REPORT

Project Description

Soil Remediation at the Former Unipkat I-22 Wellsite, Inuvialuit Settlement Region, Northwest Territories

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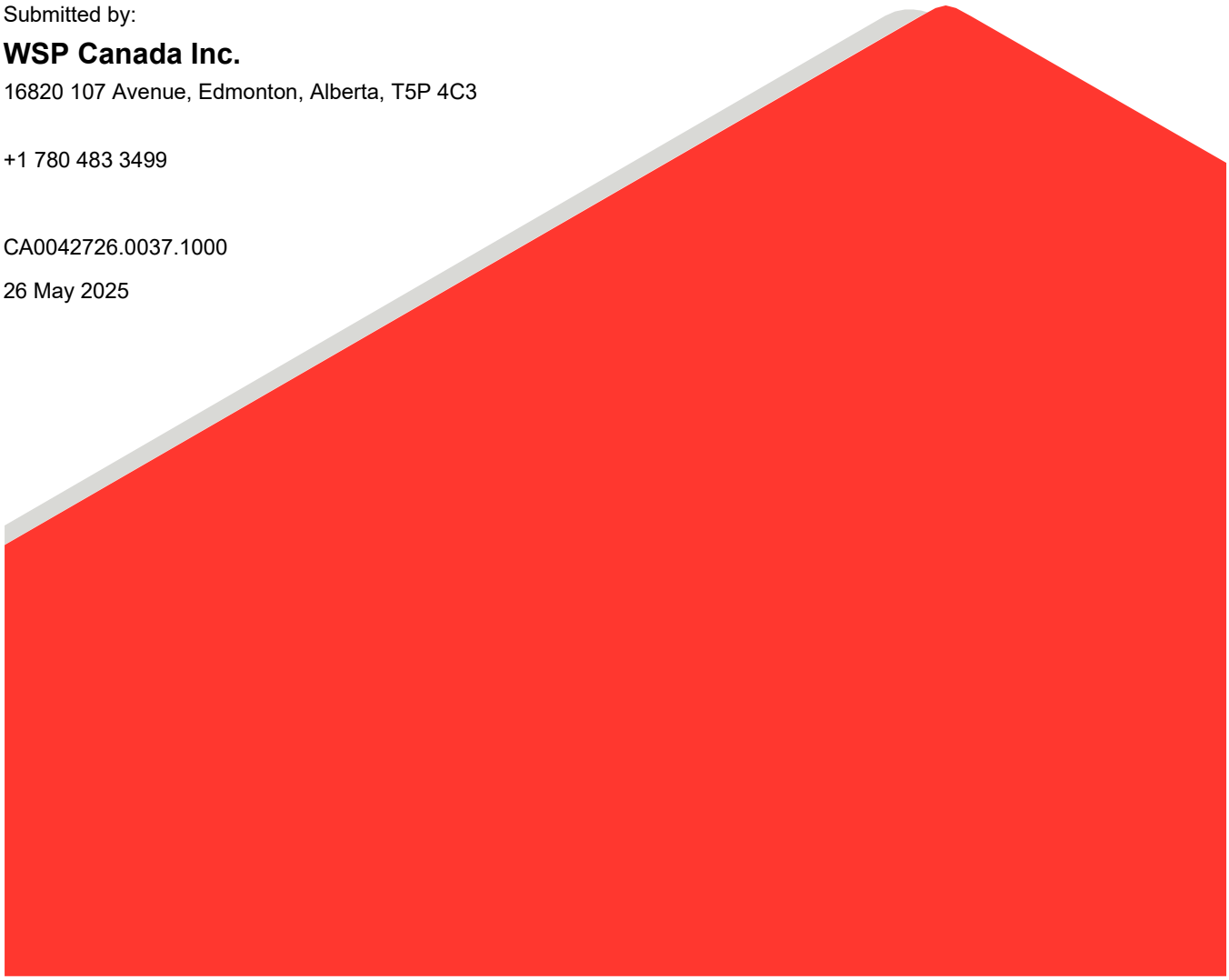

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List of Abbreviations

˚C	degrees Celsius
AEPA	Alberta Environment and Protected Areas
AICCP	Aklavik Inuvialuit Community Conservation Plan
AMSRP	Abandoned Military Site Remediation Protocol
CC	Community Corporations
CCME	Canadian Council of Ministers of the Environment
CEQGs	Canadian Environmental Quality Guidelines
CEA	Cumulative Effects Assessment
cm	centimetre
CoC	contaminants of concern
CoPC	contaminant of potential concern
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
DEW	Distant Early Warning
DFO	Fisheries and Oceans Canada
ECC	Department of Environment and Climate Change
ECCC	Environment and Climate Change Canada
ECG	Ecosystem Classification Group
EISC	Environmental Impact Screening Committee
ESA	environmental site assessment
ESWG	Ecological Stratification Working Group
ETC	Enhanced Thermal Conduction
F1, F2, F3, F4	petroleum hydrocarbon fractions 1, 2, 3 and 4
GNWT	Government of Northwest Territories
GOC	Government of Canada
GPR	ground penetrating radar
HTC	Hunters and Trappers Committee
ICCP	Inuvik Community Conservation Plan
IEG	IEG Consultants Ltd.
INAC	Indian and Northern Affairs Canada
ISR	Inuvialuit Settlement Region
IWB	Inuvialuit Water Board

km	kilometre
Komex/IEG	Komex International Ltd. and IEG Environmental
L	litre
LA*n*	Low Arctic north
LiDAR	Light Detection and Ranging
m	metre
m^2	square metres
m^3	cubic metres
masl	metres above sea level
mbgs	metres below ground surface
MRBC	Mackenzie River Basin Committee
m/yr	metres per year
n/a	not applicable
NWT	Northwest Territories
PAH	polycyclic aromatic hydrocarbons
PD	Project Description
PHC	petroleum hydrocarbon
PWNHC	Prince of Wales Northern Heritage Centre
QA/QC	quality assurance and quality control
RAP	Remedial Action Plan
SAR	Species-at-Risk
SARA	*Species at Risk Act*
SARC	Species at Risk Committee
Shell	Shell Canada Limited
SQOs	soil quality objectives
TCCP	Tuktoyaktuk Community Conservation Plan
TDS	total dissolved solids
TOC	total organic carbon
VC	valued components
VOC	volatile organic compound
WSP	WSP Canada Inc.

1.0 COVER LETTER

Submitted as a separate document.

2.0 TITLE OF THE PROPOSED DEVELOPMENT

Soil Remediation at the Former Unipkat I-22 Wellsite, Inuvialuit Settlement Region, Northwest Territories

3.0 CONTACT NAME AND ADDRESS

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4.0 APPROVALS – REGULATORY AND OTHER AUTHORIZATIONS

4.1 Purpose of This Project Description

This Project Description (PD) was developed for the proposed soil remediation (the Project) at the former Shell Canada Limited (Shell) Unipkat I-22 wellsite (the Site) in the Inuvialuit Settlement Region (ISR) at latitude 69°11’36.07” N and longitude 135°20’33.88” W. The well was drilled and subsequently abandoned in 1972 and 1973 and re-entered in 1996 for additional well abandonment activities (Komex/IEG] 2005). The Site is approximately 115 kilometres (km) northwest of Inuvik (Figures A1 to A8, Appendix A), in the ISR within the Mackenzie Delta, Northwest Territories (NWT). Historically, the Site consisted of a camp sump, a well centre (e.g., a historic well marker), a drilling waste sump, a drilling flare pit and wood pilings used to support surface infrastructure above the ground (Figure A5, Appendix A).

Subsequent to exploration well abandonment in 1996, environmental site assessments (ESAs) and remedial efforts have been conducted at the Site between 2002 and 2024, but some petroleum hydrocarbon (PHC) and metal (i.e., barium) impacts remain.

In October 2022, Shell submitted a PD to the Environmental Impact Screening Committee (EISC) for a proposed wood piling removal program (EISC Registry File [10/22-01]). The PD was approved on 1 February 2023 and wood piling removal was carried out between February and April 2023 (WSP 2023b). Shell submitted an amendment to EISC Registry File [10/22-01] on 15 November 2023 for additional wood piling removal and supplement ESA activities. The amendment was granted on 29 November 2023, and the work was carried out between February and April 2024 (WSP 2024a,b).

This new PD has been developed for proposed soil remediation activities intended to start in the winter of 2025/2026.

4.2 Regulatory and Other Authorizations

Shell, through WSP Canada Inc. (WSP), is submitting this PD to the EISC for approval. Pursuant to the terms established under the Inuvialuit Final Agreement of 1984, Shell understands that EISC approval is required for the proposed Project.

A summary of potential regulatory requirements and relevant legislation is listed in Table A. Note that all applications are either approved, currently ongoing or requirements for approvals are being determined. Section 13.0 provides details on this process.

Table A: Approvals Potentially Required for the Proposed Project

Agency and Contact Person	Relevant Legislation / Required Approval
Patricia Sung Environmental Impact Screening Coordinator Environmental Impact Screening Committee P.O. Box 2120 Inuvik, NT, X0E 0T0 Telephone: (867) 777-2828 Fax: (867) 777-2610 Email: eisc@jointsec.nt.ca	Inuvialuit Final Agreement *Western Arctic (Inuvialuit) Claims Settlement Act* Approval of PD
Bijaya Adhikari Science and Regulatory Coordinator Inuvialuit Water Board P.O. Box 2531 Inuvik, NT X0E 0T0 Telephone: (867) 678-8610 Fax: (867) 678-2943 Email: adhikarib@inuvwb.ca	*Waters Act* and Waters Regulations Type B Water Licence
Donald Arey Regional Superintendent Department of Environment and Climate Change Land and Water Beaufort-Delta Region 86 Duck Lake Road Bag Service #1 Inuvik, NT X0E 0T0 Telephone: (867) 678-8090 Email: Donald_Arey@gov.nt.ca	*Northwest Territories Lands Act* and Land Use Regulations Class A Land Use Permit

Agency and Contact Person	Relevant Legislation / Required Approval
Fish and Fish Habitat Protection Program Fisheries and Oceans Canada 867 Lakeshore Rd Burlington ON L7S 1A1 Telephone: 1-855-852-8320 Email: FisheriesProtection@dfo-mpo.gc.ca	*Fisheries Act* and *Species at Risk Act* Request for Review of Project
Navigation Protection Program Transport Canada, Prairie and Northern Group 1100 9700 Jasper Avenue Edmonton, Alberta, T5J 4E6 Telephone: (844) 425-7787 Email: NPPPNR-PPNRPN@tc.gc.ca	*Canadian Navigable Waters Act* No Interference with Navigation Notification of Work
Prince of Wales Northern Heritage Centre Department of Education, Culture and Employment Government of the Northwest Territories 4750 48th Street, P.O. Box 1320 Yellowknife, NT X1A 2L9 Telephone: (867) 767-9347 ext. 71472 Fax: (867) 873-0205	*Archaeological Sites Act* and *Access to Information and Protection of Privacy Act* Archaeological Site Data Access Request
Scientific Services Office Department of Education, Culture and Employment Government of the Northwest Territories P.O. Box 2884 Inuvik, NT X0E 0T0 Telephone: (867) 777-3298 Email: ResearchLicensing@gov.nt.ca	*NWT Scientists Act* Scientific Research Licence
Department of Infrastructure Beaufort Delta Region 106 Veterans Way, Bag Service #1 Inuvik, NT X0E 0T0 Telephone: (867) 777-7146 Fax: (867) 777-3463	*Public Highways Act* Public Highway Access Permit
Department of Infrastructure Beaufort Delta Region 106 Veterans Way, Bag Service #1 Inuvik, NT X0E 0T0 Telephone: (867) 777-7146 Fax: (867) 777-3463	*Public Highways Act* Public Highway Sign Permit

5.0 SUMMARY OF THE PROJECT DESCRIPTION

Figures A1 to A8 for this PD are provided in Appendix A.

