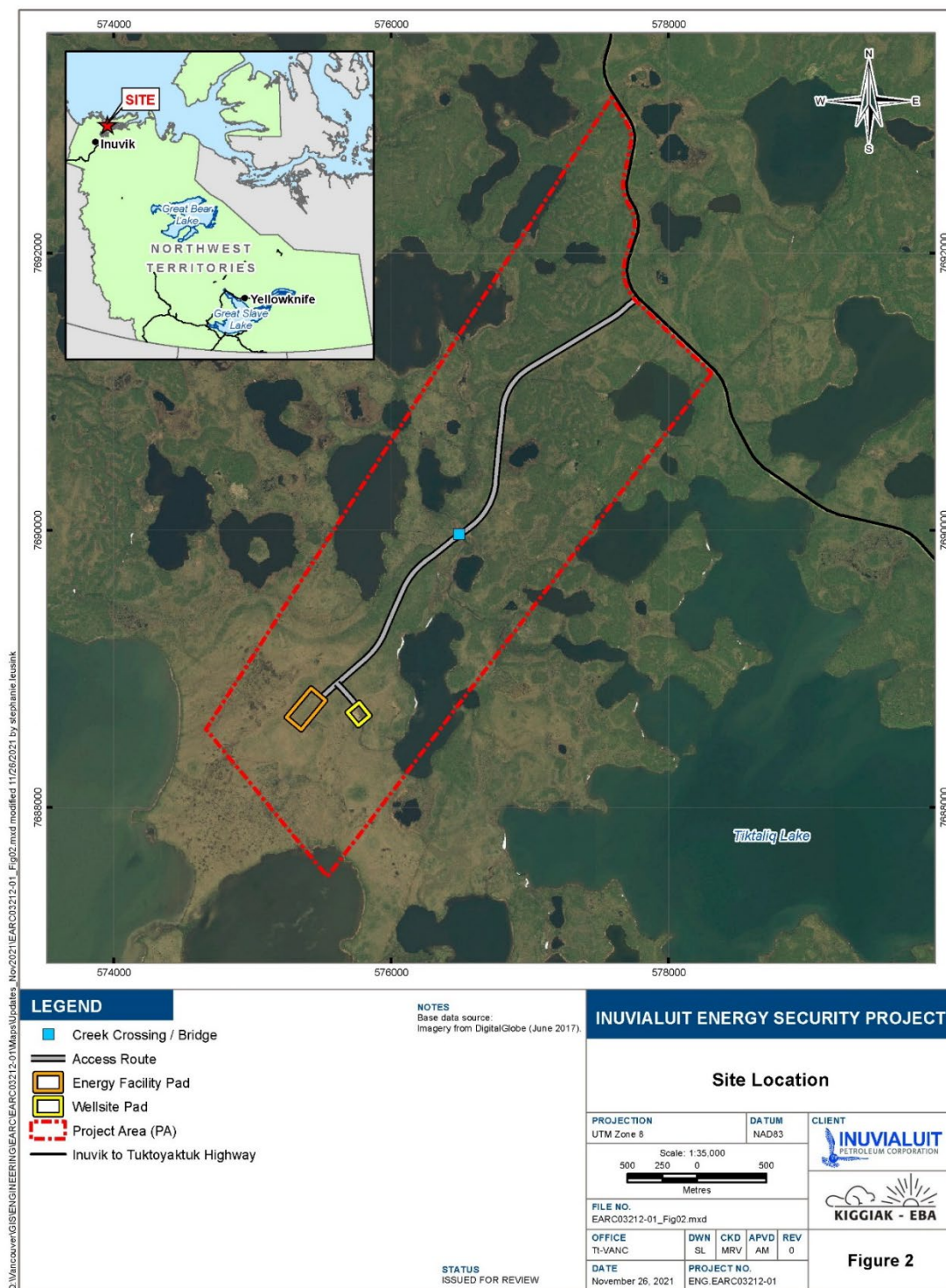


Figure 2: IESP site, access road, and local study area

3.0 Potential Impacts

An overview of wildlife and wildlife habitat features in the Project Area is available from the IESP Project Description (IESPL 2020), numerous other EISC Project Descriptions which overlap with the RSA, the ITH Impact Assessment, recent environmental studies commissioned for the IESP, as well as the Tuktoyaktuk Community Conservation Plan (TCCP 2016) and Inuvik Community Conservation Plan (ICCP 2016).

The Community Conservation Plans (CCPs) identify areas of special ecological and cultural importance (Special Designated Areas) and recommend various land use practices within each. Special Designated Areas are assigned Management Categories from A to E, with Category E areas the most significant due to sensitive cultural or renewable resources. The higher the Management Category, the higher degree of recommended land protection. The Project Area overlaps several wildlife and wildlife harvesting related Special Designated Areas for Barren-ground Caribou, Grizzly Bear and Wolverine. Table 4 outlines the Special Designated Areas which overlap with the LSA.

Table 4: Community conservation plan special designated areas

Site Number	Site Name	Mgmt Category	Importance	Siting Area Overlap	CCP Noting Site as Important
302C	Spring Caribou Harvesting Areas	Category C	Key harvesting area for caribou in the spring	LSA and RSA	TCCP 2016
306C	Summer Caribou Harvesting Areas	Category C	Key harvesting area for caribou in the summer	LSA and RSA	TCCP 2016
309C	Fall Caribou Harvesting Areas	Category C	Key harvesting area for caribou in the fall	LSA and RSA	TCCP 2016
314C	Winter Wolverine Harvesting Areas	Category C	Key area for subsistence harvesting of wolverine during the winter	LSA and RSA	TCCP 2016
315C	Winter Caribou Harvesting Areas	Category C	Key area for subsistence harvesting of caribou during the winter	LSA and RSA	TCCP 2016
322C	Critical Grizzly Bear Denning Areas	Category C	Important (from October to May) for denning grizzly bears	LSA and RSA	TCCP 2016

Site Number	Site Name	Mgmt Category	Importance	Siting Area Overlap	CCP Noting Site as Important
701E	Bluenose-West Caribou Herd Winter Range	Category E	Important winter habitat for the Tuktoyaktuk Peninsula, Cape Bathurst and Bluenose-West caribou herd, which are valued for subsistence harvest year-round	LSA and part of RSA	TCCP 2016 ICCP 2016
704C	Fish Lakes and Rivers	Category C	Important fish habitat and important historic and present subsistence harvesting area for residents of Inuvik and Tuktoyaktuk	LSA and RSA	TCCP 2016 ICCP 2016

Source: ICCP 2016, TCCP 2016

3.1 Summary of Selected Wildlife and Wildlife Habitat VECs

For the purposes of the WMMP, selected wildlife includes big game and other prescribed wildlife species most likely to interact with the IESP, species that are of conservation concern that may interact with the IESP, those species in the region that may have a key ecological role in relation to other species, and those species that have harvesting, cultural or economic value.

For species at risk, the WMMP includes their assessment and listing status under the federal Species at Risk Act (SARA), Committee on the Status of Endangered Wildlife in Canada (COSEWIC), territorial Species at Risk (NWT) Act, and/or NWT Species at Risk Committee (SARC), if applicable. These species are identified in Table 5.

Wildlife and wildlife habitat Valued Ecosystem Components (VECs) were chosen through the impact screening process, as detailed in the IESP Project Description. Maps of species range and their CCP management areas are provided in the IESP Project Description (PD) Appendix A.

3.1.1 Caribou

The Kiggiak-EBA (2018a) pre-feasibility baseline report on wildlife described barren-ground caribou conditions within the LSA. Caribou potentially occur in the LSA year-round. The LSA overlaps CCP Special Designated Areas for the harvesting of caribou in spring, summer, fall and winter areas (TCCP 2016).

The RSA also overlaps a Special Designated Area for Bluenose-West Barren-ground Caribou winter range (Site 701E). The RSA is located approximately 3 km to 7 km in from the north-west border on the range. (See Appendix A, Figure 3). The Bluenose-West herd moves into their winter range from the east/north-east. Designated as a Management Category “E” in the Inuvik and Tuktoyaktuk CCPs, the area contains environmental values significant for cultural or renewable resources and no development is recommended inside.

Caribou Conservation Measures identified in the CCPs include:

- Identify and protect important habitats from disruptive land uses.
- Avoid shooting mature bulls during the rut.
- Do not harvest more than is needed.
- Convey and promote traditional means of using all parts of each animal harvested. Discourage waste of meat.
- Develop cooperative management relationship between the co-management boards of each relevant land claim group through the Advisory Committee for Cooperation on Wildlife Management (ACCWM).
- Harvest on sustainable basis, and in manner consistent with recommendations of the management plans and HTC bylaws.
- Support the Barren-ground Caribou Management Strategy

The LSA falls entirely within an area currently prohibited for hunting caribou by all HTCs under by-laws that were written into regulation under the Wildlife Act. IESPL will monitor this prohibition and revise the IESP WMMP accordingly should the restrictions change.

3.1.2 Grizzly Bear

Baseline studies conducted in 2018 (Kiggiak-EBA 2018a) identified that the LSA is located inside a grizzly bear denning area (See Appendix A, Figure 4). Consistent with the Special Designated Area identified in the TCCP (Site 322C), habitat suitability modelling found areas with high denning potential in the LSA and field observations located a grizzly bear den during the pre-feasibility baseline studies.

Grizzly Bear dens are typically found in areas with changing topography and on generally south-facing slopes. In this area, dens can be found on glacial features (e.g., drumlins, eskers, kames) and on cut-banks above waterbodies. Grizzly Bear dens collapse in the spring, so in general, a particular den is not re-used, but the slopes used for denning can be used in subsequent years.

3.1.3 Wolverine

The LSA supports year-round wolverine habitat (Kiggiak-EBA 2018a) and is within the designated winter wolverine harvesting area (Site 314C). Traditional Knowledge reported in the pre-feasibility baseline report described the wolverine denning habitat to be similar to that of grizzly bears. Wolverine dens are typically found where snow cover is maintained later into the spring (NWT SARC 2014).

As a C-level management area, the wolverine winter harvesting area (See Appendix A, Figure 5) is sensitive to disturbance during winter harvest (November 1 – April 15).

3.2 Listed Species

The potential direct and indirect impacts of the Project on wildlife Species of Management Concern (SOMC) or SOMC wildlife groups were assessed within the Project LSA (IESPL 2020). Of these species, barren-ground caribou, wolverine, grizzly bear, horned grebe, and short-eared owl, as well as some waterbird species, were noted as being listed under SARA, COSEWIC, and/or the Species at Risk Act (NWT) Act as being threatened, of special concern, or a sensitive species (See Table 5). The occurrence of two species, grizzly bear (i.e., potential denning sites, scat, feeding sign, and tracks) and barren-ground caribou (i.e., hair, scat, tracks, antler) were confirmed in the LSA during the field survey. (Kiggiak-EBA 2018a)

According to the 2018 Wildlife Baseline Environmental Report (Kiggiak-EBA 2018a), the following wildlife species have suitable habitats in the area and have special conservation status:

Table 5: Wildlife species with suitable habitat in the LSA and special conservation status

Common Name	Scientific Name	Conservation Status		
		NWT SARA	Federal SARA	COSEWIC
Bank Swallow	<i>Riparia Riparia</i>	Not Applicable	Threatened	Threatened
Barn Swallow	<i>Hirundo rustica</i>	Not Applicable	Threatened	Threatened
Harris's Sparrow	<i>Zonotrichia querula</i>	Not Applicable	No Status	Special Concern
Horned Grebe	<i>Podiceps auritus</i>	Not Applicable	Special Concern (Schedule 1)	Special Concern
Hudsonian Godwit	<i>Limosa haemastica</i>	Not Applicable	No Status	Threatened
Lesser Yellowlegs	<i>Tringa flavipes</i>	Sensitive	No Status	Threatened
Peregrine Falcon	<i>Falco peregrinus tundrius</i>	No Status	Special Concern (Schedule 3)	Special Concern
Red-necked Phalarope	<i>Phalaropus lobatus</i>	Not Applicable	Special Concern (Schedule 1)	Special Concern
Rusty Blackbird	<i>Euphagus carolinus</i>	No Status	Special Concern	Special Concern
Short-eared Owl	<i>Asio flammeus</i>	No Status	Special Concern	Special Concern
Barren-ground Caribou	<i>Rangifer tarandus groenlandicus</i>	Threatened	No Status	Threatened
Grizzly Bear	<i>Ursus arctos</i>	No Status	Special Concern (Schedule 1)	Special Concern
Polar Bear	<i>Ursus maritimus</i>	Special Concern	Special Concern	Special Concern
Wolverine	<i>Gulo gulo</i>	No Status	Special Concern	Special Concern
Gypsy Cuckoo Bumblebee	<i>Bombus bohemicus</i>	No Status	Endangered	Endangered

Habitat suitability assessments were completed by Kiggiak-EBA (2018a) for each species with special conservation status to determine whether appropriate habitat for key life stages is available within the LSA. The LSA provides suitable nesting habitat for Horned Grebe, Red-necked Phalarope, Short-eared Owl, Harris's Sparrow, and Rusty Blackbird. These bird species could be expected to occur in the LSA during the nesting period. Portions of the access road intersect high suitable Short-eared Owl, Harris's

Sparrow, and Rusty Blackbird habitat. Pre-commissioning will be completed outside the bird nesting period (mid-May to mid-August) and in the unlikely event an active nest is encountered, set-back distances will be followed.

Grizzly bear, wolverine, and barren-ground caribou could occupy all habitat types within the LSA at any time of the year; and thus, the Project directly intersect available habitat for these species. These species have extensive home/annual ranges, extending well beyond the boundaries of the RSA. Habitat available within the RSA is also common throughout the Region. However, Traditional Knowledge holders have indicated that Husky Lakes, east of the RSA, is a particularly important area for many species including Peregrine Falcon, barren-ground caribou, and grizzly bear (KAVIK-Stantec 2013).

3.3 Potential Impacts to Wildlife

3.3.1 Pre-Commissioning Activities

Pre-commissioning activities at the Project site are planned to occur over two winter seasons, and potential impacts to wildlife are included within those identified for Operations in Table 6. Potential impacts related to Pre-Commissioning, Installation, and Commissioning activities are similar to those expected during Operations, but much shorter in duration. Specific mitigations are proposed for the Pre-Commissioning winter seasons to minimise the likelihood of disturbing denning bears or wolverines, or over-wintering caribou (Section 4.1).

3.3.2 Commissioning and Operations Activities

The duration of operations for the IESP is expected to be greater than 50 years. Operations at site, and transportation along the access road and ITH are activities that occur year-round and could result in impacts to wildlife. The extent of impacts from normal operations is within the LSA, and along the ITH right-of-way during transportation of fuels. Traffic studies in 2018-2019 indicate an average of 1762 vehicles per month, at peak operations IESP would contribute around 150 deliveries/trips per month. The frequency of potential impacts to wildlife are expected to be minor or moderate (may occur several times). The magnitude of the activities is considered Class 3 (moderate) for wildlife – there may be a decline in a valued ecosystem component in the LSA during the life of the Project, but levels will recover to baseline after Program closure.

The potential impacts of the IESP on wildlife and wildlife habitats have been summarized into one of three categories. Table 6 summarizes the categories and the potential impacts.

Table 6: Potential impacts to wildlife

Impact Category	Potential Impact to Wildlife
Habitat	Loss of habitat due to vegetation clearing and gravel fill for the road and pads.
	Risk of injury or mortality due to accidental destruction of bird nests, eggs, or young during operations
	Localized minor degradation of wildlife habitat due to possible soil erosion.
	Impacts to wildlife habitat due to possible particulate matter (dust) emissions from traffic.
	Wildlife habitat pollution due to fuel and/or chemicals spills.
	Wildlife disruption or habitat degradation due to fire, explosion, or blowout.
Sensory Disturbance of Wildlife	Sensory disturbance related to lighting, noise, traffic, physical barriers, and vibration.
	Wildlife attraction due to light, noise and/or domestic waste.
Direct Interaction with Wildlife	Wildlife collisions with vehicle traffic
	Birds or small animals attempting to nest in equipment.
	Disturbance of winter dens (bears and wolverine).
	Injury or mortality of bears, wolverine or foxes attracted to the facility.
	Increased access to the local area for harvesters.

4.0 Wildlife and Wildlife Habitat Mitigation

4.1 Specific Pre-Commissioning Mitigation

Pre-commissioning activities at the Project site are planned to occur over two winter seasons, to ensure no overlap with migratory bird windows and activities within the project area.

Grizzly bear denning area and management recommendations from the CCPs state: “All land users should refrain from any activity near known grizzly bear denning sites from October to May. Denning sites should not be physically disturbed at any time.” Areas with higher suitability grizzly bear denning habitat exist throughout the LSA. Bear den surveys will be completed in the fall prior to snowfall and prior to commencement of the activities both years.

Denning surveys conducted in October and November 2021 by ILA found no evidence of denning in the LSA. If an occupied den is identified during Pre-Commissioning, an 800m construction set-back will be established, the IESP Bear Encounter Procedures (attached as Appendix C) will be followed, and adaptive management actions will be initiated (see Table 9). As requested by the THTC, den surveys will begin in September prior to snowfall.

4.2 Employee Wildlife Awareness Education and Training

The Prime Contractor’s HSE Supervisor (during Pre-Commissioning), the IESPL HSSE Team (after Commissioning), and the ILA Wildlife Monitor will be responsible for educating and training their

respective staff on the applicable practices within the WMMP. All training records will be documented in the IESP Integrated Management System (IMS) training database.

All facility workers will receive, at minimum, a basic wildlife orientation, including how to identify species of management concern, and will be instructed not to disturb any wildlife. Information provided to employees during training will include the following:

- A review of the WMMP with a focus on prevention and mitigation measures
- An understanding of reporting requirements and procedures related to wildlife observations, wildlife incidents and wildlife-related accidents
- Instructions on waste and other wildlife attraction concerns
- Bear awareness and safety training (GNWT Guidelines)
- Appropriate videos such as “Staying Safe in Bear Country” and “Working in Bear Country”, as well as the ENR Bear Encounter Response Guidelines and GNWT Bear Safety Brochure will be provided as part of the bear awareness and safety training.
- Wildlife Monitors retained for the project will have undergone training specific to monitoring and reporting for this project.
- Education will complement the implementation of No Firearms and No Hunting/Fishing for imported workers.

4.3 Infrastructure Design

If possible, the Project first avoided infrastructure (i.e., no camp), then avoided seasonally interacting with wildlife using construction windows (i.e., migratory bird nesting), then incorporated best practice design features or mitigation (i.e., sprung structure over the plant, fencing around site, bear proof areas). There will be no camps commissioned nor purposed on the site during construction or operations.

The WMMP Review Committee will have an opportunity for an annual review of monitoring results and Project impacts on wildlife and will be consulted on any proposed changes in infrastructure design to mitigate these impacts.

The following infrastructure design measures will be applied:

- During site works construction, well workover and commissioning, the Prime Contractor on site will be responsible for establishing the appropriate infrastructure design to avoid the presence of wildlife. During Operations that responsibility will be to the IESPL Field Manager, Environment. The goal will be to assure that workers, equipment, and infrastructure will be protected from large mammals such as bears, caribou and wolverines; and that wildlife will not be impacted by human activity. Solutions include full time Wildlife Monitors; temporary fences, permanent fences, or barricades; skirting underneath buildings, and/or cameras and motion sensors.
- The first 2.5km of the access road off the ITH will follow a route that was previously disturbed.

- Design of the access road will be such to minimize the footprint of the road and to ensure embankments and drainage culverts are properly located to prevent permafrost degradation and/or soil erosion, especially at the creek crossing. We intend to maintain natural drainage patterns.
- The design of on-site storage of possible animal attractants (fuel, oil, waste) will include bear-proof areas or containers.
- Facility buildings will be designed to incorporate proper worker and animal safety. Possible solutions include avoiding blind corners, installation of proper lighting, enforcing proper waste management, kitchen and office area cleanliness and maintenance, fencing, and wildlife detection.
- Snow will be removed around buildings and work areas to increase visibility.
- Adequate lighting will be installed in areas where it is essential to detect bears, wolverines, foxes or other wildlife that may be in the vicinity.
- Infrastructure design features identified through public input, community consultation, and/or adaptive management to prevent animal attraction or disturbance will be incorporated to the extent possible.
- The location of the ITH interchange and the access road will allow for long views. The access road will be a private road, with a gate at the ITH and signage indicating that the road is for private use only. This measure is also for human safety.
- All equipment will be designed to minimize noise impacts and to meet all regulatory requirements for noise. Specifically, the project is being designed to meet the Alberta Energy Regulator Directive 038: Noise Control (2007). A noise survey will be completed following the commissioning of the plant.
- The plant will be designed to prevent any spills. All storage tanks containing products that are liquid at atmospheric temperature and pressure will be double walled. Loading and unloading areas will utilize capture trays. Spill response equipment will be readily available at the site.
- The area to be utilized for the well workover will be integrated with the new sump cap, to minimize the gravel footprint and the area to be cleared.
- A comprehensive logistics plan will be developed to ensure that arriving modules may be placed directly onto piles, thus minimizing the need for large lay-down areas.

4.4 Management of Wildlife Attractants

There will be no camps commissioned nor purposed on the site during construction or following. There will be a site kitchen during operations for light meal preparation (sink, microwave, etc.) for site workers. The following waste and other wildlife attractants measures will be applied:

- All food, garbage, grease, oils, and/or fuels will be kept in bear-proof areas or bear proof containers.
- Additional fencing or barriers will be considered around areas that might attract wildlife (i.e., fuel, chemical or waste storage facilities, sites with food storage).
- No waste will be incinerated on or off site. Waste will be transported and disposed of, in accordance with the IESP waste management plan. The Hamlet of Tuktoyaktuk Municipal Solid Waste (MSW) Disposal

facility operates year-round and is available for kitchen and food waste. No waste will be left in unattended trucks.

- Waste removal crews will be sent out to areas surrounding the site before the arrival of breeding birds in the spring to collect and properly dispose of any waste material that has been blown off-site.
- Spills will be cleaned up immediately and impacted snow or gravel will be disposed according to regulations.

4.5 Timing Restrictions and/or Setback Distances to Protect Wildlife

The following table summarizes the timing restrictions and setback distances to be applied to the IESP. The setbacks are taken from the Northern Land Use Guidelines, Northwest Territories Seismic Operations (GNWT 2015), and comments received from ENR (22 January 2022)

Table 7: Recommended setback distances for wildlife and wildlife habitat features in the NWT

Wildlife or Wildlife Habitat	Timing Restrictions	Specific Conditions	Minimum Setback Distance
All wildlife and birds, general	Breeding and birthing seasons	Varies with region and species: contact local GNWT	250 m
Bear dens (grizzly, black and polar bear)	Oct 1 – May 30	All species' dens, general industrial activities	800 m
Bears (grizzly, black and polar bear)	Jul 15 – Sep 15	Berry habitat	300 m
Caribou (barren-ground)	May 15 – Oct 15	Water crossings – general activities	1,000 m
Caribou (barren-ground and woodland)	May 15 – Oct 15	Water crossings near blasting or seismic activity	10,000 m
Caribou (barren-ground and woodland)	Year round	Shut-down distance if caribou are in the area	500 m
Caribou (barren-ground and woodland)	Snow period	Snowmobile distance if caribou are in the area	250 m
Fox dens	May 1 – Jul 15		150 m
Mineral/salt licks	Apr 1 – Jul 15		250 m
Muskox	Apr 1 – Jun 15	Shut down distance if muskox are in the area	500 m
Wolf dens	May 1 – Sep 15	If entering by foot	500 m
Wolf dens	May 1 – Sep 15	General development activities dens	800 m
Wolverine dens	Oct 15 – Jul 15		800 m
Bird staging and nesting areas	When birds are present	Flight line distance to areas	1,500 m
Nests of bird species at risk	When nests are found	Canada Warbler, Olive-sided Flycatcher, Rusty Blackbird	300 m
		Common Nighthawk	200 m
		Yellow Rail	350 m
Bald Eagle	Apr 15 – Aug 31	Nest sites	500 m
Golden Eagle	Apr 15 – Aug 31	Nest sites	800 m

Wildlife or Wildlife Habitat	Timing Restrictions	Specific Conditions	Minimum Setback Distance
Northern Goshawk and Sharp-shinned Hawk	Apr 1 – Aug 31	Nest sites	500 m
Osprey	Apr 1 – Aug 31	Nest sites	1,000 m
Raptors, general	Mar 1 – Sep 1	Nest sites	1,500 m
Raptors, general	Sep 2 – Feb 28	Nest sites	500 m
Red-tailed Hawk	Apr 15 – Aug 31	Nest sites	800 m
Trees supporting stick and/or cavity nests	Year round	Do not cut down	
Trumpeter Swan	Apr 1 – Sep 30	Breeding water body	800 m
Waterfowl	During migration		3,000 m
Waterfowl	Year round	Nest sites, staging areas and concentrations	250 m
Source: Northern Land Use Guidelines, Northwest Territories Seismic Operations (GNWT 2015).			

In addition to the general timing restrictions and setbacks, the following temporal and distancing considerations will be taken to minimize habitat disturbance:

- Workers will not walk off-site onto land at any time of year, unless there is a specific requirement (i.e., waste recovery), and these activities will be scheduled to avoid sensitive wildlife periods, especially nesting seasons.
- Final site inspection and clean-up will be conducted; site-specific clean-up will be conducted on foot where that work takes place off the right-of-way to avoid disturbance to vegetation or nests.
- There are currently no Pre-Commissioning activities planned during bird nesting and breeding season. Should any activities, including vegetation clearing, be required during the breeding bird season (generally May 15 – August 15), pre-disturbance surveys will be conducted no more than four days prior to the commencement of activity; these will focus on the suitable habitats and immediately adjacent habitats.
- If an active nest is found, setback distances will be applied and maintained until the nest is no longer active, unless exceptions are approved in consultation with ILA and ENR and/or Canadian Wildlife Service (CWS).
- Install deterrents such as motion-activated lighting or noise, or fencing or barriers, around equipment or structures that could harm animals.
- Have a wildlife sighting card program to monitor movement of wildlife. Use the data from this program to adjust mitigation measures if needed.

In addition to the above listed restricted activity periods and mitigations; special considerations will be followed when there is a high potential for species at risk to occur within the development area. The Species at Risk Act (Government of Canada 2002) protects listed species, their nesting / denning sites, and identified critical habitat. Such considerations to manage potential effects to species at risk include:

- Conducting annual surveys to identify critical habitat, nesting or denning locations, and other habitat features (e.g., overwintering habitat) of species at risk within the LSA. Although this is noted as a recommended approach, it is a vital step to ensuring compliance with the Species at Risk Act.

- Avoid Pre-Commissioning activity within restricted activity periods.
- Prior to Pre-Commissioning activities, Wildlife Monitors will perform ground-based Grizzly Bear and wolverine denning surveys over high-quality denning habitat in the LSA. If signs of active bear use are observed within 800 m, the Wildlife Monitor may implement measures to deter bears from denning within 800 m of construction and permanent development sites. Use of any deterrent measure will be reported to GNWT-ENR and ILA.
- If active bear or wolverine den, or active nesting sites are discovered within 800 m of Project sites, ILA, territorial (GNWT-ENR) authorities will be contacted immediately to determine the appropriate course of action. Any active or suspected dens will be discussed with GNWT-ENR, WMAC(NWT) and the HTC to determine appropriate actions. Activities may be temporarily suspended pending consultation with ILA and GNWT-ENR.
- Adhere to all recommended setback distances (see Table 7).
- Participate in regional surveys for species at risk in the Project area.

4.6 Wildlife Habitat Loss or Alteration

Direct habitat loss, for the duration of the Project, will occur over the physical Project footprint. The footprint area is relatively tiny compared to the size of ranges and home-ranges of SOMCs. The access road is not expected to present a physical barrier to wildlife movement.

- The footprint is limited to the pads and access road covered by gravel and with equipment operating on them.
- Snow clearing along the access road will maintain visibility and passage for both wildlife and Project vehicles.
- The access road routing avoids waterbodies and maintains natural drainage when possible.

Indirect habitat loss (functional loss) due to sensory disturbance, dust, etc.; and habitat alteration, or the physical manipulation of habitat that would decrease its value to wildlife, will extend beyond the physical Project footprint of roads and pads. Noise and light will be produced both at site and by vehicles along the access road. Wildlife is expected to acclimatise to consistent noise, but avoid loud, intermittent or percussive noise. Light is expected to be a potential attractant and deterrent depending on the species.

- Noise will be restricted to the immediate vicinity of the work in progress.
- The gas processing facility will be prefabricated in Alberta, minimizing construction related noise and durations.
- The highest noise levels will likely occur during well workover or the flaring of gas, both of which will occur during a short time frame only in a localized area.
- Maintenance of equipment in good repair and provision of appropriate mufflers for all internal combustion engines.

- Engine breaks will be prohibited in communities and at the project site.
- Generators and gas processing will be housed in noise-reducing structures.
- Limit construction activity during sensitive periods (based on recommendations from wildlife experts) to minimize effects on wildlife.
- Respond immediately to any noise complaints.
- Monitor noise levels quarterly (daytime and nighttime) and adapt our facility and management processes based upon any new information about our noise levels.
- The Energy Centre will be designed and constructed utilizing technologies and equipment to mitigate noise from rotating equipment noise sources such as heat exchanger fin fans, compressors, and generator engine exhaust.
- Additional noise mitigation methods may include selection of lower noise fan designs with slower speeds, sound baffling systems, perforated wall panels for compressor buildings, and use of high-grade mufflers for generator engine exhaust.
- Lighting will be sufficient to meet the demands of the construction activity with minimal spillage, reflectivity or spread to areas outside of the requirement zone or to the night sky.
- Lighting will use spot optics with precise beam angles when practicable to illuminate only the required area.
- Automate lighting systems where feasible with timers and sensors to respond to reduced / increased lighting requirements as needed.
- Utilize digital lighting systems where practicable combining solid-state lighting (SSL) with smart controls.
- Utilize full cut-off fixtures with light shields to reduce contribution to sky glow.
- Install motion or other types of sensors in outdoor areas where access is required on a minimal or indeterminate basis (e.g., access gates and limited use roadways / passages / corridors).

Vehicle movement along the access road will create dust that could move off the road with wind. Traffic on the access road is restricted to Project vehicles. Speed limits will be in place and IESPL has committed to employ water and/or other measures to mitigate dust creation and dispersal (Section 6.2 and Appendix B). Indirect habitat loss is not expected to extend beyond the LSA.

- Number of vehicles, heavy equipment and diesel generators will be limited.
- Ensure proper maintenance of heavy equipment to minimize air emissions.
- Restrict speed limits along the access road to minimize dust.
- Implementation of dust suppression measures during construction and summer operation activities.
- Follow the GNWT's Guideline for Dust Suppression (2013) during both construction and operation phases.
- Ambient (static) air quality stations will be installed to capture particulates for analysis. We will adapt management as information is gathered during operations.

4.7 Management of Hazards to Wildlife

The Project will construct and maintain minimal infrastructure: a well and processing facilities on gravel pads and an access road. Project traffic on the access road represents a collision hazard to wildlife. The focus is managing and avoiding collisions with caribou with additional caribou-specific commitments described in Section 4.7.1.

- The processing facilities will be enclosed in a sprung structure and fencing to minimise interactions with wildlife.
- A gate will be installed at the junction with the ITH.
- Traffic on the access road is restricted to Project vehicles.
- Speed limits will be in place that will reflect visibility and driving conditions.
- IESPL has committed to providing wildlife with the right-of-way and Project vehicles will slow or come to a stop if wildlife is in the vicinity.
- Consistent with the Wildlife Act, IESPL will report any wildlife-vehicle collisions with big game species to ENR within 24 hours.

4.7.1 Management of Hazards to Caribou

Caribou are more likely to be in the LSA and interact with the Project in winter. IESPL will implement the following measures to minimise attraction, decrease collisions and encourage caribou to maintain a safe distance or move away from Project activities.

- During Pre-Commissioning Wildlife Monitors will scout ahead of equipment to avoid disturbing caribou.
- If caribou are at the Project site when personnel arrive, work will not commence until the caribou move farther than 500 m away
- If caribou approach the site when work is underway, the Wildlife Monitor will be notified immediately, and personnel alerted both on site and along the access road. Work may continue, but caribou numbers and distances are monitored, caribou are not approached, and consideration will be given to implementing additional mitigation measures like lower speed limits, additional signage etc. Work continues unless the caribou approach in such numbers that they are at risk.
- Caribou should only be deterred from the Project area if there is a risk of injury to them or if their presence will impede project operations after waiting for them to move away of their own accord for 90 minutes.
- The Wildlife Monitor will lead any deterrence measures to gently encourage the caribou to move away from the area using methods pre-approved by ENR.
- Should caribou populations or range use change over the life of the Project, the WMMP Review Committee will provide input into revisions of caribou hazard management.
- Should a caribou-vehicle collision occur, IESPL will immediately follow reporting procedures and initiate adaptive management actions to understand the cause of the collision and suitable mitigation (Section

6.2). Consistent with the Wildlife Act, IESPL will report any wildlife-vehicle collisions with caribou to GNWT-ENR within 24 hours.

4.8 Wildlife Deterrence Procedures

The following process will apply if deterrence procedures are required:

- Situation and site will be assessed, including potential for further mortalities; consider increased wildlife deterrent mechanisms and security, including fencing and lights to ensure wildlife and personnel safety.
- Firearms will be used on-site by authorized personnel only.
- If a den is identified the animal may be hazed away (permit required) to discourage it from continuing to construct a den there. This action will be taken in consultation with ILA, ENR and the Tuk HTC and will involve the Wildlife Monitor.
- The Wildlife Monitor and designated trained staff will have access to bear deterrent materials including bear spray, cracker shells, and a 12-gauge shotgun with plastic slugs and slugs. All work crews will have at least one can of bear spray during periods when bears may be present. The use of any deterrent method will be reported to ILA and ENR.

Suitable hazing/herding techniques will be used to move wildlife from Project facilities, per consultation with ILA and GNWT-ENR or CWS. The Wildlife Monitors will advise personnel regarding the appropriate course of action. Permits are required to haze/herd wildlife.

Monitoring activities will be conducted to ensure the terms and conditions set out in licences and permits are met and to check the effectiveness of mitigation measures in avoiding or minimizing potential effects. The Wildlife Monitor will be responsible for mitigation monitoring during the pre-commissioning phase.

The Field Manager, Environment or HSE Supervisor will be responsible for monitoring the implementation of the wildlife and wildlife habitat mitigation measures and ensuring that the commitments in the WMMP are met. The Supervisor will liaise with the Wildlife Monitor.

The Wildlife Monitor will be responsible for monitoring the pre-commissioning activities as they relate to wildlife and wildlife habitat protections and the mitigation measures outlined in the WMMP. Wildlife Monitor will also be responsible for conducting and recording wildlife observations during the pre-commissioning phase. The Wildlife Monitor will ideally have monitoring and reporting experience on projects related to construction on permafrost tundra environments. The THTC and ILA will be approached to identify and/or provide potential Wildlife Monitors.

The Wildlife Monitor will record their daily wildlife observations on a Wildlife Sighting Form (Appendix C, Attachment 2). This form records the types of wildlife observed, the frequency and location of observations and the effectiveness of the mitigation measures. Pre-commissioning personnel will also carry Wildlife Sighting Forms to record any incidental wildlife observations they have and will complete these forms with the assistance of the Wildlife Monitor. The Wildlife Monitor will communicate daily wildlife observations to the Field Manager, Environment, and ILA.

The Wildlife Monitor will also provide wildlife briefing as part of daily tail-gate meetings, guidance to minimize wildlife encounters, and act as lead responder to all wildlife incidents. The Wildlife Monitor will be provided an All-Terrain Vehicle (ATV) to allow them to access all Project Areas.

Monitoring programs designed and executed carefully can be invaluable for documenting regulatory compliance for Projects. Monitoring will help ensure that the Project does not adversely affect wildlife populations and that it remains compliant with regulatory requirements. The parameters for monitoring with respect to the Project are:

- Record of wildlife sightings
- Number, location, and date of animal sightings
- Details of problem wildlife captured, and which organization conducted the capture
- The species composition and number of animals found killed
- Follow Contractors wildlife procedures and submit any wildlife incident reporting form(s) to the on-site Contractors Lead Supervisor

These parameters may be updated once further approval conditions and stakeholder commitments are confirmed.

4.9 Habitat Restoration

Habitat restoration will occur during decommissioning. Decommissioning will involve cleanup, removal of all structures and equipment, remediation, reclamation, revegetation and monitoring to meet the standards of a future time in 50+ years. A separate Cleanup, Decommissioning and Remediation plan is provided in Section 17 of the EISC Project Description. Removal of gravel and revegetation of the Project footprint (gravel pads and access road) is expected to return the area to conditions similar to those found pre-Project.

4.10 Wildlife Monitor Participation in WMMP Implementation

Wildlife Monitors are central to the implementation of management and monitoring programs under the IESP WMMP. Monitors are the most important observers, and the highest level of effort, supporting the monitoring program. They are the point-of contact and first level of reporting for staff or contractors that observe or interact with wildlife.

Whenever work is being undertaken at site, during all phases of the Project, there will be Wildlife Monitors present. Monitors will be active prior to Pre-Commissioning, then through Pre-commissioning and Operations. During Pre-Commissioning/construction multiple wildlife monitors will be present at both access road and well site. During Commissioning/Operations the Safety/Environmental roles will include Wildlife Monitoring responsibilities. During annual reviews of the WMMP, IESPL will engage the WMMP Review Committee if the roles of Wildlife Monitors evolve.

Wildlife Monitors are responsible for keeping wildlife safe from the Project and the Project staff safe from wildlife. They are charged with leading any deliberate and approved interactions with wildlife to decrease risks to that wildlife. Monitors participate in the education and training of Project staff regarding wildlife observations, interactions, and reporting. Wildlife Monitors are able to educate, and correct staff behaviour required under this WMMP. Monitors are also responsible, trained and equipped, to respond if Project staff become at risk due to unintentional interactions with wildlife.

The Field Manager, Environment will be leading implementation of the monitoring programs under the WMMP. The Wildlife Monitors field observations and reports will be the basis for management decisions and are a key part of adaptive management. Wildlife Monitors are part of the initial information gathering in support of the Root Cause Analysis prior to applying additional mitigation.

Wildlife Monitors also play a role in educating Project personnel on local wildlife, Project commitments and the WMMP. They participate in communicating wildlife-related risks during orientation and will provide wildlife briefing as part of daily tail-gate meetings, guidance to minimize wildlife encounters, and act as lead responder to all wildlife incidents. The set of Wildlife Monitor responsibilities are described in Section 8.2.

5.0 Monitoring

5.1 Wildlife Mitigation Monitoring

This WMMP includes monitoring programs designed to quantify Project-related effects on wildlife and wildlife habitat and measure the effectiveness of impact mitigation measures.

The goal of the effects monitoring is to measure if the Project is resulting in impacts to wildlife and wildlife habitat. The effects monitoring program focusses on those effect pathways most likely to have impacts to wildlife and wildlife habitat (see Table 6). Wildlife effects monitoring is focussed over the Project footprint and in the LSA. The program will use methods and protocols consistent with those being employed along the ITH so Project monitoring data can be integrated with broader regional monitoring information.

With proposed mitigation, the EISC impact assessment process did not identify significant Project impacts to wildlife and wildlife habitat. The mitigation monitoring program will identify, document and report on proper implementation of mitigation procedures and equipment, the presence of wildlife onsite, risks to wildlife or habitat and human safety, and other wildlife incidents (injury, mortality, wildlife-human interactions) that require a management response.

Where wildlife are likely only present in the LSA seasonally (i.e., caribou in winter, migratory birds in summer) IESPL would like to know when these wildlife are likely to be around the facility. This will allow us to increase awareness of staff during tailgate meetings, and potentially invoke mitigations. IESPL will collaborate with knowledge holders in GNWT-ENR, the Imaryuk Community Monitoring Program and the

Tuk/Inuvik HTC to better understand migration timing. If satellite tags are deployed on caribou moving through the LSA, we will collaborate with ENR to receive updates if/as the herd approaches the facility.

Observations and documentation under the monitoring programs will inform adaptive management and influence operational decisions under this WMMP.

The following measures will be implemented to monitor wildlife during the implementation of the project's activities:

- A trained Wildlife Monitor will be onsite during all project phases, to monitor wildlife and manage any risks.
- Annual monitoring of roadsides for invasive species will be conducted each year of operations and invasive vegetation will be controlled immediately to eliminate seed production and long-term establishment.
- All human/wildlife conflicts and incidents will be reported to ILA and GNWT-ENR and documented.
- All significant wildlife features, such as nests and dens will be documented and reported.
- Operators will implement an Observe, Record and Report policy, encouraging workers to report any activity related to wildlife. The IESPL Field Manager, Environment will be responsible for documenting this information and passing the information on to the appropriate responsible agency.
- Wildlife sightings will be recorded (including GPS location data if possible) to be submitted to the ILA and GNWT-ENR on a quarterly basis.
- IESPL will report all wildlife incidents, including bird collisions. Reporting should include species, location, date, and weather conditions. Collisions or incidents should include a root cause description and immediate consultation with appropriate ILA, territorial (GNWT-ENR) and/or federal (CWS) wildlife authorities will occur. Any key species mortality will be reported to ILA, and GNWT-ENR or CWS.
- Ongoing or multiple mortalities of bird species should be reported to CWS, ILA and GNWT-ENR (i.e., birds regularly striking infrastructure over course of time, or single incident of a large flock of migratory birds striking infrastructure).
- Ongoing monitoring and inspection of site will occur, as determined in consultation with ILA and the IESP WMMP Review Committee and using the Wildlife Monitor. Monitoring may include assessment of disturbance to den by Wildlife Monitor, monitoring den during spring to identify bear or wolverine emergence, etc.
- Monitoring may include assessment of disturbance to nesting sites by Wildlife Monitor, monitoring nesting sites during spring to species, etc.
- If a key wildlife feature of a Species at Risk is discovered, ILA, CWS and GNWT-ENR will be contacted. Activities may be temporarily suspended pending consultation with these agencies. Ongoing monitoring and inspection of key wildlife feature will be conducted, as determined in consultation with ILA, CWS and GNWT-ENR.
- GNWT-ENR, ILA and the HTCs will be contacted if an active grizzly bear or wolverine den is identified within 800 m of Project activities to determine appropriate course of action.

The following table summarizes WMMP monitoring programs for each of the potential effects and mitigation measures:

Table 8: Summary table of WMMP mitigation measures and proposed monitoring programs

Potential Impact to Wildlife	Monitoring Proposal	Metric	Frequency
All Impacts	Monitoring and recording of training, including bear safety training, ERP training, WMMP orientation, and Chemical and Waste Management Plan orientation	Number of trainings executed / number of trainings planned	Monthly
Loss of habitat due to vegetation clearing and gravel fill for the road and pads	Construction Field Inspections	Number of special protection locations identified during Pre-Commissioning survey	One month before starting of project's Pre-Commissioning
Loss of habitat due to permafrost degradation	Ground Temperature Monitoring	Temperature by thermistor	Quarterly
Risk of injury or mortality due to accidental destruction of bird nests, eggs, or young during operations	Reporting of off-site activities	Number of off-site activities during bird season	Weekly during bird season
Degradation of wildlife habitat due to possible soil erosion	Drainage monitoring	Evidence of erosion or ponding or plugged culverts	Seasonal; Daily during spring freshet/melt
Degradation of wildlife habitat due to possible particulate matter (dust) emissions from traffic	Ambient Air Monitoring	Gravity flow dust collectors in three "bird cage" collection points	24/7; collected monthly
Wildlife habitat pollution due to fuel and/or chemicals spills	Spill Reporting (NWT Regulation)	Volume, type, and location of spill over 5L; number of affected animals	By incident
Wildlife or habitat disruption due to fire, explosion, or blowout.	Incident Reporting (see ERP)	See ERP	By incident
Sensory disturbance related to lighting, noise, traffic, physical barriers, and vibration increased levels due to use of equipment (functional habitat loss)	Survey of denning locations in the Project LSA	Number of bear and/or wolverine dens in the LSA	Annually in early winter
	Noise monitoring	Noise (dB) readings from 1m, 25, 100m and 1km from facilities	Quarterly
	Digital light Intensity monitoring	Lux (luminous flux per meter)	Monthly in winter
Wildlife attraction due to light, noise and/or waste	Wildlife Sightings	Number and variety of wildlife sightings near the facility and access road	Tally weekly

Potential Impact to Wildlife	Monitoring Proposal	Metric	Frequency
Management and use of wildlife deterrents	Operational Shutdowns	The number of operational shutdowns and length of each shutdown	Tally quarterly
Use of Wildlife Deterrents	Bear/wolverine/fox deterrent use	Number of bear sprays, bear noise makers and/or shots fired	Tally weekly
Housekeeping and waste management	Technical inspections to identify and confirm cleanliness in sites of waste disposal, specifically where wildlife are observed.	Number of sites with attracting waste or materials / number of sites of waste storage	Daily
Wildlife strikes due to Project vehicle traffic on the Access Road and ITH	Wildlife Strike Reports	Number, location, and type of wildlife (GNWT-ENR and ILA)	By incident
	Speed Monitoring	To be determined	Tally Weekly
Birds or small animals attempting to nest in equipment.	Nest Count	Number of nests on facility footprint	Tally weekly during bird season
Increased access to area for hunters.	Hunter Use	Number of hunters observed crossing the Access Road or entering the site.	Tally Weekly

5.2 Inspection Frequency

During site works construction, well workover and commissioning, Prime Contractors will employ qualified health, safety, and environment (HSE) inspectors to ensure a high standard of safety and environmental protection on site. Key to this team will be a trained Wildlife Monitor.

Environmental aspects require inspection on a frequent basis. This will assist in determining any environmental effects resulting from Project activities and document the degree of compliance. The frequency of inspection will depend on the activities and their inherent environmental risk with respect to applicable environmental aspects. It can be continuously monitored or periodically inspected.

Monitoring frequencies include:

- Continuous surveillance of possible wildlife occurrence in operative locations
- Daily inspections of standard operating procedures (SOPs)
- Weekly inspections of infrastructure, must be properly designed to avoid attraction
- Monthly inspections of natural surroundings to monitor wildlife occurrence in the vicinities
- Annual inspections of caribou migrations, bear denning sites or bird nesting areas
- Upon incident, required inspection for each incident

The above is specific for pre-commissioning, well workover, and commissioning. Monitoring and inspections frequency may be refined once the Project enters the operation phase to reflect the changed state of the site and the longevity of the Project.

5.3 Supporting Documents and Protocols from Other Monitoring Plans

Contractors and workers will be monitored by on-site Prime Contractor's HSE representative for the purpose of documenting conformance and continual improvement. This is accomplished by each contractor having a representative responsible for monitoring and reporting, using checklists and reporting templates, and reporting back to the Prime Contractor's HSE Specialist about possible environmental effects.

The Prime Contractor will work with other contractors or suppliers to ensure compliance. Should any of the Contractors identify a non-compliance or non-conformance, the expectation is for Contractor's HSE Lead and the Prime Contractor to work together to correct this non-compliance or non-conformance while also identifying preventative action(s), recording the non-compliance or non-conformance, and recommending a corrective action plan. Contractors together with Prime Contractor will ensure the system is working properly and all efforts are made to minimize adverse effects to the environment. This is made possible by the method of monitoring, reporting, and continual improvement.

During Project Operations, the Field Manager, Environment will provide oversight to monitoring programs.

5.4 Project Footprint Size Reporting

The footprint of the Project includes on-site gravel pads and the access road. This footprint will be established during Pre-Commissioning and will be reported to ILA and ENR. The Project footprint is not expected to increase during the 50+ years of Project Operations.

6.0 Adaptive Management

This section describes the operational linkages between potential Project impacts, monitoring program results and management responses. It identifies thresholds for actions, the actions to be taken and who is responsible of those actions. It also identifies some initial options that might improve monitoring protocols and mitigation measures.

6.1 Management Review Process

IESPL will annually conduct a review of its IESP Integrated Management System, including the WMMP, to evaluate the system's continuing suitability, adequacy, and effectiveness.

Adaptive management decisions for the IESP will be informed by the IESP WMMP Review Committee including representation from:

- Inuvialuit Game Council
- Tuktoyaktuk Hunters and Trappers Committee
- Inuvik Hunters and Trappers Committee
- Wildlife Management Advisory Council (NWT)
- Government of the Northwest Territories, Environment and Natural Resources
- Inuvialuit Energy Security Project Ltd. (Chair)

At least annually, IESPL will convene the IESP WMMP Review Committee to review monitoring results and mitigation outcomes and allow for discussions of adaptive management actions related to the Project.

The management review will include consideration of:

1. the status of actions from previous management reviews
2. changes in:
 - a. external and internal issues that are relevant to the WMMP
 - b. the needs and expectations of interested parties, including compliance obligations
 - c. operational activities
 - d. risks and opportunities
3. the extent to which the WMMP objectives have been achieved
4. information on performance, including trends in:
 - a. nonconformities and corrective actions
 - b. monitoring and measurement results
 - c. fulfilment of its compliance obligations
 - d. audit results
5. adequacy of resources
6. relevant communication(s) from interested parties, including complaints
7. opportunities for continual improvement.

6.2 Adaptive Management Process

Adaptive management is a systematic process for continually improving management policies and practices by learning from the outcomes of operational programs. The term is commonly thought of as “learning by doing” (GNWT 2014).

The IESP WMMP Review Committee is intended to collectively inform adaptive management decisions, with feedback from the Wildlife Monitor and/or ILA and/or GNWT-ENR and/or CWS, influencing how the mitigation measures included in the WMMP may be modified to better protect personnel, wildlife, and wildlife habitat.

IESPL has identified potential impacts that could benefit from adaptive management. The table below identifies the impacts, the monitoring criteria, and the thresholds for actions. Actions are prescribed to specific roles and a suite of mitigation measures are outlined that could be employed to decrease future impacts.

Table 9: Adaptive management for project impacts on wildlife

Impact or Condition	Measurement and Criteria	Threshold	Action	Potential Mitigations to be Applied to Operations
Caribou mortality on access road, or ITH, because of a collision with Project traffic.	Number of Project traffic collisions with caribou	Each mortality is investigated immediately.	Field Manager, Environment together with the Wildlife Monitor and GNWT-ENR to investigate factors influencing and/or potential cause(s) of the collision. Field Manager, Environment to complete a Root Cause Analysis, prepare mitigation options to address the cause and submit them to the IESP WMMP Review Committee for consideration.	Increased signage when caribou present Decreased speed limits when caribou present Increased frequency of Wildlife Monitor reconnaissance in the LSA when caribou present Increased communication with GNWT-ENR when collared caribou approach the LSA. Re-configure berms (decrease height or increase frequency of breaks) created by access road snow plowing Use of vehicle convoys and/or pilot cars on access road

Impact or Condition	Measurement and Criteria	Threshold	Action	Potential Mitigations to be Applied to Operations
Caribou presence increasing risk of injury or mortality	Number of caribou observed within 500m of access road	A group of >6 individuals for more than 8 hours	Field Manager, Environment together with the Wildlife Monitor to communicate presence of caribou to GNWT-ENR and decide if additional mitigation is required	Temporary construction or operations suspensions if deemed necessary to protect caribou from potential disturbances. If caribou appear likely to remain in the site area the Wildlife Monitor may gently encourage individual or small numbers of caribou to move away from the area using methods pre-approved by ILA and GNWT-ENR
Wildlife (Species of Management Concern) attraction, interaction at site and use of wildlife deterrents	Destruction of wildlife at site	Each mortality is investigated immediately.	Field Manager, Environment together with the Wildlife Monitor and GNWT-ENR to investigate related factors and/or potential cause(s) of the attraction. Field Manager, Environment to complete a Root Cause Analysis, prepare mitigation options to address the cause and submit them to the IESP WMMP Review Committee for consideration.	Change waste management equipment Change waste management procedures Add additional specific fencing or barriers Manage sensory attractants Introduce sensory deterrents

Impact or Condition	Measurement and Criteria	Threshold	Action	Potential Mitigations to be Applied to Operations
Disturbance of denning Grizzly Bear or wolverine	Observation of active den or animal within 800m of Project infrastructure during winter	Actions taken immediately.	Follow IESP Bear Encounter Protocol. Activities in the area will be suspended and an 800m exclusion zone established. Field Manager, Environment to investigate details of the event and immediate provide to GNWT-ENR, WMAC NWT and HTC's.	Change timing and/or frequency of denning surveys over high-quality denning habitat the subsequent fall/early winter Consider denning deterrents in subsequent years
Decrease in local habitat quality due to dust from the access road	Dust collectors exceed recommended limits	Two exceedances of (Alberta Ambient Air Quality Objectives).	Field Manager, Environment together with the Wildlife Monitor investigate context of the exceedances. Take mitigative actions and report back to IESP WMMP Review Committee	Increased frequency of application of dust control measures Application of additional dust suppressants (e.g., Calcium Chloride) Decreased seasonal speed limits

7.0 Reporting Protocols

7.1 Reporting Structure

Table 10 provides the reporting structure that will be followed for all matters related to wildlife and the WMMP during the Project. Observations and reporting escalated from the bottom to the top of the table.

Table 10: Process and escalation of wildlife- and WMMP-related reporting

Phase 1: Pre-Commissioning Phase	Phase 2: Operations Phase
IESPL	IESPL Board of Directors
IESPL Senior Management	IESPL Senior Management
Prime Contractor	Regional Manager
On-Site HSE Coordinator	Field Manager, Environment
Wildlife Monitor	Wildlife Monitor

Phase 1: Pre-Commissioning Phase	Phase 2: Operations Phase
All Other Personnel	All Other Personnel

7.2 Reporting Protocol

During construction of site works, well workover and commissioning, the Wildlife Monitor will complete a daily Wildlife Sighting Form (See Appendix C, Attachment 3). This form will include information reported on wildlife sighting form(s) from that day.

If wildlife encounters occur that involve injury, mortality, or threats to personnel the events of the encounter will be recorded on a Wildlife Incident Form. ILA and GNWT-ENR will also be notified of the incident as soon as possible. Where adaptive management thresholds are exceeded, appropriate actions will be taken.

During construction of site works, well workover and commissioning, all wildlife records will be prepared and completed by the Wildlife Monitor. At the end of each week, the Wildlife Monitor will prepare a weekly report summarizing the information collected during the week. This report will be provided to the ILA and IESPL.

During operations, all wildlife records will be prepared and completed by the Wildlife Monitor. At the end of each week, the Wildlife Monitor will prepare a weekly report summarizing the information collected during the week. This report will be provided to the Field Manager, Environment, and the ILA. The Field Manager, Environment will ensure that records are maintained according to the IESP document control procedures.

In the event of a grizzly bear encounter, the Wildlife Monitor will follow the IESP Bear Encounter Protocol. This protocol describes the roles, responsibilities, and mitigations for bear encounter scenarios. A Bear Report Checklist accompanies the guidelines and will be completed by the Wildlife Monitor and GNWT-ENR will be contacted. The incident, and use of any deterrent, will be reported to ILA and GNWT- ENR. Reporting templates for bear encounters are in Appendix C.

After Pre-Commissioning has been completed, IESPL will work with the Wildlife Monitor to prepare a Pre-Commissioning Wildlife Monitoring Report which describes the work completed, any work stoppages, and observations on the success/failure of mitigation measures from the WMMP, and any effects to wildlife. The report will also summarize the daily reports.

To ensure that the Integrated Management System (IMS) is working, Contractors will be required to report any findings, non-compliances and non-conformances, and self-created corrective action plans in a non-compliances and non-conformance report. The expectation is to have Contractors forward all reports, including checklists and inspections to the Wildlife Monitor per the reporting requirements.

The following table summarizes the reporting actions to be taken:

Table 11: Where to submit data and WMMP summary reports

Information Type	Where to submit	Timing / Frequency
Wildlife incidents	Wildlife Monitor will report to IESPL and ILA. IESPL will notify THTC, Regional GNWT-ENR office.	Immediately
Wildlife related findings, non-compliances, and non-conformances	Contractors and Operators will report any wildlife related concerns to the Wildlife Monitor who will forward to ILA and IESPL. IESPL will notify THTC and GNWT-ENR.	Daily
Wildlife monitor form	Notify the On-site HSE Coordinator (Pre-Commissioning), or Field Manager, Environment (Operations) if any SOMC is observed. If personnel may be at risk consult with THTC, ILA and GNWT-ENR	Daily
Wildlife weekly report	Inuvialuit Land Administration (ILA) will prepare for IESPL	Weekly
Wildlife sightings during construction	ILA, IESPL. IESPL will ensure report goes to ENR Wildlife Management Information System (WMIS)	After pre-commissioning has been completed
Wildlife sightings during operations	ILA, IESPL. IESPL will ensure report goes to ENR Wildlife Management Information System (WMIS)	Annually during operations
WMMP Summary Report	To IESPL and ILA. IESPL will forward to: GNWT-ENR Regional office GNWT-ENR Wildlife Division HQ CIMP Discovery Portal: http://nwtdiscoveryportal.enr.gov.nt.ca/geoportals/catalog/main/home.page	After pre-commissioning has been completed; and annually during operations

8.0 Roles and Responsibilities

8.1 IESPL and IESP Senior Management Leadership Responsibilities

IESP Senior Management are responsible for setting the broad culture, behaviour, and resources in support of commitments under the IESP WMMP. IESPL and the IESP Board of Directors provide ultimate oversight.

- Are responsible and accountable for the prevention of work-related injury and illnesses and shall provide a safe and healthy workplace environment.
- Ensure that the Corporate Policy and related IESP Integrated Management System (IMS) objectives are established and are compatible with the strategic direction of the organization.
- Ensure the integration of the IESP IMS requirements into the organization's business processes.
- Ensure that the resources needed to establish, implement, maintain, and improve the IMS, including the WMMP, are available.

- Communicate the importance of effective IMS management and of meeting the IESP IMS requirements, including WMMP.
- Ensure that the IESP IMS achieves its intended outcome(s).
- Directs and supports persons to contribute to the effectiveness of the IESP IMS.
- Ensure and promote continual improvement of corporate systems, plans and procedures.
- Ensure the organization establishes and implements a process(s) for active involvement and participation of workers.
- Support the establishment and functioning of IESP IMS committees, including the WMMP Review Committee.
- Provide appropriate and well-maintained equipment for the job.
- Ensure training needs are identified, met, and maintained.

8.2 Site Management Responsibilities

Management on-site, led by the Regional Manager during Operations, is responsible for providing and supporting on-site conditions to successfully implement the IESP WMMP. This includes on-site WMMP management led by the Field Manager, Environment.

- Provide resources and direction to make sure employees are competent, properly trained and realize the level of performance that is expected of them.
- Ensure accidents and incidents are reported and investigated and corrective actions are taken.
- Ensure unsafe conditions and behaviours are corrected immediately.
- Ensure only safe work practices are used.
- Ensure regulatory requirements are met.
- Ensure hazards are identified, if possible, removed and otherwise a control plan in place.
- Ensure workers are aware of the workers' roles and responsibilities.
- Ensure training needs are identified and met.
- Ensure that workers have the appropriate training and credentials for the tasks they are required to perform.
- Ensure that the WMMP and all applicable job procedures are reviewed with all new employees.
- Encourage employees to provide input into IESP plans and procedure development and maintenance.
- Encourage employees to report every hazard, accident, injury, incident, or nonconformity.
- Correct unsafe work practices, conditions, or activities as soon as they are noticed or identified.
- Lead WMMP implementation

- Lead the drafting of Project milestone and annual WMMP summary reports with support from Wildlife Monitors (see Section 7.2)
- Lead the drafting of root cause reporting for wildlife incidents

8.3 Wildlife Monitor Responsibilities

The Wildlife Monitor is the on-site resource dedicated to observing, monitoring, recording and managing Project interactions with wildlife and wildlife habitat. They are involved in both education, correction and evolution of the wildlife management processes related to the IESP.

- Be familiar with the EPP and WMMP as well as applicable legislation.
- Be knowledgeable of corporate/project commitments with respect to wildlife and wildlife habitat and mitigation.
- Be knowledgeable of government regulations pertaining to wildlife.
- Wildlife Monitors retained for the project will have undergone training specific to monitoring and reporting for this project.
- Immediately report to supervisors and ILA any nonconformity with commitments and requirements.
- Be the point of contact for any wildlife observations by project personnel in the Project Area.
- Immediately respond and report to supervisors all bear encounters or sightings.
- Protect yourself, fellow employees, contractors, visitors, and the public during interactions with wildlife.
- Lead any response to wildlife, in consultation with THTC or ENR, include the use of herding, deterrents, or firearms.
- Lead or participate in the field programs for wildlife effects and mitigation monitoring programs in the IESP WMMP, for all phases of the Project.
- Develop and submit daily wildlife-related reporting and contribute to major summary reports (see Section 7.2)
- Participate in communicating wildlife-related risks, responsibilities and responses during orientation and education.

An orientation is required before commencing work at the facility.

- The Wildlife Monitor will also provide wildlife briefing as part of daily tail-gate meetings, guidance to minimize wildlife encounters, and act as lead responder to all wildlife incidents.
- Actively participate in the safety program development and maintenance, specifically the IESP WMMP.

8.4 Worker and Contractor Responsibilities

- Be familiar with the EPP and WMMP as well as applicable legislation.
- Be aware of all corporate and government regulations that pertain to the work being performed.

- Protect yourself, fellow employees, contractors, visitors, and the public.
- Have an orientation before commencing work at the facility.
- Actively participate in the safety program development and maintenance.
- Follow safety standards and safe work procedures set out by IESPL and regulatory bodies.
- Report potential hazards to management.
- Immediately report to supervisors all accidents, incidents, injuries, illnesses, and nonconformities.
- Immediately report to supervisors all bear, wolverine or caribou encounters or sightings.
- Report any incidents, wildlife encounters or sightings to the Wildlife Monitor.
- Participate in training offered by IESPL either on or off the worksite.
- Stop work if it becomes unsafe and report it to your manager.
- Do not work in an unsafe environment or perform unsafe work unless hazards present have been eliminated or mitigated sufficiently.
- Ensure all workers are following standard work procedures.

8.5 Visitors Responsibilities

- Follow all IESPL site-specific rules.
- Sign-in at the facility.
- Only enter the worksite after approval from IESPL operations.
- All visitors who have not been orientated must be continuously escorted.
- Visitors may work at the IESPL monitored plants following an orientation, including the EPP and WMMP.
- Wear proper Personal Protective Equipment. Visitors may be exempt from required PPE if the hazards have been effectively controlled and when accompanied by a designated employee.
- Report any unsafe condition or practice observed.

9.0 IESPL's Commitment

IESPL intends to construct and operate the IESP for 50+ years to provide increased energy security for our shareholders the Inuvialuit, and local communities. We have consulted with individuals, co-management organizations and governments to better understand potential Project effects on wildlife. We are committed to preventing, reducing, and/or mitigating impacts to wildlife and wildlife habitat that could result from the development and operation of the IESP. The IESP WMMP describes mitigation, monitoring and adaptive management processes to help fulfill that commitment. Specific commitments relevant to wildlife are summarized in Appendix B.

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11.0 Glossary

Table 12: Glossary of Terms

Term(s)	Definition
Adaptive Management	The process of decision making in the face of uncertainty or changing project or site conditions, or when new knowledge is gained.
Endangered Species	Wildlife as a species facing imminent extirpation or extinction.

Term(s)	Definition
Environment	The term environment refers to an organisation's natural and human surroundings. For the IESP, this extends from within the organisation itself to the global system, and includes air, water, land, flora, fauna (including people), and natural resources of all kinds.
Environmental Effect or Impact	An environmental effect is a change to the environment that is caused either partly or entirely by one or more environmental aspects. An environmental aspect can have either a direct and decisive effect on the environment or contribute only partially or indirectly to a larger environmental change. In addition, it can have either a beneficial environmental effect or an adverse environmental effect. Environmental effects are sometimes also referred to as environmental impacts.
IESPL Senior Management	Includes President, Vice Presidents, Directors and On-Site Manager
IESP WMMP Review Committee	Includes IESPL Senior Management, Inuvialuit Game Council, Inuvik and Tuktoyaktuk Hunters and Trappers Committees, the NWT Wildlife Management Advisory Council and the GNWT Department of Environment and Natural Resources.
Habitat	The part of the physical environment in which an animal lives and which provides the animal with its basic needs
Species at Risk	A wildlife species listed in the Species at Risk Act (Government of Canada 2002). Species are classified as being extirpated, endangered, threatened, or a special concern.
Threatened Wildlife	A species likely to become endangered if limiting factors are not reversed.
Vulnerable Wildlife	A species particularly sensitive to human activities or natural events. [As used by NatureServe - Vulnerable due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.
Wildlife	The Northwest Territories Wildlife Act defines wildlife as all native and some non-native amphibians, reptiles, birds, mammals that live in NWT.

APPENDICES

APPENDIX A: CCP MAPS

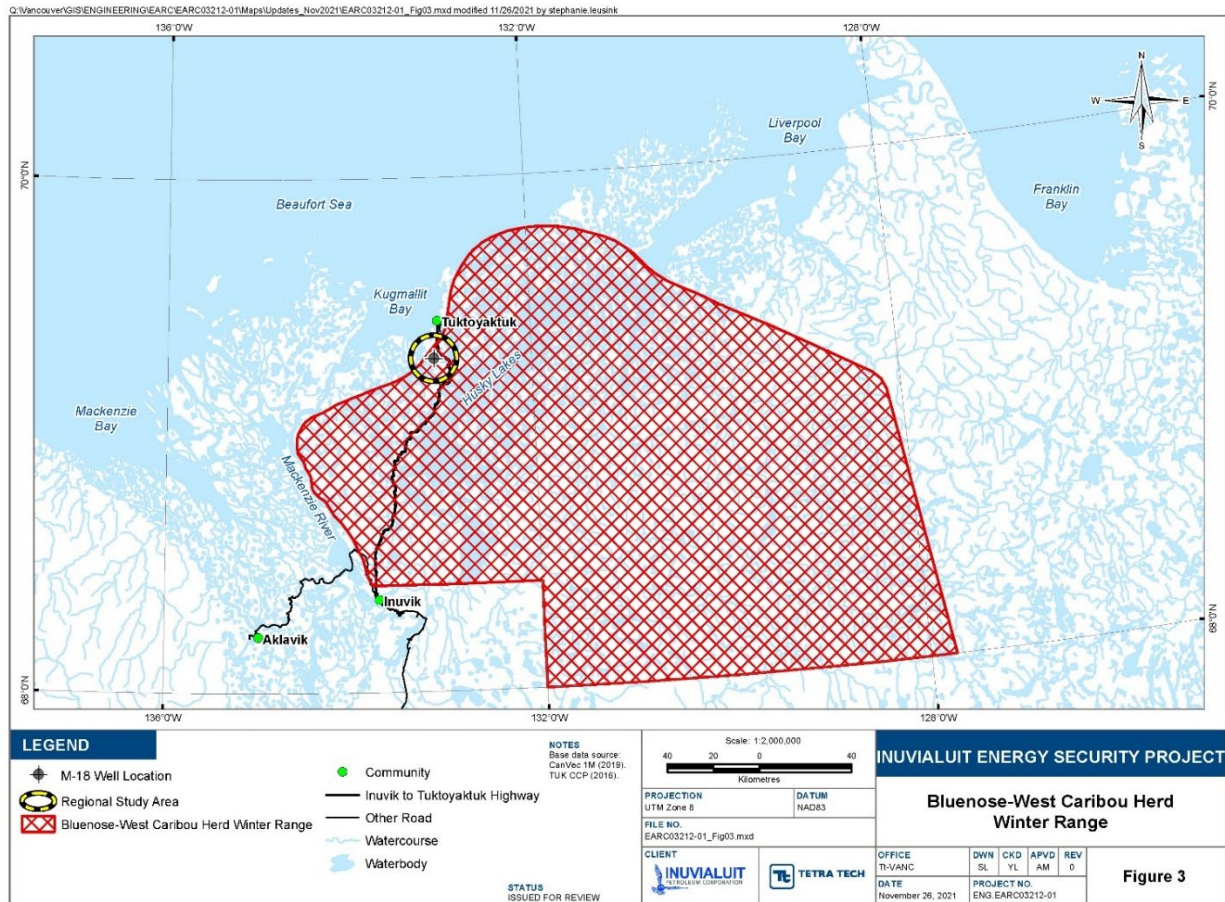


Figure 3: Bluenose-West Caribou Herd winter range, Special Designated Area 701E (from Tuktoyaktuk and Inuvik Community Conservation Plans, 2016)

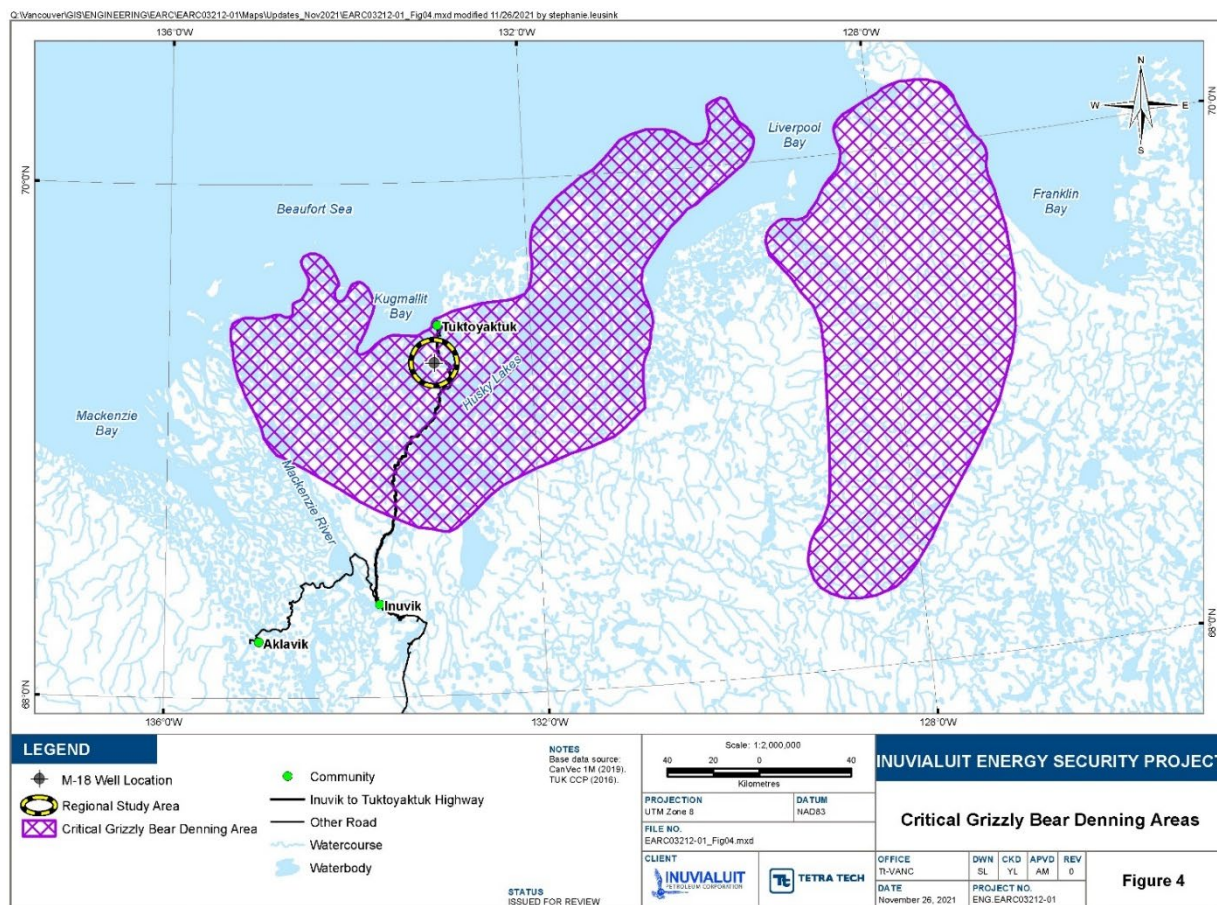


Figure 4: Critical Grizzly Bear Denning Areas, Special Designated Area 322C (from the Tuktoyaktuk Community Conservation Plan, 2016)

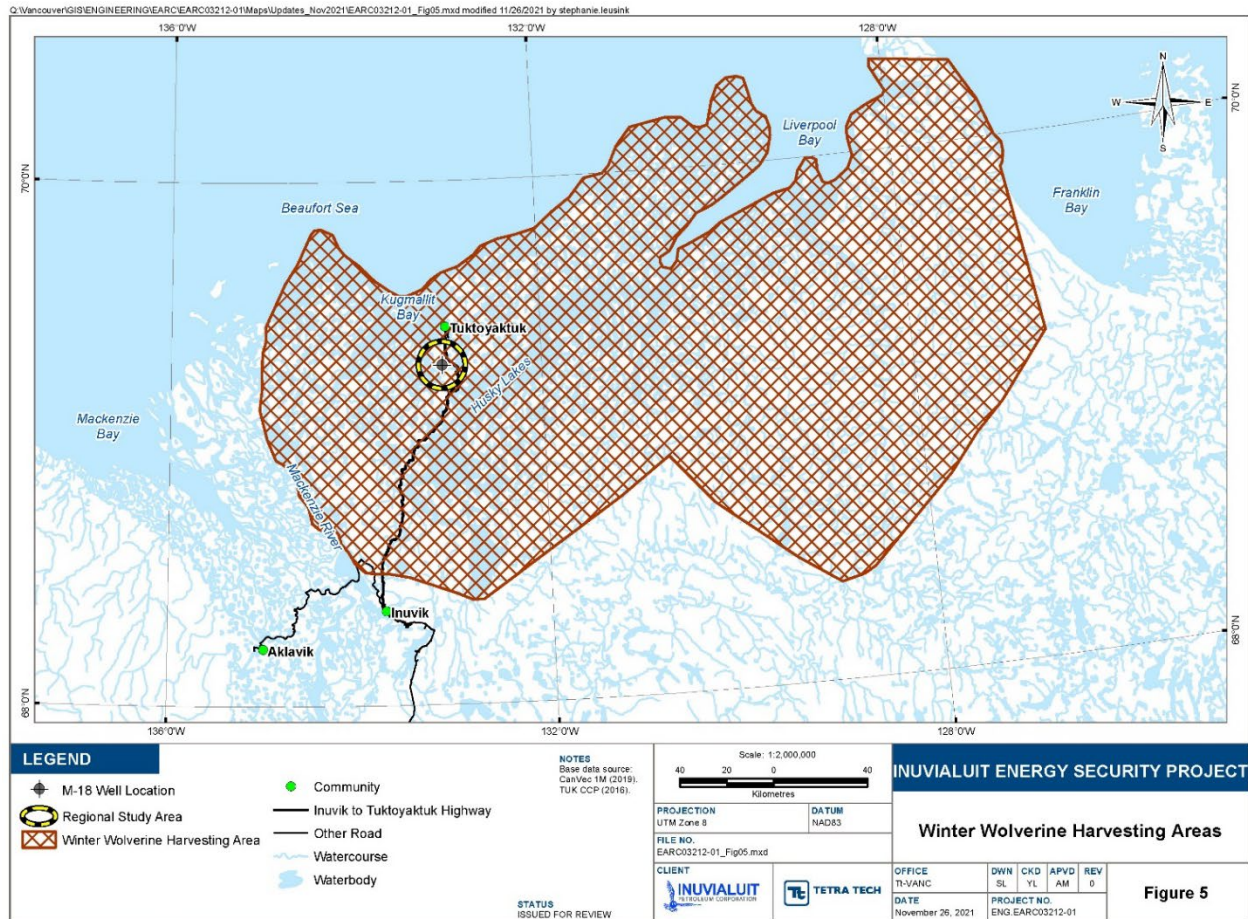


Figure 5: Winter Wolverine Harvesting Areas, Special Designated Area 314C (from the Tuktoyaktuk Community Conservation Plan, 2016)

APPENDIX B: SUMMARY OF MEASURES, CONDITIONS AND DEVELOPER'S COMMITMENTS

The following measures are to be followed to ensure the management and mitigation of potential impacts to wildlife. The primary potential environmental impacts are habitat and sensory disturbance, and collision with traffic which could lead to indirect and direct impacts, including habitat avoidance and wildlife mortality.

The table below presents the mitigation measures which have been developed to reduce or minimize potential impacts on wildlife.

Table 13: Wildlife Mitigation Measures

Wildlife Mitigation Measures	
Potential Effect on Valued Components	Mitigation
General habitat disturbance	<ul style="list-style-type: none"> Access to active pre-commissioning areas will be limited to authorized and trained personnel. Pre-commissioning vehicles and equipment will only be operated on gravel or ice pads or the constructed embankment. During summer, dust will be controlled in accordance with the Guideline for Dust Suppression (GNWT ENR 2013). Clearly delineating (flagging) vegetation clearing limits. Best management practices, contingency plans, mitigation, and emergency response plans will be implemented where necessary to prevent and address leaks and spills (details will be outlined in the Emergency Response Plan). When removing land where there is a slope in the terrain, barriers must be used to prevent sedimentation on water bodies. This will help to maintain the integrity of the aquatic habitat for fish. Ensure all major game trails are free and clear of equipment, brush piles, and so on to maintain their use as movement corridors for wildlife, where practicable. Workers will not walk off-site onto land at any time of year, unless there is a specific requirement, and these activities will be monitored and scheduled to avoid sensitive wildlife periods. Project activities will adhere to wildlife timing windows and setback distances identified in the IESP WMMP Section 4.5, Table 7.
Loss of Habitat	<ul style="list-style-type: none"> Permafrost monitoring will be implemented to avoid possible effects on habitat due to ice melting. Any vegetation clearing necessary for pre-commissioning activities (e.g., to install water crossings), will be conducted during frozen ground conditions, and will be done by hand, where practical. Use previously disturbed areas wherever possible to minimize Project footprint. Including integrating the area for the well workover with the new sump cap, and alignment of the access road along existing trails. A comprehensive logistics plan will be developed to ensure that arriving modules may be placed directly onto piles, thus minimizing the need for large lay-down areas. Conduct annual habitat surveys for species at risk within the LSA. Participate in regional surveys for species at risk in the Project area.

Wildlife Mitigation Measures	
Potential Effect on Valued Components	Mitigation
Sensory Disturbance (blasting)	<ul style="list-style-type: none"> Blasting will be conducted at borrow sources during winter only (November 15 to April 30). Blasting will not be conducted within defined setback distances, unless exceptions have been approved by ILA and ENR and/or CWS, as relevant. Wildlife Monitors will check blast areas for both human and wildlife presence prior to any detonation to ensure the area is clear; and, following detonation they will recheck the surrounding area to determine whether any wildlife have been disturbed.
Sensory Disturbance (noise and light)	<ul style="list-style-type: none"> Noise will be restricted to the immediate vicinity of the work in progress. All equipment will be designed to minimize noise impacts and to meet all regulatory requirements for noise. Specifically, the project is being designed to meet the Alberta Energy Regulator Directive 038: Noise Control (2007). Equipment will be maintained in good repair and provided with appropriate mufflers for all internal combustion engines. Engine breaks will be prohibited in communities and at the project site. Generators and gas processing equipment will be housed in noise-reducing structures. Project activities will adhere to wildlife timing windows and setback distances identified in the IESP WMMP Section 4.5, Table 7. The facility will be designed and constructed utilizing technologies and equipment to mitigate noise from rotating equipment noise sources such as heat exchanger fin fans, compressors, and generator engine exhaust. Additional noise mitigation methods may include selection of lower noise fan designs with slower speeds, sound baffling systems, perforated wall panels for compressor buildings, and use of high-grade mufflers for generator engine exhaust. Lighting will be sufficient to meet the demands of the construction activity with minimal spillage, reflectivity or spread to areas outside of the requirement zone or to the night sky. Lighting will use spot optics with precise beam angles when practicable to illuminate only the required area. Automate lighting systems where feasible with timers and sensors to respond to reduced / increased lighting requirements as needed. Utilize digital lighting systems where practicable combining solid-state lighting (SSL) with smart controls. Utilize full cutoff fixtures with light shields to reduce contribution to sky glow. Install motion or other types of sensors in outdoor areas where access is required on a minimal or indeterminate basis (e.g. access gates and limited use roadways / passages / corridors).

Wildlife Mitigation Measures	
Potential Effect on Valued Components	Mitigation
Disturbance of caribou – habitat avoidance or alienation	<ul style="list-style-type: none"> During Pre-Commissioning Wildlife Monitors will scout ahead of equipment to avoid disturbing caribou. If caribou are at the Project site when personnel arrive, work will not commence until the caribou move farther than 500 m away If caribou approach the site when work is underway, the Wildlife Monitor will be notified immediately, and personnel alerted both on site and along the access road. Work may continue, but caribou numbers and distances are monitored, caribou are not approached, and consideration will be given to implementing additional mitigation measures like lower speed limits, additional signage etc. Work continues unless the caribou approach in such numbers that they are at risk. Caribou should only be deterred from the Project area if there is a risk of injury to them or if their presence will impede project operations after waiting for them to move away of their own accord for 90 minutes. The Wildlife Monitor will lead any deterrence measures to gently encourage the caribou to move away from the area using methods pre-approved by ENR. Should caribou populations or range use change over the life of the Project, the WMMP Review Committee will provide input into revisions of caribou hazard management. Should a caribou-vehicle collision occur, IESPL will immediately follow reporting procedures and initiate adaptive management actions to understand the cause of the collision and suitable mitigation (Section 6.2). Consistent with the Wildlife Act, IESPL will report any wildlife-vehicle collisions with caribou to GNWT-ENR within 24 hours.
Disturbance to denning bears or wolverines – interruption of hibernation	<ul style="list-style-type: none"> Prior to winter construction each year, fall surveys will be conducted to locate active and suspected active bear dens within setback distances (800 m) of areas scheduled for winter work. For any proposed winter construction, these surveys will need to be conducted early enough in the fall that snow will not have obscured the bear dens. ILA will be contacted with regards to conducting these surveys. If an active grizzly bear or wolverine den is observed during winter operations (October 1 – May 30) within 800 m of construction activity, activities will be immediately suspended within this exclusion zone and ILA and GNWT-ENR will be contacted to determine appropriate mitigation. Personnel are to maintain a minimum distance of 800 m between sighted and/or known grizzly bear or wolverine den sites.

Wildlife Mitigation Measures	
Potential Effect on Valued Components	Mitigation
Interactions between wildlife and workers/equipment - incidents or mortality	<ul style="list-style-type: none"> Wildlife monitors will be on-site whenever work is being undertaken, during all phases of the Project to monitor wildlife and manage risks. No feeding, harassing, or approaching wildlife will be permitted. Project activities will adhere to wildlife timing windows and setback distances identified in the IESP WMMP Section 4.5, Table 7. Wildlife will have the right-of-way at all times. The presence of wildlife in active areas will be communicated to other drivers. Speed limits will be in place that will reflect visibility and driving conditions and vehicles will stop or reduce speeds when wildlife is on the road or near the road, respectively. The Wildlife Monitor and designated, trained staff will have access to wildlife deterrent materials including bear spray, cracker shells, and a 12-gauge shotgun with slugs. The use of any deterrent method will be reported to ILA. All work crews will have at least one can of bear spray on their person while bears are active. Snow will be removed around buildings and work areas to increase visibility. Infrastructure will be designed to exclude wildlife. Options including installing adequate lighting, motion-activated lighting, incorporating proper waste management, cleaning, and maintaining the kitchen and dining area, and wildlife detection. Wildlife observations by project personnel will be reported to a Project Wildlife Monitor. Any wildlife mortalities will be reported to ILA and GNWT-ENR by the Wildlife Monitor or Lead Operator. The destruction of wildlife will be avoided unless a Wildlife Monitor determines that no other recourse is possible or if danger to human life or property is imminent (in accordance with Sections 55-58 of the NWT Wildlife Act (2014)). Such destruction will be reported to ILA, ENR and/or CWS, and appropriate compensation will be determined for species with hunting quotas as agreed to in advance by HTC's in consultation with ILA. Wildlife observations by project personnel will be reported to a Wildlife Monitor. A list of species requiring real time reporting will be used to allow the Wildlife Monitor to provide direction on pre-commissioning activities. Wildlife Monitors may recommend avoidance of areas with sensitive wildlife activity or temporary work stoppages should observations indicate a need (e.g. when large numbers of caribou or other wildlife are in the vicinity of the road alignment or winter access routes). Wildlife Monitors will communicate daily observations to the Field Manager, Environment. Observations are not to be made available to other project personnel or the public. Interactions with other land users will be recorded and observations of poaching or evidence of illegal hunting/trapping must be reported to ILA and ENR. No hunting or trapping will be permitted by project personnel. With the exception of designated project Wildlife Monitors, project personnel are prohibited from keeping personal firearms in camps or project contractor vehicles. This firearms restriction applies to the entire length of the ITH, the Local Study Area, and any other project-related facilities or areas.

Wildlife Mitigation Measures	
Potential Effect on Valued Components	Mitigation
Traffic related disturbance, dust creation or collisions	<ul style="list-style-type: none"> The location of the ITH interchange and the access road will allow for long views. The access road will be a private road, with a gate at the ITH and signage indicating that the road is for private use only. Access to the Project access road and sites will be limited to authorized personnel. Construction vehicles will only be operated on designated routes. During operations, traffic is restricted to the gravel access road and pads. All fuel will be stored at least 100 m from waterbodies; refueling and servicing of machinery and storage of fuel and other materials for the machinery will occur a minimum of 100 m away from any waterbody. All refueling and fuel transfer will be conducted in accordance with the Safe Work Practices for Fueling Equipment and Handling Petroleum. Equipment used in or near water will be clean and free of oil, grease or other deleterious substances, and will be required to use drip pans and drip trays placed under all equipment while not in use. All equipment will be inspected regularly to ensure it is free of leaks. Dust will be controlled in accordance with the Guideline for Dust Suppression (GNWT ENR 2013). Vehicle speeds will be kept to less than 60 km/h during summer to minimize the transfer of dust from road construction areas to the surrounding vegetation. Additional speed limits and dust suppression measures may be employed during construction and summer operation activities to minimize dust. Follow the GNWT's Guideline for Dust Suppression (2013) during both construction and operation phases. Ambient (static) air quality stations will be installed to capture particulates for analysis. We will adapt management as information is gathered during operations. During pre-commissioning, vehicle movements will be planned to minimize trips and reduce the potential disturbance of wildlife. These strategies will include the use of vans or extended cab pick-up trucks to transport workers. When possible, wildlife will be given the right-of-way, including but not limited to vehicle, aircraft, and pedestrian travel. Wildlife showing normal feeding behavior and no aggression toward humans will be left alone, unless there is a human safety issue.

Wildlife Mitigation Measures	
Potential Effect on Valued Components	Mitigation
Spills or leaks may harm wildlife (e.g., caribou, grizzly bears, wolverines, etc.) and wildlife habitat	<ul style="list-style-type: none"> The plant will be designed to prevent any spills. All storage tanks containing products that are liquid at atmospheric temperature and pressure will be double walled. Loading and unloading areas will utilize capture trays. Spill response equipment will be readily available at the site. A spill contingency plan will be implemented to prevent leaks and spills. In the event of a spill, all efforts will be made to properly contain and manage the spill. All spills greater than 5 L will be reported to the GNWT Spill Line, ILA, and other appropriate agencies. The spill area will be monitored closely and appropriate deterrents (e.g., warning noises, flagging) employed to discourage grizzly bears or other wildlife from entering the affected area.
Wildlife attracted to camp/work areas and waste products – incidents and mortality	<ul style="list-style-type: none"> Ensure proper storage, transportation, and disposal of wastes to avoid attracting carnivores (e.g., bears, wolverines, foxes, etc.) to work site. Domestic waste will be stored in bear proof containers and hauled out weekly to Tuktoyaktuk for disposal. No waste will be incinerated on- or off-site. Wildlife Monitors will communicate bear sightings. Personnel will have bear safety training. Any wildlife mortalities will be reported to ILA and GNWT-ENR by the Wildlife Monitor or Filed Manager, Environment. Follow the Chemical and Waste Management Plan. The processing facilities will be enclosed in a sprung structure and fencing to minimise interactions with wildlife. Fencing will be installed in the plant operating area to keep wildlife out and additional fencing or barriers will be considered around areas that might attract wildlife Snow will be removed around buildings to increase visibility. Adequate lighting will be installed in areas where it is essential to detect bears, wolverines, foxes or other wildlife that may be in the vicinity. Infrastructure design features identified through public input, community consultation, and/or adaptive management to prevent animal attraction or disturbance will be incorporated to the extent possible. Waste removal crews will be sent out to areas surrounding the site before the arrival of breeding birds in the spring to collect and properly dispose of any waste material that has been blown off- site.

Wildlife Mitigation Measures	
Potential Effect on Valued Components	Mitigation
Encroachment on habitat and/or nesting sites	<ul style="list-style-type: none"> There are currently no Pre-Commissioning activities planned during bird nesting and breeding season. Should any activities, including vegetation clearing, be required during the breeding bird season (generally May 15 – August 15), pre-disturbance surveys will be conducted no more than four days prior to the commencement of activity; these will focus on the suitable habitats and immediately adjacent habitats. If an active nest is found, setback distances will be applied and maintained until the nest is no longer active, unless exceptions are approved in consultation with ILA and ENR and/or Canadian Wildlife Service (CWS). Clearing activities that need to occur during bird breeding periods will incorporate measures to protect birds and their eggs as per federal and territorial regulations. Use previously disturbed areas wherever possible to minimize Project footprint. Including integrating the area for the well workover with the new sump cap, and alignment of the access road along existing trails. Any vegetation clearing necessary for watercourse crossings will be conducted during frozen ground conditions, and will be done by hand, where practical. Project activities will adhere to wildlife timing windows and setback distances identified in the IESP WMMP Section 4.5, Table 7. Timing windows and setbacks restrictions Workers will not walk off-site onto the land at any time of year, unless there is an authorization (e.g., waste clean-up, emergency). Minimum snow cover requirements will help to mitigate possible effects to low-lying vegetation.

APPENDIX C: WMMP PROCEDURES AND FORMS

LIST OF ATTACHMENTS

- 1 IESP Bear Encounter Protocol – Early Site Works and Construction Phases
- 2 Bear Encounter Reporting Form
- 3 Wildlife Sighting Reporting Procedure
- 4 Land User Interaction Reporting Form

ATTACHMENT 1: IESP BEAR ENCOUNTER PROTOCOL – EARLY SITE WORKS AND CONSTRUCTION PHASES

CONTROLLED DOCUMENT

IESP Bear Encounter Protocol – Early Site Works and Construction Phases

Document Number	IESP-HSEQ-EN-PRO-0032
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Document Status	Issued for Use
Document Type	Procedure
Division	Health, Safety, Environment & Quality
Discipline	Environment
Document Owner	Alan MacDonald
Revision Date	2023-09-05
Security Classification	CONTROLLED DOCUMENT

Revision Control Page

Inuvialuit Energy Security Project			
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Division:	HSSEQ	Effective Date:	July 1, 2021
Prepared by:	Alan MacDonald	Location:	IESP Project Area
Subject:	IESP Protocol	Project Phase:	Pre-Construction
Revision:	Issued for Use	Replaces:	n/a
Reviewed by:	IESP WMMP Review Committee		

Revision Status				Approval	
Rev.	Rev. Date	Document Status	Originator	Reviewer(s)	Approver
1.0	2021-07-01	Issued for Use	IESP	IESP	Alan MacDonald
1.1	2023-09-05	Issued for Use	IESP	IESP	AM
	Click or tap to enter a date.	Choose an item.			