5.1 The Proposed Project

Shell developed the Site as an exploratory natural gas wellsite in 1972 and 1973 and re-entered it in 1996 for additional well abandonment activities (Komex/IEG 2005). The Site is approximately 115 km northwest of Inuvik (Figures A1 and A2, Appendix A), in the ISR within the Mackenzie Delta, NWT. Historically, the Site consisted of a camp sump, a well centre (e.g., a historic well marker), a drilling waste sump, a drilling flare pit and wood pilings used to support surface infrastructure above the ground.

The proposed Project focuses on soil remediation at the Site. Subsequent to exploration and well abandonment in 1996, field investigations were initiated at the Site in 2002 and included several ESA's and remedial efforts:

- 2002: Geophysical survey to map former drilling sump, and environmental assessment (soil and surface water);
- 2004: ESA (soil and surface water);
- 2007: ESA (soil, sediment, groundwater and surface water);
- 2010: ESA (soil);
- 2011: Remedial activities to excavate the flare pit, camp sump, and the drilling sump;
- 2012 and 2013: ESA (groundwater);
- 2014 and 2015: ESA (shoreline erosion);
- 2016: Removal of exposed wood pilings and re-contouring shoreline;
- 2019: ESA (soil), debris removal, monitoring well decommissioning;
- 2021: Shoreline and wood piling survey and wood piling sampling;
- 2022: ESA (soil, groundwater, surface water, sediment);
- 2023: Wood piling removal; and
- 2024: Wood piling removal and ESA (soil, surface water, sediment).

The following sections provide a description of the proposed Project.

5.2 Scope of Work

The scope of work of the Project will consist of the following activities.

- Potential mobilization of a self-contained barge camp with select soil remediation equipment (e.g., soil treatment equipment, loaders, excavators etc.) stored on-board in late summer or early fall of 2025 to be anchored at the Site, frozen-in and winterized (submitted under EISC Registry File [04/25-18]; Figure A5, Appendix A), to support the winter field program that will use an ice road extension for access.
- Construction of an approximately 110 km long ice road extension from a junction approximately 30 km north along the Government of the Northwest Territories (GNWT) Inuvik to Aklavik public ice road (Figure A2, Appendix A). A snowpack ramp will be constructed at the Site to allow access for equipment and crew. The ice road will be constructed for the winter of 2025/2026 and for wood piling removal planned for the winter of 2028.
- Mobilization of remaining equipment and self-contained winter camp (if the barge camp was not mobilized and frozen-in at the Site) to the Site via the ice road for the duration of the winter season.
- Excavation and on-site thermal treatment of soil containing PHCs at concentrations above the proposed soil quality objectives (SQOs; Appendix B, Table I) at the Site using Enhanced Thermal Conduction (ETC) technology.

- Excavation and off-site disposal of soils containing barite (i.e., true total barium) at concentrations above the proposed SQOs (Appendix B, Table I), at an approved disposal facility.
- If remediation activities are completed during the winter of 2026, then select equipment may be demobilized from the Site via ice road prior to breakup. Some equipment may be secured on the barge camp (potentially anchored at the Site) to be demobilized from the Site during the summer of 2026.
- Select equipment that was demobilized from the Site prior to breakup, and a barge camp (if a winter camp was used) will be re-mobilized by barge and boat to the Site in June 2026, if required. If a barge camp was used during the winter of 2026 (potentially anchored at the Site), it will remain during breakup and re-open to continue operations for the summer of 2026, if required.
- If required, remedial activities, including ETC treatment, may resume during the summer and fall months of 2026.
- Installation of post-remedial groundwater monitoring wells and pre- and post- remedial thermistors during the winter (pre-remedial) and summer/fall (post-remedial) months of 2026, including monitoring well sampling of existing and newly installed groundwater monitoring wells (Figure A5, Appendix A).
- Final demobilization by barge in the summer/fall of 2026, before freeze-up.
- Post-remedial groundwater and thermal monitoring, completed as day trips from Inuvik, in the summer/fall of 2027.
- Removal of remaining wood pilings (Figure A3, Appendix A) at the Site using the previously employed perimeter drilling method (EISC Registry File [10/22-01]) anticipated during a 2027/2028 winter field program.
- See Section 6.4 for the proposed Project Schedule.

5.2.1 Accommodations

Accommodations for the crew during soil remediation (summer/fall of 2025 to the summer/fall of 2026) and wood piling removal (planned for winter 2028) may either be provided by a self-contained barge camp or a self-contained winter camp (Figure A5, Appendix A).

The barge camp (with capacity for approximately 25 people) may be anchored (frozen in and winterized) at the Site from the summer/fall of 2025 to the summer/fall of 2026. Select equipment for the remediation (ETC equipment, loaders, excavators etc.) may be mobilized with the barge in late summer or early fall of 2025 (submitted under EISC Registry File [04/25-18]) and stored on-board the barge pending the construction of the ice road.

Alternatively, accommodations may be provided by a temporary, self-contained winter camp (with capacity for approximately 25 people) located on land (on a compacted ice pad) or on the river ice at the Site. The winter camp would be mobilized to Site once the ice road is complete and demobilized prior to spring breakup. If the winter camp is used, then a barge camp will be mobilized to the Site after spring 2026 breakup to provide accommodations for the summer/fall remediation (if not complete) and post-remedial activities.

Post-remedial monitoring activities in the summer of 2027 will be completed as day trips from Inuvik and no camp will be established at the Site.

5.2.2 Ice Road Construction

Beginning with ice road reconnaissance in December 2025, an ice road extension will be constructed from the Inuvik to Aklavik public ice road to the Site to allow Site access for equipment (e.g., remediation equipment, office trailer, trucks and potentially the winter camp) as well as off-site transport and disposal of waste materials. The route from Inuvik to Unipkat I-22 will initially follow the GNWT Inuvik to Aklavik public ice road to approximately the 30 km mark (Figure A2, Appendix A). The ice road extension will be approximately 110 km long and it is expected that ice road reconnaissance, profiling and construction, and access to the Site will last for approximately 16 weeks.

An ice road will also be constructed for the wood piling removal planned for the winter of 2028.

5.2.3 Equipment Mobilization and Demobilization

After construction of the ice road, snow and a limited amount of vegetation will be cleared at the Site. An office trailer, including heated portable toilets, soil treatment equipment, skid steers, loaders, excavators, fuel trucks and fuel tanks, winter camp (if one is used) and other miscellaneous equipment will be mobilized to the Site.

If remedial activities are completed during the winter of 2026, then select equipment and potentially the winter camp may be demobilized from Site via the ice road prior to breakup. Fuel tanks will be emptied prior to demobilization. Select equipment (e.g., office trailer, loader, excavator) may be secured and left on site or on the barge camp (if using) during breakup. The barge camp (potentially anchored at the Site) may demobilize after breakup or remain for summer activities. If remediation extends into the summer/fall, equipment (including a barge camp if a winter camp was used during the winter program) may be re-mobilized to Site via barge in the spring of 2026. Demobilization is anticipated to occur by barge/boat in the summer/fall of 2026.

5.2.4 Soil Remediation

Soil remediation will be completed at the Site, as described in the Remedial Action Plan (RAP; Appendix B) and summarized in the following:

- Soil containing PHC contaminants of concern (PHC CoCs; PHC Fraction F2 and Type B Hydrocarbons) at concentrations above the proposed SQOs occupies a footprint of approximately 1,700 square metres (m^2), corresponding to an estimated treatment volume of 3,800 cubic metres (m^3) at depths of up to 3.0 metres below ground surface (mbgs). There are no known concentrations of PHC CoCs above the proposed SQOs at depths greater than 3.0 mbgs.
- Soil with barite (i.e., true total barium) concentrations above the proposed SQOs occupies a footprint of approximately 200 m^2, to depths ranging from 0.5 to 1.5 mbgs, corresponding to a volume of approximately 100 m^3. There are no applicable proposed SQOs for barite barium at depths greater than 1.5 mbgs.
- Final remediation volumes may be more or less than those stated above, and will be confirmed through laboratory analysis of CoCs (PHC Fraction F2, Type B Hydrocarbons, and barite [i.e., true total barium]) in soil samples collected along the base and sidewalls during soil excavation.
- Based on current experience at West Channel (EISC Registry File [11/23-03]), soil containing PHCs at concentrations above the proposed SQOs at the Site is proposed to be treated using ETC using either the same or similar equipment as the West Channel site. The ETC treatment process involves the transfer of a heated airstream (typically between 300 and 450 degrees Celsius [°C]) to volatilize and destroy PHCs in soil whose concentrations are above the proposed SQOs. To facilitate this, soil will be placed in treatment cells in which heat is applied to via a dedicated air burner fueled by diesel. Prior to heating, the cell of soil will be

covered as a means of capturing the PHC vapour off-gas that is generated by the heating. Throughout the process, the generated PHC vapours will be channeled to a thermal oxidizer outside of the treatment cell for destruction prior to atmospheric release. The thermal oxidizer will be operated within defined parameters and monitored to ensure the efficient and complete destruction of PHC vapours. Site layout with the proposed location of the treatment cells and ancillary equipment is presented in Figure A5 (Appendix A).