Summary of Changes					
Rev.	Date	Section	Summary of Changes	Prepared By	Change(s) App'd By
1.1	2023-09-05	ALL	Updating procedure with latest IESP Document Control approved formatting and protocols	TWK	AM

Abbreviations, Acronyms, and Definitions

Abbreviations/Acronyms	Definition
CWS	Canadian Wildlife Services
ECC	Environment and Climate Change (formerly Environment and Natural Resources (ENR))
HTCs	Hunters and Trappers Committees, includes the Tuktoyaktuk Hunters and Trappers Committee and Inuvik Hunters and Trappers Committee
IESP	Inuvialuit Energy Security Project
IESPL	Inuvialuit Petroleum Corporation
IGC	Inuvialuit Game Council
IHTC	Inuvik Hunters and Trappers Committee
ILA	Inuvialuit Land Administration
ITH	Inuvik-to-Tuktoyaktuk Highway
RRO	Renewable Resources Officer
WM	Wildlife Monitor
WMMP	Wildlife Management and Monitoring Plan
WMAC-NT	Wildlife Management Advisory Council
THTC	Tuktoyaktuk Hunters and Trappers Committee

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3.0	PROTOCOL OVERVIEW	6
4.0	LINE OF REPORTING – ESW AND CONSTRUCTION PHASE	6
5.0	RESPONSE MEASURES FOR BEAR ENCOUNTERS	7

1.0 INTRODUCTION

Commencing in the Fall and Winter of 2021, the Inuvialuit Petroleum Corporation (IESPL) will be constructing civil works to complete a abandoned sump remediation in the area of the TUK M-18 (M-18) wellsite. Civil works will begin with construction of a 4.5km winter access road to the M-18 sump from the Inuvik Tuktoyaktuk Highway (ITH) at approximately KM128+800. Additional work, as outlined in the Inuvialuit Energy Security Project (IESP) Project Description, will follow. This DRAFT protocol has been developed specifically for the IESP, in consultation with GNWT Environment and Natural Resources (ENR), the Inuvialuit Game Council (IGC), and the Wildlife Management Advisory Council (WMAC) NWT. Additional input has been requested from the Inuvik and Tuktoyaktuk Hunters and Trappers Committees (HTCs); and the Inuvialuit Land Administration (ILA).

2.0 REGULATORY CONTEXT

(from Co-Management Plan for Grizzly Bears in the ISR, Yukon and NWT, 1998)

The Hunters and Trappers Committees (HTCs), Inuvialuit Game Council (IGC), Government of Northwest Territories (GNWT), Government of the Yukon Territory (YTG), Canadian Wildlife Service (CWS), and Canadian Heritage/Parks Canada (Parks Canada) co-manage grizzly bear populations in the ISR through consultation with, or direct participation on, the Wildlife Management Advisory Council (WMAC) (NWT) or the Wildlife Management Advisory Council (North Slope). WMAC(NWT) and WMAC (North Slope) are co management boards with members representing the Inuvialuit, NWT or Yukon governments, and Canada. The local/traditional knowledge of the Inuvialuit members is considered in all decisions. The chairs of the WMAC's regularly consult with HTCs and IGC on wildlife management issues. The chairs of wildlife co-management councils or boards for the Inuvialuit (NWT), Gwich'in, Sahtu, and Nunavut land claims meet periodically to discuss management of wildlife populations shared among land claim areas.

In the Northwest Territories (NWT), under Section 52 of the Wildlife Act, and subject to Section 17, “no person shall, unless authorized by a licence or permit to do so, (a) engage in an activity that is likely to result in a significant disturbance to big game or other prescribed wildlife; or (b) unnecessarily chase, fatigue, disturb, torment, or otherwise harass game or other prescribed wildlife.” Further, under Section 51(2) of the Wildlife Act and subject to Section 17, “no person shall, unless authorized by a licence or permit to do so, break into, destroy or damage a den, beaver dam or lodge, muskrat push-up or hibernaculum.” GNWT Environment and Natural Resources (ENR) enforces regulations on wildlife harassment and land use regulations to ensure proper storage of food, disposal of garbage, etc. ENR-Inuvik Region monitors, documents, and investigates problem bear occurrences and kills in the ISR. In the NWT people must report bears that they kill in defense of life or property to ENR.

3.0 PROTOCOL OVERVIEW

This IESP Bear Encounter Protocol provides detailed step-by-step procedures to follow in the event of a bear encounter, as well as contact information for emergencies and reporting of encounters, and a report template based upon GNWT ENR accepted format. It is expected that all personnel involved with the IESP will be trained and familiar with the IESP Bear Encounter Protocol.

Fall bear den surveys and ongoing monitoring within 800 metres of construction activity will be undertaken by Wildlife Monitors, in communication with the THTC, commencing in Fall 2021. The intent of the survey is that any bears attempting to den within the required set-back distances will be encouraged to move away prior to establishing a den to avoid being disturbed by construction activity.

If possible, a disturbed bear that has already established a den should be encouraged and given a chance to return to its den – especially if it is early winter and/or the bear is a female.

Baseline surveys will continue each fall by Wildlife Monitors, in communication with the THTC, in areas of new construction, at borrow sources, and winter access areas during the construction phase of the project. A separate protocol for wildlife encounters, including bear, caribou, birds and wolverine will be developed through a collaborative process prior to commencement of operations, currently expected in Q2 2023.

Grizzly bear hunting in the regional area adjacent to the ITH is conducted under quota. The ITH traverses the Tuktoyaktuk Management Area I/BC/04 as it routes near the IESP. All human-caused mortalities of grizzly bears on the ITH are counted under the quota. We expect that this rule will also apply on the IESP access road and during the Project life. Defence of life or property (DLP) or highway collision mortalities impact hunting opportunities in the communities. Wildlife compensation values will be agreed to with the HTC.

4.0 LINE OF REPORTING – ESW AND CONSTRUCTION PHASE

During construction of site works, the ILA Wildlife Monitor (WM) will be the first line of reporting in the event of a bear encounter or discovery of a bear den. WM's will be trained and prepared to observe, identify, track and/or potentially deter or destroy wildlife to ensure human safety; and to collect observations of other species at risk in the area.

The WM will notify the Site Supervisor and/or on-site HSE Supervisor in the event of a bear encounter or bear den discovery. If the safety of the animal observed, or the safety of pre-commissioning personnel, may be at risk, the WM will react immediately and follow up with ENR later.

All bear encounters or bear den discoveries will be documented on the Bear Encounter Report Template provided. The submission of reports to additional parties will depend on the nature of the bear encounter. An updated and current list of emergency contacts is provided in the IESP IMS.

A Bear Encounter Reporting Form is provided in Attachment 1.

After response protocols are completed, the situation will be reviewed with IESPL, and the Site Supervisor and corrective actions identified. These may include a wide array of actions aimed at avoiding future bear problems and ensuring that all appropriate personnel are made aware of this Protocol and legal obligations. The need for conservation and the vulnerability of bear populations to over harvest will be stressed. IESPL are committed to an adaptive management approach involving all local authorities.

Table 1: Emergency Contacts

EMERGENCY CONTACTS			
IESPL	Travis Balaski	President	Cell: (403) 461-6513
IESPL	Alan MacDonald	Director, Environment, Regulatory and IMS	Cell: (403) 862-4905
Inuvialuit Land Administration	Dean Holman	Environmental Management Coordinator	(867) 777-7009
Tuktoyaktuk HTC	Chair via Verna Storr	THTC Chair	(867) 977-2457
GNWT ENR – Initial Contact	Regular hours	Inuvik Office	(867) 678-6650 FAX (867) 678-6659
GNWT ENR – Initial Contact	After regular hours and weekends	On Call	(867) 678-0289
ENR - Tuktoyaktuk	Scott Lundrigan	Renewable Resource Officer II	(867) 977-2350 Cell (867) 340-0323
RCMP -Tuktoyaktuk			(867) 977-1111
Rosie Ovayuak Health Centre			(867) 977-2321
Tuktoyaktuk Fire Department			(867) 977-2222
ADDITIONAL CONTACTS			

5.0 RESPONSE MEASURES FOR BEAR ENCOUNTERS

Table 2: Response Measures for Bear Encounters

Response Measures for Bear Encounters		
A) SIGHTING - Bear in the general vicinity (>1km)		
Actions		Explanation
1	Assess	Assess people, equipment, and conditions.
2	Make Safe	Ensure your safety and others. Halt work until Wildlife Monitor deters the bear away from the area.
3	Contact	Contact Wildlife Monitor immediately.
4	Follow Directions	Follow directions of the Wildlife Monitor.
5	Report	Use Bear Encounter Report Template.
6	Monitor	Continue to monitor, if necessary.
B) ENCOUNTER - Bear on Site (<1km)		
Actions		Explanation
1	Assess	If safe to do so; assess people, equipment, and conditions; note location, direction of travel and general behaviour of the bear(s).
2	Make Safe	If necessary, stay indoors or in your vehicle. DO NOT APPROACH THE BEAR. Warn others. Keep all doors and windows closed.
3	Contact	Contact Wildlife Monitor immediately.
4	Follow Directions	Follow directions of the Wildlife Monitor. If necessary and safe to do so; continue to monitor the behaviour and movement until either the bear leaves on its own, deterrence is successful, or response personnel arrive.
5	Deter	Wildlife Monitor will lead deterrence procedures as safety allows. If necessary, consult with ENR-Tuktoyaktuk.
6	Report	Wildlife Monitor will fill out Bear Encounter Report Template when safe to do so, within 24 hours.
7	Monitor	Continue to monitor, if necessary.
8	File	Report will be filed with IESPL, ILA and ENR within 24 hours.

C) INJURY – To a bear or bears		
Actions		Explanation
1	As above	Follow B, Steps 1 through 4.
2	Monitor	Wildlife Monitor will assess situation: if bear is mobile, it will be monitored; if bear is immobile and/or cubs are involved, Wildlife Monitor will confer with ENR and take action as agreed by both parties.
3	Report	Wildlife Monitor will fill out Bear Encounter Report Template when safe to do so, within 24 hours.
4	Monitor	Continue to monitor situation, if necessary.
5	File	Report will be filed with IESPL, ILA, and ENR within 24 hours.
6	Follow up	Report will be forwarded by ILA to WMAC-NT, IGC, THTC and IHTC.
D) MORTALITY		
Actions		Explanation
1	As above	Follow B, Steps 1 through 4.
2	Monitor	Wildlife Monitor will assess situation: A bear may be destroyed if human life is in danger or destruction of property is imminent. Consider destruction when deterrent actions have failed, when additional deterrent actions are not possible, and when it is determined that capture and relocation cannot be conducted or is unlikely to be successful.
3	Report	Wildlife Monitor will fill out Bear Encounter Report Template when safe to do so, within 24 hours. Under the NWT Wildlife Act, mortalities must be reported to the appropriate ENR Regional contact listed as soon as is practicable.
4	Handling of the Bear	In some cases, after conferring with ENR, the Wildlife Monitor will: a) Skin the bear leaving the claws and head attached; and b) Preserve the hide by freezing and/or salting it and store it in a cool place. Be generous with the salt.
5	Disposal of the Bear	Wildlife Monitor will turn in the hide, the skull, evidence of sex and any other biological samples requested when filing the report to the nearest ENR Regional office or to an ENR Renewable Resource Officer. As per the NWT Wildlife Act, no person may retain any part of a bear killed in defence of life or property.
6	File	Report will be filed with IESPL, ILA, and ENR within 24 hours.

7	Follow up	Report will be forwarded by ILA to WMAC-NT, IGC, THTC and IHTC.
E) DISTURBANCE OF A BEAR DEN (NO BEARS ENCOUNTERED)		
Actions		Explanation
1	Stop Work	Work in the area must halt. All employees should safely retreat from the area and report the incident to the Site Supervisor and Wildlife Monitor and the appropriate ENR Regional contact listed above for further advice and assistance.
2	Assess	Staff from ENR will be required to assess the den site and may implement measures to ensure both human safety and that the bear(s) remain undisturbed. This may include the establishment of a buffer zone of at least 300 meters around the den.
3	Buffer Zone	Work inside the buffer zone may not be permitted until after den emergence.
F) DISTURBANCE OF A BEAR DEN (bear encountered)		
Actions		Explanation
1	Stop Work	If a bear is located in, at, or near a den site, work in the area must halt. All employees should safely retreat from the area and report the occurrence to the Wildlife Monitor and Site Supervisor immediately. Site Supervisor and WM will contact the ENR RRO in Tuktoyaktuk as soon as possible.
2	Exclusion Zone	The establishment of an 300m exclusion zone would happen immediately.
3	Assess	WM will assess the situation and then the WM and Site Supervisor will call ENR to report and discuss the situation. Each situation will be assessed individually but mitigations include: If the den is in an area that still allows the program to continue, then the exclusion zone will be maintained until the bear emerges in the spring. If the den could result in the halt of part or the entire program, the appropriate HTC(s) would be contacted to discuss options.
4	Contact	Confidentiality of active bear den locations is an important consideration until after emergence in the spring. Based on discussion with ILA, ENR and the HTC(s), an ILA, ENR and HTC member might need to assess the site to determine the measures the Developer will be required to implement to ensure bears are not unduly disturbed.

5	Follow Up	<p>Options to ensure a denning bear is not disturbed include (in order of application/severity):</p> <ul style="list-style-type: none"> • Adjust the access road or camp location to avoid the bear den by 800m • Do not use all or a portion of a granular source for that year of construction in order to avoid the den by 800m • Reduce the size of the exclusion zone and proceed with increased vigilance under direction and overview by the WM • Contact the HTC to preselect potential hunter(s) in case a bear needs to be harvested <p>If a den is located directly on the ROW for the road, and no other mitigations can be applied, the appropriate HTC will select a hunter to harvest the bear(s) in a den. The Developer will compensate the HTC accordingly. As per the NWT Wildlife Act, no person may retain any part of a bear killed in defence of life or property.</p>
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ATTACHMENT 2: BEAR ENCOUNTER REPORTING FORM

CONTROLLED DOCUMENT**Bear Encounter Reporting Form**

Document Number	IESP-HSEQ-EN-FRM-0028
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Division	Health & Safety, Security, Environment & Quality
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Revision Control Page

Revision Status				Approval	
Rev.	Rev. Date	Document Status	Originator	Reviewer(s)	Approver
1.0	2023-06-27	Issued for Use	Karla Langlois	Brian Adeney	AlanMacDonald
	Click or tap to enter a date.	Choose an item.			
	Click or tap to enter a date.	Choose an item.			
	Click or tap to enter a date.	Choose an item.			
	Click or tap to enter a date.	Choose an item.			

Summary of Changes					
Rev.	Date	Section	Summary of Changes	Prepared By	Change(s) App'd By
	Click or tap to enter a date.				
	Click or tap to enter a date.				
	Click or tap to enter a date.				

Bear Encounter Reporting Form

1. Reporting Party Details:				
Name, job title and affiliation:				
Contact Information: (Cell, email)				
Location of Reporting Party:(office, camp, hotel)				
Other on-site Parties Contact information: (wildlife monitors/site supervisor)	Name	Affiliation	Contact Info (cell)	
2. Bear Occurrence Details:				
Date:	Time:	Location: (coordinates, road position (KM post), or facility)		
Type of bear occurrence:	<input type="checkbox"/> sighting	<input type="checkbox"/> encounter	<input type="checkbox"/> den disturbance	<input type="checkbox"/> injury/mortality Ear tag/tattoo #?
	Explain:			
Number of bears:		# of cubs:		
Type:	<input type="checkbox"/> black	<input type="checkbox"/> grizzly	<input type="checkbox"/> unknown	
Sex:	<input type="checkbox"/> male	<input type="checkbox"/> female	<input type="checkbox"/> unknown	
Age Class:	<input type="checkbox"/> cub (<1)	<input type="checkbox"/> juvenile	<input type="checkbox"/> adult	<input type="checkbox"/> unknown
Behaviour:	<input type="checkbox"/> fearful	<input type="checkbox"/> not fearful	<input type="checkbox"/> aggressive	<input type="checkbox"/> other
General Observations:	<input type="checkbox"/> moving toward site	<input type="checkbox"/> moving away from site	<input type="checkbox"/> at site	
Other observations: (i.e. walking, resting, eating, nature of injury, cause of death, den site, den conditions, condition of cubs)	(Provide any Digital Photos to Report)			

Has bear(s) been involved in a previous incident?	No Yes	If yes, explain:		
Did the bear obtain a reward?	No Yes	If yes, explain:		
Any property damage or loss of life?	No Yes	If yes, explain:		
3. Detection/Deterrent:				
Detection system on site:	<input type="checkbox"/> Alarm	<input type="checkbox"/> Dog	<input type="checkbox"/> Motion detector	<input type="checkbox"/> Other:
Deterrence on site:	<input type="checkbox"/> Bear boards	<input type="checkbox"/> Auditory (Yelling/Flares/Alarm/Horn/Bell/ Whistle/Cracker shells)	<input type="checkbox"/> Projectile (Rubber Bullets/Firearms)	
	<input type="checkbox"/> Electric Fence	<input type="checkbox"/> Chased (Dog, vehicle)	<input type="checkbox"/> Other:	
Calibre of Rifle (if used)		Notes:		
Was deterrence used?	No Yes	Explain:		
Was the deterrence successful?	No Yes	Explain:		
Present status of bear with dates:	<input type="checkbox"/> at large	<input type="checkbox"/> captured	<input type="checkbox"/> deterred	<input type="checkbox"/> other
4. Send Copies of this report to:				
Check only those organizations that are required as per Procedure:	<input type="checkbox"/> IESPL PM	<input type="checkbox"/> IESPL DIR, Ops	<input type="checkbox"/> ECC-Inuvik	<input type="checkbox"/> ECC - Tuk
	<input type="checkbox"/> ILA	<input type="checkbox"/> IGC	<input type="checkbox"/> THTC	<input type="checkbox"/> IHTC
	<input type="checkbox"/> WMAC NWT	<input type="checkbox"/> FJMC	<input type="checkbox"/> CWS	<input type="checkbox"/> RCMP
5. Additional Comments:				
	Provide any Digital Photos to Report			

ATTACHMENT 3: WILDLIFE SIGHTING REPORTING FORM

CONTROLLED DOCUMENT

Wildlife Sighting Reporting Form

Document Number	IESP-HSEQ-EN-FRM-0026
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Discipline	Environment Management
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	Click or tap to enter a date.	Choose an item.			
	Click or tap to enter a date.	Choose an item.			
	Click or tap to enter a date.	Choose an item.			
	Click or tap to enter a date.	Choose an item.			

Summary of Changes					
Rev.	Date	Section	Summary of Changes	Prepared By	Change(s) App'd By
	Click or tap to enter a date.				
	Click or tap to enter a date.				
	Click or tap to enter a date.				

Wildlife Sighting Report Form

Date (dd/mm/yyyy): _____ Observer(s): _____

Date	Species	Number	Age/sex	Location (describe)	UTM Coordinates		Notes3	Photo ID
					Easting	Northing		

1. Target species	2. Age	2. Sex	3. Notes (where applicable)
Bears (Grizzly, black, polar) Gray wolf, wolverine Fox (red, arctic) Caribou (barren-ground and woodland) Moose Any migratory birds and owls Any bees Try to take photos	Adult Juvenile Both Unknown Other, specify	Male Female Both Unknown	<ul style="list-style-type: none"> Include type of observation: Sighting-wildlife is observed, Encounter-wildlife or person behaviour changes, Deterrent- deterrent used Any potential attractants in the area Any danger to wildlife or personnel Weather Wildlife behaviour (e.g. aggressive, fleeing, courtship) Indirect evidence of wildlife (e.g. den site, nest, tracks, scat) Pre-commissioning activity and nature of wildlife interaction with people or vehicles Cause of mortality (if observed)
Additional notes (e.g. details on wildlife interactions or response to mitigation):			

ATTACHMENT 4: LAND USER INTERACTION REPORTING FORM

CONTROLLED DOCUMENT**Land User Interaction Reporting Form**

Document Number	IESP-HSEQ-EN-FRM-0025
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Document Status	Issued for Use
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	Click or tap to enter a date.	Choose an item.			
	Click or tap to enter a date.	Choose an item.			
	Click or tap to enter a date.	Choose an item.			

Summary of Changes					
Rev.	Date	Section	Summary of Changes	Prepared By	Change(s) App'd By
	Click or tap to enter a date.				
	Click or tap to enter a date.				
	Click or tap to enter a date.				

Land User Interaction Reporting Form

Date (dd/mm/yyyy): _____ Observer(s): _____

Date	Number of Travelers	Mode of Travel	Activity	Location (describe)	UTM Coordinates		Notes	Photo ID
					Easting	Northing		

Additional notes: include details on direct interactions between non-Project land users with Project personnel or equipment.

APPENDIX D: 2021 GRIZZLY BEAR DEN SURVEYS

Grizzly Bear Den Surveys

Grizzly Bear dens are typically found in areas with changing topography and on generally south-facing slopes. In the Project area, dens can be found on glacial features (e.g., drumlins, eskers, kames) and on cut-banks above waterbodies. Grizzly Bear dens collapse in the spring, so in general, a particular den is not re-used, but the slopes used for denning can be used in subsequent years.

Baseline studies conducted in 2018 (Kiggiak-EBA 2018a) used habitat suitability modelling to identify areas with high denning potential in the LSA. Field observations also located a grizzly bear den during the pre-feasibility baseline studies. The high suitability denning habitat is shown in dark green and the location of the observed is indicated by the purple star in Figure 7.

The area of concern for the den survey was determined using an 800m setback (ENR Guidelines) from the proposed access road alignment and facility site and is shown in Figure 6.



Figure 6: Grizzly bear den habitat area of concern

In the fall, prior to snowfall, and prior to commencement of any construction activities, the survey is completed by local qualified wildlife monitoring services to ensure that no potential bears dens are impacted. The surveys are repeated about three times a week until construction begins.

In fall/winter 2021, ILA contracted Elias Services of Tuktoyaktuk, an Inuvialuit owned and registered company to complete the survey. The company has knowledge in the project area, as well as local traditional knowledge on where and when bears may start denning. Pairs of monitors, so dual observers for both safety and effectiveness, conducted the survey on all-terrain vehicles (ATVs), then snowmobiles. Monitors are familiar with the IESP Bear Encounter Protocol. During the survey, the monitors noted and recorded wildlife and wildlife sign.

Between October 12th and November 14th, 2021, sixteen ATV/snowmobile surveys were conducted in the den study area. The survey routes began near the intersection of the Project access road and the ITH. The monitors then travelled in general loops covering the study area, avoiding open waterbodies, and focussing on the areas of higher denning suitability. Figure 8 provides an example of a survey route (October 12th, 2021) reproduced from the ILA Fall 2021 Bear Den Survey Report Summary.

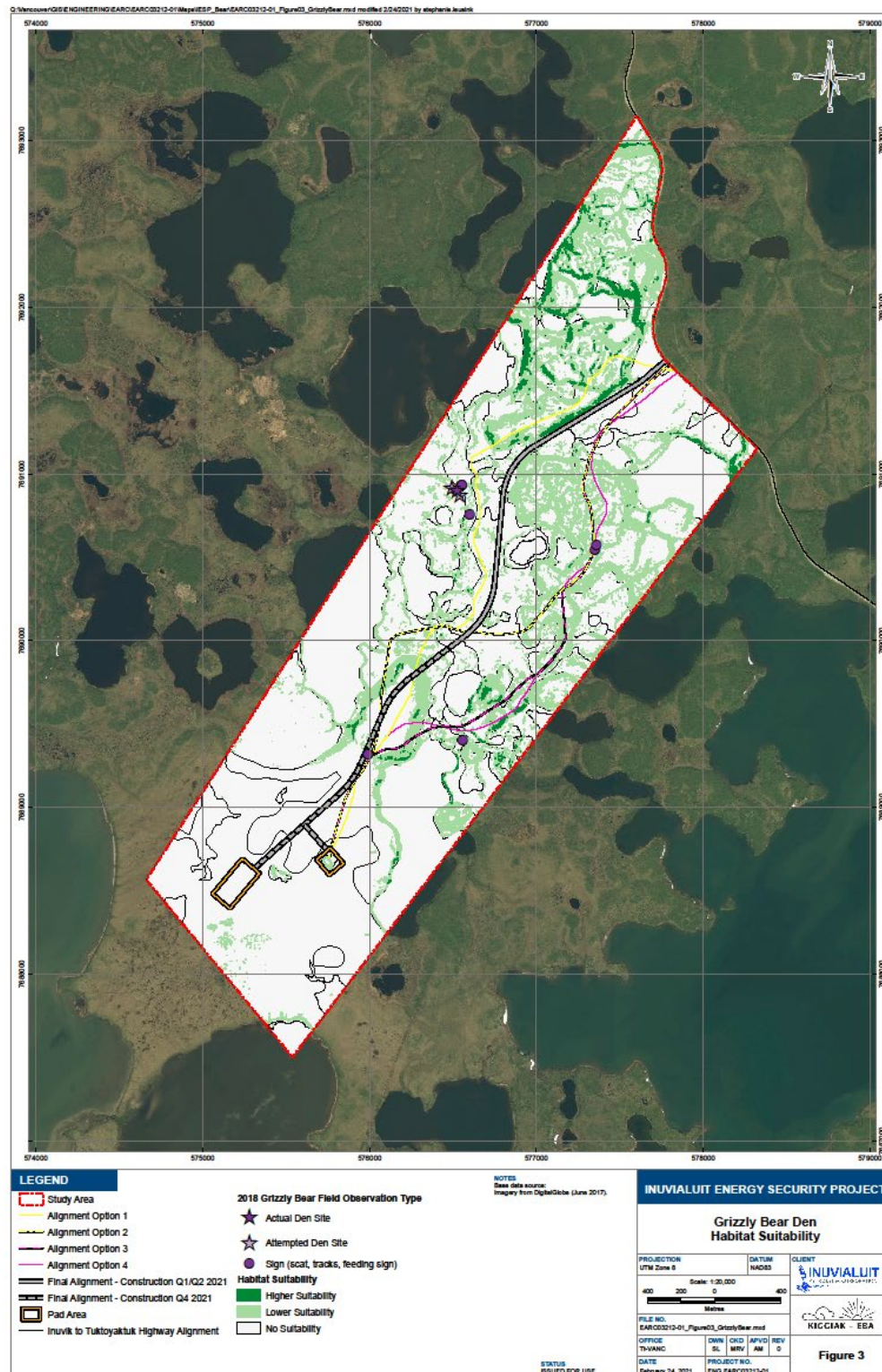


Figure 7: Grizzly bear den habitat suitability (1)

During the sixteen surveys in 2021, no bear dens were identified, and no wildlife observed. Tracks of fox, wolf, and caribou were noted, as were beaver dens. The full ILA Fall 2021 Bear Den Survey Report Summary is included on the following pages.

The Project now has two years of denning survey information. IESPL and ILA are pleased with outcomes of the 2021 den survey will conduct similar surveys prior to any Pre-Commissioning activities. IESPL will consider suggestions to improve the information generated by the denning survey.



Figure 8: Grizzly bear den habitat suitability (3)



Bag Service #21, Inuvik NT X0E 0T0
Tel: (867) 777-7000 Fax: (877) 289-2389
Email: lands@inuvialuit.com Web: www.inuvialuitland.com

Inuvialuit Petroleum Corporation
Alan Macdonald-Environmental and Regulatory Lead
Inuvialuit Energy Security Project

Dec 14th 2021

Re: ILA Fall 2021 Bear Den Survey Report Summary

Dear Mr. MacDonald,

Prior to any winter construction and in partnership with IPC, ILA conducted a Bear Den Survey to locate any active and/or suspected bear dens within the 800m setback distance of the 4.5km right of way area scheduled for winter work at km128+800 of the Inuvik-Tuk Highway. Elias Services was contracted to help complete the Bear Den Survey, which occurred from Oct 12-Nov 14, 2021. IESP provided a "Bear Encounter Protocol" form for use, which was developed and approved by GNWT Environment and Natural resources(ENR), Inuvialuit Game Council(IGC) and the Wildlife Management Advisory Council(WMAC) NWT.

Elias Services. ensured the Wildlife Monitors(WM's) were trained and familiar with the "IESP Bear Encounter Protocol" and "Grizzly Bear Habitat Suitability Map" that were provided. Also, Elias Services stated that the WM's have a tremendous amount of traditional knowledge and that they "are very capable of identifying potential areas where there may be activity of any denning." This survey was in ideal combination of Data and Inuvialuit Traditional Knowledge that helped ensure wildlife and more specifically Grizzly Bears didn't den in the winter working area.

The ILA proposed survey plan was delivered to IESP as well as Tuktoyaktuk and Inuvik HTC's on October 11th. The plan detailed the work area, the intended use of the IESP Bear Encounter Protocol form, contractor, costing and timetable of the survey. The survey started Tuesday October 12th and was completed Sunday November 14th 2021.

Elias Services hired **Noel Raymond** and **Johnny Panaktalok** out of Tuktoyaktuk to conduct the survey. The timing of the survey coincides with freeze-up of the lakes in and around the survey area, which the WM's were able work around and still deliver adequate services. They started with ATV's and as the snow increased, they were able to switch to snowmobiles. They referenced the "Grizzly Bear Habitat Suitability Map" to focus on key areas throughout. Observations for any wildlife including bear, caribou, wolf, fox, wolverine were made however only fox, wolf and caribou tracks were spotted.

Dates out were:

Tuesday Oct. 12 th -No wildlife	Friday Oct 29 th -No wildlife
Wednesday Oct 13 th -No wildlife	Monday Nov 1 st -No wildlife

Fig. 1-Grizzly Bear Habitat Suitability Map. Areas shaded in dark greens thought to be key areas of interest for bear denning.

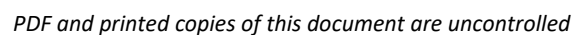


Fig. 2-Initial survey on Oct. 12th. Elias Services WM's Noel Raymond and Johnny Panaktalok.



Fig. 3-Beaver dens noticed Oct 20th.



Fig. 4-Caribou and wolf tracks spotted on westside of survey area, Oct 27th. No wildlife spotted.



ILA is pleased with the outcome of the Fall 2021 Bear Den Survey. The data provided from stakeholders helped ensure a successful survey and start to the construction of the 4.5km winter access road working season.

APPENDIX E: ORGANIZATIONS CONSULTED TO DATE

Table 14: Organizations Consulted About the IESP

Organizations Consulted about the IESP	
Inuvialuit Organizations	Outcomes
Inuvialuit Regional Corporation (IRC)	Project Sponsor – unanimous support of Chair and Board
Inuvialuit Land Administration	Supportive of the Project. Revenue from this project will help fund the ILA. Have approved Concession, land use and winter 2021-22 activity.
Inuvialuit Game Council	Provided a letter of support. Part of the WMMP Review Committee.
Tuktoyaktuk Hunters and Trappers Committee (THTC)	Provided a letter of support. Part of the WMMP Review Committee.
Inuvik Hunters and Trappers Committee (IHTC)	Provided a letter of support. Part of the WMMP Review Committee.
Aklavik Hunters and Trappers Committee (AHTC)	Provided a letter of support.
Sachs Harbour Hunters and Trappers Committee (SHHTC)	Provided a letter of support.
Paulatuk Hunters and Trappers Committee (PHTC)	Provided a letter of support.
Olokhaktomiut Hunters and Trappers Committee (OHTC)	Provided a letter of support.
Tuktoyaktuk Community Corporation	Provided a letter of support.
Inuvik Community Corporation	Provided a letter of support.
Aklavik Community Corporation	Provided a letter of support.
Paulatuk Community Corporation	Provided a letter of support.
Sachs Harbour Community Corporation	Provided a letter of support.
Ulukhaktok Community Corporation	Provided a letter of support.
Inuvialuit Water Board	Supportive of the Project.
Inuvialuit Community Economic Development Organization (ICEDO)	Supportive of the Project.
Governments	Outcome
Town of Inuvik, Mayor, and Council	Provided a letter of support.
Hamlet of Tuktoyaktuk, Mayor and Council	Provided a letter of support.
Government of the Northwest Territories, Minister of Industry, Tourism and Investment; Minister of Infrastructure; and Minister Responsible for the Worker's Safety and Compensation Commission	Supportive of the Project.
Government of the Northwest Territories, Minister Responsible for the Northwest Territories Power Corporation, Minister of Environment and Natural Resources and Minister of Lands	Supportive of the Project.

Organizations Consulted about the IESP	
Government of the Northwest Territories, MLA Inuvik Boot Lake	Supportive of the Project.
Government of the Northwest Territories, MLA Inuvik Twin Lake	Supportive of the Project.
Government of the Northwest Territories, MLA Nunakput	Supportive of the Project.
Government of Canada, Canada Energy Regulator	Reviewing the IESP Development Plan Application
Co-Management Boards	Outcome
Wildlife Management Advisory Council (NWT)	Provided comments during the EISC review. Part of the WMMP Review Committee.
Fisheries Joint Management Committee	Supportive of the Project. Recommendation to use existing Imaryuk monitoring program for the IESP which already travels the ITH. Would assist with Imaryuk funding.
Environmental Impact Review Board	Aware of the Project. Thanked IESPL for providing information about the Project.
Environmental Impact Screening Committee	Approved the Project on January 25, 2021
Federal (Government of Canada) Organizations	Outcome
Canada Energy Regulator (CER)	Approved the IESP Development Plan Application on March 8, 2021.
Fisheries and Oceans Canada (DFO)	Provided positive advice on new processes and responded to IESPL's questions. No concerns.
Canadian Northern Economic Development (CanNor)	Supportive of the Project. Provided funding for the Beaufort Delta Energy Feasibility Study.
GNWT Departments	Outcome
GNWT Department of Education, Culture and Employment	Supportive of the Project. Discussed a training initiative that could be delivered on Oil & Gas awareness training. Provided comment on the Archaeological Site Management Plan.
GNWT Environment and Natural Resources	Provided input to the WMMP. Part of the WMMP Review Committee.
GNWT Industry, Tourism and Investment	Supportive of the Project. Offered to help determine markets for CNG and NGLs coming from well.
GNWT Department of Highways (Infrastructure)	Supportive of the Project. "The GNWT built the ITH to help build the local economy with this type of project." Cooperative discussion about Project use of the ITH are ongoing. Approved the temporary access road intersection at KM 128.7 for Winter 2021-22.
GNWT Petroleum Resources Division	Supportive of the Project. Provided mapping support and other information.
Northwest Territories Power Corporation (NTPC)	Supportive of the Project. NTPC is interested in commercial agreement to purchase the gas from the Project.
OROGO – NWT Office of the Regulator of Oil and Gas Operations	Supportive of the Project. Provided help with questions regarding the NWT Oil and Gas Operations Act and Regulations.

Organizations Consulted about the IESP	
Prince of Wales Northern Heritage Centre (PWNHC)	Aware of the project. Provided help with procedures for the chance discovery of heritage resources. No concerns.
Other Organizations	Outcome
Gwich'in Tribal Council	Supportive of the Project. GTC would like updates and follow-up materials on employment opportunities.
Gwich'in Development Corporation	Supportive of the Project. GDC would like updates and follow-up materials on employment opportunities.
Inuvik Native Band	Supportive of the Project. Interested in support to understand the Development Plan Application.
Inuvik Gas Limited	Supportive of the Project. IGL are interested in commercial agreement to distribute the gas from the Project within Inuvik. Discussion of storage - short and long-term solutions for Inuvik.
Aurora Research Institute	Aware of the Project. No concerns. Have approved all field studies to date.
Aurora College	Supportive of the Project. They are interested in the opportunity to provide training for the various trades and jobs needed for the project.
Mangilaluk School in Tuktoyaktuk	Excited about the Project. Offered to help identify students who might be interested in preparing for job opportunities and for providing guidance.

APPENDIX F: IESP WMMP REVISION CONCORDANCE AND TRACKING TABLE

Table 15: IESP WMMP Concordance and Revision Tracking Table

IESP WMMP Concordance and Revision Tracking Table					
WMMP version reviewed	Reviewer	Comment	WMMP version revised	Revision	Section(s) Revised
V1 (2020)	GNWT-ENR	Remove any references to a Tier 2 WMMP and replace with Tier 1. Rename Section 5.1 to “Wildlife Mitigation Monitoring”	V2 (2021)	Reference corrected to a Tier 1 WMMP Section 5.1 re-named	Sections 1.2, 1.4 Section 5.1
V2 (2021)	GNWT-ENR	Update reference to Inuvik to Tuktoyaktuk Highway Wildlife Effects Monitoring Program (WEMP) to newer version dated November 2017.	v3 (2022-03)	Updated reference to 2017	Section 1.5
V2 (2021)	GNWT-ENR	Add a table summarizing federal and territorial statutory requirements that apply to this project back into the WMMP.	v3 (2022-03)	Inserted Regulatory Requirements, Table 1, Section 1.5.2	Section 1.5.2
V2 (2021)	GNWT-ENR	Clarify which access road and site construction activities will or will not coincide with the migratory bird nesting season, and which specific activities will take place during July-September 2022. Clarify what additional mitigation measures would be implemented (e.g. pre-construction nesting surveys) should pre-commissioning activities occur during the nesting season. s3.2, Table 5 Clarify whether there is a risk of impacts to birds and their nests during the pre-commissioning/commissioning phase.	v3 (2022-03)	Confirmed that no Pre-Commissioning construction activities will occur between May 15 and August 15, annually,	Section 2.1, 3.2
V2 (2021)	GNWT-ENR	Update this section to reflect that caribou hunting was closed in this area by all HTC's under by-laws that were written into regulation	v3 (2022-03)	Language revised as directed	Section 3.1.1

IESP WMMP Concordance and Revision Tracking Table					
WMMP version reviewed	Reviewer	Comment	WMMP version revised	Revision	Section(s) Revised
		under the <i>Wildlife Act</i> .			
V2 (2021)	GNWT-ENR	Revise to read “so, <i>in general</i> , a particular den is not re-used”	v3 (2022-03)	Language revised as directed	Section 3.1.2
V2 (2021)	GNWT-ENR	Add an appendix to the WMMP which includes a report from the bear den surveys conducted in 2021 and which outlines the methodology used in those surveys. Clarify whether road construction will commence before fall bear den surveys are completed in 2022.	v3 (2022-03)	Added Appendix 4: Bear Denning Surveys describing survey methods and the report from the 2021. Re-confirmed that den surveys will be completed before any Pre-Commissioning construction activities in 2022.	New Appendix 4, Section 4.1, Table A2-1 in Appendix 2
V2 (2021)	GNWT-ENR	Add further details about the specific protocols for bear den surveys in Section 4.1.	v3 (2022-03)	Added Appendix 4: Bear Denning Surveys describing scope and methods	Appendix 4
V2 (2021)	GNWT-ENR and WMAC NWT	Additional species at risk to Table 4: o Polar Bear o Barn Swallow o Lesser Yellowlegs o Gypsy Cuckoo Bumblebee	v3 (2022-03)	Species and Conservation Status updated in Table 5, Section 3.2	Section 3.2
V2 (2021)	GNWT-ENR	Clarify when and how decisions about infrastructure design to limit human-wildlife interactions will be made and clarify if the WMMP review committee will be consulted in that process.	v3 (2022-03)	Description of planning process added to Section 4.3 and confirmation that the WMMP Review Committee will be consulted on any infrastructure design changes to mitigate impacts observed on wildlife.	Section 4.3
V2 (2021)	GNWT-ENR	Add design considerations such as skirting for limiting wildlife access to areas underneath buildings.	v3 (2022-03)	Skirting underneath buildings added to bullet one.	Section 4.3
V2 (2021)	GNWT-ENR	Use a timing restriction for bear dens of October 01 to May 30 throughout the WMMP	v3 (2022-03)	Timing restriction edited in Table 7, Section 4.5, and Appendix 3	Section 4.5 and Appendix 3-1

IESP WMMP Concordance and Revision Tracking Table					
WMMP version reviewed	Reviewer	Comment	WMMP version revised	Revision	Section(s) Revised
		consistent with the dates used in Appendix 2. This includes changing the dates in Appendix 3-1: IESP Bear Encounter Procedures.			
V2 (2021)	GNWT-ENR	Add polar bear to bear species in Table 6.	v3 (2022-03)	Polar Bear added to Table 7, Section 4.5	Section 4.5
V2 (2021)	GNWT-ENR	Use an 800m setback for active bear and wolverine dens consistently throughout the WMMP. Specify that the setback will be maintained until the animal emerges from the den.	v3 (2022-03)	Table 7 modified to an 800m setback from all bear and wolverine dens. Confirmed references to 800 m setback in section 4.5 Confirmed no action to be taken if a den is identified until consultation with ENR, WMAC NWT and HTC's	Section 4.5, Section 6.2 (Table 9), Appendix A2
V2 (2021)	GNWT-ENR	Format the presentation of specific mitigation measures as separate bullets, similar to Section 4.5	v3 (2022-03)	Mitigation re-formatted into bullets.	Section 4.6 and Section 4.7
V2 (2021)	GNWT-ENR	Add all mitigations identified in Appendix 2.	v3 (2022-03)	Mitigations identified in Section 4 were confirmed in Appendix 2	Appendix 2
V2 (2021)	GNWT-ENR	Add mitigation measures for noise and light disturbance.	v3 (2022-03)	Mitigation for noise, light and dust from the EISC project Description inserted in Section 4.6	Section 4.6
V2 (2021)	GNWT-ENR	Rename "Wildlife Attraction" to "Use of Wildlife Deterrents".	v3 (2022-03)	Renamed reference in Table 8, Section 5.1	Section 5.1
V2 (2021)	GNWT-ENR	Monitoring should differentiate between a sighting vs. wildlife occurrence vs. incident that requires active deterrence. Instances where wildlife are attracted to or have gained access to attractants such as improperly stored wastes	v3 (2022-03)	Confirmed that in Table 8, Section 5.1 IESPL is committed to monitoring: wildlife attracted to the Project and frequency of use of deterrents. Edited monitoring proposal to:	Section 5.1

IESP WMMP Concordance and Revision Tracking Table					
WMMP version reviewed	Reviewer	Comment	WMMP version revised	Revision	Section(s) Revised
		should be specifically noted.		Technical inspections to identify and confirm cleanliness in sites of waste disposal, <i>specifically where wildlife are observed.</i>	
V2 (2021)	GNWT-ENR	Wildlife strikes by project vehicles on the Inuvik to Tuk Highway should also be recorded. There is a requirement under the <i>Wildlife Act</i> to report any wildlife-vehicle collisions involving big game species to ENR within 24 hours.	v3 (2022-03)	Recording and monitoring wildlife strikes by Project traffic on the ITH added to Table 8, Section 5.1 Collisions with big game reporting added to Section 4.7	Sections 4.7 and 5.1
V2 (2021)	GNWT-ENR	Observations of hunters crossing the access road or entering the site should be tallied weekly rather than annually, consistent with the frequency for wildlife sightings.	v3 (2022-03)	Revision to weekly tally of hunters in Table 8, Section 5.1	Section 5.1
V2 (2021)	GNWT-ENR	Provide more details about the purpose and methods for monitoring caribou migrations.	v3 (2022-03)	Text added to Section 5.1 about collaboration to increase awareness of seasonal timing where wildlife move through the LSA.	Section 5.1
V2 (2021)	GNWT-ENR	Ensure that reporting frequency of wildlife sightings to ILA and GNWT-ENR is consistent between Section 5.1 and Table 10.	v3 (2022-03)	Wildlife sightings will be summarized in weekly wildlife reports and provided to ILA, GNWT-ENR, and WMMP Review Committee annually unless there is non-compliance or a wildlife incident when reporting is initiated immediately.	Section 5.1 and (Table 10)
V2 (2021)	GNWT-ENR	The project footprint at the end of the pre-commissioning phase will be reported to ILA and ENR.	v3 (2022-03)	Post-Commissioning footprint reporting added to Section 5.4	Section 5.4
V2 (2021)	GNWT-ENR	Replace “One annually” from the Thresholds for caribou mortality and destruction of wildlife	v3 (2022-03)	Language revised in Table 9, Section 6.2	Section 6.2

IESP WMMP Concordance and Revision Tracking Table					
WMMP version reviewed	Reviewer	Comment	WMMP version revised	Revision	Section(s) Revised
		at site with investigate immediately.			
V2 (2021)	GNWT-ENR	Add collisions that occur from project traffic on the ITH as an impact.	v3 (2022-03)	Language revised in Table 8, Section 5.1 and Table 9, Section 6.2	Section 5.1 and 6.2
V2 (2021)	GNWT-ENR	<p>There should be clearer caribou response guidelines included in Section 4 to describe what is expected in order to do adaptive management. It is recommended that there be a specific sub-section within Section 4 that deals with caribou.</p> <p>For example:</p> <ul style="list-style-type: none"> o If a group of more than 6 caribou are closer than 500m to work site, work should not commence until the caribou move farther than 500 m away. o If work is happening - machinery in the area are operating and caribou approach the area anyway, then unless there are so many that it is hazardous for the caribou work continues. <p>However, if work stops overnight and caribou are still there in the morning then work would not commence until the caribou move father than 500 m away.</p> <p>Caribou should only be deterred from the project area if there is a risk of injury to them or if their presence will impede project operations after waiting for them to move away of their own accord after a pre-</p>	v3 (2022-03)	Section 4.7.1 “Management of Hazards to Caribou” was added.	<p>Section 4.7.1</p> <p>Section 6.2 and Appendix 2</p>

IESP WMMP Concordance and Revision Tracking Table					
WMMP version reviewed	Reviewer	Comment	WMMP version revised	Revision	Section(s) Revised
		determined amount of time. Describe how long caribou will be given to move away from project operations of their own accord before gently encouraging them to move away.			
V2 (2021)	GNWT-ENR	Include number of operational shutdowns and length of each shutdown as metrics to be recorded and reported on.	v3 (2022-03)	Metrics recording operational shutdowns added to Table 8, Section 6.2	Section 6.2
V2 (2021)	GNWT-ENR	Caribou monitoring and response protocols should be further discussed with the WMMP review committee.	v3 (2022-03)	Annual WMMP Review Committee meeting added to Section 1.6 and confirmed in Section 6.1	Section 1.6 and 6.1
V2 (2021)	GNWT-ENR	Provide the recommended limits for dust collectors which would trigger additional dust control measures.	v3 (2022-03)	Revised language in Table 9 to specify: Three exceedances of 29µg/m3 per day in one week (Alberta Ambient Air Quality Objectives).	Section 6.2
V2 (2021)	GNWT-ENR	Appropriate ENR contact information should be included in this section and in the Bear Encounter Procedures (Appendix 3-1) as reporting is required by law for some types of incidents (see the NWT statutory wildlife requirements document referenced earlier in the WMMP).	v3 (2022-03)	IESPL will develop and maintain a separate page of contacts to be attached to the package of forms available to the Wildlife Monitor and staff. A separate document will be easier to keep current and accurate. This page will include contact information for GNWT-ENR, ILA, HTC's, Spill Report Line etc.	
V2 (2021)	GNWT-ENR and similar from WMAC(NWT)	The Field Manager, Environment should prepare the Pre-Commissioning Wildlife Monitoring Report with the assistance of the Wildlife Monitors.	v3 (2022-03)	The Field Manager, Environment will be hired for Commissioning/Operations and IESPL is responsible for preparing and providing the Pre-Commissioning	Section 7.2

IESP WMMP Concordance and Revision Tracking Table					
WMMP version reviewed	Reviewer	Comment	WMMP version revised	Revision	Section(s) Revised
				Wildlife Monitoring Report	
V2 (2021)	GNWT-ENR	Replace the reference to Section 39 of the <i>Wildlife Act</i> to Sections 55-58 of the <i>Wildlife Act</i> (2014).	v3 (2022-03)	Reference replaced in Table A2-1, Appendix 2	Appendix 2
V2 (2021)	GNWT-ENR	Ensure there are appropriate data collection forms that capture each of the metrics to be monitored that are specified in Section 5.1 - Table 7. e.g. number of hunters observed, number of sites with attracting wastes, special protection locations identified in Pre-Commissioning surveys	v3 (2022-03)	Wildlife Sighting Form edited to include notes on: "Include type of observation: Sighting-wildlife is observed, Encounter-wildlife or person behaviour changes, Deterrent- deterrent used. Identify any potential attractants in the area" Land User Interaction Reporting form added in Appendix 3-4	Appendix 3-3, Appendix 3-4
V2 (2021)	GNWT-ENR and similar from WMAC(NWT)	Clarify the use of Wildlife Monitors during the Operations Phase.	v3 (2022-03)	Clarified that Wildlife Monitors will be present during all phases when work is occurring.	Section 4.10
V2 (2021)	GNWT-ENR	Review and update the WMMP with input from the WMMP review committee at the end of the pre-commissioning phase to reflect the wildlife mitigation and monitoring procedures that will be followed during the operations phase.	v3 (2022-03)	Annual WMMP Review Committee meeting added to Section 1.6 and confirmed in Section 6.1	Section 1.6 and 6.1
V2 (2021)	WMAC(NWT) and similar from GNWT-ENR	Clarify presence of Wildlife Monitors at all times work is occurring during all phases of project.	v3 (2022-03)	Clarified that Wildlife Monitors will be present during all phases when work is occurring.	Section 4.10
V2 (2021)	WMAC(NWT)	WMAC(NWT) would like to receive denning survey and species at risk survey results	v3 (2022-03)	Appendix 4: Bear Denning Surveys contains the results of the 2021	New Appendix 4, Section 4.5

IESP WMMP Concordance and Revision Tracking Table					
WMMP version reviewed	Reviewer	Comment	WMMP version revised	Revision	Section(s) Revised
		annually.		denning survey. Species at Risk critical habitats will be surveyed. IESPL will report and document encounters and observations of species at risk within the facility footprint. Participate in regional surveys for species at risk in the Project area.	
V2 (2021)	WMAC(NWT)	Include the Taking Care of Caribou Management Plan (ACCWM, 2014).	v3 (2022-03)	ACCWM reference added to Sections 1.5.1 and 10	Section 1.5.1 and 10
V2 (2021)	WMAC(NWT)	Commit to hold annual meetings of the WMMP review team.	v3 (2022-03)	Annual WMMP Review Committee meeting added to Section 1.6 and confirmed in Section 6.1	Section 1.6 and 6.1
V2 (2021)	WMAC(NWT)	Consider also listing the conservation actions recommended in the Community Conservation Plans for Categories C and E.	v3 (2022-03)	Confirmed caribou conservation measures are listed in Section 3.1.1	Section 3.11
V2 (2021)	WMAC(NWT)	Change “set-back distances to active nests <i>should</i> be followed” to “set-back distances to active nests <i>will</i> be followed.”	v3 (2022-03)	Language revised as directed in Section 3.2	Section 3.2
V2 (2021)	WMAC(NWT)	Change to “specific mitigations are proposed for the Pre-Commissioning winter seasons to minimize the likelihood of disturbing denning bears, wolverines, <i>or overwintering caribou.</i> ”	v3 (2022-03)	Over-wintering caribou added to Section 3.3.1	Section 3.3.1
V2 (2021)	WMAC(NWT)	Identify volume of Project-related traffic on the ITH.	v3 (2022-03)	Information added to Section 3.3.2 “Traffic studies in 2018-2019 indicate an average of 1762 vehicles per month, at peak	Section 3.3.2

IESP WMMP Concordance and Revision Tracking Table					
WMMP version reviewed	Reviewer	Comment	WMMP version revised	Revision	Section(s) Revised
				operations IESP would contribute around 150 deliveries/trips per month."	
V2 (2021)	WMAC(NWT)	Wildlife observations or incidents on the ITH should be monitored and recorded as well as on the access road to the site.	v3 (2022-03)	Recording and monitoring wildlife strikes by Project traffic on the ITH added to Table 8, Section 5.1	Section 5.1
V2 (2021)	WMAC(NWT)	Clarifying in the text that Project operations will take place year-round.	v3 (2022-03)	"Year-round" added to Section 3.3.2 and confirmed in Section 2.1, Table 3	Section 3.3.2
V2 (2021))	WMAC(NWT)	Add a specific sub-section for caribou encounters. e.g. - If caribou are at the site when workers arrive, do not start equipment. - If caribou approach the site when work is ongoing, continue working but monitor closely, do not approach, alert workers, consider lowering speed limits, etc. - If caribou are observed on the access road or the ITH, alert all workers, lower speeds, add signage, etc. - Adjust for presence of caribou if their population and range use changes over the life of the project – relate to adaptive management.	v3 (2022-03)	Section 4.7.1 "Management of Hazards to Caribou" was added.	Section 4.7.1
V2 (2021)	WMAC(NWT)	The caribou protocol and mitigations should apply to any number of caribou.	v3 (2022-03)	Section 4.7.1 "Management of Hazards to Caribou" was added.	Section 4.7.1

IESP WMMP Concordance and Revision Tracking Table					
WMMP version reviewed	Reviewer	Comment	WMMP version revised	Revision	Section(s) Revised
V2 (2021)	WMAC(NWT)	Barren-ground caribou have not used the area in recent years, and hunting in the area is currently prohibited by HTC by-laws in the <i>Wildlife Act</i> , but the area is historic winter ground as identified in the Community Conservation Plans. Inuvialuit hope and expect them to return, and for harvesting in the area to resume. It should also be noted that boreal caribou may frequent the area, and harvest is open for boreal caribou.	v3 (2022-03)	At annual WMMP Review Committee meetings, the WMMP will adapt to increased presence, and hunting, of barren-ground or boreal caribou.	Section 1.6 and 6.1
V2 (2021)	WMAC(NWT)	Changing “Wildlife monitors will be present all all times when work is occurring, during all phases of the project.”	v3 (2022-03)	Clarified that Wildlife Monitors will be present during all phases when work is occurring.	Section 4.10
V2 (2021)	WMAC(NWT)	Clarify that annual Species At Risk surveys will be completed and results will be shared with the WMAC(NWT)	v3 (2022-03)	Species at Risk critical habitats will be surveyed. IESPL will report and document encounters and observations of species at risk within the facility footprint. Participate in regional surveys for species at risk in the Project area.	Section 4.5
V2 (2021)	WMAC(NWT)	Change to “special considerations <i>will be followed</i> due to the high potential for species at risk...”.	v3 (2022-03)	Language revised as directed in Section 4.5	Section 4.5
V2 (2021)	WMAC(NWT)	“If a den is identified the animal may be hazed away...” include the Tuktoyaktuk HTC: “This action will be taken in consultation with ENR <i>and the THTC</i> and will involve the wildlife	v3 (2022-03)	Language revised to include Tuk HTC in Section 4.8	Section 4.8

IESP WMMP Concordance and Revision Tracking Table					
WMMP version reviewed	Reviewer	Comment	WMMP version revised	Revision	Section(s) Revised
		monitor.”			
V2 (2021)	WMAC(NWT)	<p>In general, the adaptive management process will include:</p> <ul style="list-style-type: none"> - Annual meetings by the review committee - Working with the HTC's and ENR when specific incidents occur, like wildlife encounters or nests of species at risk - Sharing information on observations, incidents, etc. on a regular basis - IESPL contributing to monitoring of species at risk by sharing observations <p>Should be able to respond to: if and when caribou populations rebound and the range expands again to include the development area. Changes in other animal distributions are expected with climate.</p>	v3 (2022-03)	<p>Cover letter</p> <p>IESPL agrees with the general adaptive management process described by WMAC NWT and confirmed that these elements are included in Sections 6.1 and 6.2</p>	Section 6.1 and 6.2
V2 (2021)	WMAC(NWT)	<p>The Council suggests removing mention of the adaptive management threshold. If an incident occurs, suggest sharing the wildlife incident form with GNWT and THTC as soon as practicable, and call a meeting if needed. Regarding the Pre-Commissioning Wildlife Monitoring Report, this should be completed by the Field Manager or other relevant supervisor.</p> <p>The Report should include, when applicable, any incidents or adaptive management</p>	v3 (2022-03)	<p>Cover letter</p> <p>Confirmed Table 8 in Section 5.1 contains monitoring of incidents and applications of adaptive management strategies</p> <p>IESPL is committed to immediately sharing wildlife incidents with GNWT-ENR and HTC's.</p> <p>There is not consistent direction on the use of adaptive</p>	Section 5.1, 6.0 and 7.2

IESP WMMP Concordance and Revision Tracking Table					
WMMP version reviewed	Reviewer	Comment	WMMP version revised	Revision	Section(s) Revised
		strategies such as shut-downs, speed limit reductions, etc., and their degree of success.		management thresholds. So IESPL has left thresholds in version 3.0 of the WMMP and will revise future version based on direction from the WMMP Review Committee. Revised Section 7.2 that the Pre-Commissioning Wildlife Monitoring Report will be the responsibility of IESPL with the Wildlife Monitor.	
V2 (2021)	WMAC(NWT) and similar from ENR	“WMMP implementation” and “Developing and submitting wildlife-related reporting” should be led by the Field Manager, Environment.	v3 (2022-03)	Role responsibilities updated through the WMMP.	Section 4.8, 4.10, 7.2 and 8.3
V2 (2021)	WMAC(NWT)	Ensure that it is required to fill in the wildlife sighting form for all species listed in the Table 4 (Species at Risk).	v3 (2022-03)	Appendix 3-3 revised to include recording of all migratory birds, owls and bees. Emphasis added on taking photos and as species at risk are less likely to be identified correctly.	Appendix 3-3
V3 (2022)	CER	See CER IR No.2	v3.1 (2022-03)	Updated Document Code; added References as per CER IR No.2	PDF pages 34,38,44,47 and 54 of 268
V3.1	CER	See CER IR No.3	V3.2 (2023)	Updated 1998 GNWT Guideline for Dust Suppression to 2013 version and updated References as per CER IR No.3	1.5.1 and 10.0

IESP WMMP Concordance and Revision Tracking Table					
WMMP version reviewed	Reviewer	Comment	WMMP version revised	Revision	Section(s) Revised
V3.2	CER	See CER IR No.6	V3.3 (2023 - 09)	Updated Energy Centre definition as per CER IR No.6 ; and Reference to 2013 Dust Suppression in Appendix 2 – Wildlife Mitigations; Updated Appendix numbering (1,2,3 to A,B,C); included Attachments under Appendix C; Revised protocols and procedures with updated format and cover pages	Abbreviations, Acronyms & Definitions Table; Table 2 ““Project phase descriptions, under “re-Commissioning, Site (Civil Works) to revert Energy Facility to Energy Centre; Appendix B “Wildlife Mitigations Table”
V3.3	Internal	Preparation for IFU	V4.0 (2023-09)	Updated headers from Rev.3.3 to 4.0	Headers only
V4.0	CER	See CER IR No. 7	V4.1 (2023-10)	Update Schedules	2.2
V4.1	CER	See CER IR No. 8	V4.2 (2024-01)	Update Schedules based on Level 1 Schedule	Pg. 10 / Table 3

Attachment 3: Permafrost Protection and Management Plan



Permafrost Protection and Management Plan

IESP-HSEQ-EN-PLN-0012

Rev.	Date	Purpose	Created By	Checked By	Approved By
1.0	2022-05-31	Issue for Implementation	EG/AM	TB/BJ	AM
2.0	2023-01-20	Issue for Use	EG	AM	AM
2.1	2023-04-06	Issued for Regulatory Review	EG	TM	AM
2.2	2023-09-05	Issued for Regulatory Review	EG	AM	AM
3.0	2023-09-05	Issued for Use	EG	AM	AM

Revision History					
Rev.	Date	Section	Summary of Changes	Changed by	Change Approved by
2.0	2023-01-20	Various	Changes and updates in response to CER IR No.2, upgrading bullets to letters for ease of reference; update document code	AM	AM
2.1	2023-04-06	Table 1	Corrected ILA Inspector to ILA Monitor, in response to IR No.2 and No.3	TM	AM
2.2	2023-09-05	ABB & Definitions Table; Sec.5.2	Updates reflect definition of Energy Centre per CER's IR No.6 to Abbreviations & Definitions Table, Sec.5.2; update Appendix 1 to Appendix A; and headers	TWK	AM
3.0	2023-09-05	Headers	Preparation for Issued for Use	TWK	AM

Abbreviations, Acronyms, and Definitions

Abbreviations/Acronyms	Definition
CER	Canada Energy Regulator
CSA	Canadian Standards Association
EISC	Environmental Impact Screening Committee
ESCMP	Erosion and Sediment Control Management Plan
Energy Centre	<i>Energy Centre, Energy Facility, Infrastructure Facility, and Infrastructure are terms used interchangeably in the IESP documentation. The terms are used to describe the facilities and equipment that will process the gas and liquids from the M-18 well. The Energy Centre will be placed on a granular infrastructure pad that is termed "Energy Centre pad" or "infrastructure pad"</i>
FFHPP	Fish and Fish Habitat Protection Plan
FJMC	Fisheries Joint Management Committee
GNWT	Government of Northwest Territories
IESP	Inuvialuit Energy Security Project
IESPL	Inuvialuit Energy Security Project Ltd.
IFA	Inuvialuit Final Agreement
IGC	Inuvialuit Game Council
ILA	Inuvialuit Land Administration
ISR	Inuvialuit Settlement Region
ITH	Inuvik Tuktoyaktuk Highway
PPMP	Permafrost Protection and Management Plan
TAC	Transport Association of Canada

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1.0 Objectives of the PPMP

The IESP Permafrost Protection and Management Plan (PPMP) provides management, mitigation, and monitoring efforts aimed at mitigating negative impacts due to the disturbance of permafrost from activities related to the construction of the Inuvialuit Energy Security Project (IESP). The PPMP, along with a number of other environmental protection and management plans, has been developed as part of the Environmental Protection Plan (EPP) for the Project. The PPMP applies to all phases of the IESP.

The PPMP describes an implementation and monitoring program focused on mitigating ground disturbance and early detection of changes in permafrost including visual inspections, ground temperature monitoring, and climatic data reviews.

The purpose of the PPMP is to establish and implement a plan for mitigating and managing project impacts on permafrost during the construction phase of the project with consideration to long-term operations. The PMPP will be reviewed on a regular basis or as needed, and serves as a living document that will be updated as new information is collected and as the project advances to operations.

The PPMP describes how IESPL will:

- minimize impact to permafrost due to construction activities,
- mitigate permafrost thaw and permafrost degradation,
- address maintenance-level mitigation and the long-term monitoring of the permafrost regime, and
- accommodate climate change effects as they relate to permafrost.

2.0 Guidance References

In addition to community consultations, regulations, project commitments, Best Management Practices (BMPs) and professional judgement, the following government guidelines were used as references to develop the PPMP:

- a) GNWT (Government of Northwest Territories) Northern Land Use Guidelines: Roads and Trail. (2015).
- b) GNWT Erosion Sediment Control Manual (2013).
- c) TAC Guidelines for Development and Management of Transportation Infrastructure in Permafrost Regions (2010).
- d) CSA-S500:14 — Thermosyphon Foundations for Buildings in Permafrost Regions (2014).

- e) CSA S501:14 — Moderating the Effects of Permafrost Degradation on Existing Building Foundations (2014).
- f) CSA PLUS 4011 — Technical Guide: Infrastructure in Permafrost: A Guideline for Climate Change Adaptation (2019).
- g) CSA PLUS 4011.1: 19— Technical Guide: Design and Construction Considerations for Foundations in Permafrost Regions (2019).
- h) CSA-S502:14 — Managing Changing Snow Load Risks for Buildings in Canada's North (2014).
- i) CSA-S503:15— Community Drainage System Planning, Design, and Maintenance in Northern Communities (2015).

3.0 Roles and Responsibilities

The present anticipated roles and responsibilities are outlined in Table 1.

Table 1: Roles and responsibilities

Entity	Responsibility
Contractor	<ul style="list-style-type: none"> a) Implement this PPMP under the direction of the Contractor Supervisor b) Make personnel, equipment, and materials available, as required c) Ensure this PPMP is always available on site d) Follow all laws, orders, rules, regulations, and codes of any territorial or federal environmental agency or like authority, which apply to the Project e) Take appropriate response measures f) Continue permafrost protection and mitigation measures until responsibility is transferred under the authority of the IESPL
Contractor Supervisor	<ul style="list-style-type: none"> a) Supervise the contractor team b) Ensure personnel are trained and competent in the PPMP's application c) Ensure the measures in the PPMP are applied d) Coordinate mitigative and remedial measures in all impacted areas e) Conduct regular worksite inspections f) Coordinate additional equipment and/or workforce as necessary

Entity	Responsibility
	g) Liaises with ILA Monitors and IESPL representative
On-Site Manager	<ul style="list-style-type: none"> a) Oversee completion of the Project b) Maintain records of construction, mitigation, and worksite inspection activities c) Report to IESPL d) Maintain contact with Contractor Supervisor to confirm final worksite inspection and sign-off are completed e) Support the Contractor Supervisor as required f) Oversee completion and distribution of reporting to IESPL
IESPL Management Team	<ul style="list-style-type: none"> a) Follow all permits and licenses b) Follow all laws, orders, rules, regulations, and codes of any territorial or federal environmental agency or like authority, which apply to the Project c) Liaise with Inuvialuit Land Administration (ILA) Monitor, government agencies, public and Indigenous organizations (as required) d) Confirm all reports are completed as required by authorizations e) Develop press releases and liaise with media directly (as required)
IESPL Designated Representative or Engineer	<ul style="list-style-type: none"> a) Support Contractor and IESPL by providing technical guidance on the implementation of this PPMP b) Make recommendations for modification to mitigative measures based on site reviews c) Verify that the PPMP is being followed

4.0 Regulatory, Project, and Stakeholder Requirements

4.1 Project Approvals and Conditions

The IESP Development Plan application was approved by the CER on March 8, 2022, and by the GNWT Cabinet on May 5, 2022. Previous approvals included an approval from the Environmental Impact Screening (EISC) Screening Panel that delivered an IFA 11(17)(b) decision for the IESP on January 25, 2021. The TUK 2 Productive Acreage Block (PAB) configuration was approved by the Inuvialuit Land Corporation on June 10, 2010.

IESPL track all conditions arising from regulatory applications, approvals or letters, and all commitments resulting from community or stakeholder meetings or correspondence. Conditions and commitments specific to permafrost protection have been reviewed and have been integrated into this PPMP. The CER Letter Decision of March 8, 2022 (CER File OF-EP-DEV I008 01) included the following assessment of IESPL's commitments to permafrost:

IPC stated that the thawing of permafrost can lead to subsidence and ponding and related damage to structures built on the permafrost. IPC committed to protecting the natural tundra in undisturbed areas and leaving all soils within the Regional Area undisturbed to maintain a natural insulation barrier for the underlying permafrost. IPC surveyed the Project Area to identify the best locations for the pads and the all-season access road. IPC committed to developing detailed drainage plans to maintain drainage flows and to prevent thermal degradation from ponding. IPC stated that the all-season access road has been routed mostly along a previously disturbed route that was used for a 2001 drilling program and identified locations for culverts in the road for drainage flow. (Section 6.1.3, para 1)

IPC stated that gravel thickness on the pads and road will be sufficient to bear all loads and provide thermal stability and protect the permafrost. To protect the permafrost surrounding the well, IPC has committed to placing a gelled fluid in the area between the well casing and the production tubing to limit heat transfer from the well to the permafrost. (Section 6.1.3, para 2)

IPC stated that all facilities, including storage tanks, will be built on ad-freeze piles on top of insulating gravel pads to protect the permafrost. IPC submitted that it installed ground temperature cables at four locations in the Project Area in March 2020 to depths of between eight metres and 20 metres and committed to monitor the permafrost temperatures in the Project Area during the life of the project. (Section 6.1.3, para 3)

IPC plans to run a new production string (conduit through which gas is produced to surface) and insulate the annulus of the well (the space between the well casing and the production tubing) to protect the surrounding permafrost. (Section 6.4)

The Inuvialuit Land Administration Rules and Procedures have no specific clauses related to permafrost, however, a typical land use licence or permit may contain the following terms or conditions:

The Holder shall employ methods to ensure the structures and facilities associated with the Activities prevent:

1. *the melting of permafrost;*
2. *the ground settling and/or eroding; and*
3. *the unnecessary removal of vegetation from areas not intended for development.*

4.2 Best Practices and Guidelines

The following general best practices apply to infrastructure potentially impacted by permafrost thaw:

- a) Maintain proper site grading and drainage to facilitate rapid drainage of surface water away from infrastructure.
- b) Avoid installation of new construction around existing infrastructure that could negatively affect the permafrost thermal regime.
- c) Maintain adequate ventilation by ensuring air spaces and ducts are not obstructed and screens are not clogged.
- d) Manage snow so that melt in the spring does not pond around infrastructure.
- e) Implement a snow maintenance program that ensures snow is regularly removed near critical infrastructure to promote cooling of permafrost in winter and allowed to remain in place to insulate the ground in the spring.
- f) Monitor ground temperatures using in-ground temperature sensors near or under critical infrastructure to provide an early indication of changes in the thermal regime of the permafrost.
- g) Perform regular visual inspections to monitor and document ground surface deformations, progression of cracks and deformations in foundations, and damage to structural components.
- h) Monitor and document the effectiveness of existing mitigation measures that have been implemented such as thermosyphons (refer to CSA-S500-14 - Thermosyphon foundations for buildings in permafrost regions) or mechanical cooling.

Refer to CSA-S501-14 - Moderating the effects of permafrost degradation on existing building foundations for more detail on the above recommendations.

4.3 Project Commitments

IESPL made numerous commitments related to the protection of permafrost in both the Development Plan (DP) Application submitted to the CER and the Project Description (PD) to the EISC. A list of those commitments and the reference section from the relevant application are provided in Appendix 1.

5.0 Training, Competency, and Awareness

5.1 Required Training

Proper understanding of permafrost protection measures will be required. The PPMP will be reviewed with the Contractor completing the work to confirm that the Contractor understands the proper use of the PPMP and to provide feedback for possible improvements. The Contractor is responsible for educating the construction crew on the PPMP for proper implementation. All personnel will receive orientation for mitigations key to permafrost protection.

5.2 Training Opportunities

The Contractor and its Supervisors are responsible for providing adequate ESC and permafrost protection training to all onsite employees. There are several opportunities for Inuvialuit beneficiaries or local people to participate in permafrost protection activities through the contractor and as environmental monitors throughout the construction period.

Permafrost protection training will include orientating workers to observe and visually monitor and document ground surface deformations and surface water conditions around them during construction and operations to ensure that no physical or thermal erosion, ground settlement, embankment instability issues, and deformations in foundations and equipment are resulting from the degradation of permafrost, physical erosion, or other causes. Training will also include ground temperature data collection and monitoring ground temperature instrumentation that has been installed on-site to date and further ground temperature instrumentation that will be installed during the construction of the single-span bridge, and Energy Centre.

A training session on the PPMP will be held for all employees involved in construction and implementation of permafrost protection measures. Training will include:

- Each employee's roles and responsibilities
- Review of the BMPs
- Review proper installation methods for relevant personnel
- Review of monitoring plans

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- Review of mitigation measures
 - Reporting procedures if erosion or sedimentation is observed onsite

5.3 Communication and Awareness

The Contractor and IESPL will be responsible to ensure clear communication is provided between the Contractor, IESPL, and the Regulators during the construction phase and operation of the facility in the long term. Regular meetings will be scheduled based on the level of site activity.

During pre-commissioning summer construction periods (May 15 to October 15) a weekly permafrost protection monitoring summary report will be completed by the Contractor for IESPL summarizing the relevant work associated with that week's construction that could impact permafrost and the mitigative measure that were implemented. During operations the reporting period will be monthly.

The Contractor needs to provide feedback to IESPL for improvements and address any areas of concern related to permafrost protection as part of adaptive management, and continuous communication is important for successful permafrost protection.

6.0 Aspects and Impacts

6.1 Project Activities and Aspects

Early Site (civil) Works (ESW) include the following project activities:

- Construction of an all-weather access road (approximately 4 km in length) to the Energy Centre from the ITH (Inuvik Tuktoyaktuk Highway).
- Construction of a gravel pad for the Energy Centre.
- Installation of a 35m long single-span timber bridge
- Installation of pile foundations for the bridge.
- Installation of shallow and deep (pile) foundations for the structures and equipment at the Energy Centre.
- Installation of passive thermosyphon or mechanical cooling foundation systems at the Energy Centre.

Other Project activities following ESW include the development and production of the suspended gas well M-18. This phase (following ESW) of the IESP will include the following civil works:

- To provide for future well servicing and/or emergency work, a gravel pad will be built at the well site as part of the Well Workover scope and will be joined with the new sump cap to create a single pad.
- The existing sump cap will be examined for settlement and graded and/or filled as needed.
- The sump cap will be revegetated with native species, while the well servicing pad will be kept free of vegetation by non-chemical methods.

6.2 Permafrost Conditions within Project Area

Permafrost exists throughout the IESP Project Area. Permafrost is defined as ground (soil or bedrock and included ice and organic material) that remains at or below a temperature of 0°C for at least two consecutive years. The two-year minimum excludes from the definition the top layer of ground that is subject to annual freezing and thawing (called the “active layer” or “seasonal frost”).

A geotechnical site investigation in 2020 confirmed permafrost conditions and soils comprising lacustrine and glacial deposited silts and clays containing excess ice underlying the project area (Kiggiak-EBA 2020). These soils were found to contain excess ground ice and are thaw sensitive and subject to deformation and loss of soil strength if significant changes (warming) to the ground thermal regime occur during construction or operation. This includes ground disturbance during construction of the access road and pad or heat penetration from surface structures during operations.

The sensitivity of an area to climate change is governed by the thermal and soil characteristics of the permafrost in that area. The IESP is in an area of continuous permafrost, with measured ground temperatures of -3.6 to -5.5 °C (Kiggiak-EBA 2020). The relatively cold ground temperatures reduce the sensitivity to permafrost warming but the consequence of permafrost thaw is high.

From an engineering perspective, permafrost can be classified into two general types: ice-rich (permafrost with excess ground ice which is thaw-sensitive) and ice-poor (permafrost with little to no excess ice which is thaw-stable). The type of permafrost that is typically of concern is ground that is ice-rich and thaw-sensitive. Fine-grained soils that contain visible ice or are more than 100% saturated are considered thaw sensitive. Granular soils that do not contain excess ice are considered thaw stable.

Permafrost is vulnerable to both thermal erosion of the frozen ground and physical erosion of the soil:

- Thermal erosion is characterized as the thawing of permafrost or seasonally frozen ground. Frozen ground containing ice will thaw and settle and the discharge water will flow over-saturated soil.
- Physical erosion is characterized as the mobilization of soil particles by water flow and subsequent deposition as sediment. Vulnerability to physical erosion is similar in permafrost

and non-permafrost areas but can be worsened in permafrost soils when fine-grained soils such as silt thaw and mobilize.

Thermal erosion may or may not result in physical erosion, but physical erosion will increase the vulnerability to thermal erosion. To some degree, thermal erosion of permafrost following construction on permafrost terrain is inevitable due to the change in thermal regime resulting from construction. The degree of thermal erosion and permafrost thaw can be mitigated by employing appropriate measures during construction. It becomes impractical to restore permafrost once thermal erosion has occurred and the permafrost will naturally need to establish a new equilibrium.

6.3 Permafrost Management Principles and General Protection Measures

Construction activities will follow applicable best management practices for protecting permafrost and mitigating permafrost degradation including practices for constructing on permafrost terrain relating to road and pads, grades, width, side slopes, pullouts, etc.

Numerous permafrost management and mitigation strategies are described in the guidance documents summarized in Section 2.0. The appropriate management practices to employ vary according to the activity undertaken. One of the most common causes of permafrost degradation along roads and pads is water ponding, inadequate drainage, and drainage blockages at culvert crossings. Changes in drainage flow paths tend to have a rapid impact on permafrost which can lead to future impacts on the environment.

Permafrost Management Principles follow the best practices and guidelines presented in Section 4.2.

It is essential to undertake permafrost protection measures on a proactive basis to preserve permafrost beneath and next to roads, pads and building infrastructure whose foundation relies on permafrost because once permafrost begins to degrade, it is usually difficult and expensive to halt permafrost thaw.

6.3.1 Site grading and drainage

Proper surface water drainage is essential for preserving permafrost stability. The following general protection measures help to ensure proper drainage:

- a) Do not excavate drainage ditches in permafrost with excess ground ice (ice-rich areas)
- b) The area under and within approximately 4 m of the perimeter of the structure will be graded away at no minimum than 4% slope to facilitate rapid drainage of surface water away from the structure.
- c) During the spring thaw, water will be kept from ponding under or next to the structure or foundation. Additional fill will be placed at select locations as needed to promote positive drainage.

- d) New construction around existing buildings or structures that negatively impact the permafrost thermal regime will be avoided wherever possible.
- e) Drainage considerations are based upon CAN/CSA-S503.

6.3.2 Ventilation

Ventilation allows for winter airflow under the building or structure and promotes ground freezing and maintenance of permafrost. Buildings and structures equipped with a ventilated air space or a duct ventilated pad will be checked periodically to ensure that the space or ducts are not obstructed. For example, shipping containers or sheds are placed right beside a building or structure, and any vegetation that might be restricting the foundation ventilation will be removed. Mesh such as chain link fence will be installed to protect air spaces or ducts from the accumulation of debris and other items that might restrict winter airflow, or alternative materials will be used that maintain adequate airflow capacity.

6.3.3 Snow Management

Snowbanks and snowdrifts alongside roads, pads, and around structures reduce ventilation and insulate the ground, impeding the cooling of the active layer and the underlying permafrost in winter. Snow will be cleared away from all structures to allow frost penetration and cooling of permafrost in winter. A snow management/maintenance program will be implemented to keep snow cleared all winter and stored in a designated location; however, snow may be left in place in the spring if meltwater will not be an issue. Snowbanks will be managed so that meltwater in the spring does not pond within 4 m of the building or structure. If it is not practical to remove the snowdrifts, a snow study should be undertaken to determine if other snow management mitigation measures (i.e., snow fence) can be implemented.

Monitoring the Effectiveness of Existing Mitigation Measures

Where measures have been employed in the building or structure design to maintain permafrost or provide building heat interception, such as thermosyphons or mechanical cooling, the effectiveness of these measures will be monitored appropriately to ensure performance as intended.

6.4 Project Activities and Specific Management Practices

Mitigation measures aim to prevent permafrost degradation. The following Table 2 identifies potential effects that may occur resulting from pre and post construction activities that could lead to permafrost thaw and specific measures (BMPs (Best Management Practices)) that may be implemented to mitigate the potential effect of permafrost degradation. In all cases:

- Mitigation BMPs must not contravene permit conditions or other regulatory requirements.

- Installations shown in design drawings and specifications take precedence over BMPs unless otherwise approved by the Engineer based on observed site-specific conditions.

Table 2: Potential effects, applicable activities, and mitigations measures

Phase	Activities	Mitigation and Monitoring Practices
Design Engineering	All design activities	<p>Project Engineering and Design will:</p> <ul style="list-style-type: none"> a) Minimize ground disturbances. b) Limit the area of ground disturbance to the Project footprint, unless approved otherwise by IESPL Management Team. c) Use effective road design, including stabilizing slopes and culvert installation. d) Structures and sources of heat must not be in contact with the permafrost; or, alternately, have thermal separators to protect the permafrost. e) Maintain air flow between elevated structures and permafrost. f) Design to mitigate drifting snow and thick snow accumulation. Snow insulates and prevents ground from cooling. g) Maintain positive drainage away from infrastructure - keep water way from road, pads, and buildings. Pooling water results in permafrost degradation. h) Identify areas where permafrost thaw may occur and design accordingly. i) Leave organics in place wherever possible. Vegetation naturally insulates to minimize permafrost degradation and protects soils from erosive factors of water. j) Where organic vegetation is removed for foundation design then replace it with an equivalent level of thermal protection. k) Provide sufficient cross drains along the roadway to facilitate water movement and maintain drainage patterns. l) Culvert design to include bedding materials to protect surrounding permafrost and riprap to avoid erosion around each culvert. m) Modification to the location or number of drainage culverts will be done in consultation with the Engineer based on observed site conditions during construction if required.

Phase	Activities	Mitigation and Monitoring Practices
Construction	<p>All construction-related activities including:</p> <ul style="list-style-type: none"> mobilizing and demobilizing construction equipment to and from work site operating equipment access road and pad construction installation of culverts along access road installation of bridge across the creek process facilities construction temporary workspaces and laydown areas 	<ul style="list-style-type: none"> a) Project work will be confined to the Project specifications and drawings. b) Avoid ground surface disturbance to terrain outside of planned disturbance. c) Proactively protect and prevent ground disturbance and permafrost degradation. d) Do not remove the organic protective layer during construction of the access road. e) Construction of the access road and pad will occur primarily during winter (December 15 to April 1), during frozen conditions. f) Work completed under non-frozen conditions will be done from the constructed access road and pads. g) Removal of organic vegetation will need to be replaced with an equivalent level of thermal protection as per specifications. h) Drainage culverts will be installed according to specifications to facilitate water movement and maintain drainage patterns. i) Travel of vehicles and equipment will be confined to the road alignment, pads, constructed embankments and/or compacted winter roads to avoid disturbing the tundra and vegetated areas. j) Off-road travel, if necessary, will be limited to snow machines in winter (December 1 to April 15), or low ground pressure, All-Terrain Vehicle (ATV) equipment in the summer, or by foot traffic or helicopter if necessary. k) Avoid off-road travel and construction on saturated soil during freshet and in the summer and fall months where possible. If necessary, then suitable site preparation and ground equipment will be used to prevent unnecessary soil damage and impact to sensitive tundra terrain. l) Use natural or artificial insulating materials for covering areas that have been denuded of vegetation or soil cover. m) Runoff and erosion control methods may be required to protect permafrost soils including but not limited to: <ul style="list-style-type: none"> a. diverting water away from entering the site. b. modifying slope surfaces. c. reducing slope gradients to control flow velocity. d. providing adequate or increased drainage, and e. diverting flows away from exposed soils.

Phase	Activities	Mitigation and Monitoring Practices
Operations and Maintenance	<p>Equipment activities</p> <p>Driving assess road</p> <p>Working at Energy Center</p> <p>Changes to surface water drainage patterns</p> <p>Changes to snow accumulation</p> <p>Natural events extreme rainfall summer surface runoff events, intense spring runoff, thick snowpack, tundra fire, etc.</p>	<p>a) Inspection and monitoring of buildings, structures, road and pads for movement including settlement or heave and document observations and findings.</p> <p>b) Monitor throughout life of the infrastructure.</p> <p>c) Monitor for changing drainage and water conditions.</p> <p>d) Monitor extreme weather events and changing climatic conditions.</p> <p>e) Avoid ground disturbances during operations and maintenance.</p> <p>f) Areas, where permafrost thaw may be accelerated will be identified and monitored.</p> <p>g) Thermal regimes of the road and pad embankments will be monitored using ground temperature cables (ground temperature cables).</p> <p>h) Encourage good drainage away from roads, pad and structures.</p> <p>i) Observe ground surface settling or heaving or any lateral movements.</p> <p>j) Snow fencing can be installed upwind of road and pad embankments to keep snowdrifts off the road surface and away from drainage ditches.</p> <p>k) Changes in snow cover change the characteristics of permafrost and collection of snow along the sides of the access road and the Energy Centre pad is identified may potentially result in warmer ground temperatures which could lead to thawing of permafrost and potential ponding of water alongside the embankments.</p> <p>l) Maintenance mitigations can be used such as flattening snowdrifts or spreading plowed snow accumulation.</p> <p>m) Additional embankment material can be added alongside slopes to decrease the slope gradient.</p> <p>n) Snow removal should be focused on the lee side of where snow tends to drift.</p>

6.5 Management of Climate Change Impacts

When the IESP is in operation, vigilance, and effort on the part of the operations and maintenance personnel will be required to minimize the impacts associated with climate change on the Project.

This would include:

- a) Training staff to know how to identify issues.
- b) Maintaining site drainage and culverts so that they are operating as designed in the spring and fall.
- c) Observing the performance of the infrastructure including the evaluation of drainage and thaw-related problems.
- d) Completing road and pad inspections during spring freshet.
- e) Completing road and pad inspections after heavy weather events.
- f) Addressing performance issues such as rutting and potholes in a timely manner promptly.
- g) Maintaining the road and addressing settlement issues promptly.

Table 3 outlines possible measures incorporated into the project to mitigate impacts from a changing climate.

Table 3: Potential climate change impacts and mitigation

Potential Effect	Mitigation Practices
Increase in mean seasonal temperatures, increasing Active Layer thickness, water expulsion from soils, and ground settlement.	<ol style="list-style-type: none">a) Use of geotextiles and geogrids to reinforce embankments and reduce differential settlement.b) Incorporate approaches to minimize the presence of ponded water alongside the access road and pad. (e.g., appropriate culvert placement and sizing).c) Use Erosion and Sediment Control (ESC) management practices to minimize erosion of existing fine-grained soils and mitigate permafrost degradation.d) Stage construction such that the placement of granular surfacing materials is delayed until any significant differential settlement has occurred.e) Confine activities to the Project footprint to the extent where possible.
Increase in mean seasonal temperatures resulting in increased ponded surface water and potential erosion and drainage	<ol style="list-style-type: none">a) Identify areas that are most vulnerable to climate change, including those areas with excess ground ice (ice-rich) permafrost.b) Avoid constructing in ice-rich areas, if possible, and where not possible then deploy methods to minimize thermal disturbance.

Potential Effect	Mitigation Practices
issues associated with permafrost thaw.	c) Refer to ESC Management Plan (ESCMP) for erosion and sediment control management best practices.
Increase in the high-temperature extremes increases tundra fire potential, which may impact insulating ground cover and increase ground temperatures.	Minimize the disturbed Project footprint area.
Warming temperatures globally decreasing the amount of permafrost in the local area of the Project.	a) Observe Project sites during freshet to identify and mitigate erosion concerns. b) Incorporate approaches to minimize the presence of ponded water alongside the access road and pad (e.g., appropriate culvert placement and sizing) and maintain positive drainage away from the embankments. c) Use of geotextile/geogrid materials to reinforce embankments and reduce differential settlement. d) Avoid construction on steep slopes to avoid material slumping and gully erosion. e) Stage the construction such that the placement of granular surfacing is delayed until significant differential settlement has occurred.

6.6 Management of Residual Effects

The potential effects of the type of work being carried out at the site are understood and permafrost degradation effects can be mitigated using proven road construction and site development techniques and construction practices; therefore, residual effects are expected to be minimal. This will be confirmed through construction monitoring and the adaptive management framework approach will be used.

6.7 Climatic Data Reviews

Climatic data, including mean daily air temperatures and the calculated freezing indices, will be compiled and reviewed on an annual basis. The information can assist with interpreting observed

ground temperatures measured along the IESP and will help to illustrate fluctuations in air and ground temperatures.

Climatic data review will focus on sensitive areas of the alignment to better assess how permafrost conditions may be altered due to climate change. Air temperatures will be sourced from current and historical weather stations. Although air temperatures do not solely influence ground temperatures, they offer help in understanding observed temperature trends. Freezing indices (the number of degree-days below 0°C) will be calculated, using this data, to show changes in seasonal temperatures from year to year. Annual climatic data reviews will be performed during operations.

7.0 Monitoring, Reporting, and Record Keeping

Both short-term and long-term permafrost monitoring programs will monitor permafrost conditions during construction and over time through operations. Permafrost monitoring describes approaches that will be taken to effectively monitor areas and describe visual and ground temperature monitoring activities that will be conducted regularly throughout construction and during operations. These monitoring activities will assist in adaptively managing the construction elements and long-term operational plans aimed at protecting the ground thermal regime, and in identifying specific areas where mitigative or restorative efforts may be required.

The monitoring programs will study the thermal regime of the infrastructure and surrounding area, and how factors such as surface ponding, revegetation, and patterns of snow accumulation affect the thermal regime.

Road and pad embankment permafrost monitoring includes but is not limited to observing embankments for signs of significant deformation, cracking, sloughing, ponding water, and vegetation changes alongside the embankments. Inspections will focus on any obvious construction impacts that could lead to permafrost degradation or thaw settlement. Indicators of this could include erosion, seepage, sinkholes, slumping, and tension cracks.

Performance monitoring will be carried out regularly, during construction, to identify potential construction impacts to permafrost and promote early mitigation. Visual inspections will be performed by the Contractor once a week. Inspections will be documented with field notes and photographs and will be reviewed by IESP or IESP's representative as a measure of quality control prior to finalization. Records from each inspection will be kept on-site and should be reviewed before completing an inspection to identify areas that require follow-up monitoring. Completed inspection reports and findings will be interpreted and reported in IESP's regulatory reporting requirements. Results may be shared with ILA in the IESP annual report.

7.1 Road and Bridge Monitoring

Early civil site works include the construction of an all-weather access road (approximately 4 km in length) and the installation of a 35 m long single-span bridge to the Energy Centre from the ITH. The road and bridge will be in operation year-round.

Performance monitoring of the IESP Access Road and bridge will be carried out weekly during pre-commissioning in the summer (May 15 to Oct 15), during construction to identify potential construction impacts to permafrost and promote early mitigation.

Inspections will make observations of damage to vegetation, alteration of drainage patterns or other disturbances during construction that might alter the thermal balance which may result in permafrost degradation and unintended consequences for the roads and pads.

The bridge crossing will be monitored to ensure that there is no significant degradation of the underlying permafrost crossing structures and bridge abutments which will be subject to ongoing visual inspections. In addition, the instrumentation will be installed at bridge abutments to record ground temperatures at various depths to confirm ground temperature regimes depth of the active layer and temperature of the permafrost. These temperature readings will be taken during construction and through the operational phase of the facility

7.1.1 Monitoring Procedure

Visual inspections of the access road and pads will be performed by the Construction Manager or an IESP representative. Inspections will be documented with field notes and photographs and will be reviewed by an IESPL representative as a measure of quality control.

Inspections will focus on any obvious construction impacts that could lead to permafrost degradation or thaw settlement. Indicators of this could include erosion, seepage, sinkholes, slumping, and tension cracks.

In addition, ground temperature sensors will be installed at the bridge abutment pile foundations and select locations in and next to the access road and the pad. These sensors will record ground temperatures at various depths to confirm overall ground temperature regimes, depth of the active layer and temperature of the permafrost. These temperature readings will occur during construction and into the operational phase of the facility.

Drainage patterns will be monitored along the roadway. If drainage patterns change in a way that adversely impacts the roadway, the IESP representative will be notified, and they will advise on the appropriate action to take.

Culverts are important in moving water across the roadway. Culverts will be inspected:

- in springtime before freshet;
- in Fall time before snowfall; and
- after periods of heavy rainfall;

to determine their condition and function and to see if a culvert is damaged or not functioning properly. If that is the case, then appropriate action will be taken to rectify the situation.

7.1.2 Inspection Frequency

Visual inspections of the access road and pads will be performed by the Construction Manager (CM) once a week during construction and monthly during operations.

Drainage and erosion control structures will be inspected regularly and repaired when necessary. They should be kept clean and free of debris to prevent ponding of water and changes in natural or engineered drainage patterns that may cause thermal erosion in previously stable areas. Culverts and ditches require regular inspections during the winter and spring to check for icing conditions.

Visual inspections of the bridge will be undertaken regularly documenting, but not limited to:

- deviations from issued for construction design
- any damage to structural bridge components
- cracks and deformations in the foundation of the structure
- cosmetic damage
- ground-surface settlement or heave

7.1.3 Corrective Actions

Culverts are susceptible to ice build-up, particularly if water flows are continuous but low during the late winter months. Ice buildup occurs as the low water flow is forced to the surface of the stream channel. As the ice builds up it can eventually fill and block the culvert. When spring conditions arrive the snow meltwater cannot flow through the ice blocked culvert causing it to back up until it overtops the roadway. The flowing water often erodes the embankment fill leaving the culvert exposed or can undermine the culvert resulting in the eventual collapse of the culvert and the embankment fill.

Work should be suspended in any area that has unacceptable risks for permafrost degradation, such as:

- Erosion and Sediment Control (ESC) measures are reaching their capacity (e.g., silt fences) and/or are not functioning properly
- Significant rainfall causing erosion and sedimentation
- Observations of distressed embankments or building structures

The Structural Bridge Engineer and Geotechnical Engineer will be notified if any issues are observed with the Bridge.

The ESCMP and FFHMP will be referred to if any issues are noted along the creek crossing.

7.1.4 Reporting

An annual report of all permafrost monitoring activities will be prepared for the period of construction and on an annual basis during operations. Reports will provide results of permafrost monitoring activities, indicate if any issues were identified, and describe corrective actions to address these issues. The reports will also provide updates on relevant permafrost monitoring work being carried out in the project area by other parties.

7.1.5 Record Keeping

Records from each inspection will be stored in the IESP IMS Sharepoint site and should be reviewed prior to completing an inspection to identify areas that require follow-up monitoring. Completed inspection reports and findings will be interpreted and reported in IESP's Annual Report to be submitted to the ILA and other regulator stakeholders. Records will be kept according to IMS protocol.

Quality assurance and quality control of visual and quantitative monitoring results and data will be kept through proper training of IESPL staff and contractor staff, periodic verification of field observations and monthly review of monitoring results.