- The winter 2026 treatment schedule for ETC is dependent upon the required reduction in soil moisture content and PHC mass to meet the proposed site-specific SQOs. Based on current experience at West Channel (EISC Registry File [11/23-03]), it is expected that by using multiple treatment units to each treat up to 400 m^3 of soil over an approximate 10 to 15 day period, that the Project duration will be approximately 60 days, including mobilization, staging/setup, and demobilization. The work will be staged such that while multiple batches of soil are undergoing treatment, excavation and stockpiling will continue outside the treatment cells to stage subsequent batches for treatment.
- Prior to the start of soil treatment using ETC, thermistors will be installed (into drilled boreholes) below the ETC treatment area, in the disturbed area of the Site and in background locations to monitor permafrost conditions.
- The permafrost at the base of the excavation will be insulated, as necessary, to limit deterioration if exposed during the summer. At a minimum, extruded polystyrene insulation (or soil) will be temporarily placed at the base of the excavation and topped with soil fill. Additional protection measures may be implemented as required (refer to the Permafrost Protection Plan [Appendix H]).
- Soil samples will be collected from the treatment cells for laboratory analysis of PHCs to confirm the efficacy of treatment. Once these analyses have been completed, and the treated soil meets the proposed SQOs, it will be used to backfill excavations. Cooling of the soil is expected to occur through incidental aeration through handing and stockpiling or hydrated and quenched (summer only) after treatment while waiting for analytical results before backfilling.
- Once treatment of the initial batches has been completed, the treatment cells will be dismantled and reconstructed on the waiting stockpiles. A four to five unit operation will occupy an approximate 75 metre (m) by 105 m area, plus nominal additional space for ancillary equipment such as an excavator, loader, and fuel tanks (Figure A5, Appendix A).
- If, after the first treatment pass, the soil PHC concentrations remain above the proposed SQOs, the soil will undergo further ETC treatment, with the treatment temperature and duration (or both) adjusted. Following subsequent treatment, additional soil samples will be collected to confirm treatment results. Soil that does not meet the proposed site specific SQOs following subsequent treatment will be placed in closed 1 m^3 mega sacks and staged temporarily in the secondary containment (i.e., fuel storage area [Figure A5, Appendix A]) for off-site disposal at an approved facility outside the NWT, via ice road or barge, depending on quantity and time of the year.
- Soils containing barite at concentrations above the proposed SQOs at the Site (at depth less than 1.5 mbgs) will be excavated for off-site disposal at an approved facility outside the NWT. Given the low volume of soil exceeding the proposed SQOs for barite, no backfill is expected to be required and the excavated areas will be recontoured using balanced grading.

5.2.5 Post-Remedial Groundwater Monitoring Well and Thermistor Installation

Following soil remediation, post-remedial groundwater monitoring wells and thermistors will be installed at the Site using an environmental drilling rig during the summer/fall of 2026 (Figure A5, Appendix A). If weather or ground conditions prevent adequate site access, post-remedial drilling activities may be delayed until suitable conditions exist to mobilize and use drilling equipment at the Site. The monitoring wells will be developed following installation, after which the first sampling event will occur. In the summer/fall of 2027, another round of post-remedial groundwater and thermal monitoring will be completed as day trips from Inuvik (i.e., no camp will be required).

5.2.6 Wood Piling Removal

The remaining wood pilings (Figure A3, Appendix A) at the Site are anticipated to be removed during a 2027/2028 winter field program using the previously employed perimeter drilling method (EISC Registry File [10/22-01]). Ice road construction, accommodations (winter camp) and mobilization will follow that described in Sections 5.2.1 to 5.2.3.

5.3 Community Engagement

Shell initiated both written and in-person community consultations in Inuvik, Aklavik and Tuktoyaktuk in the summer of 2022 regarding planned wood piling removal at the Site, and consultations have been ongoing since. The most recent community consultations occurred in-person during the week of 24 March 2025, in Tuktoyaktuk and Aklavik and virtually with the Inuvik HTC on 2 Aprill 2025 and 12 May 2025, and Tuktoyaktuk HTC on 9 May 2025. The following organizations were consulted with:

- Inuvik Hunters and Trappers Committee (HTC); Community Corporation (CC); and Elders Committee;
- Tuktoyaktuk HTC, CC and Elders Committee; and
- Aklavik HTC, CC and Elders Committee.

A summary of the consultations to-date is provided in Appendix K.

5.4 Environmental Effects Assessment

5.4.1 Valued Components

Based on the assessed site conditions, type and timing of work, the following Valued Components (VCs) were selected for the environmental effects assessment:

- sensitive terrain;
- permafrost;
- soil quality;
- vegetation communities;
- polar bear;
- grizzly bear;
- wolverine;
- barren-ground caribou;

- migratory birds;
- water quality;
- fish and fish habitat; and
- subsistence harvesting.

5.4.2 Mitigation of Potential Effects

The primary mitigation measures include the following.

- Construct the ice road using best management practices (Project-specific ice-road engineered design plans and quality assurance and quality control [QA/QC] plans) and build up the snow cover (and supplement with ice if required) on the snowpack ramp to protect underlying vegetation and terrain.
- A self-contained barge camp may be anchored at the Site in late summer or early fall of 2025 (submitted under EISC Registry File [04/25-18]), or a self-contained winter camp may be located on land (on a compacted ice pad) or river ice to house crews and serve as a staging area during the winter program; an office trailer, dedicated fuel storage area and equipment/supplies staging area will be in previously disturbed areas of the Site, where possible.
- Clearing of vegetation (if required) will be limited to the area of the excavation, soil treatment cells and staging area. Vegetation and organic layer will protect the underlying permafrost outside the soil treatment areas.
- Use of trucks and heavy equipment will be restricted, where possible, to flat terrain, avoiding sensitive slopes on land.
- Protect trails and work areas, as needed with wood and/or drill mats.
- Creating a thermal break beneath the ETC units to limit heat transfer to the underlying soil - this may involve placing polystyrene foam insulation (i.e., Blue Board), or an air gap (pipes buried in a gravel/fill pad or I-beams to create an elevated platform upon which the treatment units sit).
- Shorelines will be avoided wherever possible, except as required to complete the work and the site access ramp.
- Inuvialuit Wildlife Monitors will be present during the completion of the Project, and the Project-specific Wildlife Management and Monitoring Plan (Appendix C) will be implemented.
- Clean work areas will be maintained with appropriate wildlife-proof temporary waste storage and regular removal of waste for disposal at approved facilities in accordance with the Project-specific Waste Management Plan (Appendix D).
- The dedicated fuel storage area and refuelling areas will be bermed and lined at least 30 m away from the ordinary high-water mark of the Arvoknar Channel, with the exception of fuel tanks for the winter camp generators (potentially located on the river ice) or the integrated fuel tanks on the barge (potentially anchored at the Site).
- Drip trays or secondary containment will be used at the dedicated fuel storage and refuelling areas to contain any drips or accidental spills in accordance with the Project-specific Spill Contingency Plan (Appendix E).
- Drip trays will be placed under all vehicles and equipment when not in use.

- The Migratory Bird Regulations (Government of Canada [GOC] 2022) and ECCC's Guidelines to Avoid Harm to Migratory Birds and Fact Sheet: Nest Protection Under the Migratory Birds Regulations (ECCC 2023a,b, internet site) will be reviewed and followed. If active bird nests are encountered, a species-specific no-disturbance buffer area will be established until the nest has been abandoned.
- Should suspected heritage resources be found during Project activities, work will cease in the immediate vicinity and regulators and the Prince of Wales Northern Heritage Centre (PWNHC) will be notified.
- The Project-specific Spill Contingency Plan (Appendix E), Emergency Response Plan (Appendix F), Erosion and Sediment Control Plan (Appendix G), Permafrost Protection Plan (Appendix H) and Reclamation, Closure and Monitoring Plan (Appendix I) will be implemented and made available to all staff.
- Advise HTCs and CCs of Project schedule and any possible interference with subsistence harvesting; and schedule meetings with Tuktoyaktuk, Inuvik and Aklavik HTCs and CCs.
- There will be effective communication between Project team, field crew members, Inuvialuit communities and other affected parties prior to, during and after the Project.
- All mitigation measures described in this PD will be implemented and terms and conditions of regulatory authorizations will be adhered to.

5.4.3 Effects Assessment Results

The environmental effects assessment predicts that the Project, including implementation of proposed mitigation measures, will result in residual effects that are not significant. The effects assessment results for the identified VCs are summarized in Table B.

Table B: Summary of Potential Effects, Proposed Mitigation, Residual Effect Characteristics and Predicted Significance for each Valued Component

VC	Potential Effects	Proposed Mitigation	Residual Effect Characteristics	Predicted Significance
Sensitive terrain	Soil compaction /disturbance	■ Establish barge camp anchored at the Site or a winter camp on land (on a compacted ice pad of a minimum thickness of 15 centimetres [cm]) or river ice. ■ Use track-mounted or low ground-bearing heavy equipment where possible. ■ Minimize overall vehicle use (trucks and heavy equipment) to the extent feasible and, where possible, travel around the Site on paths/trails that are either existing or established at the outset of the work. ■ Use snow to compact the ramp to the Site for the protection of underlying terrain to a minimum thickness of 15 cm. If required, use water to strengthen the ramp. ■ Spread all snow berms created at the Site and level them at time of demobilization to allow the Site to drain. ■ Keep travel to level terrain and avoid traversing steep slopes in mobile equipment/vehicles. ■ Protect trails and work areas, as needed with wood and/or drill mats. ■ Minimize access to the shoreline by mobile equipment/vehicles (i.e., restrict to mobilization/demobilization). ■ Recontour disturbed areas as part of reclamation activities. ■ Locate office trailer, soil treatment area, fuel storage area and equipment/supplies staging area in previously disturbed areas of the Site, where possible. ■ Minimize overall truck and equipment use to the extent feasible.	■ low magnitude ■ localized geographic extent ■ infrequent occurrence ■ medium-term duration ■ fully reversible	Not significant
Permafrost	Permafrost melt	■ Establish barge camp anchored at the Site or a winter camp on land (on a compacted ice pad of a minimum thickness of 15 cm) or river ice. ■ Locate office trailer, soil treatment area, fuel storage area and equipment/supplies staging area in previously disturbed areas of the Site, where possible. ■ Minimize overall truck and equipment use to the extent feasible. ■ Use track-mounted or low ground-bearing heavy equipment where possible. ■ Minimize overall vehicle use (trucks and heavy equipment), and where possible, travel around the Site on paths/trails that are either existing or established at the outset of the work. ■ Keep travel to level terrain and avoid traversing steep slopes in mobile equipment/vehicles. ■ Protect trails and work areas, as needed with wood and/or drill mats. ■ Creating a thermal break beneath the ETC units to limit heat transfer to the underlying soil - this may involve placing polystyrene foam insulation (i.e., Blue Board), or an air gap (pipes buried in a gravel/fill pad or I-beams to create an elevated platform upon which the treatment units sit). ■ Use snow to compact the ramp to the Site for the protection of underlying terrain to a minimum thickness of 15 cm. If required, use water to strengthen the ramp.	■ moderate magnitude ■ localized geographic extent ■ frequent occurrence ■ medium-term duration ■ partially reversible	Not significant