7.2 Energy Centre Pad and Foundations Monitoring

7.2.1 Monitoring Procedure

Early civil site works include the construction of:

- A gravel pad for the Energy Centre
- Erection of a 35 m long single-span bridge
- Installation of deep and shallow (piles and spread/strip footing) foundations for the structures and equipment at the Energy Centre
- Installation of passive thermosyphon or mechanical cooling foundation systems at the Energy Centre

The monitoring program will observe that the construction activities are not resulting in permafrost degradation and if any changes in the thermal condition of the underlying foundation materials have occurred that may negatively affect the Energy Centre. The monitoring program will include observations and documentation of the following access road and pads, site features and buildings:

-
- a) Visual settlement and distress of the pad embankment
 - b) Progression of cracks and deformations in the foundation of the structure
 - c) Progression of ground surface deformation
 - d) Progression of doors and/or windows sticking or not sealing
 - e) Progression of any other damage to other visible structural components
 - f) Climatic data (including air temperature, wind speed and direction, total precipitation)
 - g) Ground temperatures

7.2.2 Inspection Frequency

Visual inspections of the pads will be performed by the Construction Manager (CM) once a week during construction/pre-commissioning activity and monthly during operation. Drainage and erosion control structures will be inspected regularly and repaired immediately when necessary to mitigate permafrost degradation.

Visual inspections of the Energy Centre pad will be undertaken regularly. Inspections will document:

- a) Ground-surface settlement or heave
- b) Visual observations of no water ponding or physical erosion alongside the pad and buildings
- c) Visual observations of any damage to buildings and structures
- d) Deviations from issued for construction design
- e) Cracks and deformations in the foundation of the structure
- f) Cosmetic damage
- g) Observations of settlement, geotechnical soils, and foundation issues

Monitoring to detect undesirable changes in the geothermal regime can provide advance warning of foundation and structural distress. The pad and building foundations will be instrumented with ground temperature cables to monitor the thermal and physical performance of the permafrost soils. By the time these observations are made, the foundation distress has progressed, its causes are difficult to stop, and the costs of remediation and rehabilitation will be much higher than if identified sooner.

Complex foundations will be present at the Energy Centre, and they will be inspected frequently based upon protocols established by foundation monitoring protocols. To carry out these activities, special technical expertise is required. Several monitoring schemes are applicable for operational monitoring of foundations and assessing foundation performance. This is not part of the PPMP but may include visual

inspections of the structure and the site; conventional level surveys; ground temperature monitoring; thermal imagery; and remote sensing surveys.

Performance assessments of foundation systems constructed in permafrost terrain benefit from ground temperature monitoring. For thermosyphons and mechanically cooled foundation systems, thermal imagery of the radiator section in the winter is useful to assess the functioning of the thermosyphon. When photographed with an infrared camera, the radiator will display as being warmer than the surrounding area. Thermal imagery can also detect heat leakage or conduction under elevated structures.

For piled foundations, ground temperature cables will be installed at the time of pile construction. Vertical temperature-sensing cables will be at least 10 m long. A suitable number of temperature-sensing (thermistor) beads on the cable are about eight to ten, and a higher concentration of thermal-sensing beads will be located near the ground surface where annual temperature variations are greatest.

For on-grade structures constructed on an engineered granular pad, it is desirable to install two or more horizontal thermistor cables near the base of the pad. The typical design strategy of structures on engineered granular pads is to ensure that the seasonal thawing under the building does not reach the native ground surface. Therefore, horizontal temperature monitoring monitors the ground temperatures below any insulation or thermal mitigation devices, such as thermosyphons or ventilation conduits.

Ground temperature monitoring is included as part of the regular maintenance schedule of the building. The frequency of monitoring depends on the significance of the structure and the consequences of negative foundation performance. The recommended frequency is monthly, and at a minimum, four times per year; and this should be specified by the designing engineer as part of the performance monitoring plan.

Warming of near-surface ground temperatures is an early warning that foundation movements and structure distress could develop in the future. Such warming is usually detected prior to any distress being noted. Where warming is identified, mitigation strategies can be developed and implemented to stabilize the thermal regime of the ground and prevent excessive structural movements and distress.

7.2.3 Corrective Actions

Work will be suspended in any area that has unacceptable risks for permafrost degradation due to observations of distressed embankments or building structures. The Structural Bridge Engineer and Geotechnical Engineer will be notified if any observations appear to be negatively impacting the permafrost ground conditions. The corrective actions and mitigative measures that may be applied for structures impacted by changing permafrost conditions are highly variable, site-specific, and potentially

complex that requires expert intervention. Changing permafrost conditions can be divided into those applied to the site or those applied to the structure itself and its foundation. The appropriate Engineering specialist(s) need to be notified and CSA S501 should be referenced — Moderating the effects of permafrost degradation on existing building foundations.

7.2.4 Reporting

An annual report of all permafrost monitoring activities will be prepared for the period of construction. Reports will provide results of permafrost monitoring activities, indicate if any issues were identified, and describe corrective actions to address these issues. The reports will also provide updates on relevant permafrost monitoring work being carried out on the project.

Regular permafrost observation and monitoring reports will be prepared during construction and kept on file in the IMS Sharepoint and may be provided to regulatory groups upon request. The monitoring reports should include:

- a) Project area
- b) Name(s) of environmental monitor(s)
- c) Dates of monitoring and the date the report submitted
- d) Overall weather conditions (including notable weather events)
- e) Report recipient(s)
- f) Contractor(s) undertaking work
- g) Description, photos, and status of construction by area, including within environmentally sensitive areas (i.e., work near water)
- h) Environmental meetings and key issues discussed
- i) Key communications with environmental authorities
- j) Outstanding environmental issues and/or non-compliances and the corrective actions required.

7.2.5 Record Keeping

Records will be kept of any works that impact, including but not limited to:

- a) Records of site observations
- b) Ground temperature monitoring on the project
- c) Additional ground temperature and permafrost monitoring that may have been initiated
- d) Construction or operational events that could impact permafrost

- e) Any erosion and sediment events that occurred that would have impacted permafrost
- f) Remediation, mitigation, and control measures implemented to mitigate impact to permafrost

Plans to monitor the performance of the structures, foundations, and mitigation techniques are not part of the PPMP. Depending on site-specific conditions, performance monitoring may include:

- a) Routine visual inspections
- b) Recording and assessing crack monitoring points
- c) Conducting floor elevation and foundation element surveys
- d) Thermal monitoring of the subgrade, open-air gaps, and floors
- e) Leak checks on water supply and sewage disposal systems
- f) Surface and groundwater monitoring
- g) Operational monitoring of thermosyphons or other cooling techniques if present

The designer, building owner, and maintenance staff will collaboratively develop a suitable monitoring program, including a schedule and reporting system, that is appropriate for the site-specific conditions.

8.0 Emergency and Incident Response

An emergency response plan will be always available on-site. Potential emergencies might include:

- Sinkhole from permafrost thaw resulting in trafficability issues or pad failure
- Slump or slope failure from permafrost thaw resulting in embankment failure

Response planning for incidents that might result in erosion or sedimentation should include, but are not limited to the following:

- Adequate heavy equipment available on site for immediate use
- Sufficient trained personnel to implement the emergency response plan
- Appropriate construction activity shutdown plan, if required

All environmental incidents related to the impact to permafrost will be reported to the Environmental Monitor (EM), the Contractor, and IESPL as soon as possible so that appropriate and prompt notifications are issued, and project management can ensure that incidents are handled appropriately. All personnel on-site have a responsibility to report all environmental concerns or incidents regardless of magnitude. It is the responsibility of the EM to follow up with the Contractor to ensure that an Environmental Incident Report (EIR) is filed.

In the case of any environmental concern and/or incident, Project personnel are responsible for informing their Site Superintendent, who must then report to the EM. Contractors are responsible to ensure that all crew are adequately trained and equipped to deal with potential environmental incidents related to their work. Any concerns about preparedness for environmental incidents should be brought to the attention of the Site Superintendent or the EM.

The Emergency Contacts List is available in the ERP and at the quick link in the IESP IMS Sharepoint site.

9.0 Adaptive Management

IESP's approach for adaptive management of permafrost will be a systematic approach that links site observations, ground temperature monitoring, and local knowledge with response actions to mitigate permafrost degradation. Possible changes in the permafrost regime due to construction and climate require triggers and planned responses to mitigate future permafrost degradation. An adaptive management approach helps to evaluate the long-term success of permafrost preservation and confirm that disturbed areas associated with the IESP have stabilized and are performing as expected.

A response framework for permafrost degradation will require the Contractor and IESPL to respond to pre-defined levels of changes or effects to the permafrost regime. The following permafrost response action plan is in alignment with IESP's regulatory and permit commitments.

This plan outlines how adaptive management will be used to respond to conditions potentially resulting in degradation of permafrost which addresses:

- Triggers to identify signs of potential permafrost degradation
- Response actions to avoid or mitigate permafrost degradation

A permafrost response framework assumes that the best management actions may not be defined upfront but will be determined in response to specific changes documented through the PPMP. The permafrost response should be a clearly defined and timely process that is responsive to the results of the PPMP. It provides the means to respond to all reasonable monitoring outcomes, without the need to develop specific management responses to all possible (i.e., theoretical) scenarios before they occur.

If impacts from the construction of the IESP could result in future permafrost degradation, then a series of pre-determined action levels will apply, as described below.

9.1 Low Action Level

Low Action Level triggers for adaptively managing construction impacts to permafrost include:

- a) Appearance of tension cracking along the access road and on the infrastructure pads less than 50 mm

- b) Initial deflections, settlements, or sinkholes less than 50 mm

Response:

Performance monitoring will continue at the regular intervals identified in the PPMP. No further response or actions are warranted at this response level.

9.2 Moderate Action Level

Moderate Action Level triggers for adaptively managing construction impacts to permafrost include:

- a) Tension cracking along the access road and on the infrastructure pads greater than 50 mm, but less than 150 mm, or
- b) Deflections, settlements, or sinkholes greater than 50 mm, but less than 150 mm, or
- c) Moderate ponding of meltwater along the access road, alongside the pads or on the pads, or around buildings and equipment
- d) Visual signs of movement, settlement, or distress of the bridge superstructure or pile foundations, or
- e) Continued growth and or other physical changes to the road and pad embankments

Response:

If conditions meet the Moderate Action Level criteria, then the following response actions may be undertaken:

- a) Increase performance monitoring intervals to daily and identify any construction impacts that could lead to future permafrost degradation,
- b) Backfill deflections, settlements, and sinkholes with suitable material, and
- c) Regrade pads to eliminate meltwater ponding.

9.3 High Action Level

High Action Level triggers for adaptively managing construction impacts to permafrost include:

- a) Tension cracking along the access road and on the infrastructure pads greater than 150 mm wide, or
- b) Deflections, settlements, or sinkholes greater than 150 mm, or
- c) Significant ponding of meltwater on or alongside the infrastructure pads or around buildings and equipment, or

- d) Any significant physical changes to any embankments and buildings, structures, and equipment.

Response:

If conditions meet the High Action Level criteria, the following response actions will be undertaken:

- a) Construction Manager and Contractor should immediately close the affected area.
- b) Geotechnical Engineer to inspect the affected area immediately and investigate any factors that could lead to future permafrost degradation.
- c) Further response actions will be governed by the type and severity of the situation.

In the event of a construction shutdown, for reasons such as inclement weather, permit or licence contraventions, or health and safety incidents; these may lead to an increased risk of potential permafrost degradation where mitigation had not yet been installed or completed. In such an event, then additional ESC and permafrost mitigation measures will need to be completed to protect the permafrost.

10.0 Continual Improvement

The PPMP will be updated annually with ground temperature data and permafrost observations collected for the IESP, and as Project requirements, monitoring, and environmental conditions change. The PPMP could also be updated as needed in response to changes in legislation and consultation with Indigenous communities. Updates will be communicated to all required parties and comments received will be considered during PPMP updates. Continual improvement is supported through Adaptive management.

11.0 Related Documents

- IESP Erosion and Sediment Control Management Plan (ESCMP).

12.0 References

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APPENDIX A: COMMITMENT REGISTER

IESPL have made commitments in regulatory applications, information request responses and community meetings. A summary of commitments made during the Environmental Impact Screening process in the IESP Project Description (PD) and in the CER Development Plan (DP) application process is provided in Table A-1 below.

Table 4: List of IESPL Commitments Related to Permafrost	
IESP Development Plan (DP) or Project Description (PD) Application Reference	Commitment
DP Page 111. Section 5.2.4 para 3.	Numerous design measures are in place to protect permafrost. The active layer is an insulating boundary that will be left intact wherever possible. Efforts will be made to place gravel for roads, pads, and piles directly on the tundra without disturbing it. The Gravel acts as an additional insulator to permafrost, with the active layer freezing up into the base of the gravel. All buildings, tanks and facilities will be placed on piles for additional barrier between heated buildings and permafrost ground. Numerous mitigation measures are in place to protect permafrost.
DP Page 116. Section 5.3.3, Para 2 and 3.	Given the uncertainty of the events associated with climate change, greater vigilance, and effort on the part of maintenance operators will be required including regular inspections and monitoring of the performance of infrastructure (facilities are being designed to be supported on deep foundation systems that are designed to rely on permafrost at greater depth and can be made relatively less vulnerable to permafrost thaw). IPC has already installed strategically placed ground temperature cables for the IESP and will continue monitoring ground temperatures throughout the Project life cycle. Adaptation to climate change will be an ongoing exercise as part of IPC's "plan-do-check-act" cycle in the IESP Integrated Management System.
DP Page 117. Section 5.3.5. paragraph 1.	The proposed access road will be designed and constructed considering these guidelines (the Transport Association of Canada (TAC) Guidelines for Development and Management of Transportation Infrastructure in Permafrost Regions (TAC 2010)); and lessons learned from the recent ITH construction, Borrow Source 312 and 177 roads, and numerous pads built in Tuktoyaktuk.

DP Page 117. Section 5.3.5. paragraph 2.	Most buildings, tanks and other facilities will be built on ad-freeze piles on top of insulating gravel pads to protect permafrost. Geosynthetic liners and/or geotextile may be incorporated into the gravel for additional protection where needed. Ground temperature cables were installed at four locations in the PA in March 2020. Gravel thickness on the pads and road will be sufficient to bear all loads and provide thermal stability and protection to the permafrost.
DP Page 117. Section 5.3.5. paragraph 3.	The temperature of the gas reservoir is significantly higher (~86°C) than the surrounding ground temperature, so if left unprotected, a significant amount of heat would be transferred to the permafrost soil, causing it to thaw. To minimize the chance of this ever occurring the annulus (area between well casing and the production tubing) will be filled with a gelled fluid that will limit the heat transferred to the surrounding frozen ground. Special production tubing that is vacuum jacketed is being looked at to further protect the surroundings from heat transfer. Vacuum jacket tubing is a special configuration where the tubing contains an inner portion surrounded by a vacant space and then an outer portion. The empty space between the inner and outer portions will have all the air removed from it - creating a vacuum in that space and protecting the permafrost.
DP Page 216. Section 13.3.6, paragraph 3.	To mitigate potential impacts to permafrost, IPC will protect the natural tundra vegetation in undisturbed areas.
DP Pages 216 - 217 Section 13.3.6 paragraph 1	To minimize changes to the ground temperature, and, as such, prevent the permafrost below the road or pad from thawing and degrading, the all-season roads and pads will be designed to do three things: <ul style="list-style-type: none"> • Insulate the underlying permafrost to keep the subsoil frozen, • Prevent ponding, and • Move the frozen layer upwards into the pad or road In addition, all facilities, including storage tanks, will be set on adfreeze piles on top of the insulating pads. The use of piles will help with snow removal as well as protect the permafrost.
DP Page 217. Section 13.3.6 paragraph 2	IPC intends to monitor the permafrost temperatures in the Project Area during the life of the Project.

DP Page 217 Section 13.3.7 Paragraph 1	All soils within the PA and RA will be left undisturbed to protect permafrost. Borrow will be required for the construction of roads and pads. This might typically create an impact to soil outside the RA, however, no impacts related to the development of a borrow source are anticipated because all borrow is expected to come from existing borrow sources.
DP Page 217 Section 13.3.7 Paragraph 2	Detailed drainage plans will be developed to maintain continued drainage flows and thermal degradation from ponding does not occur. Culverts will be built throughout the access road to make sure drainage is not impeded. The access road and facility pads are distanced from the water bodies and existing drainage, except for the creek crossing at KM 2.2. ... a bridge will be placed on piles over this creek crossing. Most of the proposed access road route is along a previously disturbed route that was used for the 2001 drilling program, thereby further minimizing soil and permafrost disturbance in the area.
PD Page 5-13, Section 5.5.3, paragraph 5	GNWT guidelines for road access will be applied to all contractors to mitigate siltation, erosion issues, permafrost disturbance, etc.
PD Page 5-23, Section 5.5.13, Para 1	All soils within the LSA and RSA will be left undisturbed to protect permafrost.
PD Page 5-23, Section 5.5.13, Para 2	Erosion of soil from permafrost degradation is a concern. Detailed drainage plans will be developed to ensure that drainage continues to flow and thermal degradation from ponding does not occur. Culverts will be built throughout the access road to ensure drainage is not impeded.
PD Page 6-16, Section 6.6.4, para 2	In terms of environmental and permafrost protection, our proposed construction methods will meet or exceed those used by the ITH construction teams.
PD Page 6-17, Section 6.6.4.2, para 3	The road will be constructed with a minimum fill thickness required to cover microrelief and protect permafrost.
PD Page 6-18, Section 6.6.4.3, para 3	The embankment pad will be designed to prevent the thawing of ice-rich permafrost below and seasonal freeze-thaw of frost-susceptible soils. The design will consider the seasonal air temperature data, climate change considerations, and the design active layer for the project. The crest elevation and footprint of the pad will extend beyond the perimeter of the facilities, and the surface of the pad will be graded away from the structure in all directions to avoid ponding water. The embankment pad thickness may

	<p>be reduced in cases by installing horizontal insulation that provides an equivalent barrier to heat flow and adequate bearing capacity to support the design loads of the foundation(s). Final design will consider insulation alternatives that might save borrow.</p>
<p>PD Page 16-2, Section 16.2.2, Para 1.</p>	<p>The M-18 well is in a region where the ground is in a permafrost condition. Reservoir temperature is significantly higher (~50°C) than the surrounding ground temperature, so if left unprotected, a significant amount of heat would be transferred to the permafrost soil, causing it to thaw. Should this occur, the casing on the well could be compromised leading to a loss of well control. To minimize the chance of this ever occurring the annulus (area between well casing and the production tubing) will be filled with a gelled fluid that will limit the heat transferred to the surrounding frozen ground. Special production tubing that is vacuum jacketed is being looked at to further protect the surroundings from heat transfer. Vacuum jacket tubing is a special configuration where the tubing contains an inner portion surrounded by a vacant space then an outer portion. The empty space between the inner and outer portions will then have all the air removed from it creating a vacuum in that space. In addition, the temperatures at the well and in the surrounding permafrost will be monitored carefully. The overheating of permafrost will not happen suddenly. This risk can be monitored and, if necessary, the well could be managed in time to prevent an Loss of Well Control.</p>
<p>PD Page 16-4, Table 16-1, Section 1.1</p>	<ol style="list-style-type: none"> 1. There will be no new disturbance of soils. All pad and road construction will be directly upon undisturbed ground. Borrow will be removed from existing disturbed borrow pits. 2. The IESP will utilize arctic-proven pad and road construction methods. 3. The design of the road, including embankment thickness, will consider the local terrain conditions as well as the potential presence of ice-rich permafrost and drainage conditions in the area. 4. The road alignment will be designed to avoid unfavorable thick organic and ice-rich polygonal terrain. 5. Drainage culverts will be placed along the road as needed to allow for cross drainage and to avoid water ponding along the edge of the road.

<p>PD Page 16-5, Table 16-1, Section 1.2</p>	<ol style="list-style-type: none"> 1. Construction of road and well site pad and Energy Centre Pad will be completed during winter months under stable, frozen ground conditions. 2. Limit the use of construction equipment to the immediate footprint of the all-season access road or drilling area, camp, staged equipment, and storage areas 3. Vegetation removal will be minimized and conduct progressive reclamation at the culvert installations at the watercourse crossing. 4. Vegetation removal (brushing) will be conducted without removing the underlying root and/or peat layer to maintain an insulating barrier to protect the underlying permafrost and prevent soil erosion. 5. The gas processing facilities and storage will be mounted on trailers or modules and piles off the ground. 6. Rig mats will be used to ensure additional insulation when appropriate. 7. All buildings will be placed on thick gravel pads and/or piles to provide insulation.
<p>PD Page 16-5, Table 16-1, Section 1.3</p>	<ol style="list-style-type: none"> 1. Assessment of whether vacuum-jacketed tubing will be utilized in the well bore to a depth exceeding the permafrost layer (estimated at 400m) to insulate the well bore from the permafrost. Thermal analysis is underway. 2. Additionally, if necessary, we will install well annulus fluids to help insulate the wellbore.
<p>PD Page 16-5, Table 16-1, Section 1.4</p>	<ol style="list-style-type: none"> 1. Erosion control techniques (e.g., silt fences) will be utilized if there is a potential for soil surface erosion alongside the road or pad embankments. 2. Drainage culverts will be placed along the road as needed in order to allow for cross drainage and to avoid water ponding along the edge of the road.
<p>PD Page 16-5, Table 16-1, Section 1.5</p>	<p>The road conditions will be monitored regularly for potential erosion, subsidence or permafrost degradation.</p>

<p>PD Page 17-5, Section 17.6, para 2,3 and 4</p>	<p>Current ILA Rules do not require the removal of gravel pads and roads. Given the potential impact to the permafrost of gravel removal, unless a method for removing gravel without disrupting drainage, fisheries, and permafrost is discovered by the time we decommission the M-18 project, we anticipate that gravel will remain in situ following decommissioning. We expect that the gravel pads and road would remain in place without an impact to local ecology or traditional land use in the area.</p> <p>In the event that some of the gravel is recovered for use elsewhere (as gravel is always in high demand in the arctic), the remaining gravel footprint would be seeded with native vegetation species in such a way as to minimize disturbance to local drainage and permafrost; and to encourage re-growth of the area to natural vegetation communities. However, any proposed “mining” of the gravel should consider potential impacts to drainage and permafrost.</p> <p>The crossing of the Creek at KM2 of the proposed access road will require a bridge or large culvert. Our intention will be to decommission the crossing in such a manner as to minimize long term maintenance requirements and to minimize impacts to the fisheries, the natural drainage, and the permafrost.</p>
<p>EISC IR Response Nov 8, 2020, Page 10, para 3.</p>	<p>Key mitigative measures that have been incorporated into the design parameters to manage uncertainty related to future climate trends and extremes in the permafrost region that this development will be constructed include:</p> <ul style="list-style-type: none"> • Thick embankments that insulate and stabilize the active layer and the use of non-woven geotextile fabric, where appropriate to assist in maintaining the integrity of the access road and infrastructure pad embankments; • The use of deep foundation systems that are designed to rely on permafrost at greater depth and can be made relatively less vulnerable to surficial permafrost thaw; • The use of culverts to balance seasonal overland surface flows as necessary; and • Adoption of construction methods that minimize disturbance of the natural ground and vegetation before fill is placed.

Attachment 4: Fish and Fish Habitat Protection Plan



Fish and Fish Habitat Protection Plan

IESP-HSEQ-EN-PLN-0013

Rev.	Date	Purpose	Created By	Checked By	Approved By
1.0	2022-05-31	Issue for Implementation	BA	TB	AM
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Rev.	Date	Section	Summary of Changes	Changed by	Change Approved by
1.0	2022-05-31		ORIGINAL		
2.0	2023-01-16	Various	Changes and Corrections in response to CER IR No.2, upgrading bullets to letters for ease of reference	AM	AM
2.1	2023-04-06	Various	Changes and Corrections in response to CER IR No.3 and No.4	TM	AM
2.2	2023-09-05	ABB & Definitions Table; Table 1 & Sec.8.2	Updates related to CER IR No.6, updating Abbreviations & Definitions Table with Energy Centre, and reflecting changes in Table 1 "Project Phase Descriptions – Pre-Commissioning;" and Sec. 8.2-e, General Mitigation Measures; updating header and Appendix 1,2,3 to A,B,C	TWK	AM
3.0	2023-09-05	Headers	Preprepared for Issued for Use	TWK	AM

Abbreviations, Acronyms, and Definitions

Abbreviation/Acronym	Definition
BMP	Best Management Practice
CBMP	Community-Based Monitoring Program
CER	Canada Energy Regulator
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
DFO	Fisheries and Oceans Canada
EIR	Environmental Incident Report
EISC	Environmental Impact Screening Committee
EM	Environmental Monitor
ESC	Erosion and Sediment Control
ESCMP	Erosion and Sediment Control Management Plan
Energy Centre	<i>Energy Centre, Energy Facility, Infrastructure Facility, and Infrastructure are terms used interchangeably in the IESP documentation. The terms are used to describe the facilities and equipment that will process the gas and liquids from the M-18 well. The Energy Centre will be placed on a granular infrastructure pad that is termed "Energy Centre pad" or "infrastructure pad".</i>
ESW	Early Site Works
FFHPP	Fish and Fish Habitat Protection Plan
FJMC	Fisheries Joint Management Committee
GNWT	Government of the Northwest Territories
GNWT	Government of Northwest Territories

Abbreviation/Acronym	Definition
HADD	harmful alteration, disruption, or destruction of fish habitat
HSEQ	Health and Safety, Security, Environment and Quality
IESP	Inuvialuit Energy Security Project
IESPL	Inuvialuit Energy Security Project Limited
IFA	Inuvialuit Final Agreement
IFA	Inuvialuit Final Agreement
IGC	Inuvialuit Game Council
IHTC	Inuvik Hunters and Trappers Committee
ILA	Inuvialuit Land Administration
ISR	Inuvialuit Settlement Region
ITH	Inuvik Tuktoyaktuk Highway
IWB	Inuvialuit Water Board
NWT	Northwest Territories
PPMP	Permafrost Protection Management Plan
SARA	Species at Risk Act
TCCP	Tuktoyaktuk Community Conservation Plan
THTC	Tuktoyaktuk Hunters and Trappers Committee

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1.0 Objectives of This Management Plan

The FFHPP is a document that guides overall fish and fish habitat management practices that are to be implemented by IESPL or its Contractors during all phases of the Project. The FFHPP provides guidance, general mitigation measures and best management practices (BMPs) to protect the environment surrounding the project. This document is an adaptive management plan that offers both proactive and reactive mitigations to Project-related effects on fish and fish habitat.

The purpose of this Fish and Fish Habitat Protection Plan (FFHPP) is to provide a standalone directive describing monitoring and mitigation measures to be implemented and prevent or minimize the potential for adverse effects to fish and fish habitat from project activities.

The FFHPP, along with several other environmental management plans, has been developed as part of the Environmental Protection Plan (EPP) for the Project. The FFHPP applies to all phases of the IESP.

The FFHPP is supplemented by the IESP Erosion and Sediment Control Management Plan (ESCMP) and the IESP Permafrost Protection Management Plan (PPMP).

2.0 Guidance References

In addition to community consultations, regulations, project approvals and commitments, Best Management Practices (BMPs) and professional judgement, the following government guidelines were used as references to develop the FFHPP:

- Fisheries and Oceans Canada. Measures to Protect Fish and Fish Habitat (2022a).
- Fisheries and Oceans Canada. Interim Code of Practice: Culvert Maintenance (2022b).
- Fisheries and Oceans Canada. Northwest Territories Restricted Activity Timing Windows for the Protection of Fish and Fish Habitat (2013).
- Fisheries and Oceans Canada. Projects Near Water: Pathways of Effects (2018).
- Tuktoyaktuk Community Conservation Plan (2016).

3.0 Roles and Responsibilities

3.1 Contractors

The FFHPP will be reviewed with the Contractors associated with each phase of the Project prior to any works being completed and the Contractors are responsible for implementing the FFHPP at the Project.

IESPL and their Contractors will be jointly responsible for educating their crews on the contents of the FFHPP.

Contractors must complete their work in such a fashion that all watercourses, including any ditches and swales, where works are to occur, are effectively isolated from downstream habitat. Where/when applicable, Contractors will coordinate with their EM prior to and during the installation of any watercourse isolation measures in order that the EM can arrange for the concurrent salvage of fish within the isolated portion of a watercourse.

General requirements of applicable environmental legislation, regulations, standards, guidelines, and BMPs will be adhered to throughout the duration of the Project. It is the responsibility of each Contractor to acquire and familiarize themselves with the requirements of the guideline documents and of the legislation discussed.

3.2 Environmental Monitor

The Environmental Monitor (EM) associated with each phase of the Project will carry out inspections at regular intervals, as well as additional inspections during any incidents or malfunctions that affect the work or sensitive environmental area and following any significant rainfall events. It is equally important to take corrective action prior to expected inclement weather events rather than to react during or after the event.

At a minimum, the EM will visit the Project area prior the start of construction, operations, or decommissioning works to ensure all Project personnel are aware of environmental sensitivities and the requirements of the FFHPP, as well as to ensure these requirements are effectively implemented. Monitoring will be conducted with greater frequency during periods of inclement weather (i.e., heavy precipitation, strong winds) and during critical stages of the Project. Generally, work within the 30 m buffer of watercourses requires the close oversight of the EM. An EM will be available during key monitoring stages such as:

- a) During start-up of the Project and installation of erosion and sediment control measures;
- b) During work that occurs within 30 m of the high-water mark of any watercourse (i.e., within the riparian zone);
- c) During instream works (i.e., work below the high-water mark), especially during worksite isolation;
- d) During fish salvage operations that take place when stream isolation infrastructure is being installed; and
- e) During completion of the Project and decommissioning/removal of mitigation measures.

The primary responsibility of the EM is to confirm that the environmental protection objectives of the Project are met and that the requirements of this FFHPP and the other environmental Management Plans are enacted. EM responsibilities include:

- a) Conduct annual water quality data collection in August at the pre-determined sampling locations as part of the long-term Surface Water Sampling Procedure (stand-alone document).
- b) Monitor compliance with the FFHPP by conducting regular inspections of erosion and sediment control measures (See Erosion and Sediment Control Management Plan).
- c) Review the contractors work procedures to assess functionality and compliance with the FFHPP and applicable regulations, standards, and BMPs.
- d) Monitor all works conducted within a watercourse (i.e., below the high-water mark) to ensure downstream habitat is effectively isolated.

Maintain complete records of activities related to the implementation of the FFHPP. This should include any readings or measurements taken, photographs and incident reports.

Environmental monitors onsite will be trained on the information pertaining to the FFHPP. If it is decided that further assessment of fish habitat within the Project Area is necessary, members of the Imaryuk Monitoring Program will be consulted regarding any further fish and fish habitat monitoring completed within the Project Area.

4.0 Regulatory Approvals and Commitments

4.1 Project Approvals and Conditions

The IESP Development Plan Application was approved by the CER on March 8, 2022, and by the GNWT Cabinet on May 5, 2022. Previous approvals included an approval from the Environmental Impact Screening Committee (EISC) that delivered an IFA 11(17)(b) decision for the IESP on January 25, 2021. The TUK 2 Productive Acreage Block (PAB) configuration was approved by the Inuvialuit Land Corporation on June 10, 2010.

IESPL track all conditions arising from regulatory applications, approvals or letters, and all commitments resulting from community or stakeholder meetings or correspondence. Conditions and commitments specific to fish and fish habitat protection have been reviewed and have been integrated into this FFHPP. The CER Letter Decision of March 8, 2022 (CER File OF-EP-DEV I008 01) included the following assessment of IESPL's commitments to fish and fish habitat protection:

To minimize effects on surface water and fish and fish habitat, IPC (IESPL) committed to completing construction during the winter; construction of a bridge over the unnamed watercourse in a location that

avoids an area of potential spawning habitat; dust monitoring, suppression, and adaptive management in the summer, based on NWT guidelines; and a comprehensive spill contingency plan.

Fisheries and Oceans Canada (DFO) have reviewed the IESP Project Overview and provided a Letter of Advice to IESPL on October 30, 2020, indicating that the project will not require authorization under the Fisheries Act or the Species at Risk Act, provided the plan incorporates the following measures:

- a) Conduct in-water undertakings and activities during periods of low flow, or during frozen conditions;
- b) Limit impacts on riparian vegetation to those approved for the work, undertaking or activity;
- c) Removal of riparian vegetation should be kept to a minimum and limited to the right-of-way of the bridge;
- d) Re-vegetate the disturbed area with native species suitable for the site;
- e) Stabilize any waste materials removed from the work site to prevent them from entering the watercourse;
- f) Develop and implement an erosion and sediment control plan to minimize the introduction of sediment into any waterbody during all phases of the work, undertaking or activity;
- g) Monitor the watercourse to observe signs of sedimentation during all phases of the work, undertaking or activity and take corrective action;
- h) Operate machinery on land in stable dry areas or from a barge; and,
- i) Develop and implement a response plan to avoid a spill of deleterious substances.

4.2 Applicable Legislation

Fish and fish habitats are protected by various legislation, primarily the Fisheries Act, under which “fish” includes (a) parts of fish, (b) shellfish, crustaceans, marine animals, and any parts of shellfish, crustaceans, or marine animals, and (c) the eggs, sperm, spawn, larvae, spat, and juvenile stages of fish, shellfish, crustaceans, and marine animals.

4.2.1 Inuvialuit Water Board (IWB)

The IWB reviews and decides on the issuance of licenses and water use/disposal conditions within the Inuvialuit Settlement Region (ISR). The IESP will not require a permit from the IWB as the Project will use less than 100 m³/day of direct water, which will be sourced by truck from Tuktoyaktuk if and when needed. No local lakes or rivers will be used for water requirements. The project does not cross any watercourse greater than five metres wide at high water; does not require flood control, dams, dikes, or watercourse training; and will not require the deposit of any type of waste. The crossings will be constructed during the winter while the creek is completely frozen so it will not require temporary cofferdams or diversions.

4.2.2 Fisheries Act

The federal Fisheries Act is the main federal legislation providing protection for all fish, fish habitat, and water quality (Government of Canada 1985a). The Act is administered federally by DFO and Environment Canada. This Act provides protection against the 'death of fish, other than by fishing' and the 'harmful alteration, disruption or destruction of fish habitat' (HADD), unless authorized by DFO. DFO has determined that an Authorization is not required for the Project.

Subsection 36 (3) states that no one shall deposit or permit the deposit of a deleterious substance of any type into water frequented by fish or in any place under any conditions where the deleterious substance may enter the water. This would include erosion and sedimentation impacts from construction or operations at development sites.

4.2.3 Species at Risk Act

The Species at Risk Act (SARA) prohibits the killing, harming, harassing, capturing, or taking of species at risk, or destruction of their critical habitats (Government of Canada 2002). Species are designated 'at risk' by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), an independent body of experts that assesses species according to a broad range of scientific data. The federal Cabinet then decides whether those species should receive legal protection under the SARA. Several aquatic species known to occur in the Project Region (10km radius from the M-18 well) are protected under SARA.

4.2.4 Canadian Navigable Waters Act

Navigable water, per the Canadian Navigable Waters Act (Government of Canada 1985b), is a canal or other body of water that the public has a right to use for travel or transport. Any work that affects navigation on navigable waters requires an application for approval under the Navigation Protection Program. The unnamed tributary to Gunghi Creek is deemed a non-scheduled waterway pursuant to the Canadian Navigable Waters Act.

4.3 Applicable Guidelines

Supplementary environmental standards, guidelines, and BMPs are also contained in the following documents:

- DFO's Code of Practice: Culvert Maintenance (DFO 2022b)
- DFO's Interim Code of Practice: End-Of-Pipe Fish Protection Screens for Small Water Intakes in Freshwater (DFO 2020)
- DFO's Measures to Protect Fish and Fish Habitat (DFO 2022a)
- Northwest Territories Restricted Activity Timing Windows for the Protection of Fish and Fish Habitat (DFO 2013)

DFO provides restricted timing windows for in-stream work in the NWT (DFO 2013). These will be considered, however, there is no intention for in-stream work at any phase of the project. The watercourses within this Project area will freeze to bed during the winter. All civil work near water will occur during winter to avoid impacts to fish and fish habitat.

4.4 Project Commitments

IESPL is committed to addressing the following concerns of the Fisheries Joint Management Committee (FJMC) throughout the Project life cycle:

- a) IESPL will collaborate with the Imaryuk Monitoring Program to communicate with Inuvialuit and members of the public that the Project access road cannot be used to access fishing locations.
- b) Fishing observed within the Project area will be reported to the Imaryuk Monitors.
- c) IESPL will collaborate with the Imaryuk Program and facilitate the coordination of monitoring activities within the Project area and will cooperate with Fisheries Joint Management Committee (FJMC), Inuvik Hunters and Trappers Committee (IHTC), Tuktoyaktuk Hunters and Trappers Committee (THTC) members and where relevant to the activities under the Community Based Monitoring Program (CBMP), with the CBMP as well.
- d) IESPL will consult and collaborate with the Inuvialuit Game Council (IGC) and other relevant authorities to develop appropriate environmental monitoring programs during each phase of the IESP, including an appropriate sampling program for fish within the Local Project Area.

Additional Project commitments relating to fish and fish habitat include:

- a) Daily monitoring of drainage channels and culverts will be conducted during spring freshet/melt to limit any possible soil erosion.
- b) Spill reporting is required for spills over five litres (5L) as they have the potential to adversely impact wildlife or fish habitat.
- c) The stream channel and bed at the unnamed tributary to Gunghi Creek will not be disturbed during the bridge construction program or during operations. This will also ensure that aquatic connectivity and fish passage will not be impeded during construction or operations.
- d) The Project will schedule all civil work during the winter only, to limit the risk of fish being disturbed. In addition, the area with gravel-cobble substrate noted in the unnamed tributary to Gunghi Creek will be avoided. (Kiggiak-EBA 2018).
- e) Continued fish monitoring and fish habitat assessment is unnecessary throughout construction and operations once erosion and sediment controls are in place. However, should these conditions change, an adaptive management approach will be implemented to adjust the monitoring approach in consultation with the THTC and FJMC.

- f) The access road will not be available for public transportation for any purpose, including access to recreational or commercial fishing areas throughout the life of the Project.
- g) Fishing from the access road bridge will be prohibited.
- h) Upon project closure and once mitigations are applied, the residual negative effects will be considered negligible for the majority of valued components, including traditional land use, wildlife harvesting, fish, and wildlife habitat, at any phase of the project.
- i) Potential impacts to fisheries will be monitored and fish habitat plans will be updated with baseline information to inform the adaptive management plan.
- j) A trail to the small lake west of Iqalushaq Lake (used in the fall and/or winter for ice fishing) cuts west-south-west across the top of the Project Area but does not cross the access road. The THTC expressed concern about increased access to the area and wanted to ensure access road security. IESPL is committed to ensure only authorized traffic is permitted for safety reasons. A gate will be installed at the ITH intersection and access road use will be monitored at all times of day.

5.0 Communication and Awareness

The IESP falls within the Category 704C Fish and Fish Lakes Designated Area and within five kilometers of the Inuvik to Tuktoyaktuk Highway (ITH) and is consequently subject to the Community Fishing Restrictions and the Licensed Sport Fishing Restrictions established under the Community Fishing Plan. IESPL will make it clear to all staff that no fishing is to be carried out within the Project Area (within 1km of the road or pads), without a licence from the ILA, and the IESP access road will not be used as access for fishing. IESPL will maintain communication with the Imaryuk Monitoring Program regarding any observed fish.

6.0 Project Activities and Aspects

The Project activities are described in the following table:

Table 1: Project Phase Descriptions

Phase	Project Phase Description
Pre-commissioning	Remediation Permitted through the Inuvialuit Land Administration (ILA), the existing drilling mud sump adjacent to the M-18 well was remediated to prevent the contents from contacting the environment and to prevent surface water drainage from pooling at the cap and disturbing the permafrost. The scope included construction of a temporary winter access trail and snow bridge, removal of ponded water (as ice) from the sump edges for legal disposal, addition of borrow (fill) material from Borrow Source 177 on the existing sump cap, and recontouring the existing drainage to flow around the sump cap. The cap will eventually be keyed into the new well pad built on undisturbed ground north of the wellhead for purposes of well workover and future well servicing.

Phase	Project Phase Description
	<p>Site (Civil) Works will involve winter construction of a four (4) kilometer all-weather access road from KM 128.7 on the ITH to the wellsite and the facility pad area; winter construction of gravel pads for the energy centre; installation of piles, and winter construction of a bridge to cross the unnamed creek at the 2.6km post. The scope will include borrow excavation and transport to the site from local borrow sources; ground preparatory work, such as laying down willows and brush, installation of temporary construction trailers, construction activities and cleanup per Northern Land Use Guidelines for Access Roads and Trails. (Indian and Northern Affairs Canada. 2010)</p> <p>Well Workover Permitted by the Canada Energy Regulator, well workover includes nine steps: complete the wellpad, extend the cellar and wellhead to elevation, install blowout prevention equipment; drill out existing cement and plugs; circulate the well to remove debris; install production tubing; insulate gas production from the permafrost; cap the well with a new wellhead; pressure test the wellhead and secure for future tie-in with the gas plant.</p>
Module Fabrication and Transportation	<p>Fabrication involves the building of facility modules on transportable skids in the south at an established fabrication facility. The completed modules will be tested and then prepared for shipment to the north.</p>
	<p>Transportation of Modules The completed modules will be delivered to a staging area in Inuvik or Tuktoyaktuk via the Dempster Highway or via Barge from Hay River. Transportation logistics will involve approvals from the appropriate authorities for highway, barge or rail use. Final delivery from the staging area(s) to the project site will occur via truck along the ITH from Inuvik or Tuktoyaktuk.</p>
Installation, Commissioning and Operations	<p>Installation of Modules and Plant Infrastructure will involve setting of Plant Modules and off-module equipment (such as tanks, SynGas Generator, FT Reactor) onto the pile foundations, and assembly and installation of interconnecting pipe ways and electrical systems. Plant Infrastructure such as office/control room and warehouse will also be installed.</p>
	<p>Commissioning includes activities associated with the start-up of the facility. Preliminary activities undertaken to test the equipment, connections, etc.; and completion activities to validate construction per design, demonstration of strength and integrity of the piping /mechanical systems and communication / function of the control systems.</p>
	<p>Operations will involve a Federally (CER to 2034), then Territorially (OROGO) regulated, fully operational facility. Operational activities include natural gas treatment and natural gas liquids extraction, CNG production, synthetic diesel production, fuel loading, waste management, and supporting infrastructure and equipment.</p>
	<p>Transportation of Fuels will be contracted to other parties. The activity includes trucking CNG, propane, and synthetic diesel to local commercial and residential consumers. The primary route of transport is the ITH to the communities of Tuktoyaktuk and to Inuvik in compliance with Transportation of Dangerous Goods Regulations.</p>

Phase	Project Phase Description
Decommissioning	Decommissioning will involve cleanup, removal of all structures and equipment, remediation, reclamation, revegetation and monitoring to meet the standards of a future time in 50+ years. A separate Cleanup, Decommissioning and Remediation plan is provided in Section 17 of the EISC Project Description and as part of the ESW Operations Authorization Application.

7.0 Potential Effects

DFO's Pathways of Effects, which include in-water activities and land-based activities, were reviewed as part of the FFHPP (Government of Canada 2018). Potential effects to fish and fish habitat as a result of the IESP include:

- a) Potential for increased fishing pressure and improved human access to remote water bodies;
- b) Water quality degradation;
- c) Construction and maintenance of bridge and culverts;
- d) Equipment maintenance, fuel storage and refueling could result in the release of deleterious substances;
- e) Potential for instream works and impacts to fish; and/or
- f) Disturbance or harm to fish as a result of:
 - i. Sediment release during bridge construction;
 - ii. Changes to aquatic habitat features/availability;
 - iii. Changes to hydrology;
 - iv. Increase in dust from the access road, resulting in harm to riparian vegetation;
 - v. Removal of riparian vegetation; and/or
 - vi. Changes in structure and cover for terrestrial and aquatic habitats.

8.0 Mitigation Measures

8.1 Avoidance

Mitigation by avoidance is the first step to reducing the risk to fish and fish habitat. The Project considered several alternative access routes, and the final decision is the one that maintains the greatest distance from nearby lakes and ponds.

Additional avoidance measures considered for this project include:

- a) Instream works will be completed in winter conditions.
- b) No fueling and maintenance of machinery and equipment within 100 m of any water body.
- c) The access road will not be available for public transportation for any purpose including to access fishing areas (security and access entry restrictions will be limited to IESP personnel and contractors and authorized visitors only).
- d) By developing a bridge at the unnamed tributary to Gunghi Creek (Km 2+3), the stream channel and bed will not be disturbed during the construction or operations. This will also ensure that aquatic connectivity and fish passage will not be impeded during construction or operations.
- e) The culvert at the unnamed watercourse (Km 1+6) will be designed to the standards outlined in the Northern Land Use Guidelines, Access: Roads and Trails (Northwest Territories Lands 2016).
- f) Work zones will be clearly marked to limit construction-related disturbances to only those areas required for construction (i.e., design footprint, laydown, and temporary access).

8.2 General Mitigation Measures

General measures to avoid harm to fish or fish habitat include the following:

- a) Schedule project activities for dry weather whenever possible. Minimize project works near watercourses during periods of heavy or prolonged precipitation. As much as feasible, works will be timed to occur outside of sensitive timing windows (e.g., instream and migratory bird seasons). Work below the ordinary high-water mark must be isolated from flows.
- b) The work area will be established and clearly marked. Orange construction (snow) fence installed on rebar stakes or highly visible flagging can be used to delineate the active work area. Ensure all Contractor employees are familiar with the marking system and are given clear instructions/training before work begins. Augment and replace field markers as needed.
- c) Upon completion of the Project, all equipment, supplies, materials, and waste will be removed. All permanent erosion and sediment control (ESC) structures remaining should be degradable and have a positive effect on the overall environment.
- d) The FFHPP will be an adaptive management strategy for the Project that evaluates and adjusts management decisions (i.e., mitigation measures) to reflect the actual interactions. Contractors should be prepared to change existing measures and BMPs should they fail or in the event additional measures are warranted. The EM should be notified of any changes to assess that changes are adequate and/or installed properly. The FFHPP will be re-evaluated annually to consider and incorporate these changes.
- e) Hold a pre-construction/activity meeting that includes the EM and all persons undertaking work on site to ensure a common understanding of the contents of this FFHPP, other applicable

- management plans, safety, responsibilities, reporting, response plans, etc. During ESW the Director, HSEQ or the Onsite Manager will lead this meeting. During Well Workover, Installation and Operation of the Energy Centre the Director, HSEQ or the Onsite Environmental Manager will lead the meeting. During construction, daily tailgate meetings will refer to environmental issues that may arise and inform new employees about environmental compliance on site.
- f) Ensure all Contractors review and sign off on this FFHPP and accompanying Management Plans, and the applicable guidelines prior to starting the Project. The Director, HSEQ will be responsible.
 - g) Ensure Contractors know how to properly install any protection measure and understand BMPs used on the Project. Improperly installed measures/BMPs do not perform their intended functions and will not achieve desired environmental protection outcomes. The Director, HSEQ or the Onsite Environmental Manager will ensure Contractors know how to properly install any protection measure and understand BMPs used on the Project.
 - h) GNWT guidelines for road access will be applied to all contractors to mitigate siltation, erosion issues, permafrost disturbance, etc.
 - i) All relevant federal and provincial acts, regulations, guidelines, and codes of good practice will apply to all work and activities associated with the Project.