VC	Potential Effects	Proposed Mitigation	Residual Effect Characteristics	Predicted Significance
		■ Spread all snow berms created at the Site and level them at time of demobilization to allow the Site to drain. ■ Minimize access to the shoreline by mobile equipment/vehicles (i.e., restrict to mobilization/demobilization). ■ Recontour disturbed areas as part of reclamation activities. ■ Excavation of soils with COC concentrations above the proposed SQOs will be completed in stages, limiting the duration of permafrost exposure. ■ The permafrost at the base of the excavation will be insulated, as necessary, to limit deterioration if exposed during the summer. At a minimum, extruded polystyrene insulation (or soil) will be temporarily placed at the base of the excavation and topped with soil fill. Additional protection measures may be implemented as required. ■ The successfully treated soil will be aerated or hydrated and quenched (summer only) as necessary, to reduce the temperature of the soil prior to using it to backfill the excavations. ■ Clearing of vegetation (if required) will be limited to the area of the excavation, soil treatment cells and staging area. Vegetation and organic layer will protect the underlying permafrost outside the soil treatment areas. ■ Prevent surface water from entering an open excavation, using grading, ditches or berms and prevent precipitation from entering the excavation, using tarps or other cover. ■ Install pre- and post-remedial thermistors for thermal monitoring to evaluate pre-remediation baseline conditions and monitor post-remediation permafrost. ■ The Project-specific Permafrost Protection Plan (Appendix H) will be implemented during all phases of the Project.		
Soil quality	Spills/contamination	■ Implement the Project-specific Spill Contingency Plan (Appendix E). ■ On-site fuel storage will consist of one double-walled fuel truck (18,200 litres [L]) and one double-walled fuel tank (100,000 L) at the Site, potentially an integrated fuel tank on the barge (800,000 L) or 1,000 L fuel tanks for the winter camp generators. ■ All storage containments will be securely stored in a designated bermed and lined storage area 30 m from the ordinary high-water mark of the Arvoknar Channel, with the exception of fuel tanks (approximately 1,000 L each) for the potential winter camp generators (if on the river ice) or the integrated fuel tank (800,000 L) on the barge camp (potentially anchored at the Site). ■ Locate spill kits wherever fuel is stored or used. ■ Use portable drip trays and appropriately sized fuel transfer hoses when refuelling motorized equipment. ■ A designated fuel monitor will conduct daily visual inspections to check for leaks or damage to any fuel storage containment and refuelling equipment. Leaks or damage will be immediately addressed. ■ Regular maintenance and checks of all motorized equipment will be undertaken to avoid preventable leaks. ■ Place drip trays under all equipment when not in use.	■ low magnitude ■ localized geographic extent ■ infrequent occurrence ■ medium-term duration ■ fully reversible	Not significant

VC	Potential Effects	Proposed Mitigation	Residual Effect Characteristics	Predicted Significance
		■ If soils that do not meet the proposed SQOs (after treatment) require hauling to an off-site disposal location, place soil in closed 1 m^3 mega sacks and stage temporarily in the secondary containment (i.e., fuel storage area) to prevent infiltration, runoff, and vertical migration of dissolved CoCs pending removal from Site via winter road or barge. An internal berm will be constructed between the fuel tanks and the soil storage area to minimize the potential for spills within the bermed area impacting soils stored therein. The containment capacity of the bermed fuel storage area will be increased throughout the Project as required if the volume of materials stored within the secondary containment increases. ■ Soils impacted by accidental spills during the Project will be treated by the on site ETC units. In the unlikely event that contaminated soils stored in the fuel storage area are impacted by a spill, the mega sacks will be cleaned with spill pads and/or re-bagged.		
Vegetation communities	Alteration/loss of habitat; damage/removal of vegetation; introduction of invasive species	■ Use track-mounted or low ground-bearing heavy equipment where possible. ■ Minimize overall vehicle use (trucks and heavy equipment) to the extent feasible and, where possible, travel around the Site on paths/trails that are either existing or established at the outset of the work. ■ Keep travel to level terrain and avoid traversing steep slopes in mobile equipment/vehicles. ■ Protect trails and work areas, as needed with wood and/or drill mats. ■ Clearing of vegetation (if required) will be limited to the area of the excavation, soil treatment cells and staging area. ■ Use snow to compact the ramp to the Site for the protection of underlying vegetation to a minimum thickness of 15 cm. If required, use water to strengthen the ramp. ■ Spread all snow berms created at the Site and level them at time of demobilization to allow the Site to drain. ■ Locate office trailer, soil treatment area, fuel storage area and equipment/supplies staging area in previously disturbed areas of the Site, where possible. Locate potential winter camp (if on land) on a compacted ice pad of a minimum thickness of 15 cm) or on river ice. ■ Travel with trucks and equipment on flat terrain, avoiding sensitive slopes and shorelines, where feasible. ■ All equipment and vehicles will be cleaned of soil and seeds before mobilizing to Site to avoid accidental introduction of invasive vegetation species. ■ Recontour disturbed areas as part of reclamation activities to facilitate natural revegetation; additional revegetation measures (e.g., reseeding with a native seed mixture) may be implemented.	■ low magnitude ■ localized geographic extent ■ infrequent occurrence ■ medium-term duration ■ fully reversible	Not significant
Polar bear	Sensory disturbances; negative human-bear encounters	■ Implement the Project-specific Wildlife Management and Monitoring Plan (Appendix C). ■ Wildlife Monitors will continuously assess the proposed Project area and advise on any wildlife concerns. ■ Wildlife Monitors will work in alternating shifts to ensure monitoring takes place during all work activities.	■ low magnitude ■ localized geographic extent ■ infrequent occurrence ■ short-term duration ■ fully reversible	Not significant

VC	Potential Effects	Proposed Mitigation	Residual Effect Characteristics	Predicted Significance
Grizzly bear	Sensory disturbances; negative human-bear encounters	■ If using a winter camp (on land or river ice), a perimeter fence or night- and day-shift Wildlife Monitors will be used. ■ Locate office trailer, soil treatment area, fuel storage area and equipment/supplies staging area in previously disturbed areas of the Site, where possible. Locate potential winter camp (if on land) on a compacted ice pad of a minimum thickness of 15 cm) or on river ice. ■ Crews will keep the Site clean at all times, and food, attractants and waste will be temporarily stored in wildlife-proof containers and removed from the Site regularly as described in the Project-specific Waste Management Plan (Appendix D). ■ Crews will be instructed to not feed or harass wildlife, and workers will not be allowed to hunt, trap or have dogs on the Project. ■ Active activities will cease if bears or caribou are observed in proximity to the Site (i.e., within 500 m) or if wolverine are seen within 250 m of the Site; activities will only resume once the animals have left the area. ■ Limit disturbance in potential nesting areas. Avoid any active nests by implementing species-specific setback distances. ■ To mitigate potential effects on nesting bank swallows, follow Environment and Climate Change Canada's (ECCC's) pamphlet on Bank swallow [*Riparia riparia*] in sandpits and quarries (ECCC 2016; Appendix C of the Wildlife Management and Monitoring Plan [Appendix C]). ■ The Migratory Bird Regulations (GOC 2022) and ECCC's Guidelines to Avoid Harm to Migratory Birds and Fact Sheet: Nest Protection Under the Migratory Birds Regulations (ECCC 2023a,b, internet site) will be reviewed and followed. ■ On the ice road, wildlife will have the right of way at all times; speed limits will be implemented and communicated through signage. ■ If wildlife is observed in proximity to the ice road, their location will be communicated to all Project staff. ■ Implement all applicable ice road measures (in Section 6.3.2). ■ Snowbanks along the ice road will not exceed 1 m in height and will have regular gaps (e.g., every 30 m) to avoid entrapment of crossing wildlife. ■ The ice road will be abandoned at the end of the winter work to limit public access to the Site. ■ Crews will receive bear awareness training and will follow the Project-specific Wildlife Management and Monitoring Plan including the GNWT's Safety in Grizzly and Black Bear Country guidelines (GNWT ENR 2017). ■ Helicopter transportation (during 2027 post-remedial monitoring activities) will follow all requirements in the GNWT guidelines for flying low (GNWT 2019), and the Canadian Aviation Regulations (2025) (e.g., adhere to flight altitudes, avoid hovering). ■ Implement the Project-specific Spill Contingency Plan (Appendix E) and Emergency Response Plan (Appendix F). Keep spill response equipment easily accessible. Store fuel and hazardous materials in bermed, lined areas a minimum of 30 m from the ordinary high-water mark of the Arvoknar Channel, with the exception of fuel tanks (approximately 1,000 L each)	■ low magnitude ■ localized geographic extent ■ infrequent occurrence ■ short-term duration ■ fully reversible	Not Significant
Wolverine	Sensory disturbances; negative human-wolverine encounters		■ low magnitude ■ localized geographic extent ■ infrequent occurrence ■ short-term duration ■ fully reversible	Not Significant
Barren-ground caribou	Sensory disturbances; indirect habitat alteration; direct habitat disturbance		■ low magnitude ■ localized geographic extent ■ infrequent occurrence ■ medium-term duration ■ fully reversible	Not significant
Migratory birds	Sensory disturbances; indirect habitat alteration; direct habitat disturbance		■ low magnitude ■ localized geographic extent ■ infrequent occurrence ■ medium-term duration ■ fully reversible	Not significant
Water quality	Disturbance of sediment / increase in turbidity / contaminant spills into nearby water bodies at the		■ low magnitude ■ localized geographic extent ■ infrequent occurrence ■ medium-term duration	Not significant

VC	Potential Effects	Proposed Mitigation	Residual Effect Characteristics	Predicted Significance
	Site or on the ice road.	for the potential winter camp generators (if located on the river ice) or the integrated fuel tank (800,000 L) on the barge camp (potentially anchored at the Site). ■ Minimize overall vehicle use (trucks and heavy equipment), and where possible, travel around the Site on paths/trails that are either existing or established at the outset of the work. ■ Limit traffic on steep slopes, wherever possible. ■ Install erosion control measures, including silt fence, blankets, and mats as needed (as described in the Project-specific Erosion and Sediment Control Plan (Appendix G). ■ Maintain/install monitoring wells to allow for sampling and analysis of groundwater during and after remediation activities. ■ Ponded water in topographic lows (including excavations) within the proposed construction area will be treated using an on-site water treatment system. Treated water will be sampled for laboratory analysis of CoCs prior to discharge to the terrestrial environment (minimum of 30 m from any waterbody), in accordance with discharge criteria in the future Inuvialuit Water Board (IWB) Water Licence. ■ Implement speed limits on the ice road and limit public use to minimize auditory disturbance of fish. ■ Implement Fisheries and Ocean Canada's (DFO's) Interim Code of Practice: End-of-pipe Fish Protection Screens for Small Water Intakes in Freshwater (DFO 2020) for water withdrawals during ice road construction and, if required during snowpack ramp construction. ■ All snow berms created at the Site will be spread and levelled at time of demobilization to allow the Site to drain. ■ Implement all applicable ice road measures (in Section 6.3.2).	■ fully reversible	
Fish and fish habitat	Sensory and physical disturbances; habitat disturbances.		■ low magnitude ■ localized geographic extent ■ infrequent occurrence ■ medium-term duration ■ fully reversible	Not significant
Subsistence harvest	Harvesting interference	■ Advise HTCs and CCs of Project schedule and any possible interference with traditional harvesting; and schedule meetings with Tuktoyaktuk, Inuvik and Aklavik HTCs, CCs and Elders. ■ There will be effective communication between Project team, field crew members, Inuvialuit communities and other affected parties prior to, during and after the Project.	■ low magnitude ■ localized geographic extent ■ infrequent occurrence ■ medium-term duration ■ fully reversible	Not significant

5.4.4 Cumulative Effects

For this Project, it is anticipated that the proposed mitigation measures implemented during work activities will result in no significant cumulative effects. Additional mitigation is not considered to be necessary.

6.0 SUMMARY OF THE PROPOSED DEVELOPMENT

6.1 Purpose

The proposed Project focuses on soil remediation at the Site. Remediation is proposed to be completed by excavating soils with concentrations of PHCs above the proposed SQOs and treating them using ETC, as well as excavating soils with concentrations of barite (i.e., true total barium) above the proposed SQOs and disposing of them offsite. Post-remedial activities include conducting groundwater and thermal monitoring.

6.2 Location

The Site is approximately 115 km northwest of Inuvik, in the ISR in the Mackenzie Delta, NWT at latitude 69°11’36.07” N and longitude 135°20’33.88” W. The site location is presented in Figure A1 (Appendix A). The ice road extension to the Site will pass through Inuvialuit 7(1)(A) Private Lands and will follow the Mackenzie River East Channel and Arvoknar Channel (Figure A2, Appendix A).

6.3 Scope of Work

The scope of work for the Project consists of the following activities, which are described in Sections 6.3.1 through 6.3.7:

- Potential mobilization of a self-contained barge camp with select soil remediation (e.g., soil treatment equipment, loaders, excavators etc.) stored on-board in the late summer or early fall of 2025 to be anchored at the Site, frozen-in and winterized (submitted under EISC Registry File [04/25-18], Figure A5, Appendix A) for the winter field program that will use an ice road extension for access.
- Construction of an approximately 110 km long ice road extension from a junction approximately 30 km north along the GNWT Inuvik to Aklavik public ice road. This will allow Site access for equipment as well as the off-site transport and disposal of waste materials. The ice road extension will cross Inuvialuit 7(1)(A) Private Lands and will follow the Mackenzie River East Channel and Arvoknar Channel (Figure A2, Appendix A). It is expected that ice road reconnaissance and profiling will begin in December 2025 and construction will be completed in February 2026. A snowpack ramp will be constructed at the Site to allow access for equipment and crew. An ice road will also be constructed for the wood piling removal planned for the winter of 2028.
- Mobilization of remaining equipment (e.g., office trailer, including heated portable toilets, soil treatment equipment, skid steers, loaders, excavators, fuel trucks and fuel tanks and other miscellaneous equipment) and self-contained winter camp (if the barge camp was not mobilized and frozen-in at the Site) to the Site via the ice road for the duration of the winter season.
- Excavation and on-site thermal treatment of soil containing PHCs at concentrations above the proposed SQOs (Appendix B, Table I) at the Site using ETC technology.
- Excavation and off-site disposal of soils containing barite (i.e., true total barium) at concentrations above the proposed SQOs (Appendix B, Table I), at an approved facility, and possibly the off-site disposal of soils failing thermal treatment, albeit such an outcome is not anticipated.
- If remediation activities are completed during the winter of 2026, then the office trailer, soil treatment equipment, skid steers, loaders, excavators, fuel trucks and fuel tanks, winter camp (if one is used instead of

a barge camp) and other miscellaneous equipment may be demobilized from the Site via ice road prior to breakup. Some equipment may be secured on the barge camp (potentially anchored at the Site) to be demobilized from the Site following 2026 spring breakup.

- Select equipment that was demobilized from the Site prior to breakup, and a barge camp (if a winter camp was used) will be re-mobilization by barge and boat to the Site in June 2026, if required. If a barge camp was used during the winter of 2026 (potentially anchored at the Site), it will remain during breakup and re-open to continue operations for the summer of 2026, if required.
- If required, remedial activities, including ETC treatment, may resume during the summer and fall months of 2026.
- Installation of post-remedial groundwater monitoring wells and pre- and post-remedial thermistors (proposed locations in Figure A5, Appendix A) during the winter (pre-remedial) and summer/fall (post-remedial) months of 2026, including monitoring well sampling of existing and newly installed groundwater monitoring wells.
- Final demobilization by barge in the summer/fall of 2026, before freeze-up.
- Post-remedial groundwater and thermal monitoring, completed as day trips from Inuvik, in the summer/fall of 2027.
- Removal of remaining wood pilings at the Site (Figure A3, Appendix A) using the perimeter drilling method anticipated during a 2027/2028 winter field program.

6.3.1 Accommodations

Accommodations for the crew during soil remediation (summer/fall of 2025 to the summer/fall of 2026) and wood piling removal (planned for winter 2028) may either be provided by a self-contained barge camp or a self-contained winter camp (Figure A5, Appendix A).

Post-remedial monitoring activities in the summer of 2027 will be completed as day trips from Inuvik and no camp will be established at the Site.

Barge Camp

Accommodations may be provided by a barge camp (e.g., John Wurmlinger supplied by E Gruben's Transport Ltd. [EGT], or similar) (with capacity for approximately 25 people). The barge camp may be anchored (frozen in and winterized) at the Site from the summer/fall of 2025 to summer/fall 2026 at a location depicted in Figure A5 (Appendix A). All domestic waste generated by the barge camp will be temporarily stored in wildlife-proof containers on the barge and regularly transported back to Inuvik for subsequent disposal at an approved facility. Select equipment for the remediation (e.g., soil treatment equipment, loaders, excavators etc.) may be mobilized with the barge in the summer/fall of 2025 (submitted under EISC Registry File [04/25-18]) and stored on-board the barge pending the construction of the ice road.

The barge camp will have sleeping rooms, kitchen, bathroom facilities with flushing toilets, recreational room, equipment storage and fuel storage (maximum 800,000 L of diesel in integrated fuel tanks). The barge camp will be powered and heated using generators. Water will be supplied to the onboard heated water tank (max capacity approximately 185,000 L) from Inuvik by barge or water truck. Grey water and sewage will be stored in a heated sludge tank (approximately 120,000 L) on the barge and will be emptied (by supply barge or vacuum truck) as required for disposal at an approved facility in Inuvik as detailed in the Waste Management Plan (Appendix D).

Winter Camp

During the winter of 2026, accommodations may be provided by a temporary, self-contained winter camp (with capacity for approximately 25 people) to be located on land or on the river ice at the Site (Figure A5, Appendix A). If located on land, the camp will be placed on a compacted ice pad with a minimum thickness of 15 cm. At either location (on land or on river ice), the camp will have a perimeter fence or, if a fence is not possible, night- and day-shift Wildlife Monitors will be used as a wildlife protection measure. Generally, the camp will comprise trailer units including sleepers, kitchen, bathroom facilities with flushing toilets, dedicated first aid room, recreational room and generator buildings. The winter camp will be powered and heated using diesel generators, which will have associated fuel tanks (approximately 1,000 L, with secondary containment and/or drip tray). Water will be supplied as required via water truck from Inuvik to either a heated water tank adjacent to the camp or stored in the water truck. An approximately 40,000 L heated combined sewage and grey water tank, also adjacent to the camp, will be emptied as required using a vacuum sewage truck. The sewage and grey water will be transported off site and disposed of at an approved facility (e.g., the Inuvik sewage lagoon). All domestic waste generated by the winter camp will be temporarily stored in wildlife-proof containers at the camp and regularly transported back to Inuvik for subsequent disposal at an approved facility as detailed in the Waste Management Plan (Appendix D).

The winter camp would be mobilized to Site once the ice road is complete and demobilized prior to spring breakup.

6.3.2 Ice Road Construction and Use

The annual Inuvik to Aklavik public ice road is built and maintained by the GNWT and is usually in operation by the end of December. In early winter, an ice road extension will be constructed from the Inuvik to Aklavik public ice road to the Site to allow for site access for equipment (e.g., remediation equipment, office trailer, trucks, winter camp if a barge camp was not used) as well as off-site transport and disposal of waste materials in Inuvik. The route from Inuvik to the Site will originally follow the GNWT Inuvik to Aklavik public ice road to a point approximately 30 km along the road (Figure A2, Appendix A).

Moveable wooden barricades (approximately 2 m long and with reflective materials) and warning signs (i.e., “use at own risk” and “no heavy traffic” with the associated weight limit) will be placed at the junctions with the GNWT Inuvik to Aklavik ice road. The ice road extension to the Site may be approximately 110 km long, will cross Inuvialuit 7(1)(A) Private Lands and will follow the Mackenzie River East Channel and Arvoknar Channel. A short snowpack ramp will be constructed from river ice to land to access the Site. The proposed routing of the ice road extension and snowpack ramp is subject to change based upon river level and bank conditions at the time of construction, and the proposed routing may need to be adjusted to account for field conditions at the time of the work.

Prior to ice road construction, reconnaissance and ice profiling will be conducted, beginning in December to determine the ice thickness and conditions along the proposed routes. The construction of the ice road will follow Project-specific ice-road engineered design plans and QA/QC plans that meet or exceed the Guidelines for Safe Ice Construction (GNWT 2015a). Once in place, ongoing maintenance will be completed along the ice road extension, including monitoring ice for signs of deterioration, weather checks for wind and sun damage, snowfall and clearing operations. Operations will cease on the ice road extension should it be deemed necessary. The construction and use of the ice road extension will include the following tasks:

- completion of ice profiles;
- construction of the ice road;

- maintenance of the ice road;
- use of the ice road; and
- abandonment of ice road.

An ice road will also be constructed for the wood piling removal planned for the winter of 2028.

6.3.2.1 Completion of Ice Profiles

Beginning in December, ice road reconnaissance and ice profiling will be conducted to determine the ice thickness and conditions prior to ice road construction. The primary purpose of this is to confirm that there is sufficient minimum ice thickness to support the construction equipment. The collection of extensive ice thickness data is completed using ground penetrating radar (GPR) ice profiling and is considered the industry best practice. The GPR equipment will be calibrated at the start of each shift, and at approximately halfway through the planned profiling for the day. This is a minimum requirement and may be done more frequently at the discretion of the operator.

6.3.2.2 Construction of Ice Road

Prior to deployment for ice road construction, the minimum ice thickness from the ice profile data and corresponding allowable weight will be assessed based on the road construction equipment being used. Permitted loads will be calculated according to the project specific ice-road design. The following steps will be implemented.

1) Two-way traffic lanes will be established on the ice road and will be managed using two-way radios and inReach devices.
2) A barricade will be set up at the entrance of the ice road extension (at the junctions with the public Inuvik to Aklavik ice road) to prevent any equipment or vehicles from accessing the road while it is under construction.
3) Once minimum ice thickness is confirmed safe for construction vehicles, graders and plow trucks will push snow to open the ice road along the same route that the ice profile was measured.
4) The minimum width of the ice road will be 30 m from snowbank to snowbank from initial construction.
5) Once the ice road has been cleared of all snow, both natural and artificial methods of growing the ice may be employed to achieve the desirable ice thickness to support hauling operations. Water withdrawal from the Mackenzie River (and channels) will follow the DFO Interim Code of Practice: End-of-pipe Fish Protection Screens for Small Water Intakes in Freshwater (DFO 2020).
6) Transition between river ice and the Site will be achieved by ramping the entrance (using packed snow and, if required ice, to a minimum thickness of 15 cm) to a grade adequate to support hauling vehicles.
7) After the initial passes of snow clearing have been completed, the ice road contractor will conduct a visual inspection to determine ice integrity and record observations on the Ice Cover Inspection Report (Appendix J).
8) Route marking and appropriate signage will be erected and maintained on the ice road during the construction, operation and maintenance phases. These include the entrance sign, speed limits where allowable speed limits vary, turn signs where the radius is less than 100 m, narrow road width ahead, speed signs and hazard awareness signs where maintenance crews are operating, and delineators where there are no other obvious delineations (i.e., snowbanks) to mark the safe limits of the travel way.