8.3 Best Management Practices (BMP)

Best management practices (BMP) for work near water will be reviewed and followed, including measures to protect fish and fish habitats (DFO 2022a). The BMPs listed below should be implemented, wherever possible, to minimize the harmful disruption or destruction of fish habitat:

8.3.1 Erosion and Sediment Control

- a) Regularly monitor for signs of sedimentation during all phases of the work and undertake corrective action if required. This includes monitoring of the aquatic habitat and any upland surface drainage potentially flowing into nearby waterbodies.
- b) Ensure proper ESC controls around waterbodies to avoid sedimentation of the aquatic habitat, such as installing silt fencing and/or check dams as necessary.
- c) Adhering to the Erosion and Sediment Control Management Plan (ESCMP).
- d) ESC measures are provided in the ESCMP to minimize potential for sediment laden runoff to enter a watercourse. If sediment laden runoff is observed entering any watercourse in the Project area, the EM will be notified and the EM will direct best management activities, including additional sediment control measures or halting work.

- e) All ESC measures will be constructed of biodegradable materials or be removed upon completion of Project.
- f) Potential effects resulting from erosion and sedimentation will be mitigated by the construction schedule (i.e., completing construction during winter) and cleanup all debris to prevent spring runoff moving the debris and impacting the watercourses.
- g) All construction activities, excluding the watercourse and drainage crossings, will be conducted 100 m or greater from any waterbodies (i.e., surrounding lakes within the Project area).
- h) Work near water bodies or watercourses should be postponed or rescheduled in the event of significant weather events, such as rainfall, stormwater runoff or significant snowmelt. Additional ESC measures should be considered in the event of high-water levels risking sedimentation into nearby waterbodies.

8.3.2 Riparian Vegetation

- a) The removal of riparian vegetation, if necessary, will be kept to a minimum.
- b) Use hand-clearing wherever possible to maintain the root structures and limit erosion and sedimentation.
- c) Restore all disturbances below the high-water mark and in riparian zone (i.e., 30 m from the top of bank) as soon as possible (i.e., silt fences required during construction).
- d) Maintain the original established vegetation wherever possible to aid ground stabilization and minimize potential erosion and sedimentation.
- e) Work zones will be clearly marked to limit construction-related disturbances to only those areas required for construction.
- f) Any clearing that will be completed as part of Project will need to be identified and any disturbed vegetation should be restored to the state that is equivalent to or better than it was prior to construction.
- g) Vegetation clearing methods for shrubs should be by laying down or cutting rather than blading.

8.3.3 Minimize Disturbance or Harm to Fish

- a) Minimize the area of potential disturbance below the high-water mark as much as possible. Limit equipment movement and ensure it is situated on stable surfaces (e.g., coarse substrates or rig mats).

- b) Remain within disturbance area per design, no impacts may occur to aquatic habitat outside of design footprint.
- c) Construction within 100m of water will occur in winter conditions to avoid impacts to fish and fish habitat.
- d) Downstream water flow must be maintained to avoid impacting downstream fish and fish habitat.
- e) Instream works will be completed in during winter (isolated from flowing water). Any instream work should be completed in isolation from flowing water.
- f) The access road will not be available for public transportation for any purpose including accessing fishing areas (security and access entry restrictions will be limited to personnel only).
- g) Support and collaborate with the Imaryuk Monitoring Program to prevent work overlap and provide support to the monitoring program under the ITH Corridor Community Fishing Plan.

8.3.4 Machinery Onsite

- a) Refuelling and maintenance of equipment, as well as the storage of any excess fuels, oils, lubricants, or other petrochemical products, will occur at least 100 m from any watercourse and/or catch basin.
- b) If feasible, machinery used in proximity to any watercourse will use environmentally friendly fluids (i.e., non-toxic, biodegradable, or vegetable oil-based hydraulic fluid).

8.3.5 Deleterious Materials and Spill Management

- a) No deleterious materials or Project-related debris are allowed to enter any watercourse. Debris generated from the Project works must be contained, collected, and disposed of properly off-site. A catchment tarp should be hung from the underside of the bridge or from the abutments during removal or replacement in such a way that any potential debris fallout is contained.
- b) In the event of any fluid spills or leaks into a watercourse, the Spill Contingency Plan will be enacted, and notifications are to begin immediately.
- c) Keep an emergency spill trailer and kits on site during all phases of the works, undertakings, and activities.
- d) Contain any water that has become contaminated with deleterious substances.
- e) Ensure clean-up measures are suitably applied so as not to result in further alteration of the bed and/or banks of the watercourse.

- f) Report any spills near or in a water body immediately (See Section 10). Stop works, undertakings and activities in the event of a spill of a deleterious substance.
- g) Clean up and appropriately dispose of snow or water contaminated with deleterious substances at an approved offsite waste management facility.
- h) All construction and maintenance vehicles will be equipped with spill kits. Any fuel-containing equipment onsite must include direct access to a nearby spill kit (less than 30 m).
- i) Any parked fuel-containing equipment or vehicles within 100 m of water will be placed within secondary containment meeting 150% of the fuel-capacity of the equipment or vehicle.

8.3.6 Water Quality

- a) During construction, or as deemed necessary by the EM, install catchment tarp under bridge to catch debris.
- b) Proper installation of ESC structures (i.e., silt fences) and regular inspection of the ESC structures onsite.
- c) Proper use, fueling and maintenance of machinery and equipment per Spill Contingency Plan.
- d) Prompt Emergency/Spill Response.
- e) Instream works will be completed during winter (isolated from flowing water).
- f) No fueling and maintenance of machinery and equipment will be within 100 m of any watercourse.

8.3.7 Dewatering Isolated Area

Where dewatering of any isolated area is required, all pump water intakes must be screened according to DFO's Interim Code of Practice: End-Of-Pipe Fish Protection Screens for Small Water Intakes in Freshwater (2020b) to prevent entrainment or impingement of fish and other aquatic organisms. BMPs related to the design and proper installation of the intake end of pipe fish screens include:

- a) Screens will be located away from natural or artificial structures that may attract migrating fish.
- b) Orient the screen face in the same direction as the flow.
- c) Intake hoses must be screened with a maximum mesh size of 2.54 mm; Suspend the screens a minimum of 300 mm above the bottom of the watercourse, or as close to the surface as possible, to prevent entrainment and conveyance of sediment downstream.

- d) Ensure the screen is inspected, cleaned and debris is removed on a regular basis.
- e) Ensure pumps are shut down when fish screens are removed for inspection and cleaning.

8.3.8 Culvert Works

- a) The removal of accumulated debris (i.e., branches, stumps, other woody materials, garbage, ice, buildup) in an active channel culvert should be conducted outside the Northwest Territories Restricted Activity Timing Windows for the Protection of Fish and Fish Habitat (DFO 2013) for the NWT to avoid impacts to potentially spawning fish, unless there is immediate blockage of water or fish movement at which time removal can occur. The removal of debris will be limited to within and immediately upstream of the culvert, to the extent that affects fish passage.
- b) ESC measures will be installed prior to construction to avoid risk of erosion or sedimentation.
- c) Culverts will be inspected after spring freshet and heavy rainfall to ensure no debris buildup has occurred.
- d) An isolation method will be constructed of a suitable material or equipment, such as aqua dams, steel plate coffer dams or sheet piles, or other materials that are non-erodible and non-hazardous (non-toxic) to fish and fish habitat (i.e., deleterious by nature).
- e) Remove any debris slowly to allow clean water to pass and to prevent downstream flooding.
- f) If rock armouring is required to stabilize culvert inlets and outlets:
 - Place clean rocks into the eroding area, appropriately-sized and shaped per specified design;
 - Do not obtain rocks from below the ordinary high-water mark of any water body;
 - Ensure that acid generating rock is not used;
 - Avoid the use of rock that fractures and breaks down quickly when exposed to the elements;
 - Install rock at a similar slope to maintain a uniform stream bank and natural stream alignment; and
 - Isolation area should be implemented to ensure work is completed in dry conditions.

8.3.9 Dust Suppression

- a) NWT Guidelines for Dust Suppression will be applied to minimize dust in the summer from truck traffic and dust monitoring and adaptive management.
- b) Water will be used as preference on the alignment to control dust during summer operation activities. Water will be provided by truck from Tuktoyaktuk.
- c) All vehicle traffic crossing the bridge will be limited to a 30 km/hour speed limit with a moderately higher speed limit of 50km/hour on the rest of the access road.

8.3.10 Concrete

In the event concrete is required as part of the bridge construction, the following should be considered:

- a) Precast concrete abutments for the bridge would reduce the risk of spills into nearby water bodies. If not properly stored or managed, uncured concrete could be unintentionally released into the water. Uncured concrete leachate is highly toxic to fish and other aquatic life and can alter the water quality of the stream, if released prior to curing.
- b) Concrete materials are to be kept out of the rain and protected from wind. Both dry and wet materials will be stored under cover, protected from rainfall and runoff.
- c) Wash concrete handling equipment, in designated concrete washout areas. Designated concrete washout areas, if required on site, will be located as far from the high-water mark as possible (preferably at least 100 m). Appropriate containment facilities for wash-down water must be available to ensure the runoff does not enter the aquatic environment.
- d) If uncured concrete is to be used, a carbon dioxide (CO₂) tank with regulator, hose, and gas diffuser must be available on-site during concrete work to neutralize pH levels should a concrete spill into water occur. Project members must be trained in its proper use.
- e) Prevent any water that contacts uncured or partly cured concrete (during activities like exposed aggregate wash-off, wet curing, or equipment washing) from directly or indirectly entering any watercourse.
- f) Hold any water that contacts uncured or partly cured concrete until the pH is between 6.5 and 8.0 pH units and the turbidity is less than 25 nephelometric turbidity units (NTU), measured to an accuracy of +/- 2 NTU. Use biodegradable release oil on the forms, where possible. Ensure that the form release oil does not enter the aquatic environment when applying it.

8.4 Management of Climate Change Impacts

Potential climate-related impacts associated with this project would involve increasing atmospheric temperatures, which may result in increased melting. Warmer weather may result in more ice melt, including from permafrost, which may result in sediment release and higher water runoff from the Project.

- a) ESC measures will be regularly monitored to ensure they are meeting the needs of the environment, particularly following significant precipitation events and during significant increases in temperatures. Any failing or ineffective measures will be corrected immediately.
- b) This FFHPP will be reviewed annually and any notable changes from previous years will be addressed.
- c) Culvert sizes should accommodate a 1:100-year flood capacity.

8.5 Management of Residual Effects

If the mitigation measures outlined in this FFHPP are implemented, there are no anticipated residual harmful effects to fish and fish habitat as a result of the Project. As part of the adaptive management plan, any additional construction plans not outlined within this FFHPP will be reviewed and assessed for potential impacts to fish and fish habitat. The Erosion and Sediment Control Management Plan will be used in conjunction with this FFHPP to ensure all ESC-related activities are properly mitigated.

9.0 Monitoring, Reporting, and Record-Keeping

9.1 Monitoring and Inspection Frequency

Fish and Fish Habitat Monitoring for both construction and operations of the IESP will include the following programs:

Table 2: IESP Fish and Fish Habitat Monitoring Programs

Phase	Program	Responsible Individual(s)
All	Imaryuk Program	Imaryuk Monitors
All	Bridge Crossing Erosion and Sediment Monitoring	IESPL Environmental Monitors
Construction	Spill or Release Monitoring	IESPL Environmental Monitors
All	Water Quality Sampling	IESPL Environmental Monitors
All	Bridge Monitoring	IESPL Environmental Monitors
All	Ambient Dust Monitoring	IESPL Environmental Monitors
Construction	Culvert Installation Monitoring	IESPL Environmental Monitors
All	Access Road Culvert Monitoring	IESPL Environmental Monitors

Records of all monitoring will be organized by date and kept in the IESP IMS Records and Reports sharepoint file. The Director, HSEQ will review the reports against 2021 baseline sampling on a regular basis, as results are provided.

9.1.1 Imaryuk Monitoring Program

Upon development of the Inuvik-Tuktoyaktuk Highway (ITH), Inuvialuit identified the potential for increased access to nearby lakes that might negatively impact fish stocks, habitat and the cultural activities that depend on them. The Imaryuk Monitoring Program was created by employing local monitors to help protect local water bodies by engaging in public education, monitoring fishing and impacts to fish habitat, and collecting traditional and scientific data in both the areas adjacent to the ITH and the Husky Lakes.

IESPL will collaborate with the Imaryuk Monitoring Program and facilitate the coordination of monitoring activities within the Project to contribute to increased knowledge within this area. IESPL believes that the mechanics of this collaboration are best understood through discussion with those responsible for the Imaryuk Monitoring Program as they are best positioned to understand the activities permitted under the mandate given to the program by the HTC's and the funding arrangements supporting the work. At this time, IESPL anticipates the following ways in which this collaboration could occur:

- The access road to the M-18 wellsite will not be available to the public; but it can be made available to the Imaryuk Monitors. Use of the road by Monitors will need to be coordinated in advance to ensure safety.
- Any fishing observed within the Project area will be reported to the Imaryuk Monitors.
- IESPL will collaborate with the Imaryuk Monitoring Program to communicate with Inuvialuit and members of the public that the access road cannot be used to access fishing locations. IESPL will prohibit fishing from the access road bridge.
- The results of project-specific environmental monitoring programs will be made available to the Imaryuk Monitoring Program.
- IESPL will consult and collaborate with IGC, FJMC, and other relevant authorities to develop appropriate environmental monitoring programs during each phase of the IESP, including an appropriate sampling program for fish and fish habitat within our Local Project Area.

9.1.2 Unnamed Tributary to Gunghi Creek Crossing (2+3 Km)

9.1.2.1 Construction

Construction methods for the single span bridge are intended to ensure that the stream channel and bed will not be disturbed during the construction program or during operations. No sediment loading is expected to occur from the construction of the bridge. This will also ensure that aquatic connectivity and fish passage will not be impeded during construction or operations.

No ongoing fish monitoring is planned for this Project, however, should conditions change (i.e., water flow increases due to climate change and potential subsequent erosion), the monitoring approach will be adapted to suit the change.

An environmental monitor will be onsite during construction to identify any signs of erosion or sediment release. The EM will also be onsite during any concrete works to watch for uncured concrete spills or releases into watercourse. Appropriate spill response actions will be taken in the event of a release.

A section of the unnamed tributary to Gunghi Creek has gravel substrate that will be avoided.

9.1.2.2 Water Quality

Construction is to be conducted during frozen/winter conditions; therefore, water quality and turbidity monitoring is not possible during instream construction. The EM will complete annual water quality sampling as part of the long-term Surface Water Sampling Procedure to compare to the baseline water quality samples taken in the IESP 2021 Baseline Environmental Report Near Tuktoyaktuk, NWT (Kiggiak-EBA 2021a). Visual monitoring of the watercourse will be completed weekly during annual freshet for the duration of the project, and any sediment plumes observed because of construction-related activities will be mitigated immediately (i.e., appropriate ESC measures will be installed).

9.1.2.3 Operations

Routine bridge monitoring will be conducted to ensure no impacts to fish and fish passage have developed throughout the life of the Project. Bridge monitoring will occur during snowfall and icing events during all seasons to ensure the safety of crew as well as to inspect the conditions of the bridge.

Expansion beyond the access road and the well pad are not anticipated during operation or decommissioning phases of the Project. However, if the Project footprint does need to expand within the Project Area at a future date, this FFHPP will need to be adapted to reflect the nature of the work, the potential impacts to fish and fish habitat, and to outline activity-specific mitigation measures that will need to be implemented.

9.1.2.4 Dust Management

IESPL will be responsible for maintenance of the access road and to limit dust as much as possible.

Monitoring will include mitigations previously mentioned and an ambient dust monitoring program will be in place during summers to provide timely information of the effectiveness of dust management.

Management strategies will be adapted based upon the findings of the monitoring, to ensure dust impacts from the access road are minimized.

9.1.3 Access Road Culvert Crossings

Only one culvert crossing (at Km 1+6) within the Project has potential to hold fish and fish habitat; all others are intended to primarily serve upland road drainage and are not anticipated to be hydraulically connected to nearby fish-bearing water bodies (Appendix 3). During periods of inundation, hydraulic connectivity may be seasonally observed. Drainages are observed to contain flowing water, similar mitigations for watercourses (i.e., isolation, fish salvage, and sediment plume monitoring) will be required.

The crossing at the unnamed watercourse and all drainage pathways should be visually monitored weekly during spring freshet/melt to identify potential soil erosion and sedimentation of nearby aquatic habitat. An environmental monitor will be available during the culvert installation to ensure work is being completed under dry, isolated conditions. Winter work is proposed to limit any impacts to fish, however, an environmental monitor is required to be present during all instream works. All relevant monitoring outlined for the unnamed tributary to Gunghi Creek Crossing may be applied to the culverts as well (i.e., any signs of sediment entering into a defined watercourse will require ESC measures to mitigate further impacts).

The access road culverts listed in Appendix 1 – Table 4 are not anticipated to hold fish or fish habitat due to their terrestrial location and distance from nearby water bodies. Monitoring of these culverts is necessary to observe that flow is maintained, if any, and erosion is minimized. Daily monitoring of drainage channels and culverts will be conducted during spring freshet/melt to limit any possible soil erosion. Approximate locations are shown in Appendix 3.

All culverts will be routinely monitored for debris buildup and should be maintained according to DFO's Code of Practice for Culvert Maintenance (DFO 2022b).

9.2 Requirements

If at any point during construction, the culverts listed in Appendix 1 – Table 4 have active flow of water, an isolation should be in place to ensure no sedimentation runoff occurs into the nearby water bodies.

9.3 Corrective Actions

Corrective actions will be taken if any potential for fish and fish habitat impacts are observed (e.g., erosion potential or sediment release). In general, corrective actions include the stop of work until the issue of concern has been fixed.

9.4 Reporting

Weekly environmental monitoring reports shall be prepared during construction and kept on file and may be provided to regulatory groups upon request. The monitoring reports should include:

- a) Project area
- b) Name(s) of environmental monitor(s)
- c) Dates of monitoring and the date the report submitted
- d) Overall weather conditions (including notable weather events)
- e) Report recipient(s)
- f) Contractor(s) undertaking work

- g) Description, photos, and status of construction by area, including within environmentally sensitive areas (i.e., work near water)
- h) Environmental meetings and key issues discussed
- i) Key communications with environmental authorities
- j) Outstanding environmental issues and/or non-compliances and the corrective actions required.

Should any impacts on fisheries be observed during the life of the Project, the Proponent is to notify the Fisheries Joint Management Committee and the Imaryuk Monitoring Program of the impacts, and the mitigation measures undertaken or planned. Any fish or fishing observed will be reported to the Imaryuk Monitoring Program and included in any environmental monitoring reports. The Proponent shall provide relevant fisheries baseline information to the Fisheries Joint Management Committee.

It is the Contractor's duty to notify DFO if unauthorized death of fish has been caused or is about to be caused by any means other than fishing and/or an authorized harmful alteration, disruption, or destruction of fish habitat. Such notifications will be directed to DFO's Fish and Fish Habitat Protection Program (1-855-852-8320).

9.5 Record Keeping

Records will be kept of any and all works that impact fish and fish habitat, including but not limited to:

- a) Water quality monitoring completed in or near the Project
- b) Additional fish habitat assessments that may come about throughout the life of the Project
- c) Construction events that could result in harm to fish and fish habitat
- d) Equipment cleaning procedures prior to entering into any watercourse
- e) Sediment releases throughout the life of the Project that enters into a water body that has fish habitat potential
- f) Remediation, mitigation, and control measures implemented to protect fish and fish habitat

10.0 Emergency and Incident Response

All environmental incidents will be reported to the EM, the Contractor, and IESPL as soon as possible, so that appropriate and timely notifications are issued, and project management can ensure that incidents are handled appropriately. All personnel on-site have a responsibility to report all environmental concerns or incidents regardless of magnitude. It is the responsibility of the EM to follow-up with the Contractor to ensure that an Environmental Incident Report (EIR) is filed.

In the case of any environmental concern and/or incident, Project personnel are responsible for informing their Site Superintendent, who must then report to the EM. Contractors are responsible to ensure that all

crew are adequately trained and equipped to deal with potential environmental incidents related to their work. Any concerns about preparedness for environmental incidents will be brought to the attention of the Site Superintendent or the EM.

The Emergency Contacts List (Table 3) will be updated as part of the FFHPP, as necessary. The responsibility for updating and maintaining all IESP Emergency Contact Lists has been assigned to the Director, HSEQ or the onsite OHS Lead. Contact Lists are available on the IESP IMS as a quick link on the home page and available to all personnel and contractors.

Table 3: Emergency Contact List

Agency	Phone Number
Emergency Services	911
24-Hour Spill Report Line	1-867-920-8130
Inuvik RCMP (Non-emergency)	1-867-777-1111
Inuvik Fire Department (Non-emergency)	1-867-777-8611
Tuktoyaktuk RCMP (Non-emergency)	1-867-977-1111
Tuktoyaktuk Fire Department (Non-emergency)	1-867-977-2222
NWT Wildfire Reporting Line	1-877-698-3473
Inuvik Region Wildlife Emergency	1-867-678-0289
Wildlife Violations/ Big Game Vehicle Collision	1-866-762-2437
DFO (aquatic habitat/fisheries issues, Record and Report 24-hour Hotline)	1-867-669-4900
NWT Environment and Natural Resources General Inquires	1-867-767-9055
IESPL – Site Director (to be confirmed)	(to be confirmed)

10.1 Environmental Incident Reporting

An Environmental Incident Report (EIR) will be prepared as soon as possible following an incident. Contractors are responsible for completing the EIR and the EM will follow-up with the Contractors to

ensure it is filed. The target for reporting is within one (1) working day from the time of the incident. The EIR Template is available in the IESP IMS under *Quick Links/Report Templates and Forms*.

Any incidents that result in non-compliance with a permit or environmental legislation (such as the Fisheries Act) must be reported within 12 hours to the governing body (e.g., DFO).

An environmental incident is one that has caused, or has the potential to cause, one or more of the following:

- Environmental damage
- Adverse effects on fish, wildlife, or other environmental resources
- Adverse publicity with respect to environment
- Legal action with respect to violation of statutes or environmental damage

Examples of Environmental Incidents include, but are not limited to:

- Spills of oil, fuel, hydraulic fluids, or chemicals;
- Discharge of deleterious substances (e.g., sediment, spills, concrete) into fish-bearing water;
- Mass wasting, landslides, erosion, or floods as they affect environmental or water quality;
- Activities that affect fish or fish habitat, wildlife, wildlife harvesting, or recreation;
- Violation of environmental regulations, permits, or approvals;
- Forest or grass fires related to activities;
- Work and/or removal of vegetation in or near water bodies without regulatory approval.

Any environmental incidents will be reported immediately to IESPL and the applicable governing agency. Any spills will be handled according to the guidelines of the Spill Contingency Plan.

*****ALL SPILLS TO WATER ARE REPORTABLE*****

If in doubt as to whether or not to report an incident, err on the side of caution and report it.

11.0 Adaptive Management

Adaptive management will be implemented throughout the project life, which includes local consultation with community organizations and regulators.

At least annually, or following an Environmental Incident, IESPL will review monitoring results and mitigation outcomes and allow for discussions of adaptive management actions related to the Project.

The management review will include consideration of:

1. the status of actions from previous management reviews.

2. Changes in:
 - a. external and internal issues that are relevant to the FFHPP;
 - b. the needs and expectations of interested parties, including compliance obligations;
 - c. operational activities; and/or
 - d. risks and opportunities.
3. The extent to which the FFHPP objectives have been achieved.
4. Information on performance, including trends in:
 - a. nonconformities and corrective actions;
 - b. monitoring and measurement results;
 - c. fulfilment of its compliance obligations; and/or
 - d. audit results.
5. Adequacy of resources.
6. Relevant communication(s) from interested parties, including complaints.
7. Opportunities for continual improvement.

The outcomes of the review will be used to identify where mitigation or reclamation measures are not adequate and to identify additional mitigative, monitoring or reclamation measures to be applied.

12.0 Continual Improvement

The FFHPP will be reviewed and/or updated at least once annually to reflect changes to Project requirements, environmental conditions, and monitoring results. The FFHPP will also be updated as needed in response to changes in legislation and consultation with local Inuvialuit organizations.

Updates will be communicated to all involved parties and comments provided will be considered during FFHPP updates.

13.0 Related Documents

Inuvialuit Energy Security Project - 2021 Baseline Environmental Report Near Tuktoyaktuk, NT (Kiggiak-EBA 2021a)

IESP Erosion and Sediment Control Management Plan

IESP Permafrost Protection and Management Plan

14.0 References

Canadian Council of Ministries of the Environment (CCME). 2011. **Protocols Manual for Water Quality Sampling in Canada**. ISBN: 918-1-896997-7-0 PDF 186 pp.

Community of Tuktoyaktuk, The Wildlife Management Advisory Council (NWT), and the Joint Secretariat. 2008. **Tuktoyaktuk Community Conservation Plan: a Plan for the Conservation and Management of Natural Resources and Lands within the Inuvialuit Settlement Region in the Vicinity of Tuktoyaktuk, Northwest Territories**. 169 pp.

Evans, C.E., J.D. Reist and C.K. Minns. 2002. **Life history characteristics of freshwater fishes occurring in the Northwest Territories and Nunavut, with major emphasis on riverine habitat requirements**. Can. MS Rep. Fish. Aquat. Sci. 2614: xiii + 169 pp.

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Government of Canada. 1985b. **Canadian Navigable Waters Act. R.S.C., 1985, c. N-22**. Last amended on October 4, 2019.

Government of Canada. 2002. **Species at Risk Act. S.C. 2002, c. 29**. Last amended on February 3, 2022.

Government of Northwest Territories (GNWT). 2013. **Guideline for Dust Suppression**. Department of Environment and Natural Resources, Yellowknife, NT.

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Kiggiak-EBA Consulting Ltd. 2021a. **Inuvialuit Energy Security Project - 2021 Baseline Environmental Report Near Tuktoyaktuk, NT**.

Northwest Territories Lands. 2016. **Northern Land Use and Guidelines, Access: Roads and Trails**. 39 pp. ISBN: 978-0-7708-0233-2

Sawatzky, C.D., D. Michalak, J.D. Reist, T.J. Carmichael, N.E. Mandrak, and L.G. Heuring. 2007. **Distributions of Freshwater And Anadromous Fishes From The Mainland Northwest Territories, Canada**. Can. Manuscr. Rep. Fish. Aquat. Sci. 2793: xiv + 239 pp.

APPENDIX A: Fish and Fish Habitat Conditions in the Project Area

Watercourse Crossings within the Project

The IESP includes two watercourse crossings:

- **Culvert at Unnamed Watercourse (Km 1+6):** Watercourse flows in a northwest direction between an unnamed lake and an unnamed tributary to Gunghi Creek (Appendix 3). No fish were caught in the creek, but some were observed downstream in a tributary. As channel habitat provided limited to no flows in the unnamed watercourse, fish likely only use the channel during seasonal flood conditions in the spring. A bathymetric survey was also completed on the unnamed lake that is located approximately 100 m upstream from the crossing location. The unnamed lake was deemed to have sufficient depth for overwintering fish; however, no fish presence was detected (e.g., fish finder and no incidental observations). An individual providing local field support said the unnamed lake was not traditionally known to contain fish based on his and other local experience. Additional information about the Project environment is provided in the Project Description (IESPL 2020) and the IESP 2021 Baseline Environmental Report Near Tuktoyaktuk, NWT (Kiggiak-EBA 2021a).
- **Bridge at unnamed tributary to Gunghi Creek (Km 2+3):** Approximately 85 m downstream of the potential bridge location, the watercourse flows into a pond (Appendix 3). Northern Pike (*Esox lucius*) and Ninespine Stickleback (*Pungitius pungitius*) were sampled from the watercourse in August 2018. The resulting assessment identified potential for the watercourse to support various regional fish life stages during the open water season but will likely freeze to bottom in the winter. Additional information is provided in the Project Description (IESPL 2020) and the August 2018 Baseline Aquatic Assessment (Kiggiak-EBA 2018).

Seven additional drainage culverts will be installed along the IESP access road; however, fish habitat is not anticipated at those locations (Table 4 and Appendix 3). These are intended to facilitate cross drainage under the road and to equalize water elevations on both sides.

Table 4: Culverts to be installed along the IESP Access Road

Station	Crossing Type	Size (mm)	Length (m)	Slope
0+265.1	Culvert	825	16.1	1.64
0+557.8	Culvert	825	15.6	2.81
0+822.3	Culvert	825	20.7	1.95
1+137.6	Culvert	825	15.7	0.99
1+501.0	Culvert	825	16.0	1.77

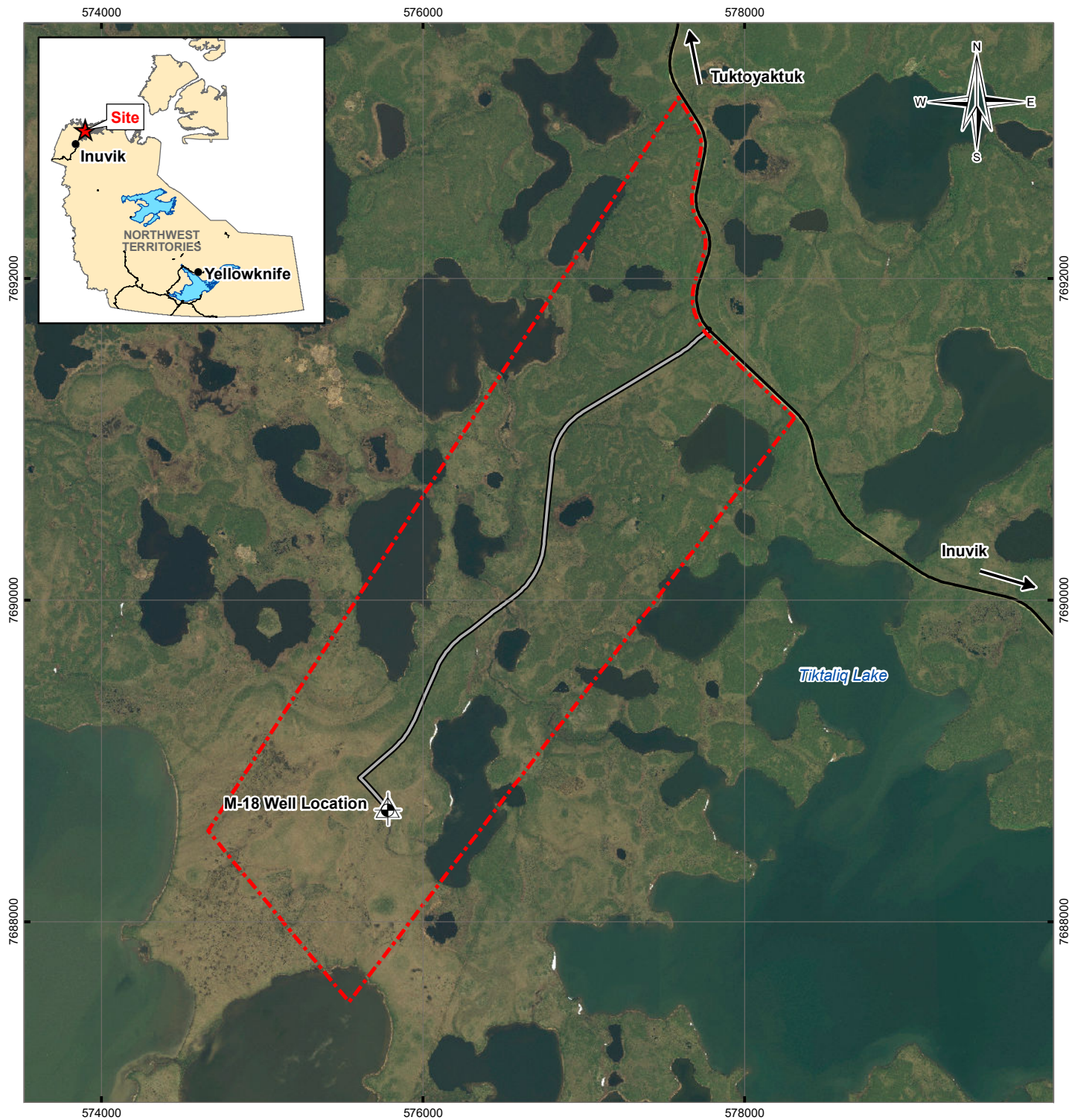
Station	Crossing Type	Size (mm)	Length (m)	Slope
1+772.2	Culvert	825	15.5	1.41
2+977.5	Culvert	825	18.9	0.40
3+580.0	Culvert	825	18.2	1.52

Local Historical Fish Data





Several fish surveys were conducted along the length of the ITH as part of original baseline studies for the road redevelopment project to characterize fish and fish habitat along the corridor, including the area of the highway nearby the Study Area (Evans et al. 2002 and Sawatzky et al. 2007). According to the Tuktoyaktuk Community Conservation Plan (TCCP), the Study Area is also located in the vicinity of spring, summer, fall, and winter fish harvesting areas near the Husky Lakes and Fish Lakes and Rivers Management areas (Community of Tuktoyaktuk et al. 2008). These areas provide important fish habitats and are culturally important to the Inuvialuit as both historical and current subsistence harvest areas for the people of Inuvik and Tuktoyaktuk. Actual species presence is dependent on habitat and watershed characteristics, and connectivity between suitable channel habitat and upstream lakes to provide feeding, rearing, and/or overwintering habitats. The harvest species most important to the local community include Lake Whitefish, Inconnu, Lake Trout and Northern Pike (Community of Tuktoyaktuk et al. 2008).

APPENDIX B: PROJECT OVERVIEW MAP

Q:\Vancouver\GIS\ENVIRONMENTAL\EENW03643-02\Maps\Erosion_Sediment\EENW03643-02_Fig01_Erosion_Overview.mxd modified 3/23/2022 by MEGAN VERBURG



LEGEND

-  M-18 Well Location
-  Project Area
-  Proposed Access Road Alignment
-  Inuvik Tuktoyaktuk Highway (ITH)

NOTES

Base data source:
Imagery from DigitalGlobe (June 2017).

STATUS
ISSUED FOR REVIEW

INUVIUIT ENERGY SECURITY PROJECT EROSION & SEDIMENT CONTROL MANAGEMENT PLAN

Project Overview

PROJECTION

UTM Zone 8

DATUM

NAD83

CLIENT

IESP Ltd
(Inuvialuit Energy
Security Project Limited)

Scale: 1:35,000

500 250 0 500

Metres

FILE NO.

EENW03643-02_Fig01_Erosion_Overview.mxd

OFFICE

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DATE

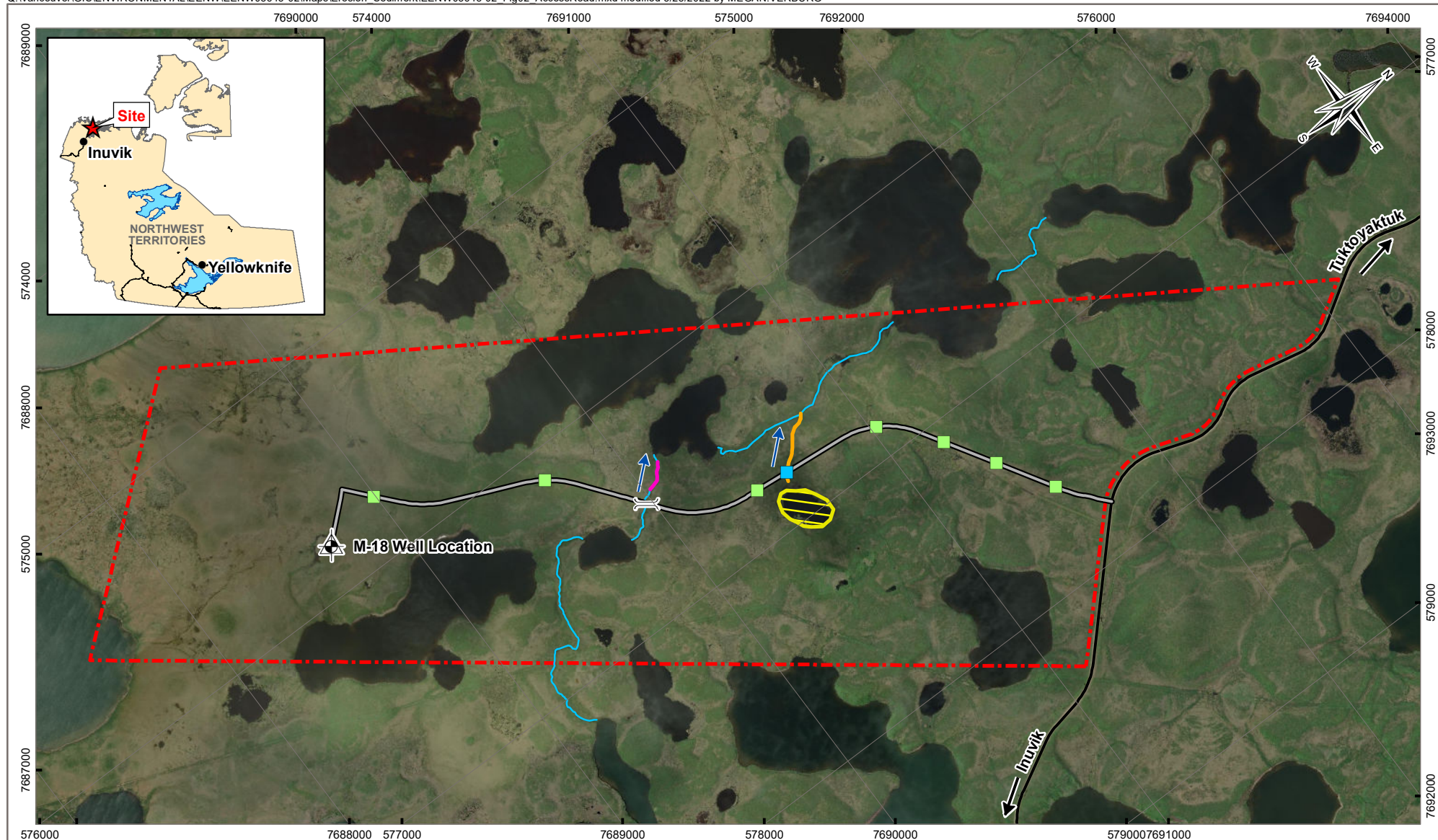
March 23, 2022

PROJECT NO.

ENW.EENW03643-02

Figure 1

APPENDIX C: ACCESS ROAD LAYOUT



LEGEND

- Bridge at Unnamed Tributary to Gunghi Creek (2+3 km)
- Culvert at Unnamed Watercourse (1+6 km)
- Culvert Location
- M-18 Well Location
- 2021 Fish Habitat Assessment
- 2018 Fish Habitat Assessment

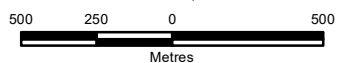
NOTES

Base data source: Imagery from DigitalGlobe (June 2017).

- Bathymetry Survey Boundary
- Project Area
- Proposed Access Road Alignment
- Inuvik Tuktoyaktuk Highway (ITH)
- Flow Direction
- Watercourse

STATUS
ISSUED FOR REVIEW

Scale: 1:25,000



PROJECTION

UTM Zone 8

DATUM

NAD83

FILE NO.

ENW03643-02_Fig02_AccessRoad.mxd

CLIENT

IESP Ltd
(Inuvialuit Energy
Security Project Limited)

INUVIALUIT ENERGY SECURITY PROJECT EROSION & SEDIMENT CONTROL MANAGEMENT PLAN

Access Road Layout

OFFICE

Tl-VANC

DATE

March 23, 2022

DWN

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WB

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0

PROJECT NO.

ENW.EENW03643-02

Figure 2

Attachment 5: Waste Management Plan



IESP Waste Management Plan

IESP-HSEQ-EN-PLN-0014

Rev.	Date	Purpose	Created By	Checked By	Approved By
2.0	2023-01-24	Issue for Department Review	AM	BJ	TB
2.1	2023-04-05	Issue for Regulatory Review	AM	TM	AM
3.0	2023-09-05	Issue for Regulatory Review	AM	AM	AM
4.0	2023-12-11	Issue for Regulatory Review / Issued for Use	AM	BJ/TB	AM
4.1	2024-01-09	Issue for Use	AM	TWK/BJ/TB	AM

Revision History					
Rev.	Date	Section	Summary of Changes	Changed by	Change Approved by
1.0	2022-03-28		IFRR for ESW Phase	Original Issue	
2.0	2023-01-24	References Header	Changes as per CER IR No.2; update Document code	AM	AM
2.1	2023-04-05	Abbreviations, Acronyms, and Definitions	Changes as per CER IR No.2 and IR No.3; added Abbreviations, Acronyms, and Definitions; corrected reference to Spill Contingency Plan	TM	AM
2.2	2023-09-05	Various	Changes as per CER IR No.6	TWK	AM
3.0	2023-09-05	Headers	Prepared for Issued for Use	TWK	AM
4.0	2023-12-11	Various, Tables 4 and 5	Updates as per CER IR No.8 / Prepared for Issued for Use	BJ/AM	AM
4.1	2024-01-09	Pg. 10 Table 2	Updates per IESP EPF Level 1 Schedule	BJ/AM	AM

Abbreviations, Acronyms, and Definitions

Abbreviations/Acronyms	Definition
CNG	Compressed Natural Gas
EISC	Environmental Impact Screening Committee
EM	Environmental Monitor
Energy Centre	<i>Energy Centre, Energy Facility, Infrastructure Facility, and Infrastructure are terms used interchangeably in the IESP documentation. The terms are used to describe the facilities and equipment that will process the gas and liquids from the M-18 well. The Energy Centre will be placed on a granular infrastructure pad that is termed "Energy Centre pad" or "infrastructure pad".</i>
ENR	Environment and Natural Resources
ESW	Early Site Works
EPP	Environmental Protection Plan
GNWT	Government of Northwest Territories
HSEQ	Health, Safety, Environment, and Quality
IESP	Inuvialuit Energy Security Project
IFA	Inuvialuit Final Agreement
IPC	Inuvialuit Petroleum Corporation
IESPL	Inuvialuit Energy Security Project Limited
ILA	Inuvialuit Land Administration
ITH	Inuvik-Tuktoyaktuk Highway
ISR	Inuvialuit Settlement Region
NWT	Northwest Territories
WMP	Waste Management Plan

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1.0 Introduction

Inuvialuit Energy Security Project Ltd. (IESPL) is committed to preventing, reducing, or controlling adverse effects to the environment occurring as a result of the Inuvialuit Energy Security Project (IESP). Giving effect to this commitment and drawing from precedent, IESPL have developed an Integrated Management System (IMS) and a comprehensive Environmental Protection Plan (EPP) related to specific aspects of the Project to prevent, manage, and/or mitigate potential environment effects.

The IESP Waste Management Plan (WMP) is part of the Project's EPP and IMS and is based upon the ISO 14000 PLAN-DO-CHECK-ACT cycle of continual improvement.

Per the ISO 14000 EMS Standard, IESPL's environmental planning (PLAN) includes impact assessment, stakeholder and community consultations, regulatory review, and risk, hazard, and opportunity assessments. Our implementation (DO) procedures include procedures for training and awareness, documentation, standardized processes, contingency (emergency) planning, and methods and mitigation measures to reduce or prevent direct impacts from the implementation of the project. We will CHECK on the effectiveness of our implementation through regular reporting, monitoring, audits, and management review. Finally, we will ACT on the results of our checking using an adaptive approach to continual improvement to reflect changing site conditions, activity levels or lessons learned to continue to mitigate potential effects on wildlife, wildlife habitat, harvesters, and the environment.

1.1 Purpose and Objectives of the WMP

The Inuvialuit Petroleum Corporation (IPC), an Inuvialuit corporation established under the Inuvialuit Final Agreement (IFA), is proposing to develop and operate the Inuvialuit Energy Security Project (IESP) under the subsidiary Inuvialuit Energy Security Project Ltd (IESPL).

As a subsidiary of IPC, IESPL is committed to the spirit, intent, and implementation of the Inuvialuit Final Agreement. The objectives of the IFA are to:

- Preserve Inuvialuit cultural identity and values within a changing northern society.
- Enable Inuvialuit to be equal and meaningful participants in the northern and national economy and society.
- Protect and preserve Arctic wildlife, environment, and biological productivity.

The IESP goals and commitments have considered the IFA, recent Project Descriptions, input and recommendations from the Project scientists, planners, engineers and management team, and numerous regulations, guides, and best practices (as referenced below).

The WMP has been developed to provide safe management of waste for project personnel and the public and to protect and preserve wildlife, and the environment, in the Project Area during all phases of the project.

2.0 Project Description

2.1 Basic Overview of the Proposed Development

IESPL is proposing to develop and produce energy resources from the suspended TUK M-18 well (M-18) for the Inuvialuit Energy Security Project. The IESP would involve the construction and operation of a small gas plant (the IESP Energy Centre) at the M-18 wellsite. The Energy Centre will convert natural gas and condensate into Compressed Natural Gas (CNG), propane, and Synthetic Diesel. The hydrocarbon products will then be transported by truck (third-party contractor) on the Inuvik-Tuktoyaktuk Highway (ITH) to local customers for power, heat, and/or fuel.

The IESP includes six distinct contractual scopes, as detailed in Table 1. Durations are current best estimates. Finalization of Principal Contractors remains subject to the finalization of contracts.

Scope 1 – Early Site Works (ESW)

Scope 2 – Well Workover

Scope 3 – Energy Centre Procurement, Fabrication, Transport, and Installation

Scope 4 – Commissioning and Operations

Scope 5 – Transportation of Fuels

Scope 6 – Decommissioning

Table 1: Project work scope descriptions

Work Scope	Scope Description
<p>Early Site Works</p> <p>Estimated Duration:</p> <p>Two winter seasons</p> <p>Principal Contractor:</p> <p>IESPL</p>	<p>Early Site Works: Permitted by the Inuvialuit Land Administration and the Canada Energy Regulator, Early Site Works will involve winter construction of a four (4) kilometer all-weather access road from KM 128.7 on the ITH to the wellsite and the Energy Centre pad areas, including placement of a drainage culvert and equalization culverts; winter construction of a pre-fabricated bridge to cross the unnamed creek at the 2.2 km post; winter construction of gravel pads for the Energy Centre; and installation of ad-freeze piles. The scope will require borrow excavation and transport to the site from local borrow sources, ground preparatory work, installation of temporary construction trailers,</p>

Work Scope	Scope Description
	construction activities, and cleanup per Inuvialuit Land Administration (ILA) permit conditions and the Northern Land Use Guidelines for Access Roads and Trails (Indian and Northern Affairs Canada. 2010). A permit for the T-intersection at the ITH will be obtained from the GNWT.
Well Workover Estimated Duration: 1 month Principal Contractor: IESPL	Well Workover: Permitted by the Canada Energy Regulator, the M-18 well will be prepared for workover by extending the cellar and wellhead to adjust for additional fill around the pad, constructing the gravel well pad by placement of borrow and tying into the existing sump cap, installing blowout prevention equipment, and displacing diesel from the well with kill weight sodium chloride brine. Following workover activities, the wellhead will be re-installed, the well will be flowed to clean up any kill fluid lost to the formation, and the well will be shut-in and secured for future tie-in to the Energy Centre. The entire process is expected to take less than a month and will occur during the winter to minimize sensory disturbance to wildlife.
Procurement, Fabrication, Transportation, and Installation Estimated Duration: 3+ years Principal Contractor: Bird Construction* and various module fabrication vendors*	<p>Procurement and Fabrication involves the purchase of materials and equipment, technology, structures, or facilities, as well as building of Energy Centre modules on transportable skids in the south at an established fabrication facility. The completed modules will be tested and then prepared for shipment to the north.</p> <p>Transportation of the completed modules to a staging area in Inuvik or Tuktoyaktuk will occur via the Dempster Highway and/or via Barge from Hay River. Transportation logistics will involve approvals from the appropriate authorities for highway, barge, or rail use. Final delivery from the staging area(s) to the project site will occur via truck along the ITH from Inuvik or Tuktoyaktuk.</p> <p>Installation of Modules and Energy Centre Infrastructure will involve setting of Energy Centre Modules and off-module equipment (such as tanks, towers, generators) onto the pile or spread footing foundations, and assembly and installation of interconnecting pipe ways and electrical systems. Energy Centre Infrastructure such as office/control room and</p>

Work Scope	Scope Description
	warehouse will also be installed. The Energy Centre will be made ready for start-up.
Commissioning and Operations Estimated Duration: 50+years Principal Contractor: IESPL	<p>Commissioning includes activities associated with the start-up of the Energy Centre. Preliminary activities undertaken to test the equipment, connections, etc.; and completion activities to validate construction per design, demonstration of strength and integrity of the piping /mechanical systems and communication / function of the control systems.</p> <p>Operations will involve a Federally or Territorially regulated, fully operational Energy Centre. Operational activities include natural gas treatment and natural gas liquids extraction, CNG production, diesel and synthetic diesel production, propane production, fuel loading, waste management, and supporting infrastructure and equipment. The initial license to operate will be obtained from CER.</p>
Transportation Estimated Duration: 50+years Principal Contractor: TBD*	<p>Transportation of Fuels will be contracted by IESPL to other parties. The activity includes trucking CNG, propane, diesel, and synthetic diesel to local commercial and residential consumers. The primary route of transport is the ITH to the communities of Tuktoyaktuk and to Inuvik in compliance with Transportation of Dangerous Goods Regulations.</p>
Decommissioning Estimated Duration: 2-3 years plus any monitoring Principal Contractor: TBD*	<p>Decommissioning will involve cleanup, removal of all structures and equipment, remediation, reclamation, revegetation, and monitoring to meet the standards of a future time in 50+ years. A Cleanup, Decommissioning and Remediation plan that would meet the standards of 2022 is provided in Section 17 of the EISC Project Description. The plan will be updated and approved prior to actual decommissioning.</p>

*NOTE: Finalization of Principal Contractors remains subject to finalization of contracts.

Pending authorization, Early Site Works activities are expected to begin in Q3 2022, well workover in Q1 2023, and commissioning is scheduled for early 2026. No civil construction activities will occur between May 15 and August 15, 2023, to comply with the Migratory Bird season restrictions.

The Project is expected to be operational for 50+ years. A summary of the development schedule, season, and duration is provided in the table below.

Table 2: Development schedule and duration

Major Activity	Duration	Timing
Early Site Works	Less than six months	Between October 2023 and April 2026 (over winter seasons)
Well Workover	Less than one month	Q1 2024
Procurement and Fabrication	18-24 months	2023-2025
Transport of Modules to Tuktoyaktuk	Less than six months	2024 and 2025
Installation and Commissioning	Less than three months	2025 and 2026
Energy Centre Operations (including transportation)	Greater than 50 years	All Seasons
Energy Centre Decommissioning	Less than three years	Undetermined

2.2 Project Location

The IESP is located approximately 16 kilometres south of Tuktoyaktuk, Northwest Territories, Canada, in the Inuvialuit Settlement Region (ISR). It is located about four kilometres south-west of the Tuktoyaktuk municipal boundary and four kilometres west of the ITH near the Gunghi Creek watershed. The M-18 well is located at 69°17'50.6"N latitude and 133°04'34.6"W longitude in the TUK 2 concession block. The M-18 well and proposed project infrastructure, including the access road, is located entirely on Inuvialuit 7(1)(a) Private Lands.

2.3 Relevant Regulatory Requirements and Guidelines

IESPL are committed to developing the Inuvialuit Energy Security Project (IESP) in full compliance with all federal, territorial, and local laws and regulations. IESPL programs and plans are based upon industry best practices and government guidelines. Current versions of NWT ENR guidelines are found at [Guidelines | Environment and Natural Resources \(gov.nt.ca\)](https://www.gov.nt.ca/guidelines-environment-and-natural-resources). A list of relevant regulatory requirements and guidelines as of this date is provided in Table 3.

Table 3: Relevant Regulatory Requirements and Guidelines

Regulatory Requirements and Guidelines
Federal Legislation
Canada Environmental Protection Act, 2021
National Pollutant Release Inventory, 2022
Transportation of Dangerous Goods Act and Regulations, 2001
CCME Guidelines for Decommissioning Industrial Sites, 1998
Territorial Legislation
NWT Environmental Protection Act, 1988
NWT Oil and Gas Operations Act, 2014
NWT Used Oil and Waste Fuel Management Regulations, 2003
NWT Waste Reduction and Recovery Act, 2003
NWT Electronics Recycling Regulations, 2016
NWT Transportation of Dangerous Goods Act, 2020
NWT Public Health Act, 2019 (amended)
Northwest Territories–Nunavut Spills Working Agreement, 2014
NWT Environmental Guideline for Contaminated Site Remediation, 2003
NWT Guideline for Industrial Waste Discharges in the Northwest Territories, 2004
NWT Guideline for Hazardous Waste Management, 2017
NWT Guide to the Spill Contingency Planning and Reporting Regulations, 2007

3.0 Waste Handling & Disposal

3.1 Introduction

Each phase of the Project will generate slightly different waste streams. None of the Project phases will generate significant waste. Because most of the construction and fabrication work will be completed off-site, the waste usually created on-site during construction will remain in the south. There will never be a landfill on the site. A list of anticipated wastes from each Project Phase is provided in Table 4. Additional details on specific waste streams are provided in Section 4.

Table 4: Anticipated Waste Types by Project Phase

Project Phase	Anticipated Waste Types
Early Site Works	<p>The main waste types produced during the construction of the Early Site Works (ESW) are expected to be domestic waste, non-hazardous industrial waste, and natural organic material. This phase of the project includes an on-site “lunch” trailer with potable water, eating area and washrooms. Sewage from the onsite trailer will be hauled to the Tuktoyaktuk sewage lagoon. Domestic waste will be stored indoors or in secure airtight bear proof containers and transported to the Hamlet of Tuktoyaktuk landfill for disposal on a daily basis.</p> <p>Oily rags, spill pan waste, or any other equipment-maintenance-related “oily” waste will be stored separate from domestic waste in secure airtight bear proof containers and transported to an approved landfill for disposal on a daily basis. All spills will be cleaned up and disposed per the Spill Contingency Plan.</p> <p>Site Preparation may require removal of the tundra organic layer. This material will be stored and re-used for reclamation purposes. There may also be some woody debris waste. Peat, brush, and shrub cuttings will not be disposed of in or near water bodies. In some cases, brush may be salvaged and used to control erosion at the site. For instance, stacked brush on the downhill side of a slope can slow and trap sediment. Extra brush will be collected, mulched, and trucked away for use off-site or disposal in a landfill. Brush will not be disposed by burning on-site.</p>
Well Workover	<p>All solid industrial waste generated during the well workover (e.g., cement cuttings, dunnage, tubing protectors, packing material, etc.) will be collected in waste bins and disposed of at an approved landfill. The total volume will be less than 2000kg. All gas produced during the well clean-up will be flared (not vented).</p>

Project Phase	Anticipated Waste Types
	<p>to atmosphere). At the end of operations, the waste completion brine (NaCL/water) will be hauled to disposal in the south at a regulated facility. Sewage from the onsite lunch/office trailer(s) will be hauled to the Tuktoyaktuk sewage lagoon. Domestic waste will be segregated and stored in secure airtight bear proof containers and transported to an approved landfill for disposal. All spills will be cleaned up and disposed per the Spill Contingency Plan.</p> <p>Waste fluids from the workover will consist of spent diesel fuel circulated from the wellbore. If practical, this will be burned in industrial waste heating units in Tuktoyaktuk or Inuvik. If this is not practical, the waste diesel will be trucked to a disposal/recycling location in BC or Alberta, along with waste completion brine (NaCL/water).</p>
Procurement and Fabrication	All waste from manufacturing and fabrication of the Energy Centre equipment, facilities and structures will be generated off-site and disposed according to local regulations. There will be no fabrication, or waste from fabrication, on-site.
Transport of Modules and Energy Centre Infrastructure	Waste types expected to be generated by transportation of modules include wood, plastic wrap, cardboard, pallets, or packing. These wastes will be hauled south with the back-haul for recycling or re-use. This phase of the project does not include an on-site kitchen or toilets. All spills will be cleaned up and disposed per the Spill Contingency Plan.
Installation of Modules and Energy Centre Infrastructure	There may be some additional packaging waste and minor amounts of construction waste in this activity. This phase of the project requires on-site lunchrooms and toilets. All waste will be collected, stored, managed, and disposed by type per the IESP Waste Management Plan for Installation, Commissioning and Operations.
Commissioning	There may be some additional packaging waste and minor amounts of construction waste in this activity. This phase of the project requires on-site lunchrooms and toilets. All waste will be collected, stored, managed, and disposed by type per the IESP Waste Management Plan for Installation, Commissioning and Operations.

Project Phase	Anticipated Waste Types
Operations	There are no liquid waste streams expected from the Energy Centre processes. All industrial, non-hazardous solid waste will be sent to a regulated off-site waste facility licensed to receive that waste. Hazardous wastes will be taken south for proper disposal at a licensed and regulated facility in B.C. or Alberta. Management and disposal of all waste will meet or exceed regulations. Industrial and hazardous wastes will be manifested, tracked, and quantified for an annual report.
Transportation of Fuels	No waste will be generated onsite from this activity. Any domestic or sewage waste will be disposed as above. All spills will be cleaned up and disposed per the Spill Contingency Plan.
Decommissioning	Decommissioning wastes may include numerous salvageable, re-usable or recyclable structures or equipment. Management and disposal will follow the requirements of the day. See IESP Project Description Section 17, as approved by the EISC, for more detail on the IESP Decommissioning and Reclamation plan.

3.2 Waste Hierarchy

This Waste Management Plan incorporates the basic principles of the waste hierarchy: source reduction, reuse, recycle/recover, treatment, and disposal. The waste hierarchy is the order of priority of actions to be taken to reduce the amount of waste generated and to improve overall waste management processes and programs. The waste hierarchy, in order of priority, is as follows:

- Source reduction is the elimination or decrease of the volume or toxicity of waste by adopting practical methods such as using alternative materials or processes. This can be achieved by material elimination, inventory control and management, material substitution, process modification and improved housekeeping, maintenance, and training.
- Reuse is achieved by using a product more than once for the same application or different purposes. Reusing material such as brush waste, containers, pallets, etc. can reduce the amount of waste to landfill.
- Recycling of products that typically have one use is an excellent method of reducing the volume of waste going for landfill disposal at a worksite. Sorting products so they can be managed in bulk eliminates the need for additional handling and allows for different products to be managed by efficient recycling processes.

- Waste treatment is used to reduce the volume, mass and/or toxicity of the material prior to disposal due to contaminants contained within the waste. There are a number of treatment options including biological and physical processing which may be used separately or combined to be the most effective and efficient.
- Disposal of waste is the final option for waste management. When disposing of waste, the type of waste, volume, location, and final containment must be considered. The waste disposal options available to this project include regulated landfills, municipal sewage lagoons for non-hazardous and domestic wastes, and hazardous waste disposal facilities in the south. The physical and chemical characteristics as well as the regulatory requirements and liability associated with disposal may limit which options are used for waste disposal.

3.3 Waste Characterization

Waste characterization is used in assessing the appropriate handling, treatment, transportation, and disposal of the waste. Characterization is the assessment of the physical, chemical, and toxicological properties of the waste product. These properties are used to determine the dangers relating to the handling, storage, and transportation of the waste on public roads, as well as to determine the environmental consequences of the waste so that an appropriate disposal option can be determined. This allows the determination of hazardous or non-hazardous waste. Waste transportation and disposal from the IESP will be regulated by the GNWT and the receiving jurisdiction (if outside the GNWT).

Regulated wastes include any waste material which is specifically regulated as hazardous by the Federal or Territorial government, or a waste listed as dangerous for transport (in TDGA).

The following are properties that wastes may have that require additional personal protective equipment, and safe work procedures when handling, storing, and/or disposing.

3.3.1 Flammability

This will apply to liquids, solids, or gases; however, the most common are liquids or solutions which have a flash point of 23°C or below. Other materials included in this class are oxidizers which readily yield oxygen to support the combustion of organic materials, waste which can spontaneously combust, and flammable compressed gases. Examples of ignitable wastes include acetone, hexane, methanol, and isopropanol.

3.3.2 Corrosives

A waste is corrosive if its pH is equal to or less than 2, or equal to or greater than 10. Liquids which corrode steel at rates greater than 6.35 mm/yr are also considered corrosive. Examples of corrosive waste include mineral acids, sodium, and potassium hydroxide.

3.3.3 Reactivity

This classification encompasses two types of hazards; physical and health. Wastes with reactive physical characteristics are those with the potential of reacting violently, presenting fire hazards, and/or capable of explosion at normal temperatures and pressures. Wastes with reactive health hazards are those which will release toxic or irritating vapors or fumes when mixed with water or acids. Examples are reactive laboratory wastes, such as sulphide solutions and water-reactive metals.

3.3.4 Toxicity

This classification includes those substances which can cause acute, chronic, or adverse effects in humans and/or the environment. Examples of toxic wastes include biocides, carcinogens, and heavy metals such as lead, chromium, and arsenic.

Generally, a waste is considered non-hazardous if it does not possess any of the above-mentioned characteristics; however extreme caution must be used when following these guidelines.

Although some materials do not fall into these hazard classes, they still may pose a threat to the environment or humans and should be handled accordingly. The following compounds could be considered in this class:

- Sulfur dioxide and other sulphur compounds
- Oxides of nitrogen compounds
- Carbon monoxide
- Organic compounds, in particular hydrocarbons (except methane)
- Heavy metals and their compounds
- Dust, asbestos, glass, and mineral fibres
- Chlorine and its compounds
- Fluoride and its compounds

If doubt exists whether a material is a “hazardous waste” or a “dangerous good” personnel will be trained to consult with their supervisor or the onsite HSEQ Advisor.

3.4 Waste Summary Table

Table 5 provides a summary of wastes for all phases of the project, including a description of handling and disposal methods, and estimated volumes.

Table 5: Summary of Estimated Wastes by Phase

Description	Waste Stream	Estimated Volume per year	Handling Method	Disposal Method
Waste from Early Site Works				
Domestic/Kitchen Waste	Domestic	1200 kg	Food waste must be stored in secure airtight bear-proof containers	Transport to Hamlet of Tuktoyaktuk landfill
Beverage Bottles – plastic	Recyclable	5000 Bottles	Place in Enviro or Seacan	Donate to a local charity or transport to a local recycling depot
Beverage Cans – aluminum	Recyclable	5000 Cans	Place in Enviro or Seacan	Donate to a local charity or transport to a local recycling depot
Oily Rags and Absorbent Materials from Spill Pans	Industrial	225 kg	Package and store onsite in sealed containers or HAZMAT drum	Transport to approved disposal facility
Textiles (waste clothes and PPE)	Industrial	25 kg	Package and store onsite in sealed containers or HAZMAT drum	Transport to approved disposal facility
Waste from Well Workover				
Domestic/Kitchen Waste	Domestic	200 kg	Food/Kitchen waste must be stored in secure airtight bear proof containers	Transport to Inuvik or Tuktoyaktuk landfill
Beverage Bottles – plastic	Recyclable	300 Bottles	Place in Enviro or wooden Sea can	Transport to a recycling depot in Tuktoyaktuk or Inuvik, NWT
Beverage Cans – aluminum	Recyclable	300 Cans	Place in EnviroCan or wooden Sea can	Transport to a recycling depot in Tuktoyaktuk or Inuvik, NWT
Water – grey water	Domestic	48m3	Store in heated, insulated, sealed tanks and truck to Municipal Sewage Lagoon	Transport to the Hamlet of Tuktoyaktuk sewage lagoon
Water – black water	Sewage	48m3	Store in heated, insulated, sealed tanks and truck to	Transport to the Hamlet of Tuktoyaktuk sewage lagoon

Description	Waste Stream	Estimated Volume per year	Handling Method	Disposal Method
			Municipal Sewage Lagoons	
Solid waste from well workover (packaging, dunnage, tubing protectors, swab cups) (2000kg)	Recyclable	one time waste from well workover	Stored in Disposal Bin	Recycle where possible - balance to Class II landfill
Cement cuttings from Well Workover (also contains rubber & iron from bridge plugs) (1000kg)	Industrial	one time waste from well workover	Stored in Disposal Bin	Class II Landfill
Flared Gas (6mmscf/day for 3days)	Industrial	one time waste from well workover	Flare, do not vent	Flare to atmosphere
Waste Lube Oil from rig and support equipment (500L est.)	Industrial	one time waste from well workover	Stored in HAZMAT drum	Transport to a local waste oil burner
Workover fluids from Well Workover (NaCl brine - small amount cement dust & diesel oil) (est. 40 m3)	Hazardous	one time waste from well workover	Stored in double walled tank	Transport to an approved disposal well in B.C. or Alberta
Spent Diesel from the wellbore (est. 60 m3)	Hazardous	one time waste from well workover	Stored in a double-walled tank	Stabilize & use in a local waste oil burner or transport to approved disposal well in B.C. or Alberta
Produced liquid hydrocarbon & trace methanol (50 m3 est)	Hazardous	one time waste from well workover	Stored in a double-walled tank	Stabilize & use in a local waste oil burner or transport south to a regulated disposal well
Other chemicals and additives – Specify: (Methanol)	Hazardous	20 barrels	Store on site in approved tank or container	Transport south to approved disposal facility
Waste from Installation of Energy Centre Modules and Infrastructure				
Domestic/Kitchen Waste	Domestic	1000 kg	Food waste must be stored in secure airtight bear-proof containers	Transport to Hamlet of Tuktoyaktuk landfill
Beverage Bottles – plastic	Recyclable	4000 Bottles	Place in Enviro or Seacan	Donate to a local charity or transport to a recycling

Description	Waste Stream	Estimated Volume per year	Handling Method	Disposal Method
				depot in Tuktoyaktuk or Inuvik, NWT
Beverage Cans – aluminum	Recyclable	4000 Cans	Place in Enviro or Seacan	Donate to a local charity or transport to a recycling depot in Tuktoyaktuk or Inuvik, NWT
Oily Rags and Absorbent Materials from Spill Pans	Industrial	125 kg	Package and store onsite in sealed containers or HAZMAT drum	Transport to approved disposal facility
Textiles (waste clothes and PPE)	Industrial	25 kg	Package and store onsite in sealed containers or HAZMAT drum	Transport to approved disposal facility
Water – grey water	Domestic	125 m3	Store in heated, insulated, sealed tanks and truck to Municipal Sewage Lagoon	Transport to the Hamlet of Tuktoyaktuk sewage lagoon
Water – black water	Sewage	125 m3	Store in heated, insulated, sealed tanks and truck to Municipal Sewage Lagoons	Transport to the Hamlet of Tuktoyaktuk sewage lagoon
Solid waste from packaging	Recyclable	2000 kg	Stored in Disposal Bin	Recycle where possible - balance to Class II landfill
Waste from Commissioning and Operations				
Domestic/Kitchen Waste	Domestic	1200 kg	Food waste must be stored in secure airtight bear-proof containers	Transport to Hamlet of Tuktoyaktuk landfill
Beverage Bottles – plastic	Recyclable	6000 Bottles	Place in Enviro or Seacan	Donate to a local charity or transport to a recycling depot in Tuktoyaktuk or Inuvik, NWT

Description	Waste Stream	Estimated Volume per year	Handling Method	Disposal Method
Beverage Cans – aluminum	Recyclable	6000 Cans	Place in Enviro or Seacan	Donate to a local charity or transport to a recycling depot in Tuktoyaktuk or Inuvik, NWT
Oily Rags and Absorbent Materials from Spill Pans	Industrial	125 kg	Package and store onsite in sealed containers or HAZMAT drum	Transport to approved disposal facility
Textiles (waste clothes and PPE)	Industrial	25 kg	Package and store onsite in sealed containers or HAZMAT drum	Transport to approved disposal facility
Water – grey water	Domestic	125 m3	Store in heated, insulated, sealed tanks and truck to Municipal Sewage Lagoon	Transport to the Hamlet of Tuktoyaktuk sewage lagoon
Water – black water	Sewage	125 m3	Store in heated, insulated, sealed tanks and truck to Municipal Sewage Lagoons	Transport to the Hamlet of Tuktoyaktuk sewage lagoon
Liquid Industrial waste	Hazardous	10 m3	Stored in barrels	Transported to Alberta or BC for disposal in appropriate facility
Solid Industrial Waste	Hazardous but Recyclable due to valuable metals	5000 kg	Stored in barrels or super sacks	Return to original manufacturer for reclamation
Solid waste from packaging	Recyclable	500 kg	Stored in Disposal Bin	Recycle where possible - balance to Class II landfill

4.0 Waste Streams for the Project

4.1 Kitchen and Domestic Waste

Domestic waste, also known as household waste or kitchen waste includes food scraps, paper, bottles, and may also include fabric, empty glass, metal or plastic containers, plastics, or other non-hazardous wastes.

All domestic, non-hazardous waste will be gathered daily and stored in bear-proof containers. Domestic waste and empty containers will be removed from the site as needed, and at least once per week. Currently, beverage containers are the only recyclable that can be received locally, due to transportation economics. Beverage containers will be packaged appropriately in multi-sectional bins and shipped regularly to an appropriate recycling facility in Tuktoyaktuk or Inuvik.

The IESP will seek approval from the Hamlet of Tuktoyaktuk to dispose of all domestic waste in the municipal landfill.

4.2 Sewage and Domestic Wastewater

Raw Sewage and Domestic Wastewater generated during the project at the various on-site trailer offices / lunchrooms will be collected into holding tanks that will be heated and insulated.

The IESP will seek approval from the Hamlet of Tuktoyaktuk to dispose of all Raw Sewage in the municipal Sewage Lagoon.

No raw sewage, treated effluent, or other wastewater will be discharged on the land.

IESP will have installed heated and insulated effluent watertight storage tanks located with each of its lunch/ field trailers / offices. There will be storage sufficient for about two weeks of effluent given the probability in the region for adverse weather conditions. This should allow for a contingency in the event that severe weather hampers the travel of mobile equipment.

Sewage will be transported off-site with by means of a vacuum truck to the Hamlet sewage lagoon on a weekly basis. Tanks on the transport vehicles will be watertight, baffled tanks and will be maintained to the manufacturer's specifications to ensure dependable performance.

4.3 Hazardous Waste

The GNWT Guideline for Hazardous Waste Management (GNWT, 2017) defines "hazardous wastes" as:

"A contaminant which is no longer used for its original purpose and is intended for recycling, treatment, disposal or storage and is:

- a) A dangerous good according to the TDGR;*
- b) Leachable waste;*
- c) Hazardous to the aquatic environment;*
- d) Waste containing dioxins and furans;*
- e) Contaminated soil/snow/water from a contaminated site;*
- f) Drilling waste;*
- g) Listed waste; or*

h) Any other waste deemed hazardous.

Hazardous waste does not include a material that is:

- a) Authorized for on-site disposal by the applicable regulator for the specific activity in which the hazardous waste was generated;*
- b) Household hazardous waste being transported to a municipal collection depot;*
- c) Included in Class 1, Explosives or Class 7, Radioactive materials of TDGR;*
- d) Exempted as a small quantity;*
- e) An empty container; or*
- f) Goods that are defective, surplus, or otherwise not usable for their intended purpose and that are in the process of being returned directly to a manufacturer or supplier.”*

Some examples of Hazardous wastes that may be generated onsite includes heavy equipment batteries, aerosols, solvents, some petroleum hydrocarbons, and waste filters.

There is anticipated to be very small volumes of hazardous waste during the Project. All hazardous waste generated will be stored on-site in a safe and secure manner which minimizes, to the extent possible, risk to the site workforce, the public, wildlife, and the environment. All hazardous waste generated at the project will be classified, collected in appropriate labeled containers, segregated into compatible groups, securely stored, transported, and disposed of, in an appropriate and approved manner. IESPL will obtain a waste generator number for TDGA purposes.

Documentation related to the management of hazardous wastes will be accurately completed, submitted to all required bodies with copy(s) retained for a period of no less than 5 years. On-site storage of hazardous waste will be short term (<180 days) and within the allowable limits. Hazardous waste generated during the Project will be disposed of in B.C. or Alberta at an approved and licensed hazardous waste disposal facility.

4.4 Other Wastes

Vehicle and Equipment Maintenance: Vehicle and Equipment Maintenance will take place off-site in Tuktoyaktuk or Inuvik for all project phases. Any vehicle maintenance wastes will be generated off-site and will be responsibly managed and disposed off-site in town.

Containers with Residues: Used product containers and/or drums will have residuals consolidated so that the drums can be considered empty with residuals. These drums must be empty and labeled as “Residue Last Contained _____” and tracked on a Movement Document prior to removal from the site to a recycler or returned to the supplier. If waste cannot be safely consolidated, the IESP HSE Advisor will classify the residuals according to class and volume and will prepare and transport the waste to an approved facility.

Spill Cleanup: Any waste created by a spill will be collected, managed, and disposed in accordance with GNWT Regulations and Guidelines and the IESP Spill Contingency Plan.

5.0 Training

Personnel working on the project will be required to be certified and under the direct supervision of an individual certified in Workplace Hazardous Material Information System (WHMIS). Personnel involved with the transportation of wastes from the project will be required to be certified and under the direct supervision of an individual certified in Transportation of Dangerous Goods (TDG).

Under WHMIS legislation, safe handling precautions and product specific information is found in Material Safety Data Sheets (MSDS). All materials used on the Project and regulated by WHMIS will have available MSDS on site and accessible to all workers.

The HSE Advisor on site will have completed HAZWOPER training. (Hazardous Waste Operations and Emergency Response). This training was developed in the USA and is an excellent supplement to the Incident Command System training already in use at the site, but with a hazardous waste focus.

6.0 Tracking & Recording

Tracking and recording waste types and volumes is a necessary and important function in an efficiently running waste management program. Adequate records on waste details such as dates, quantities, waste in storage, being transported, treated, and disposed of, will be kept for a period of at least 5 years.

The IESP on-site HSE Advisor will maintain an accurate record of all hazardous waste materials generated on site and all materials transported off site. That record, at a minimum, will include:

- A list of the materials being stored/transported
- The volume of each material being stored/transported
- The type of container used to store the material
- The location of the stored material

An Excel template will be used to track all waste currently waiting for transport off site for disposal, treatment, or recycling. A summary will be prepared each year to monitor waste trends and allow for tracking waste volumes and types.

All waste records will be tracked from cradle to grave by the generator and kept on record for a period of five (5) years. The generator of the waste (HSE Advisor and/or a Plant Operator) will be responsible for completing Part A of the Federal Movement Document (FMD). This individual will be required to hold a valid certificate in TDG.

With respect to hazardous waste, the GNWT Guideline for Hazardous Waste Management (GNWT, 2017) and hazardous waste regulations in other provinces, requires that a completed waste manifest accompany shipments of hazardous waste. A Movement Document supplied by the Department of Environment and Natural Resources qualifies as a hazardous waste manifest form and is recognized by other provincial agencies. All parties involved in the disposal of hazardous wastes, the generator, the carrier, and the receiver must be registered and provided with the appropriate registration number. In the NWT these numbers are provided by ENR according to the Guideline above.

The form contains the following information:

- Detailed information on the types and amounts of hazardous waste shipped
- A record of the firms or individuals involved in the shipment
- Information on the storage, treatment or disposal of the waste and confirmation that they reached their intended final destination

The generator (Consignor), Carrier, and Receiver (Consignee) must each complete their portion of the FMD. The information provided on the FMD as well as other TDGR requirements (i.e., labeling and placarding) are also intended to assist first responders (police, ambulance, firefighters) with hazard information should a transportation accident occur. The FMD completion instructions are provided on the reverse side of each Movement Document.

For non-hazardous waste, the Movement Document supplied by the NWT Department of Environment and Natural Resources will be used to track all non-hazardous waste. Records will be kept for a minimum of 5 years and an annual summary will be prepared.

The following reporting structure (Table 6) will be followed for all matters related to waste and the WMP during Phase 1 and Phase 2 of the project, respectively.

Table 6: Reporting structure

Phase 1: Pre-Commissioning Phases	Phase 2: Operations Phase
IESPL President	IESPL President
IESPL Directors	IESPL Directors
Prime Contractor Supervisor	Regional General Manager

Phase 1: Pre-Commissioning Phases	Phase 2: Operations Phase
On-Site HSE Coordinator	Lead Operator
ILA Environmental Monitor	On-Site HSE Coordinator
All Other Personnel	Environmental Monitor
	All Other Personnel

7.0 Management Review & Adaptive Management

7.1 Management Review Process

IESPL will annually conduct a review of its Integrated Management System, including the WMP, to evaluate the system's continuing suitability, adequacy, and effectiveness.

The management review will include consideration of:

1. The status of actions from previous management reviews
2. Changes in:
 - a. External and internal issues that are relevant to the WMP
 - b. The needs and expectations of interested parties, including compliance obligations
 - c. Operational activities
 - d. Risks and opportunities
3. The extent to which the WMP objectives have been achieved
4. Information on performance, including trends in:
 - a. Nonconformities and corrective actions
 - b. Monitoring and measurement results
 - c. Fulfillment of its compliance obligations
 - d. Audit results
5. Adequacy of resources
6. Relevant communication(s) from interested parties, including complaints
7. Opportunities for continual improvement

7.2 Adaptive Management Process

Adaptive management is a systematic process for continually improving management policies and practices by learning from the outcomes of operational programs. Adaptive management involves “observing and/or monitoring the effects of actions and, where necessary, adjusting actions based on the observations and/or monitoring results.” (MVLWB et al. 2022)

Based on feedback from on-site personnel, the WMP may be modified to better protect personnel, the public or the environment during the pre-commissioning phase.

When there is an incident related to waste management, and/or when changing site conditions are identified, the Regional General Manager, together with Plant Operators, the HSE Advisor, the Environmental Monitor, and any relevant people, will do a reassessment, determining the lessons learned from either the incident or the changed conditions. In those cases, new measures will be applied in order to improve the environmental performance related to waste management.

This document is a controlled document in the IESP IMS and is subject to the IESP Management of Change process IESP-HSEQ-QMS-301.

8.0 References

Government of the Northwest Territories. 2017. Guideline for Hazardous Waste Management.

Indian and Northern Affairs Canada. 2010. Northern Land Use Guidelines for Access Roads and Trails.

MVLWB et al. 2022. (Mackenzie Valley Land and Water Board, Gwich'in Land and Water Board, Sahtu Land and Water Board, Wek'èezhìi Land and Water Board.) [DRAFT LWB Waste and Wastewater Management Policy - Public Review - Aug 2022.docx \(live.com\)](#) Accessed January 25, 2023.

Attachment 6: Erosion and Sediment Control Management Plan



Erosion and Sediment Control Management Plan IESP-HSEQ-EN-PLN-0015

Rev.	Date	Purpose	Created By	Checked By	Approved By
1.0	2022-06-12	Issue for Department Review	BA	BJ/TB	AM
2.0	2023-01-20	Issue for Regulatory Review	BA	AM	AM
2.1	2023-04-06	Issue for Regulatory Review	BA	TM	AM
2.2	2023-09-05	Issue for Regulatory Review	BA	TWK	AM
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Revision History					
Rev.	Date	Section	Summary of Changes	Changed by	Change Approved by
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2.1	2023-04-06	Various	Changes and updates in response to CER IR No. 3 and No.4	TM	AM
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3.0	2023-09-05	Headers	Prepared for Issue for Use	TWK	AM

Abbreviations, Acronyms, and Definitions

Abbreviations/Acronyms	Definition
EISC	Environmental Impact Screening Committee
ESCMP	Erosion and Sediment Control Management Plan
DFO	Fisheries and Oceans Canada
EM	Environmental Monitor
ESC	Erosion and Sediment Control
FFHPP	Fish and Fish Habitat Protection Plan
FME	Field Manager, Environment
GNWT	Government of Northwest Territories
IESP	Inuvialuit Energy Security Project
IESPL	Inuvialuit Energy Security Project Limited
ILA	Inuvialuit Land Administration
ISR	Inuvialuit Settlement Region
ITH	Inuvik Tuktoyaktuk Highway
Kiggiak-EBA	Kiggiak-EBA Consulting Ltd.
PESC	Permanent erosion and sediment control measures
PPMP	Permafrost Protection and Management Plan
TESC	Temporary erosion and sediment control measures

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1.0 OBJECTIVES OF THIS MANAGEMENT PLAN

The Erosion and Sediment Control Management Plan (ESCMP) provides management, mitigation, and monitoring efforts aimed at preventing or mitigating negative impacts such as erosion and sedimentation of adjacent vegetation, nearby waterbodies, and/or fish habitat; as well as airborne dust impacts due to ground disturbance, from activities related to the construction and operation of the Inuvialuit Energy Security Project (IESP). The ESCMP, along with several other environmental management plans, has been developed as part of the Environmental Protection Plan (EPP) for the Project. The ESCMP applies to all phases of the IESP.

The ESCMP describes an implementation and monitoring program with an emphasis on preventative measures at source and early detection of erosion and sedimentation concerns, including visual inspections, monitoring, and climatic data reviews, which is a vital component of the adaptive management. The purpose of this ESCMP is to establish and implement a plan for erosion and sediment control (ESC) measures at the Project, particularly crucial at the construction phase with consideration to long-term operation.

Management, monitoring, and mitigation measures herein were developed from community consultations, regulator requirements and guidelines, project commitments, Best Management Practices (BMPs) and professional judgement.

The ESCMP describes how IESPL and its contractors will:

- a) minimize the potential for erosion and sedimentation due to construction activities,
- b) mitigate erosion and sedimentation over time,
- c) accommodate climate change effects as they relate to erosion potential, and
- d) address long-term monitoring of erosion and sedimentation and maintenance-level mitigation.

2.0 GUIDANCE REFERENCES

In addition to community consultations, regulations, project commitments, Best Management Practices (BMPs) and professional judgement, the following government guidelines were used as references to develop the ESCMP:

- a) Fisheries and Oceans Canada's (DFO) Measures to Protect Fish and Fish Habitat (DFO 2022a)
- b) DFO's Code of Practice: Culvert Maintenance (DFO 2022b)
- c) GNWT, Department of Transportation – Erosion and Sediment Control Manual (Northwest Territories Transportation 2013a)

- d) DFO's Interim code of practice: end-of-pipe fish protection screens for small water intakes in freshwater (DFO 2020);
- e) Department of Environment and Natural Resources Guidelines for Dust Suppression (GNWT 2013b)
- f) GNWT Northern Land Use Guidelines: Roads and Trails (GNWT 2015a)
- g) GNWT Northern Land Use Guidelines: Camp and Support Facilities (GNWT 2015b)

3.0 ROLES AND RESPONSIBILITIES

Roles and responsibilities for the implementation and use of the ESCMP are outlined in Appendix 1.

The organizational structure, including roles in the execution of the IESP, may change through each phase of development, and responsibilities for the implementation of the ESCMP may be re-assigned depending on project phase.

4.0 REGULATORY REQUIREMENTS

4.1 Project Approvals and Conditions

The IESP Development Plan application was approved by the CER on March 8, 2022, and by the GNWT Cabinet on May 5, 2022. Previous approvals included an approval from the Environmental Impact Screening (EISC) Screening Panel that delivered an IFA 11(17)(b) decision for the IESP on January 25, 2021. The TUK 2 Productive Acreage Block (PAB) configuration was approved by the Inuvialuit Land Corporation on June 10, 2010.

IESPL track all conditions arising from regulatory applications, approvals or letters, and all commitments resulting from community or stakeholder meetings or correspondence. Conditions and commitments specific to erosion and sediment control have been reviewed and have been integrated into this ESCMP. The CER Letter Decision of March 8, 2022 (CER File OF-EP-DEV I008 01) included the following assessment of IESPL's commitments to erosion and sediment control:

IPC identified the potential for erosion and sedimentation of the unnamed stream from transport incidents on or near the stream, as well as the potential for dust from the all-season gravel road to accumulate on the watershed. To minimize effects on surface water and fish and fish habitat, IPC committed to completing construction during the winter; construction of a bridge over the unnamed watercourse in a location that avoids an area of potential spawning habitat; dust monitoring, suppression, and adaptive management in the summer, based on NWT guidelines; and a comprehensive spill contingency plan.

4.2 Relevant Regulatory Bodies

This ESCMP has been developed in consideration of applicable legislation, guidelines, and best management practices as they may apply to the Project. Regulatory bodies with jurisdiction over the Project include:

Inuvialuit Land Administration (ILA): Required permits may include Land Use Permit, Access Authorization, Production Licence, Licence of Occupation, Surface Development Plan approval and Temporary Right-of-Way Permit. Land Use Permits typically contain numerous conditions.

Canada Energy Regulator (CER): Issue Development Plan approval, Operations Authorization (OA), Authorization to Alter the Condition of a Well (ACW), and Production Authorization under the Northwest Territories Oil and Gas Operations Act (OGOA) and Regulations.

GNWT Department of Transportation: Permit under the Public Highways Act to access the project site from the Inuvik Tuktoyaktuk Highway (ITH) and to ensure a proper turn lane and entrance to the access road meet or exceed government safety requirements. Provide relevant guidance documents.

Inuvialuit Water Board (IWB): IWB reviews and decides on the issuance of licenses and water use/waste disposal conditions within the Inuvialuit Settlement Region (ISR). The IESP will not require a permit from the IWB.

Fisheries and Oceans Canada: The federal Fisheries Act (2019) is the main federal legislation providing protection for all fish, fish habitat, and water quality (Government of Canada 1985a). The Act is administered federally by Fisheries and Oceans Canada (DFO) and Environment Canada. This Act provides protection against the 'death of fish, other than by fishing' and the 'harmful alteration, disruption or destruction of fish habitat' (HADD), unless authorized by DFO. DFO has determined that an Authorization is not required for the Project. Subsection 36 (3) states that no one shall deposit or permit the deposit of a deleterious substance of any type into water frequented by fish or in any place under any conditions where the deleterious substance may enter the water. This would include erosion and sedimentation impacts from construction or operations at development sites.

4.3 Relevant Interested Parties

As per the ISO 14001 Standard, an interested party is person or organization that can affect, be affected by, or perceive itself to be affected by a decision or activity. To "perceive itself to be affected" means the perception has been made known to the organization.

IESPL have determined the following organizations as relevant interested parties. IESPL have met and will continue to meet, regularly, with all interested organizations and communities. A List of the organizations is available in the IESP Development Plan – Part One, Table 17.

4.4 Best Practices and Guidelines

The GNWT Erosion and Sediment Control Manual (GNWT 2013a) offers guidance on selecting, installing, and monitoring the best methods for erosion control on a specific site in the NWT. Best Management Practices (BMPs) should be implemented; however, the following points are important to consider:

- a) Mitigation BMPs must not violate permit conditions or other regulatory requirements.
- b) Installations, as indicated in site specific design drawings and specifications, take precedence over BMPs unless otherwise approved by the Engineer based on observed site conditions.
- c) The location and method of mitigation installation is to be recorded to facilitate inspection.

4.5 Project Commitments

Existing commitments made regarding the Project's ESC management include the following:

4.5.1 General Commitments

- a) Erosion and sediment control BMPs and culvert installation guidelines, as appropriate, will be implemented.
- b) Where necessary, maintenance activities will be carried out in conformance with the DFO Measures to protect fish and fish habitat (2022a).
- c) Installation guidelines, such as the INAC Northern Land Use Guidelines for Roads and Trails (2010), will be followed.
- d) Sedimentation and erosion will be minimized by engaging in winter construction rather than summer construction; by "laying down" or cutting of shrubs rather than blading; restricting clearing to the approved and marked alignment for the access road; ensuring no soil or debris piles are left within 100 metres of a waterbody; and construction of ESC structures at the bridge site which may include silt fencing, riparian zone preservation, or slope texturing grading.
- e) All soils within the Project area will be left undisturbed to protect permafrost. Borrow will be required for the construction of roads and pads, however, no impacts related to the development of a borrow source are anticipated because all borrow is expected to come from existing borrow sources outside of the Project area.
- f) All construction activities, excluding the watercourse and drainage crossings, will be conducted 100 m or greater from any waterbodies.
- g) GNWT guidelines for road access will be applied to all contractors to mitigate siltation, erosion issues, permafrost disturbance, etc.

4.5.2 Monitoring and Inspection Commitments

- a) Inspect and maintain culverts, as needed, in the spring and fall. Maintenance will include the removal of accumulated debris (e.g., woody debris, boulders, garbage, and ice build-up) that may prevent the efficient passage of water and fish through any culverts and may also include the reinforcement of eroding inlets or outlets.
- b) The road conditions will be monitored regularly for potential erosion, subsidence, or permafrost degradation. IESPL will monitor drainage for evidence of ponding due to plugged culverts regularly, prior to winter and during spring freshet/melt.
- c) Regular monitoring for erosion and potential sedimentation will occur at roads, drainage culverts, the bridge, pads, and remediated sump cap. Adaptive management will be used to respond to sedimentation and manage erosion from any erosion incidents resulting from site infrastructure or operations.
- d) IESPL will conduct bridge monitoring during snowfall and icing events during cold seasons. Safety of staff and drivers is of highest importance. IESPL will take necessary measures, as needed, to ensure the safety of the crossing and reduce impacts to fish passage due to de-icing products (See FFHPP for more details regarding the requirements for fish and fish habitat).
- e) IESPL will include the water quality monitoring plan as part of the sediment and erosion control plan.
- f) Routine monitoring and inspections at watercourse crossings and equalization culverts will be carried out to confirm the proper performance of the culvert (this will include examination for debris buildup, subsidence or lifting, and stream bank or bed erosion).

4.5.3 Commitments to Protect Fish and Surface Water

- a) The proposed bridge crossing at the creek will be designed to span its entire bank width to not create any obstructions for the creek and protect the creek from erosion.
- b) Winter construction work is proposed to prevent impacts to fish, fish habitat or water quality.
- c) Construction of a bridge rather than culvert over the unnamed tributary to Gunghi Creek will be completed to protect fish and fish habitat. A section of the stream that has gravel substrate has been mapped and will be avoided.
- d) Complete construction activities during the winter months and cleanup all debris to prevent spring runoff moving the debris and impacting the watercourses.

4.5.4 Dust Suppression

- a) Dust suppression based on GNWT Dust Suppression Guidelines will be applied to minimize dust in the summer from truck traffic.
- b) All vehicle traffic crossing the bridge will be limited to a 30 km/hour speed limit.
- c) During the short summer period, if the access road becomes dry, dust suppression measures will be applied 50 m either side of the access road stream crossing to minimize this impact.

4.5.5 Construction of Bridge Crossing

- a) Construction work will be completed in winter during frozen/dry conditions to ensure no impacts to fish, fish habitat or water quality.
- b) GNWT guidelines for road access will be applied to all contractors to mitigate siltation, erosion issues, permafrost disturbance, etc.
- c) The proposed bridge crossing at the creek will be designed to span its entire bank width to not create any obstructions for the creek and protect the creek from erosion.

4.5.6 Erosion and Sediment Control

- a) Potential effects resulting from erosion and sedimentation will be mitigated by the construction schedule (i.e. winter construction).
- b) Installing silt fencing and/or check dams in the drainage system as necessary to minimize siltation in runoff near waterbodies.
- c) Erosion control techniques (e.g., silt fences) will be utilized if there is a potential for soil surface erosion alongside the road or pad embankments.

4.5.7 Drainage Culverts

- a) Detailed drainage plans will be developed to maintain continued drainage flows and thermal degradation from ponding does not occur. Culverts will be built throughout the access road to ensure natural drainage is not impeded.
- b) Drainage culverts will be placed along the road as needed in order to allow for cross drainage and to avoid water ponding along the edge of the road.

4.5.8 Closure

- a) Following cleanup after the last date of operations, the decommissioning and removal of all infrastructure, and the remediation of any potential surface or sub-surface contamination, the M-18 wellsite and gas plant processing areas will be reclaimed in a manner consistent with ILA

Rules and any applicable regulations. Reclamation activities may include the restoration of natural drainage and topography and revegetation which are intended, in part, to minimize erosion and sedimentation.

- b) After decommissioning, and final remediation and reclamation activities have been completed, a period of monitoring in accordance with ILA Rules will be implemented in a way that enables a successful closure of activities, including revegetation and stabilization of soils.