9) A sign will be placed at each entrance to the ice road and will include the maximum loading limits of the ice road, minimum 300 m spacing between vehicles travelling over river ice sections and the status as either “OPEN” or “CLOSED”.

6.3.2.3 Ice Road Maintenance

Once the ice road has been constructed, it will require regular maintenance throughout the winter program to keep it free of snow cover. Clear ice will result in the quickest growth with fewest cracks, allowing the activities to progress as planned. One grader and one plow truck will remain at the Site, and graders(s) and plow truck(s) will mobilize from Inuvik, as needed, for ice road maintenance for the duration of the Project.

Maintenance will be completed as follows.

1) GPR profiling will be conducted at least once a week at the start of the program. Once confidence in ice thickness is established, the frequency of GPR profiling can be re-assessed.

2) The ice road will be visually inspected daily, and the results recorded on the Ice Cover Inspection Report (Appendix J). Dry cracks, wet cracks, pressure ridges, thermal contraction or expansion cracks and water level changes will be recorded and discussed with the Site Supervisor.

3) Repairs and maintenance will be undertaken to address cracks, thin ice zones or damaged areas.

4) Routine flooding/spraying operations will be conducted to build and maintain the ice cover. Water for ice road construction and maintenance may be directly pumped from the Mackenzie River following’s DFO’s Interim Code of Practice: End-of-pipe Fish Protection Screens for Small Water Intakes in Freshwater (DFO 2020) and the ice road contractor will record the quantity of used water on the daily report. Water will be taken using a portable pump, only when needed, and will be supervised.

5) Dry cracks, large ice pop-outs and potholes will be marked and repaired as needed.

6) Tight blading of the road surface with a grader will be performed as required to improve ice levelling, improve vehicle traction on the ice or clean spills.

6.3.2.4 Ice Road Use and Abandonment

The following measures will be implemented during the operation (i.e., use) of the ice road.

1) Weight of each piece of equipment will be determined before mobilization and will be within permitted loads based on the ice thickness. As there will be no scale on site, a conservative approximation will be used for loads.

2) The minimum distance between vehicles on the ice road will be 300 m.

3) The maximum speed limits will be implemented and communicated through signage.

4) Vehicles should remain at least 5 m away from snowbanks on the over river ice portions of the ice roads to avoid cracks which develop in the thinner ice underneath snowbanks.

5) If poor weather conditions or poor ice conditions make it unsafe for operation, the ice road will be temporarily closed.

6) After the ice road transport is complete for the season, the entrance to the ice road extensions will be bermed, signed and abandoned for all construction and public use. Adequate signage warning the public that

there is no further inspection or maintenance being done on the ice roads will be placed at both ends, at the junctions with the existing Inuvik to Aklavik ice road and at the Site.

6.3.2.5 Snowpack Ramp

Snow will be used to compact the ramp to the Site following the GNWT Northern Land Use Guidelines – Access: Roads and Trails (GNWT 2015b). If required, water will be used to strengthen the ramp for the protection of underlying vegetation and terrain to a minimum thickness of 15 cm. For that purpose, water may be obtained from the town of Inuvik or withdrawn from the river at the Site. Water withdrawal from the river (if required) will follow the DFO's Interim Code of Practice: End-of-pipe Fish Protection Screens for Small Water Intakes in Freshwater (DFO 2020). The proposed locations and routing of the snowpack ramp are subject to change based upon river level and bank conditions at the time of construction, and the proposed routing may need to be adjusted to account for field conditions at the time of the work.

The construction of the snowpack ramp will use less than approximately 99 m^3 of water per day and the water requirement will be for a duration of approximately one weeks each winter. The field crew will maintain a water withdrawal log that will include, at a minimum, the day, time, water body and location, name of contractor/employee and volume of water withdrawn.

No watercourse crossings will be constructed to access the Site.

6.3.3 Equipment Mobilization

After construction of the ice road and snowpack ramp, snow and vegetation clearing work at the Site will be conducted. Graders and plow trucks will be used to clear snow and an excavator equipped with a brushing head (or equivalent) may be used to clear any vegetation, if required. The ice road construction equipment will then be demobilized. One grader and one plow truck will remain staged at the Site for ice road maintenance for the duration of the Project.

An office trailer, including heated portable toilets, soil treatment equipment, skid steers, loaders, excavators, fuel trucks and fuel tanks, winter camp (if using) and other miscellaneous equipment will be mobilized to the Site.

6.3.4 Soil Remediation

Review of historical data (Section 19.0) indicates that CoCs in soil (PHCs and barite) at the Site warrant remedial action (as described in detail in the RAP [Appendix B]).

Based on past assessments and the development of proposed site-specific SQOs (Section 4.0 of the RAP [Appendix B]), soils containing PHCs CoCs at concentrations above the proposed SQOs occupy a footprint of approximately 1,700 m^2, corresponding to a treatment volume of 2,500 m^3 from ground surface to 1.5 mbgs, and an additional treatment volume of 1,300 m^3 from depths between 1.5 mbgs and 3.0 mbgs (total treatment volume of 3,800 m^3). There are no PHC concentrations above the proposed SQOs at depths greater than 3.0 mbgs.

Soil with barite (i.e., true total barium) concentrations above the proposed SQOs occupies a footprint of approximate 200 m^2, to depths ranging from 0.5 to 1.5 mbgs, corresponding to a volume of approximately 100 m^3. There are no applicable proposed SQOs (Section 4.0 of the RAP [Appendix B]) for barite at depths greater than 1.5 mbgs.

The Site is subject to active erosion by the Arvoknar Channel (detailed discussion in Section 10.1.3.1) and the proposed soil remediation targets the excavation and treatment of soil with PHC and the excavation and off-site disposal of soil with barite barium concentrations above proposed site-specific SQOs. The depth of potential site erosion (Section 10.1.3.1) by the Arvoknar Channel is anticipated to be less than 3 mbgs.

The approximate extents of soil with PHC and barite concentrations exceeding proposed SQOs that require excavation are presented in Figure A5 (Appendix A). Final remediation volumes will be confirmed through laboratory analysis of PHC CoCs and barite (measured as true total barium) in soil samples collected along the base and sidewalls of the excavations. Details on the remediation methods and background information are provided in the RAP (Appendix B).

The development of the proposed SQOs (refer to Section 4.0 of the RAP, Appendix B) were based on the GNWT Department of the Environment and Climate Change (ECC) draft Environmental Guideline (GNWT ECC 2023) which rely on, in order of preference, the following guidelines:

- CCME Canadian Environmental Quality Guidelines (CEQGs) (CCME 2022 and updates, internet site) and Canada-Wide Standards (CCME 2008), as well as related guidelines and protocols;
- Federal Environmental Quality Guidelines (ECCC 2021); and
- Other jurisdictions, as appropriate, with Alberta, British Columbia and Ontario the order of preference. Including Alberta Environment (AENV 2009) Soil Remediation Guidelines for Barite.

None of the criteria used in these guidelines reflect remote Arctic conditions, in terms of human exposure scenarios or ecological settings. To address this shortcoming, Indian and Northern Affairs Canada (INAC; now Crown-Indigenous Relations and Northern Affairs Canada), commissioned the development of modified PHC remediation guidelines for use on Distant Early Warning (DEW) Line sites and other abandoned military sites in the Arctic. The result was the Abandoned Military Site Remediation Protocol (AMSRP) (INAC 2008 a, b). The AMSRP criteria were used in the development of the proposed SQOs to account for the remote Arctic conditions and traditional land use at the Site. Furthermore, Alberta Environment and Protected Areas (AEPA) guidelines (AEPA 2024) were used in the assessment of some CoCs based on the publication date of the CCME CEQGs and their lack of specificity around applicability to various exposure pathways. This was done to increase the level of conservatism in the assessment.

Table C summarizes the applicable CoCs and proposed SQOs for the Site, and the governing pathway based on the lowest, most conservative available criteria for each soil horizon for the operable pathways and CoC screening in the RAP (Appendix B, Sections 4.5 and 4.6, Figures 8 to 11). The primary CoCs driving remedial volumes at the Site are PHC Fraction F2, Type B hydrocarbons and barite (true total barium).

Table C. Summary of Applicable Remediation Guidelines for the Selected Exposure Pathways, applicable CoCs (fine-grained soils, natural area/parkland use).

CoC Parameter	Surface Soil (<0.5 mbgs) Remediation Guidelines (mg/kg)	Subsoil (>0.5 to 1.5 mbgs), Remediation Guidelines (mg/kg)	Subsoil (>1.5 mbgs) Remediation Guidelines (mg/kg)	Soil Guideline Source and Governing Pathway
PHC F2	9,800	9,800	10,000	Surface < 0.5 mbgs: Protection of wildlife and avifauna soil and food ingestion, AEPA 2024, Table A-1 Subsoil >0.5 to 1.5 mbgs: Direct contact and ingestion of soils by humans; GNWT ECC 2023, Table 5-3 Subsoil > 1.5 mbgs: Management limit; CCME CWS 2008

CoC Parameter	Surface Soil (<0.5 mbgs) Remediation Guidelines (mg/kg)	Subsoil (>0.5 to 1.5 mbgs), Remediation Guidelines (mg/kg)	Subsoil (>1.5 mbgs) Remediation Guidelines (mg/kg)	Soil Guideline Source and Governing Pathway
Type B Hydrocarbons	2,500	5,000	5,000[1] / 10,000	Surface < 0.5 mbgs: Protection of wildlife and avifauna soil and food ingestion; INAC 2008b, Table 14 Subsoil > 0.5 to 3.0 mbgs: Management limit; INAC 2008b, Table 14 Subsoil > 3.0 mbgs: Management limit; CCME CWS 2008
Barium (True Total)	39,000		NGR	Surface < 0.5 mbgs and Subsoil >0.5 to 1.5 mbgs: Site-specific criteria for the protection of humans from direct contact and ingestion (modified from AENV 2009)

Notes:
1 – criteria applied to a maximum depth of 3.0 mbgs, after which the CCME management limit of 10,000 mg/kg is used based on the exposure assessment conducted in Section 4.5 of the RAP (Appendix B).
NGR – no guideline required based on the exposure assessment conducted in Section 4.5 of the RAP (Appendix B).

Petroleum Hydrocarbons

The soil containing PHCs at concentrations above the proposed SQOs at the Site is proposed to be treated using ETC using either the same or similar equipment as the West Channel site (EISC Registry File [11/23-03]). This technology, patented in 1999 by ICG Thermal Inc. of Calgary, Alberta, involves the transfer of a heated airstream (typically between 300 and 450°C) to volatilize and destroy PHCs in soil whose concentrations are above the proposed SQOs. To facilitate this, soil will be placed in treatment cells in which heat is applied via a dedicated air burner fueled by diesel. Prior to heating, the cell of soil is covered as a means of capturing the PHC vapour off-gas that is generated by the heating. Through the process, the generated PHC vapours are channeled to a thermal oxidizer external to the treatment cell for destruction prior to atmospheric release. The thermal oxidizer will be operated within defined parameters and monitored to ensure the efficient and complete destruction of PHC vapours.

ETC is a batch treatment technology, with multiple treatment cells constructed and operated simultaneously to each treat up to 400 m^3 of soil over an approximate 10 to 15 day period, depending on CoC concentrations and soil moisture content. It is anticipated that four to five mobile treatment units will be mobilized to the Site for treatment.

Based on the anticipated volume of soils with COCs exceeding the proposed SQOs at the Site, it is estimated that the Project duration will be approximately 60 days, including mobilization, staging/setup, and demobilization. Delays in startup or complications during excavation and treatment of soil may necessitate extending the Project into the summer/fall of 2026. The equipment is modular, with loads configurable to suit transport by either truck (i.e., on the ice road in winter) or barge (i.e., on the river in summer/fall). The work will be staged such that while the four to five batches of soil are undergoing treatment, excavation and stockpiling will continue to form additional stockpiles. The permafrost at the base of the excavation will be insulated, as necessary, to limit deterioration if exposed during the summer. At a minimum, extruded polystyrene insulation (or soil) will be temporarily placed at the base of the excavation with fill on top. Additional protection measures may be implemented as required. The Permafrost Protection Plan (Appendix H) will be implemented during all Project activities. Once treatment of the

initial batches has been completed, the treatment cells will be dismantled and new cells constructed with the waiting stockpiled soil. A five-unit process is expected to occupy a footprint on the order of 75 m by 105 m, plus additional space for camp and ancillary equipment such as an excavator, loader and fuel tanks.

Soil samples will be collected from the extents of each excavation area and analyzed for CoCs applicable to the Site (refer to the RAP, Appendix B). Soil samples will also be collected for analyses from the treatment cells to confirm efficacy of treatment. Once these analyses have been completed and the treated soil meets the proposed SQOs, the treated soil will be used to backfill the excavations. The soil will be aerated or hydrated and quenched (summer only) as necessary, both to reduce the temperature of the soil and prepare it for revegetation. If required, water may be sourced from the Arvoknar Channel (i.e., if free from contaminants) following DFO's 2020 Interim Code of Practice: End-of-Pipe Fish Protection Screens for Small Water Intakes in Freshwater or imported during mobilization. Water use for hydrating treated soil is anticipated for summer operations only, will be less than approximately 99 m^3 of water per day and the water requirement will be for a duration of approximately 10 weeks. The field crew will maintain a water withdrawal log that will include, at a minimum, the day, time, water body and location, name of contractor/employee and volume of water withdrawn.

Note that if, after the first treatment pass, the soil PHC concentrations remain above the proposed site-specific SQOs, the soil will undergo further ETC treatment, with the treatment temperature, duration (or both) adjusted. Following subsequent treatment, additional soil samples will be collected to confirm treatment results. Soil that does not meet proposed SQOs following subsequent treatments will be stockpiled for off-site disposal at an approved facility outside the NWT, via ice road or barge, depending on quantity and time of year (Section 6.3.5).

Wood pilings and existing monitoring wells encountered in the excavation areas will be removed using the excavator during soil excavation. The wood pilings will be temporarily stored on-site during the winter program prior to transportation for off-site disposal at an approved facility outside the NWT (e.g., Secure Energy's Fox Creek facility in Alberta or a similar facility in British Columbia). Wood pilings not in the excavation areas will be left in place during remediation to stabilize the Site and slow erosion.

Prior to the start of soil treatment using ETC, approximately 10 thermistors will be installed (into drilled boreholes) below and adjacent to the ETC treatment area, approximately four will be installed in the disturbed area of the Site and approximately two will be installed in background locations to monitor potential degradation to permafrost conditions. Addition thermistors may be installed based on Site conditions. The proposed locations of the thermistors are presented in Figure A5 (Appendix A).

Barite

Based on discussions with affected parties during community engagement (24 to 28 March 2025, Section 12 and Appendix K), soils containing barite (measured as true total barium) at concentrations above the proposed SQOs at the Site (depths less than 1.5 mbgs) will be excavated for off-site disposal at an approved facility outside the NWT. This approach is specific to this Site, which is subject to active erosion. It may not be the preferred approach at other sites with similar CoCs in the region. Given the low volume of soil exceeding the proposed SQOs for barite, no backfill is expected to be required and the excavated areas will be recontoured using balanced grading.

While currently available analytical data suggests there is limited commingling of PHC-containing and barite-containing soils, barite-containing soils may be included within the ETC cells during PHC treatment (i.e., they will not be deliberately segregated). In the event this occurs, the ETC process will have no effect on the barite-containing soils, nor will the barite-containing soils affect the treatment of PHCs. Soil excavated and treated will

be representatively sampled and analyzed for CoCs applicable at the Site, which will determine final disposition of the soils (either as excavation backfill, or removal for off-site disposal).

6.3.5 On-Site Water Treatment

In the event that remedial activities occur in the summer months, ponded areas may form within the proposed construction area that may require dewatering, or groundwater may seep into excavations. This water will be treated using an on-site water treatment system (as described in the RAP [Appendix B]) and sampled for laboratory analysis of future IWB Water Licence criteria prior to discharge to the terrestrial environment (minimum of 30 m from any waterbody). Any treated water that does not meet the discharge criteria imposed by the IWB Water Licence will be stored in drums or tanks within the secondary containment area for off-site disposal at an approved facility.

6.3.6 Off-Site Disposal of Soils Exceeding the Proposed SQOs for PHCs

Based on the results of the technology screening and WSP's successful experience with the ETC technology at Shell's West Channel site (EISC Registry File [11/23-03]) with similar soil and CoCs, the technology is assumed to be effective at the Site (bench-scale testing using Site soil scheduled for summer 2025 [Appendix B]). In the unlikely event that bench-scale testing determines that the soil is not suitable for ETC treatment, soils exceeding the proposed SQOs for PHC will instead be excavated for appropriate out-of-territory disposal (e.g., Secure Energy's Fox Creek facility in Alberta or a similar facility in British Columbia). In this instance, an evaluation will be completed to determine if the excavations can be levelled through balanced grading or if a borrow source may be required.

6.3.7 Equipment Demobilization

If remedial activities are completed during the winter of 2026, then the office trailer, soil treatment equipment, skid steers, loaders, excavators, fuel trucks and fuel tanks, winter camp (if one is used) and other miscellaneous equipment may be demobilized from the Site via ice road prior to breakup. Some equipment may be secured on site or on the barge camp (potentially anchored at the Site) to be demobilized from the Site following 2026 spring breakup. Fuel tanks will be emptied prior to demobilization of Project staff. Any hazardous or non-hazardous waste will be collected and transported to Inuvik for appropriate disposal.

If remedial field execution extends into the spring/summer of 2026, select equipment may be left at the Site (or on the barge, potentially anchored at the Site) during the spring thaw. Precautions such as the removal of mobile equipment and fuel, as well as securement of any remaining structures will be implemented to guard against potential damage from flooding and high-water levels in the Arvoknar Channel during freshet. The barge camp (potentially anchored at the Site) may demobilize after breakup or remain for summer activities. Re-mobilization of equipment (including a barge camp if a winter camp was used during the winter program) and final demobilization would then occur by barge and boat during the summer/fall of 2026.

6.3.8 Post-Remedial Groundwater Monitoring Well and Thermistor Installation

Following the completion of remedial excavations, soil treatment and backfilling, approximately four post-remedial groundwater monitoring wells and an additional two thermistors will be installed using an environmental drilling rig during the spring/summer of 2026. Additional groundwater monitoring wells or thermistors may be installed based on Site conditions. If final demobilization of remediation equipment occurs during the winter of 2026, then a barge camp, drilling rig and associated equipment may be mobilized to the Site for installation of the monitoring wells and thermistors and then demobilized prior to prior to freeze-up. If weather or ground conditions prevent adequate site access, post-remedial drilling activities may be delayed until suitable conditions exist to mobilize and use drilling equipment at the Site.

While there has been an absence of established CoCs in groundwater at the Site, it is anticipated that post-remedial monitoring wells to monitor suprapermafrost groundwater quality will be required as part of future Water Licence conditions. If required, the monitoring wells will be installed into 150 mm diameter boreholes drilled using either direct push or solid stem augers mounted on a track-mounted drill rig. Monitoring wells may also be installed manually using drive-points or hand augered, as ground conditions allow. Upon installation, monitoring well locations will be surveyed.

The monitoring wells will be developed following installation, after which the first post-remedial sampling event will occur including both the newly installed and existing monitoring wells (if sufficient groundwater is present). Stability of electrical conductivity, pH, turbidity, dissolved oxygen and temperature in the groundwater will be monitored during well purging to indicate the timing of groundwater sample collection. Groundwater samples will be analyzed for the established CoCs at the Site.

To monitor post-remedial permafrost, the environmental drilling rig will be used to install additional thermistors at the Site in the areas of the remedial excavations.

The locations of the proposed monitoring well and thermistor installations are presented on Figure A5 (Appendix A).

The post-remedial monitoring activities and schedule are described in the Reclamation, Closure and Monitoring Plan (Appendix I) and will be completed as day trips from Inuvik via crew boat or helicopter access.

6.3.9 Wood Piling Removal

The remaining wood pilings at the Site (Figure A3, Appendix A) are anticipated to be removed during a 2027/2028 winter field program, so that they do not become a navigation hazard through the natural erosion of the Site by the Arvoknar Channel. Ice road construction, accommodations (winter camp) and mobilization will follow that described in Sections 6.3.1 to 6.3.3.

Using existing wood piling information (Figure A3, Appendix A), the pilings will be located and marked by a surveyor. The pilings are reported to have been installed to a depth of 6.0 mbgs or greater and are proposed to be removed using the previously employed perimeter drilling method (EISC Registry File [10/22-01]). A dozer will first be used to clear snow at and around the pilings. The pilings on land are assumed to be fully frozen in place, and the pilings area will be flooded, if needed, to provide the drill rig access and set-up. Water use will be less than approximately 99 m^3 of water per day and the water requirement will be for a duration of approximately eight weeks. The field crew will maintain a water withdrawal log that will include, at a minimum, the day, time, water body and location, name of contractor/employee and volume of water withdrawn. A drilling rig will then be used to drill a series of close-proximity boreholes around the perimeter of the targeted wood piling (e.g., a daisy pattern) with a target depth of between 3 and 5 mbgs. The pilings will then be extracted using either a logger choker attached to the piling and pulled out by excavator or using the drilling rig winch line to pull out the pilings. The holes will be backfilled and compacted with the drill cuttings created by the perimeter drilling process.

Based on previous laboratory results of collected piling samples, the wood pilings will be temporarily stockpiled securely on site in a previously disturbed area (e.g., the PHC excavation area [Figure A5, Appendix A]) during the winter program prior to transportation for off-site disposal at an approved facility outside the NWT (e.g., Secure Energy's Fox Creek facility in Alberta or a similar facility in British Columbia). There will be no additional soil sampling as part of these activities.

6.4 Project Timeline

The proposed Project schedule is presented in Table D below.