5.0 TRAINING, COMPETENCY AND AWARENESS

5.1 Required Training

Proper installation of ESC measures will be required. The ESCMP will be reviewed with the Contractor completing the work to confirm that the Contractor understands the proper use of the ESCMP and to provide feedback for possible improvements. The Contractor is responsible for educating the construction crew on the plan for proper implementation. A potentially useful resource for training are the installation guidelines are provided by the Government of the Northwest Territories, Department of Transportation - Erosion and Sediment Control Manual (GNWT 2013a).

5.2 Training Opportunities

The Contractor and its Supervisors are responsible for providing adequate ESC training to all onsite employees. There are several opportunities for Inuvialuit beneficiaries or local people to participate in the installation of ESC measures through the contractor and as environmental monitors throughout the construction period. In addition, environmental monitors will be required during the operational phase to ensure protective measures are maintained and upgraded as needed.

A training session on the ESCMP will be held for all employees involved in construction and implementation of ESC measures. Training will include:

- Each employee's roles and responsibilities
- Review of the BMPs
- Review proper installation methods for relevant personnel
- Review of monitoring plans
- Review of mitigation measures
- Reporting procedures if erosion or sedimentation is observed onsite

5.3 Communication and Awareness

The Contractor and IESPL will be responsible to ensure clear communication is provided between the Contractor, IESPL, and the Regulators during the construction phase and operation of the facility in the long-term. Regular meetings will be scheduled based on the level of site activity.

An environmental summary report will be completed by the Field Manager, Environment (FME) weekly and shared with the Contractor and IESPL to summarize the relevant ESC work associated with that week's construction.

As part of the adaptive management plan, it is important for the Contractor, the FME, and the Environmental Monitor (EM) to provide feedback for possible improvements and address any areas of concern regarding the ESCMP to IESPL. Continuous communication is important for successful erosion and sedimentation management.

6.0 ASPECTS AND IMPACTS

6.1 Project Activities and Aspects

Early Site (civil) Works (ESW) include the following project activities:

- Construction of an all-weather access road (approximately 4 km in length) to the Energy Centre from the ITH (Inuvik Tuktoyaktuk Highway).
- Construction of a gravel pad for the Energy Centre.
- Installation of a 35 m long single-span timber bridge
- Installation of pile foundations for the bridge.
- Installation of shallow and deep (pile) foundations for the structures and equipment at the Energy Centre.
- Installation of passive thermosyphon or mechanical cooling foundation systems at the Energy Centre.

Other Project activities following ESW include the development and production of the suspended gas well M-18. This phase (following ESW) of the IESP will include the following civil works that could result in erosion or sedimentation impacts:

- To provide for future well servicing and/or emergency work, a gravel pad will be built at the well site as part of the Well Workover scope and will be joined with the new sump cap to create a single pad.
- The existing sump cap will be examined for settlement and graded and/or filled as needed.
- The sump cap will be revegetated with native species, while the well servicing pad will be kept free of vegetation by non-chemical methods.

During operations, the regular placement and grading of fill and gravel to build up and/or maintain the all-weather access road and/or pads will require ongoing ESC measures.

6.2 General Erosion Protection Approach and Measures

Erosion is the displacement of surface soil and/or rock by water, wind and/or ice, whereas, sedimentation is the deposition of eroded material into moving or standing water. The prevention of erosion at its source is essential to limit the transport and deposition of eroded material into water and reducing adverse effects to the environment. However, soil disturbance is sometimes unavoidable, thus sediment controls are installed on a construction site to prevent downgradient sedimentation before being carried off-site. Once sediment becomes displaced, controlling it becomes very difficult, imprecise, and costly.

Erosion can occur as a result of several factors associated with construction and infrastructure development. Water flow is the primary cause of erosion on transportation construction sites and on operational infrastructure sites. Four broad environmental factors that affect erosion are as follows:

- Climate: the effects of precipitation, duration of frozen conditions, and weathering.
- Soil characteristics: particle size (texture), permeability, structure, and organic matter content.
- Vegetative cover: plant growth and cover improve soil permeability, and root structures help hold soil in place.
- Topography: slope angle, length, aspect, and shape.

Mitigation measures aim to prevent erosion and reduce the effects of sedimentation. Two primary types of ESC measures are as follows:

- Temporary measures are implemented during construction and will be removed once permanent measures are installed or vegetation cover is established; and
- Permanent measures are incorporated into the design for long-term post-construction ESC.

6.3 Potential Risks, Impacts and Specific Mitigation Measures

Project specific potential risks, impacts, and mitigation measures are provided in Appendix 2.

6.4 Mitigation and BMP Strategies

The contractor should plan to install the ESC measures prior to any ground disturbance and maintain them as construction progresses. Appropriate planning for placement of mitigation measures will be required so that installed erosion and sediment controls are not damaged due to requirements for site access or construction activity.

6.4.1 Procedural Best Management Practices

As part of the ESCMP, procedural or administrative BMPs are the minimum requirements for non-structural methods of ESC management and include site management and scheduling procedures. Procedural BMPs are presented in Table 7.3, 7.4 and 7.5 in addition to Section 8.0 of the GNWT Erosion and Sediment Control Manual (GNWT 2013) and are summarized as follows:

- a) Minimizing the amount of exposed soil at any one time (includes slopes, ditches, channels, well pads, stockpiles and borrow areas).
- b) Observe environmental timing restrictions to minimize potential negative impacts on fish and wildlife and avoid nesting periods.
- c) Minimize work in wet soil conditions or wet weather periods in order to minimize soil disturbance and mud tracking.
- d) Maintain proper site grading and drainage to facilitate rapid drainage of surface water away from infrastructure.
- e) Avoid installation of new construction around existing infrastructure that could negatively affect existing ESC measures.
- f) Protect permafrost (see Permafrost Protection and Management Plan)
- g) Install BMPs early and correctly for the appropriate applications as presented in the GNWT Erosion and Sediment Control Manual (GNWT 2013a).
- h) Avoid ponding water at construction locations and plan for increased drainage structures in wet areas.
- i) Direct surface flow around the site to keep surface water from causing erosion and sedimentation.
- j) Cover exposed soil with seeding mix where appropriate to promote revegetation.
- k) Roughen soil surfaces using slope texturing.
- l) Preserve and use existing drainage patterns and systems.
- m) Control construction traffic and avoid unnecessary heavy traffic and soil compaction to reduce disturbance.
- n) Implement clear signage at sensitive zones (i.e., nearby watercourses) to mitigate hazards.
- o) Keep stockpiles protected from wind and water erosion.

6.4.2 Structural Best Management Practices

For BMP numbering reference and additional information regarding the ESC measure, refer to the GNWT Erosion and Sediment Control Manual (GNWT 2013a).

6.4.2.1 Bridge Construction BMPs

- a) Slope protection is recommended to stabilize the banks of the unnamed watercourse under the proposed bridge deck. This may involve vegetative cover, matting or riprap armouring on slopes to protect soil from erosion.
- b) Silt fence (BMP #1) is recommended to intercept runoff into the watercourse from above the high-water mark.

6.4.2.2 Access Road and Embankment BMPs

- a) Silt fence (BMP #1) is recommended to intercept runoff, reduce velocity, and allow water to temporarily pond and settle out sediments. Installation of silt fence is to be done along the base of the slope and run parallel to the access road. Silt fences should be placed far enough away from toe of slope to provide a retention area (minimum of 1.8 m away from toe of slope is recommended), parallel to ditch lines so that slope runoff is intercepted perpendicular to flow direction. Silt fence shall not be placed across ditch lines to intercept ditch drainage. Routine maintenance of silt fence is required so that damage is repaired, accumulated sediment is removed, and the silt fence continues to function properly. Once soil surfaces are stabilized by vegetation, silt fences shall be removed (temporary ESC measure).
- b) Slope texturing (BMP #27) is recommended for all disturbed slopes. This involves roughening the surface soils to promote infiltration of water, trap seeds, reduce water velocity and rill development on slopes through contouring. This can be done using horizontal machine track patterns.
- c) Diversion ditches (BMP #14) are recommended to divert water away from the construction site in order to reduce slope erosion.

6.4.2.3 Access Road Hill

At approximately Km 2+460 to 2+600, the access road route has a steep grade (up to 15% grade) which will need to be filled to achieve an acceptable 6% grade for trucks. Erosion protection in the form of an energy dissipation berm, riprap and diversion berms are necessary as per design drawings.

- a) Energy Dissipation Berm (BMP #11) are structures used to reduce the velocity of water flow in order to reduce erosion and/or collect sediment deposits.
- b) Class 1M riprap armouring (BMP #9) is recommended.

- c) BMPs for riprap include placing appropriately sized, clean rocks into the eroding area, avoid the use of rock that is acid-generating, avoid the use of rock that fractures and breaks down quickly when exposed to the elements and install rock at a similar slope to maintain a uniform stream bank and natural stream alignment.

For areas with higher erosion potential and greater environmental sensitivity identified, road construction should be sequenced in short intervals where possible so that the exposed area is minimized, and permanent ESC measures can be installed quickly, reducing the potential for erosion and sedimentation. For areas with lower erosion potential and no connectivity, permanent ESC measures can be installed after completing longer intervals; however, these areas may vary and should be assessed based on site and seasonal weather conditions.

6.5 Management of Climate Change Impacts

After the IESP is in operation, maintenance operators will be required to monitor and address the potential impacts associated with climate change on the Project. This would include:

- a) Training staff to know how to identify issues.
- b) Maintaining culverts so that they are operating as designed in the spring and fall. Spring freshet may continue to start earlier.
- c) Observing the performance of the infrastructure including the evaluation of drainage and thaw-related problems due to warmer summers.
- d) Completing road inspections after heavy weather events to check for washouts or instability.
- e) Addressing performance issues such as rutting and potholes in a timely manner.
- f) Maintaining the road and addressing settlement issues promptly (See Permafrost Management Plan).

Table 1 outlines possible measures incorporated into the project to mitigate impacts from a changing climate.

Table 1: Potential Climate Change Impacts and Mitigations

Potential Effect	Mitigation Measures
1. Changes in seasonal temperatures and impacts of increasing temperature on ground	a) Embankments will be constructed by grade fill methods and no disturbance to the subgrade will occur.

Potential Effect	Mitigation Measures
settlement and water ponding associated with permafrost thawing.	<ul style="list-style-type: none"> b) Culvert sizing will be sized appropriately to minimize ponding and will be monitored to identify any necessary improvements over time (i.e., need for increased culvert sizing). c) Refer to Permafrost Management Plan for best management practices. d) Be aware of ice-rich areas within the Project area and monitor any changes annually. e) Avoid constructing in ice-rich areas, if possible, and where not possible then deploy methods to minimize thermal disturbance (see PPMP). f) Use of woven geotextile to reinforce embankments and reduce differential settlement. g) Use of geofabrics, geosynthetic materials, wattles or other erosion control products in ditches covered by organics to minimize erosion of the existing fine-grained soils. h) Stage the construction such that the placement of granular surfacing is delayed until any significant differential settlement has occurred. i) Confine activities to the Project footprint to the extent where possible.
2. Increasing wildfire threat	<ul style="list-style-type: none"> a) Minimize the disturbed Project footprint area and vegetation. b) Maintain up-to-date emergency response plan that includes fire response. c) Identify and minimize any anthropogenic fire sources and risks.
3. Decreasing permafrost and subsequent increase in thawing	<ul style="list-style-type: none"> a) Monitor annual spring freshet and identify and mitigate erosion concerns. b) Maintain cleared drainage pathways for water during spring freshet to limit excessive ponding or erosion potentials. c) Minimize slope grades wherever possible to minimize erosion risks. d) Time construction to avoid work during heavy rainfall dates. e) Monitor ground stability and reinforce embankments to reduce differential settlement.

6.6 Management of Residual Effects

The potential effects of the type of work being carried out at the site is well understood and environmental effects can be mitigated using proven techniques from road and site development in the area. As a result, residual effects are expected to be minimal, but this will be confirmed through construction and operations monitoring plus adaptive management should impacts be observed.

6.7 Site Reclamation

IESP is anticipated to be in use for 50 or more years. Following completion of the project, the M-18 wellsite and gas plant processing areas will be decommissioned and reclaimed in a manner consistent with ILA Rules and any applicable regulations at the time. Reclamation activities may include the restoration of natural drainage and topography and revegetation of native plant species which are intended, in part, to minimize erosion and sedimentation. After decommissioning, and final remediation and reclamation activities have been completed, a period of monitoring in accordance with ILA Rules will be implemented in a way that enables a successful closure of activities, including revegetation and stabilization of soils to natural tundra conditions.

If the closure monitoring provides results that meet established guidelines, and the program is considered successful, ongoing monitoring will not be required. At that time, IESPL would apply for a final clearance letter (or relevant legal acknowledgement of the time) from the ILA. If guidelines are not met, ongoing monitoring and associated corrective actions will be required in the affected area. Details of the monitoring programs will be presented to the ILA for approval at least three years prior to the closure of the site to allow for proper engagement and approvals.

All ESC structures should be decommissioned once the Project area has been reclaimed to a level where surface erosion and sedimentation have been stabilized, and potential adverse effects to receiving aquatic systems during peak precipitation events are deemed unlikely by the EM. Non-degradable materials will be removed and disposed of off-site.

7.0 MONITORING, REPORTING AND RECORD KEEPING

7.1 Monitoring Procedure

Monitoring helps document and verify ESC conditions and assumptions for regulatory compliance as well as ensures that ESC measures remain in place and are functioning as intended. During operation, regular monitoring for erosion and potential sedimentation will occur at roads, drainage culverts, the bridge, both pads and the M-18 remediated sump. Daily monitoring of work areas during construction and operation should be completed to identify:

- the effectiveness of existing ESC measures in place
- areas where ESC measures are failing, damaged or degrading
- the potential for scouring at new culvert installations/upgrades

In summary, monitoring is required for:

- Fish and wildlife protection measures
- The installation and success of all ESC measures throughout the life of the Project

- The bridge and all culvert monitoring during snowfall and icing events, and after significant season changes (i.e., first thaw post-construction)
- Dust mitigations (where applicable; see Section 7.1.1)
- Identifying potential instream sedimentation in the form of visible plumes

Visual monitoring for sediment plumes will be required weekly following the first flowing water event after construction of instream work (i.e., spring freshet and thaw events) to identify any construction related runoff release into the water system. Monitoring of all potential runoff locations is required to identify potential drainage channels forming that could impact nearby ponds/lakes.

If sediment plumes are observed, the source and plume will be recorded and photographed, the Environmental Monitor will be notified and corrective actions will be taken immediately (i.e., additional ESC measures will be implemented).

If the visible plume is naturally occurring (i.e., from a natural source unrelated to the Project such as upstream bank slumping and runoff), the source and plume will be recorded and photographed. The Environmental Monitor will be notified, and the observation documented.

Any ESC measures observed to be failing or incorrectly installed will require immediate corrective action, and any mitigation measures that are not working will have revised methods as part of the adaptive management plan (Section 9.0).

Trained Environmental Monitors will be onsite during construction of watercourse crossings and other activities along the new access road. The environmental monitor will check to ensure the proper mitigations and BMPs are being used. During operations, the proponent will visually check all water crossings for any potential issues on a regular basis. This includes assessing culverts or other crossing structures for blockages or sedimentation or erosion. Routine monitoring should be increased during spring freshet or after significant rainfall/snowfall events. If sediment is entering a watercourse or erosion is occurring at the watercourse crossing, appropriate immediate action will be taken to correct the situation.

Adaptive management will be used to respond to sedimentation and manage erosion from any erosion incidents resulting from site infrastructure or operations.

7.1.1 Dust Monitoring Plan

Increased dust release can have a number of adverse effects on the local environment, project safety and human/wildlife health. Dust near water can increase the number of suspended solids, reducing the habitat quality for fish and aquatic organisms. Increased suspended solids can reduce light penetration in water which in turn inhibits aquatic plant growth, causing a cascade of adverse effects on the ecosystem. Additionally, increased particulate in the water can settle and smother invertebrates, as well as other bottom dwelling organisms, and reduce spawning habitat for certain species (i.e. salmonids). An

increase in suspended sediments can also damage fish gills, causing respiratory distress and developmental issues. Ambient dust can also cause increased heat absorption and reduce transpiration of nearby vegetation by blocking stomata. Long-term impacts of dust in a work area can alter species presence near roads, whereby some plants are more tolerant than others, which could ultimately alter the habitat for wildlife in the area. Finally, excess dust off the roadway creates a safety hazard to vehicles travelling on the roadway. In summary, there are many environmental and safety reasons to minimize dust generation from gravel roads, and introducing administrative measures to keep dust from becoming airborne through road traffic and prevailing winds.

An ambient dust monitoring program will be in place during summers to provide timely feedback to lower dust levels. The monitoring plan may include regular monitoring of dust levels using ambient air monitoring equipment. The current management plan for dust suppression includes trucking in clean water for water-controlled dust suppression or the use of approved dust suppressants on the access road throughout the life of the Project. However, changes in climate and road usage may require adaptive management of dust suppression if water is not sufficient in managing the dust levels during the summer months. Regular monitoring for dust levels will inform IESPL of the total suspended particulate (TSP), and the Ambient Air Quality Guideline established under the Environmental Protection Act should be followed to respect the maximum desirable levels of dust in ambient air (GNWT 2014). Measured as TSP, the standards for dust over 24 hours are 120 micrograms per cubic metre ($\mu\text{g}/\text{m}^3$) and averaged over a year are 60 $\mu\text{g}/\text{m}^3$. If TSP levels exceed these recommended standards, alternative dust suppression products should be explored. The *GNWT Guidelines for Dust Suppression* provides a list of approved products, as well as methods and procedures required to obtaining approval for use and application of these products (GNWT 2013b).

To help reduce effects on watercourses, speeds will be reduced to 30 km/hour when crossing watercourses, and dust suppression will be applied to 50 m from approaches on either side of the bridge crossing to minimize impacts to fish and fish habitat.

Used oil cannot be used as a dust suppression/road stabilizing product or added to other dust suppression products.

7.2 Monitoring Inspection Frequency

Upon installation, all ESC measures should be routinely monitored to identify the success of the installation. The GNWT Erosion and Sediment Control Manual provides recommended guidelines for inspection frequency for each BMP. For example:

- a) Sediment fences are recommended to be inspected daily, at a minimum of once every 7 days, and after significant storm events and spring melt.

- b) Riprap armouring requires periodic inspections to check for erosion or movement of riprap. Inspections should be conducted at a minimum of once per year, after major rain events and following spring freshet.

During construction, inspections of all ESC measures (e.g., sediment fences) should be conducted daily or at minimum once every seven days. Inspections should be completed again after significant rain or snowmelt events.

Once the Project is in operation, routine inspections must be conducted to ensure that erosion and sediment controls are securely in place and working. Prior to spring breakup of each year, inspection frequency should be limited to once a week, however, prior to spring freshet inspections should also be completed to verify:

- that ESC measures are properly installed at existing construction locations prior to winter freeze up;
- that drainage culverts and/or pathways are not blocked with debris prior to winter freeze up or during spring freshet; and
- there are no ESC concerns that could cause flooding, erosion, or sedimentation.

These routine inspections should be completed again after spring freshet to ensure that ESC measures withstood the seasonal flows which are typically the highest of the year. Weekly monitoring during freshet will be completed and any notable failures should be documented, corrected. Records will be kept onsite for reference to better manage ESC concerns related to seasonal changes, year-to-year. This ESCMP should be updated annually to account for any Project specific changes or lessons learned.

Culverts should be routinely inspected for debris build up or blockages, especially after any major weather event such as heavy rainfall. Inspections of culverts should also be completed after spring freshet as their performance may be affected by permafrost degradation (See PPMP for additional information).

7.3 Requirements

Areas of ESC concern, failing ESC measures and recommended improvements must be documented and provided to the Contractor for action. Minor deficiencies should be corrected within 24 hours from when the problem was first identified. Major deficiencies must be corrected immediately, which can require halting construction activities in the specific area until the concerned areas have been satisfactorily protected. Inspections should be completed by a representative of the Consultant who is qualified to inspect ESC measures and is not the on-site project manager.

ESC maintenance inspections must be appropriately and regularly documented.

In the event that inspections of culverts and drainage ditches indicate notable sediment discharge into any water bodies (i.e., visible sediment plumes), ESC measures will be implemented. Any observed discharges of sediment into a waterbody must be reported to the appropriate regulatory agencies as soon as possible following incident occurrence.

7.4 Corrective Actions

Corrective actions on failing, deficient or incorrectly implemented ESC measures should be taken immediately to prevent further erosion and/or sedimentation. The GNWT Erosion and Sediment Control Manual provides guidance to properly install and repair BMP's (GNWT 2013a).

Work should be suspended in any area that has severe erosion and sedimentation identified, such as:

- ESC measures are reaching their capacity (e.g., silt fences) and/or are not functioning properly, which require cleanout and repair (or replacement).
- Visible sediment plumes observed in a nearby watercourse or waterbody due to construction related activities, especially during periods of increased runoff (e.g., spring freshet, snowmelt, high intensity rain events, etc.).
- Significant rainfall causing erosion and sedimentation.
- Observations of distressed fish within or near the working areas (such as during bridge construction).

This ESCMP should be updated annually to include any Project specific lessons learned from the previous years.

7.5 Reporting

Daily inspection reports during construction should be included in the weekly ESC summary report submitted to IESPL with a summary of the inspection outcomes completed that week. Weekly reporting should document the following:

- Ongoing site activities (i.e., what work was completed with respect to effects on environment)
- Weather Conditions
- Daily Inspection forms, summary of inspections completed, any major findings, and/or deficiencies in ESC measures
- Issues, incidents, non-conformances, and non-compliance's
- Corrective actions taken
- Any anticipated issues from observed ESC concerns

- Ongoing issues that have not been addressed
- Photographs

During the freshet event following construction, there is increased potential for ESC concerns onsite. A weekly summary report will be completed to document:

- ESC material installation (e.g., maintenance requirements)
- Areas requiring ESC installation
- Visual observation of surface water for sedimentation (e.g., sediment-laden runoff in ditches or sediment plumes within watercourses)

An annual report of all ESC monitoring activities will be prepared for the period of construction and on an annual basis during operations. Reports will provide results of ESC monitoring activities, freshet sediment plume monitoring activities, indicate if any issues were identified, and describe corrective actions to address these issues. The reports will also provide updates on relevant ESC monitoring work being carried out in the project area by other parties.

7.6 Record Keeping

Records from each inspection will be always kept on-site and should be reviewed prior to completing an inspection to identify areas that require follow-up monitoring. Completed inspection reports and findings will be interpreted and reported in IESP's Annual Permit Report to be submitted to the ILA and other regulatory stakeholders.

Quality assurance and quality control of visual and quantitative monitoring results and data will be kept through proper training of IESPL staff and contractor staff, periodic verification of field observations and monthly review of monitoring results.

8.0 EMERGENCY AND INCIDENT RESPONSE

An emergency response plan will always be available on-site. Response planning for incidents that might result in erosion or sedimentation should include, but are not limited to the following:

- a) Additional materials for ESC protection, such as straw bales, clean rock (washed to be free of fine sediment), sandbags, granular material and filter fabric, and adequate access to heavy equipment available on site or nearby for immediate use.
- b) Sufficiently trained personnel to implement the emergency response plan.
- c) Water samples should be tested for sediment concentrations and/or turbidity during the incident. Results should be prepared for submission to the appropriate regulatory agencies.
- d) Sufficient equipment on-site to construct temporary check dams or sedimentation ponds.

- e) Emergency plan for building or enlarging sedimentation ponds, runoff basins, silt traps, etc. as temporary silt fences may become inundated during a storm event.
- f) Appropriate construction activity shutdown plan.

During any construction shutdown, temporary (TESC) and permanent (PESC) erosion and sediment control measures must still be regularly maintained. As a minimum, the following actions must be taken:

- a) Continued inspection and maintenance of installed ESC measures on a weekly basis and immediately following major precipitation events or freshet.
- b) Completing a pre-shut down meeting with the engineer's environmental representative at least four weeks prior to proposed shut down date to confirm PESC and TESC mitigation planning has been properly implemented to specification requirements.
- c) Appropriate placement and protection of stockpiled topsoil and other erodible materials.
- d) Seeding and re-vegetation of completed areas and exposed surfaces.
- e) Installation and maintenance of perimeter control measures to minimize potential sedimentation.
- f) Tarp material should be available to cover temporarily exposed steep surfaces or stockpiles of soil. The sheeting or tarps are to be sufficiently anchored to prevent displacement by wind.

8.1 Communication

All environmental incidents should be reported to the EM, the Contractor, and IESPL as soon as possible, so that appropriate notifications can be made, and project management can ensure that incidents are handled appropriately. All personnel on-site have a responsibility to report all environmental concerns or incidents regardless of magnitude. It is the responsibility of the FME to follow-up with the Contractor to ensure that an Environmental Incident Report (EIR) is filed.

In the case of any environmental concern and/or incident, Project personnel are responsible for informing their Site Superintendent, who must then report to the EM. Contractors are responsible to ensure that all crew are adequately trained and equipped to deal with potential environmental incidents related to their work. Any concerns about preparedness for environmental incidents should be brought to the attention of the Site Superintendent or the FME.

The Emergency Contacts List is available in the ERP and at the quick link in the IESP IMS Sharepoint site.

8.2 Environmental Incident Reporting

An Environmental Incident Report (EIR) should be prepared as soon as possible following an incident. Contractors are responsible for completing the EIR and the FME should follow-up with the Contractor to

ensure it is filed. The target for reporting is within one (1) working day from the time of the incident. The EIR Template is available in the IESP IMS as a quick link.

Any incidents that result in non-compliance with a permit or environmental legislation (such as the Fisheries Act) must be reported within 12 hours to the governing body (e.g., DFO).

An environmental incident is one that has caused, or has the potential to cause, one or more of the following:

- Environmental damage
- Adverse effects on fish, wildlife, or other environmental resources
- Adverse publicity with respect to environment
- Legal action with respect to violation of statutes or environmental damage

Examples of Environmental Incidents include, but are not limited to:

- Spills of oil, fuel, hydraulic fluids, PCBs, or chemicals
- Discharge of deleterious substances (e.g., sediment, spills, concrete) into fish-bearing water
- Mass wasting, landslides, erosion, or floods as they affect environmental or water quality
- Activities that affect fish or fish habitat, wildlife, or recreation
- Violation of environmental regulations, permits, or approvals
- Forest fires related to activities
- Work and/or removal of vegetation in or near water bodies without regulatory approval

9.0 ADAPTIVE MANAGEMENT

IESPL's adaptive management will be used to respond to sedimentation and manage erosion from any erosion incidents resulting from site infrastructure or operations. Pre-emptive measures such as installing ESC measures prior to construction will limit the ESC effects of the Project. Annual reporting and updates to the ESCMP based on Project specific events and observations can reduce the risk of repeated incidents.

In the event of a construction shutdown, for reasons such as inclement weather, permit or licence contraventions, or health and safety incidents; these may lead to an increased risk of potential permafrost degradation where ESC mitigation had not yet been installed or completed. In such an event, then additional ESC mitigation measures will need to be completed to protect the local environment (including waterbodies) from Project related erosion and sedimentation.

Adaptive management will be implemented throughout the project life, which includes local consultation with community organizations and regulators.

At least annually, or following an Environmental Incident, IESPL will review monitoring results and mitigation outcomes and allow for discussions of adaptive management actions related to the Project.

The management review will include consideration of:

1. the status of actions from previous management reviews.
2. Changes in:
 - a. external and internal issues that are relevant to the ESCMP;
 - b. the needs and expectations of interested parties, including compliance obligations;
 - c. operational activities; and/or
 - d. risks and opportunities.
3. The extent to which the ESCMP objectives have been achieved.
4. Information on performance, including trends in:
 - a. nonconformities and corrective actions;
 - b. monitoring and measurement results;
 - c. fulfilment of its compliance obligations; and/or
 - d. audit results.
5. Adequacy of resources.
6. Relevant communication(s) from interested parties, including complaints.
7. Opportunities for continual improvement.

The outcomes of the review will be used to identify where mitigation or reclamation measures are not adequate and to identify additional mitigative, monitoring or reclamation measures to be applied.

10.0 CONTINUAL IMPROVEMENT

It is expected that the ESCMP will be reviewed annually and updated as needed. Reviews will consider effectiveness of ESC mitigation measures, based upon monitoring and observations collected for the IESP, and as Project requirements, monitoring, and environmental conditions change. The ESCMP could also be updated as needed in response to changes in legislation and consultation with local Inuvialuit organizations, including the Inuvialuit Climate Change monitoring initiatives and the Imaryuk Program.

Updates will be communicated to all required parties and comments received will be considered during updates. Continual improvement is supported through Adaptive Management.

11.0 RELATED DOCUMENTS

- IESP Permafrost Protection and Management Plan (PPMP)
- IESP Fish and Fish Habitat Protection Plan (FFHPP)

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APPENDIX A: ROLES AND RESPONSIBILITIES

Table 1: Roles and Responsibilities

Entity	Responsibility
<p>Field Manager, Environment (FME)</p> <p>Environmental Monitor (EM)</p>	<p>The FME and EM will provide guidance on implementing the recommended measures and, if necessary, to develop additional mitigation measures if the need arises, as part of the adaptive management plan.</p> <p>The EM should carry out inspections at regular intervals, as well as additional inspections during any accidents or malfunctions that affect the work or sensitive environmental areas and following any significant rainfall or spring freshet events. It is equally important to take secure protective measures prior to inclement weather events rather than to react during or after the event.</p> <p>At a minimum, the EM should visit the Project area prior the start of construction works to ensure all Project personnel are aware of environmental sensitivities and the requirements of the ESCMP are effectively implemented before construction starts.</p> <p>The primary responsibilities of the FME are to confirm that the environmental protection objectives of the Project are met and that the requirements of this EMP and contractor's ESCMP are enacted. FME responsibilities include:</p> <p>Monitor compliance with the ESCMP.</p> <p>Communicate the requirements of the ESCMP to the contractors and their respective employees during pre-job and tailgate meetings.</p> <p>Be on site or a representative as per the schedule established between parties prior to Project start up and remain on-call (via phone or email) during non-critical work periods to respond to emerging environmental issues or emergencies.</p> <p>Review the contractors' work procedures to assess functionality and compliance with the ESCMP and applicable regulations, standards, and BMPs.</p>

Entity	Responsibility
<p>Field Manager, Environment (FME)</p> <p>Environmental Monitor (EM)</p> <p>Field Manager, Environment (FME)</p>	<p>Have the authority to modify and/or halt any construction activity at any time if deemed necessary for the protection of the environment.</p> <p>Advise Project personnel if Project activities have caused or are likely to cause an environmental incident and make recommendations for corrective action.</p> <p>Liaise directly with Project personnel and provide technical advice to resolve situations that may impact the environment as they arise.</p> <p>The EM has primary responsibility for monitoring activities including:</p> <p>Monitor all works conducted within a watercourse (i.e., below the highwater mark) to ensure downstream habitat is effectively isolated (See Fish and Fish Habitat Protection Plan).</p> <p>Maintain complete records of activities related to the implementation of the ESCMP. This should include any measurements taken, inspection records, photographs, and incident reports.</p> <p>Complete and submit monitoring reports to IESPL at intervals detailed in the contract and report any unanticipated adverse effects to the environment within 24 hours of occurrence. Such reports should include the nature of the effect, its cause, mitigation and/or remediation implemented, and whether a work stoppage was ordered, as well photographs, analyses, and measurements, if applicable.</p> <p>Generally, work within the 30 m buffer of watercourses requires the close oversight of the EM. An EM should be available during key monitoring stages such as:</p> <ul style="list-style-type: none"> • During start-up of the Project and installation of ESC measures; • During work that occurs within 30 m of the highwater mark of any watercourse (i.e., within the riparian zone); • During instream works (i.e., work below the high-water mark), especially during worksite isolation; and • During completion of the Project and decommissioning/removal of mitigation measures.

Entity	Responsibility
Environmental Monitor (EM)	
Contractor	<p>Contractors will comply with all laws, orders, rules, regulations, and codes of any territorial or federal environmental agency or like authority, which are applicable to the Project.</p> <p>Contractors will cooperate with the EM appointed for the work. They must comply with written or verbal instructions with respect to execution of the proposed work in compliance with the mitigation measures outlined in the Tender Specifications, and ESCMP, which are at a minimum, consistent with the regulatory agencies having jurisdiction over the area of the Project.</p> <p>Contractors must complete their work in such a fashion that all watercourses, including any ditches and swales, where works are to occur, are effectively isolated from downstream habitat. The Contractor will coordinate with the EM prior to and during the installation of the isolation measures in the order that the EM can arrange for the concurrent salvage of fish within the isolated portion of a watercourse.</p> <p>Contractors are responsible for following and enforcing the BMPs and mitigation measures outlined in the ESCMP. Ensure ESCMP is always available on site.</p> <p>Contractors will correct deficiencies and any non-compliance upon direction from the EM whether written or verbal. Corrections should be made as soon as reasonably possible and ideally within 24 hours of directions.</p> <p>Contractors will arrange provision of appropriate on-site waste containers and their removal, if required.</p>
Contractor	

Entity	Responsibility
	<p>Contractors are responsible for the restoration of all disturbed areas resulting from any of the works they undertake. The contractor is responsible for reinstatement of the Project area after construction, to the satisfaction of the FME and the EM.</p>
Contractor Supervisor	<p>Coordinate mitigative and remedial measures in all impacted areas.</p> <p>Ensure personnel are trained and competent in the ESCMP's application and that mitigation measures are adequately applied.</p> <p>Make personnel, equipment, and materials available as required.</p> <p>Continue to implement the ESCMP until responsibility is transferred under the authority of the IESPL.</p>
Contractor Project Manager	<p>Oversee completion of the Project.</p> <p>Report any incidences to IESPL and maintain communication. Ensure proper reporting is provided to IESPL.</p> <p>Maintain records of construction, mitigation, and worksite inspection activities</p> <p>Maintain contact with Contractor Supervisor to confirm final worksite inspection and sign-off are completed.</p>
IESPL	<p>Comply with all permits and licenses.</p> <p>Develop press releases and liaise with media directly (if required).</p> <p>Liaise with Inuvialuit Land Administration (ILA) Monitor, government agencies, public and Indigenous organizations (as required).</p> <p>Confirm all reports are completed as required by authorizations.</p>

Entity	Responsibility
Engineer and/or IESPL Designated Representative	Support Contractor and IESPL by providing technical guidance on the implementation of this ESCMP. Make recommendations for modification to mitigative measures based on site reviews. Verify that the ESCMP is being followed.

APPENDIX B: PROJECT-SPECIFIC EROSION AND SEDIMENT CONTROL MEASURES

NOTE: For BMP numbering reference and additional information regarding the ESC measure, refer to the GNWT Erosion and Sediment Control Manual (GNWT 2013a).

Table 2: Project-Specific Erosion and Sediment Control Mitigation Measures

Activity / Impact / BMP	Specific Mitigations	Maintenance (Construction and Operation)
Site preparation May cause erosion and sedimentation, releasing sediment into watercourses or water bodies and negatively impacting fish and fish habitat. Erosion can lead to permafrost degradation, ground instability and cause unsafe conditions.	<ul style="list-style-type: none"> Erosion and sedimentation control measures (per GNWT 2013a) will be in place prior to construction activities and before the spring melt/freshet Silt fencing will be used downgradient of the works where required. Sediment control measures will be in place prior to construction activities and before the spring melt/freshet Ponded water will be directed away from watercourses. 	<ul style="list-style-type: none"> Regularly inspect and maintain ESC measures (daily during construction and after weather events, routinely throughout the project life) Repair ESC measures and structures if damage occurs (e.g. silt fences failing) ESC products should be made of biodegradable materials (e.g., jute, sisal, or coir fiber), or otherwise have a removal/maintenance plan for non-biodegradable materials once the site has stabilized.
Riparian Zone Management Disturbed vegetation and root structure removal along the banks of watercourses can lead to increased sedimentation and erosion.	<ul style="list-style-type: none"> Riparian areas (i.e. vegetated areas immediately adjacent to watercourses) will be maintained wherever possible. When practical, riparian vegetation in the ROW will be altered by hand. If machinery must be used, the depth of the snow cover must be measured in order that 	<ul style="list-style-type: none"> Effective sediment and erosion control measures will be maintained until re-vegetation of disturbed areas is achieved or until such areas have been permanently stabilized by other effective sediment and erosion control

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<p>BMP 6: Riparian Zone Preservation</p> <p>BMP 11: Rolled Erosion Control Products (RECP)</p> <p>Riparian Zone Management (cont'd)</p> <p>Riparian Zone Management (cont'd)</p>	<p>machinery is operated in a manner that minimizes disturbance to the banks of the water body.</p> <ul style="list-style-type: none"> • When practicable, alter riparian vegetation in the ROW by hand to ensure that root structure and stability are maintained. • If machinery must be used, operate machinery on land and in a manner that minimizes disturbance to the banks of the water body. • Machinery will be operated on land above the high-water mark, outside of bed and banks. • Banks will be restored to original condition if any disturbance occurs. • Grading of the stream banks for the approaches will not occur. • Prior to the spring melt/freshet, the site will be stabilized by covering exposed areas with erosion control blankets (e.g., cocoa matting) to keep soil in place and prevent erosion to allow re-vegetation the following spring. If revegetation is not possible, the site will be stabilized using effective sediment and erosion control measures (e.g., riprap) to meet specific attributes of the watercourse. 	<p>measures, in the event that re-vegetation is not possible.</p>

Activity / Impact / BMP	Specific Mitigations	Maintenance (Construction and Operation)
<p>Stockpiles</p> <p>Might cause excessive erosion and sedimentation</p> <p>BMP 1: Silt Fences</p>	<ul style="list-style-type: none"> Stockpiles of borrow material should be kept 100 m from a watercourse or waterbody with the appropriate erosion control mitigation in place (e.g., snow berms, silt fences etc.) to prevent sediment from entering a watercourse or waterbody. 	<ul style="list-style-type: none"> Stockpiles should be stabilized with seeding or a tarp cover to limit wind erosion potential.
<p>Construction of access road, including embankments and slopes</p> <p>Erosion of exposed slopes</p> <p>Sedimentation from grade works</p> <p>Vehicles and equipment use can cause ponding and rutting</p> <p>BMP 1: Silt Fences</p> <p>BMP 11: Energy Dissipaters</p> <p>Construction of access road, including embankments and slopes (cont'd)</p>	<ul style="list-style-type: none"> Silt fencing or straw wattles should be installed around the perimeter of the working areas prior to start of work. Erosion control measures will be in place prior to construction activities and the spring melt/freshet, where applicable. Removal of vegetation will be limited to the width of the ROW. Edge of ROW should be clearly marked prior to construction. In areas of steeper access road gradient, energy dissipaters will be used if required to control water speed and trap sediment. Tracked equipment will be used wherever practical to avoid rutting. Personnel should coordinate transportation to and from site to limit the number of vehicles on site or parked on ROW (i.e. use shuttle buses if necessary). 	<ul style="list-style-type: none"> Silt fences should be inspected daily during construction works and the conditions identified (i.e., how much sediment is present, is it still installed correctly, etc.). Inspection forms will be completed daily and documented as part of the weekly report during construction, for necessary record keeping. Markers identifying the ROW should remain in place while work is being completed in that area. Inspect frequently (weekly, minimum once every 7 days) after construction has been completed until site is stable. Inspect ESC measures after major storm events and before and after spring

Activity / Impact / BMP	Specific Mitigations	Maintenance (Construction and Operation)
	<ul style="list-style-type: none"> Travel of vehicles will be confined to existing infrastructure roads and trails as much as possible to avoid disturbing vegetated areas Travel on steep slopes will be avoided. Slopes (including for stockpiled material) should not exceed engineered standards (3H:1L). Disturbed areas should be stabilized using an appropriate ESC method if required. Construction will cease during high rainfall or runoff events. Embankment construction will use a fill-only approach; there will be no cutting into the subgrade 	<p>freshet to ensure ESC measures are still functioning as intended, and are functional.</p>
<p>Dust suppression</p> <p>Reduced visibility and vehicle collision risk.</p> <p>Disturbance of nearby vegetation.</p> <p>Sedimentation into fish habitat.</p> <p>Water Trucks or other Suppressants as per the GNWT</p>	<ul style="list-style-type: none"> Vehicle speeds will be limited to 30 km/h on unfinished surfaces and within 50 m of watercourse crossings Dust suppression will include spraying water or use of approved dust suppressants on road surfaces when necessary to reduce dust and sediment from entering watercourses or waterbodies. Environmental Protection Act sets air quality standards for total suspended particulate (TSP). The standards for dust over 24 hours are 120 micrograms per cubic metre ($\mu\text{g}/\text{m}^3$) and averaged over a year are 60 $\mu\text{g}/\text{m}^3$. These 	<ul style="list-style-type: none"> Drainage from the application of dust suppressants (e.g., water) will be directed into vegetated areas. A dust suppression plan should be implemented to monitor dust particulates in the air and water truck frequency should be adapted accordingly to manage the dust levels Alternative suppressants will be considered and approved if water trucks

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Guideline for Dust Suppression (GNWT 2013b)	standards apply to the whole of the Northwest Territories.	prove to be ineffective or contribute to erosion concerns.
<p>Culverts and ditches</p> <p>Sediment release</p> <p>Blockage of culverts may cause overflow flooding of roads</p> <p>Unchecked flow in ditches can lead to high velocities and increased erosion and sedimentation</p> <p>Culverts and ditches (cont'd)</p> <p>BMP 21: Off-take ditches</p> <p>BMP 7: Rock check dams</p> <p>DFO's Code of Practice for Culvert Maintenance</p>	<ul style="list-style-type: none"> • Drainage from the embankment will be into well-vegetated areas to avoid sediment deposition into adjacent waterbodies and watercourses. Where this is not possible, sediment traps, ditches with check dams, and scour protection will be used to prevent sedimentation in waterbodies. • Wherever parallel ditches are required, coarse-grained material will be reinforced with geotextiles or rip-rap to protect areas prone to erosion. • Snow melt from winter snow-plowing should drain into vegetated areas to prevent sediment from entering a watercourse. • In-stream work will be planned to occur as a single event at any one location, and construction will be limited to occurring during winter. • Limit the removal of accumulated material and debris to within the culvert and immediately upstream and downstream. 	<ul style="list-style-type: none"> • Inspect frequently (weekly) and after major storm events (and after spring freshet) to ensure ESC measures are still functioning as intended. • Maintain ESC measures until re-vegetation of the disturbed areas (i.e. slopes) has occurred or effective degradable ESC measures have permanently stabilized the area, in the event that re-vegetation is not possible.

Activity / Impact / BMP	Specific Mitigations	Maintenance (Construction and Operation)
	<ul style="list-style-type: none"> Remove accumulated materials and debris slowly to prevent downstream flooding and to reduce the amount of sediment-laden water going downstream. If rock is required to stabilize the culvert as an ESC measure, DFO's Code of Practice for Culvert Maintenance should be followed. Drainage culverts will be installed according to engineer approved specifications to facilitate water movement and maintain drainage patterns. 	
<p>Bridge Work</p> <p>See IESP Fish and Fish Habitat Protection Plan.</p> <p>Unmaintained bridge deck can release sediment into watercourse throughout the project life, which can have significant negative impacts to fish and fish habitat.</p> <p>Riparian vegetation clearing can increase erosion of banks.</p>	<ul style="list-style-type: none"> Sediment control measures at watercourse crossing sites will be in place prior to construction activities and the spring melt/freshet were applicable. A 30 m setback should be maintained from the watercourse of undisturbed area to protect riparian vegetation and slope stability around watercourse. Where bridge structure crossing occurs, a sufficient buffer between the road surface and waterbodies will be followed to prevent physical erosion of banks. Machinery will be operated on land or on ice and in a manner that minimizes disturbance to the banks of the lake, river or stream. 	<ul style="list-style-type: none"> IESPL will conduct bridge monitoring during snowfall and icing events during all seasons. Bridges require occasional maintenance to ensure their longevity and that they are functioning in a manner which will not affect the environment. Bridge maintenance should be documented and included with regular environmental reporting. Regularly monitor the watercourse for signs of sedimentation during all phases of the works, undertakings and activities and take corrective action if required.

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Bridge Work (cont'd)	<ul style="list-style-type: none"> • Regular monitoring for sediment plumes upstream and downstream of the proposed crossing. • Bridge construction will be completed during frozen conditions in winter where no flow is present, and no work will be carried out in the active stream channel. • Temporary berms will be used during construction of the bridge to prevent impacted runoff from entering directly into the creek. • Design of the bridge will prevent runoff from the bridge deck and side slopes and approaches will be directed to a vegetated area to prevent sediment and other substances from entering the creek. • Dried or wet concrete and other materials or sediment will be prevented from entering the creek during construction (See Fish and Fish Habitat Protection Plan). • Appropriately sized riprap, if available, should be placed at the stream side of the abutment and retaining walls or any other area which cannot be re-vegetated and should be free of silt and other debris. • If water pools in the excavated area (i.e., to construct bridge abutments), the water will be pumped away from the site to prevent suspended sediment in the water from re-entering the watercourse. 	<ul style="list-style-type: none"> • Use biodegradable ESC materials whenever possible. • Keep the ESC measures in place until all disturbed ground has been permanently stabilized. • Remove all sediment control materials once site has been stabilized.

Activity / Impact / BMP	Specific Mitigations	Maintenance (Construction and Operation)
<p>The use of machinery in or near water</p> <p>The use of machinery in or near water (cont'd)</p> <p>May cause sediment to enter watercourses</p>	<ul style="list-style-type: none"> • Machinery will be operated on land or on ice and in a manner that minimizes disturbance to banks of water bodies or watercourses. • Installation of the bridge and piles will occur during the winter. • Washing, refueling, and servicing machinery and storage of fuel and other materials for machinery will be conducted at least 100 m from the high-water mark and in a manner to prevent any deleterious substances from entering the water. • All-terrain vehicles (ATVs) and mobile equipment will avoid steep banks at crossings. • Erosion and sedimentation control measures will be implemented (per GNWT 2013a). • Construction will cease during high rainfall or runoff events. 	<ul style="list-style-type: none"> • Machinery brought on-site will be in a clean condition prior to conducting work. • Machinery will not be left in or near the watercourse. Regular inspections of equipment should be done to ensure no leaks or spills have occurred.