Table D: Proposed Project Schedule

Project Activity	Estimated Time Frame[2]
Engagement and consultation	Ongoing
Regulatory permitting	January to December 2025
Logistics planning	November to December 2025
Pre-mobilization of barge camp (if using) and remediation equipment	August 2025
Field program – ice road reconnaissance and construction	December 2025 to February 2026
Field program – soil remediation (winter)	February to April 2026
Field program – soil remediation (summer/fall; if required) and reclamation	July to August 2026
Post-remedial groundwater monitoring well and thermistor installation, and monitoring	July to August 2026
Post-remedial monitoring[1]	July to August 2027
Final wood pilings removal (anticipated)	December 2027 to April 2028
Contingency (in case of unforeseen delays)	May 2028 to April 2030

Note: Final demobilization may occur via ice road or barge depending on the progress of the soil treatment.

[1]Post-remedial monitoring will be conducted as proposed in the Reclamation, Closure and Monitoring Plan (Appendix I).

[2]In the event that permitting or other unforeseen project delays affect the proposed schedule, the estimated timeframes may be extended by one to two years, depending on the nature of the delay.

6.5 Personnel and Equipment Requirements

During the field programs, local businesses and community members will have the opportunity to supply goods and services. The proposed personnel and equipment list for the Project are presented in Tables E to G (soil remediation), Tables H and I (post remedial monitoring), and Table J and K (wood piling removal).

Table E: Proposed Project Personnel – Soil Remediation

Personnel	Estimated Number Required Onsite
WSP Site Supervisor/Construction Manager	1
ETC soil treatment crew	4 to 6
Drilling crew	2 to 3
WSP Environmental Scientist	1
Inuvialuit Wildlife Monitor	1
On-site Advanced Level Medic	1
Surveyor	1
Camp master	1
Catering personnel	3

Personnel	Estimated Number Required Onsite
Housekeeping personnel	1
Equipment operators and support personnel	As required
APPROXIMATE TOTAL	20 to 25

Note: There will be multiple work rotations and personnel will cross-shift throughout the program. The table provides a summary of site personnel of one shift. Inuvialuit will be trained as part of the ETC crew. Personnel may serve more than one role, depending on the work being performed.

Table F: Proposed Equipment List – Ice Road Construction and Maintenance

Equipment	Number Required	Local / Inuvialuit (Yes/No)
Grader (construction and maintenance)	1	Yes
Plow trucks (construction and maintenance)	2 to 4	Yes
Water truck	1	Yes
Gravel truck	2 to 4	Yes
Fuel truck (fuel equipment)	2	Yes
Brush mulcher	1	Yes
Snowcat (pull ice profiler equipment)	1	Yes
Sherp or equivalent all terrain vehicle	1	Yes
Dozer (clear snow)	1	Yes
Snowmobile	1	Yes
Ice profiler equipment (pre-construction)	1	Yes
Spill kit	2	Yes
Satellite phone	2	Yes
First aid kit	2	Yes

Note: All equipment will be inspected and verified to be suitable for the summer scope of work.

Table G: Proposed Equipment List – Soil Remediation

Equipment	Estimated Number Required	Local / Inuvialuit (Yes/No)
ETC treatment cells	4 to 5	No
Environmental drilling rig	1	Yes
Skid steer loaders	2	Yes
Wheeled loader (CAT 928 or equivalent)	2	Yes
Hydraulic excavator (CAT 320 or equivalent)	2	Yes
Pick-up truck, including dedicated medical transportation (winter transport)	4	Yes
Barge (transportation of equipment to Site for summer/fall)	1	Yes
Crew Boat (transportation of crew to Site daily for summer/fall)	1	Yes
Fuel truck (fuel equipment on-site, and deliver fuel to ETC tanks)	2	Yes
Fuel tanks (fuel ETC equipment)	2 to 3	Yes
Water treatment system	1	No
Truck or tactor and trailer with end dump (haul soil for disposal, if required)	4 to 6	Yes
Office trailer	1	Yes
Potential self-contained winter camp, including dedicated first aid room and perimeter fence, and spacer barge (if required)	1	Yes
Tugboats and track hoe (anchoring the barge camp)	1	Yes
Potential self-contained barge camp, including dedicated first aid room and integrated fuel tanks	1	Yes
Water truck (supply for camp)	1	Yes
Sewage truck (sewage disposal)	1	Yes
Light stand	2	Yes
Spill kit	> 1	Yes
Satellite phone (and other communication devices)	> 2	Yes
Satellite internet system	1	Yes
First aid kit	> 1	Yes
Miscellaneous environmental field equipment	1	No

Note: All equipment will be inspected and verified to be suitable for the scope of work. The self-contained winter camp will be used if the barge camp is not mobilized to the Site in the summer/fall of 2025.

Table H: Proposed Project Personnel – Post Remedial Monitoring

Personnel	Number Required Onsite
WSP Site Supervisor	1
WSP Environmental Scientist	1
Inuvialuit Wildlife Monitor	1
Boat operator	2
Helicopter pilots	2
APPROXIMATE TOTAL	7

Note: Post remedial monitoring will be completed as a day trip with no accommodation at the Site. Boat or helicopters will be used to access the Site depending on site access conditions (e.g. water level, weather).

Table I: Proposed Equipment List – Post Remedial Monitoring

Equipment	Number Required	Local / Inuvialuit (Yes/No)
Helicopter	1	No
Crew boats	2	Yes
Miscellaneous environmental field equipment	1	No
Emergency kit (first aid, spill, and firefighting)	1	Yes
Satellite phone	2	Yes

Note: Post remedial monitoring will be completed as a day trip with no accommodation at the Site. Boat or helicopters will be used to access the Site depending on site access conditions (e.g. water level, weather).

Table J: Proposed Project Personnel – Wood Pilings Removal

Personnel	Number Required
WSP Site Supervisor/Construction Manager	1 to 2
Drilling crew	2 to 4
Inuvialuit Wildlife Monitor	1
WSP Environmental Scientist	1
Surveyor	1
On-site Advanced Level Medic	1
Mechanic	1
Camp master	1
Catering personnel	3
Housekeeping personnel	1
Equipment operators and support personnel	As required
APPROXIMATE TOTAL	15 to 25

Note: There will be multiple work rotations and personnel will cross-shift throughout the program. The table provides a summary of site personnel of one shift.

Table K: Proposed Equipment List – Wood Pilings Removal

Equipment	Number Required	Local / Inuvialuit (Yes/No)
Drilling rig (drill out pilings)	1	Yes
Water truck (supply for camp, flooding on land pilings)	1	Yes
Sewage truck (sewage disposal)	1	Yes
Fuel truck (fuel equipment on-site)	1	Yes
Service truck (for mechanic)	1	Yes
Pick-up truck, including dedicated medical transportation	4	Yes
Excavator (Site work, cutting retrieval and loadout)	1	Yes
Loader (haul sleigh camp, Site work)	1	Yes
Tractor and trailer (mob/demobilization equipment)	2 to 4	Yes
Tractor and trailer with end dump (haul pile cuttings for disposal)	4 to 6	Yes
Light stand	2	Yes
Potential self-contained winter camp, including dedicated first aid room and perimeter fence	1	Yes
Potential self-contained barge camp, including dedicated first aid room and integrated fuel tanks	1	Yes
Spill kit	> 1	Yes
Satellite phone	> 2	Yes
Satellite internet system	1	Yes
First aid kit	> 1	Yes
Miscellaneous environmental field equipment	1	No

Note: All equipment will be inspected and verified to be suitable for this scope of work. The self-contained winter camp will be used if the barge camp is not mobilized to the Site in the fall preceding wood piling removal.

6.6 Waste Handling and Disposal

Shell and their contractors are responsible for the removal and appropriate disposal of waste products generated from the Project and will use an integrated waste management system to ensure that wastes generated by the Project are disposed of in a manner that does not adversely affect the environment, public health, or safety. A Project-specific Waste Management Plan was prepared and is provided in Appendix D. Waste handling and disposal procedures will be conducted in accordance with applicable legislation, including GNWT waste management and disposal guidelines, transportation rules and regulations, and others as outlined in the Waste Management Plan.

Waste generated during the Project will be transported and disposed of off site at approved facilities, e.g., at the Inuvik Solid Waste Disposal Facility or outside the NWT.

6.6.1 Historic Waste

General infrastructure remaining at the Site includes a well centre (e.g., a historic well marker), a partial drilling waste sump and/or wood pilings used to support surface infrastructure above the ground (Figure A5, Appendix A). Wood pilings are proposed to be removed following the soil remediation.

6.6.2 Non-Hazardous Waste

The following non-hazardous waste is anticipated to be generated during the Project:

- non-recyclable domestic waste (organic and non-organic waste including garbage, office garbage and food scraps);
- construction materials (lumber, and similar items); and
- recyclable domestic waste (beverage containers, tin cans, plastic and glass).

Non-hazardous (combustible) waste may be burned in the incinerator on the barge, if a barge camp is used, and non-hazardous (non-combustible) waste will be transported off site and disposed of at an approved disposal facility as per the Waste Management Plan (Appendix D).

Recyclable materials will be separated, transported and recycled as outlined in the Waste Management Plan (Appendix D).

6.6.3 Hazardous Waste and Sewage

Hazardous waste generated from Project activities is expected to include impacted soils, waste oil, oil, fuel filters, batteries, and waste antifreeze/solvents. Hazardous waste will be properly packed in approved transport containers, manifested as per GNWT requirements and shipped to an approved out of territory disposal site as per the Waste Management Plan (Appendix D).

Camp generated sewage and grey water will be temporarily stored in the camp's holding tanks, emptied as required using a vacuum sewage truck (winter) or a supply barge (summer), and disposed at an approved facility (e.g., the Inuvik sewage lagoon).

6.7 Fuel Requirements, Storage, Transportation and Handling

On-site fuel storage during the Project will consist of one double-walled fuel truck (diesel; 18,200 L) that will travel to Inuvik via the ice road as needed to refuel and then return to the Site, one fuel tank (100,000 L) securely stored in a designated bermed storage area, and, if a barge camp is used, the integrated fuel tank on the barge (800,000 L) and up to four propane tanks (combined 9,092 L). The fuel storage and refuelling areas will be bermed and lined, with a containment volume of at least 110% of the total volume of stored fuel and be 30 m away from the ordinary high-water mark of the Arvoknar Channel. The containment capacity will be increased throughout the Project as required if the volume of materials stored within the secondary containment increases, e.g., through adding soil that does not meet the criteria after treatment. Spill kits will be located wherever fuel is stored or used. Portable drip trays and appropriately sized fuel transfer hoses will be used when refuelling motorized equipment, to avoid any leaks/drips. In accordance with the Spill Contingency Plan (Appendix E), established procedures and drip trays will be used during refuelling operations to prevent any spills.

A designated fuel monitor will conduct daily visual inspections to check for leaks or damage to any fuel storage facilities and refuelling equipment. Regular maintenance and checks of all motorized equipment will also be undertaken to avoid preventable leaks.

The Project-specific Spill Contingency Plan is provided in Appendix E will be implemented and made available to all staff and contractors on the Site.

7.0 DEVELOPER COMMITMENTS

The Project consists of different components, all to be completed with proven, best management practices to limit the potential for adverse effects on environmental and cultural resources. The following list summarizes the proposed key mitigation measures. More detailed Project-specific mitigation measures are provided in Section 14.0.

- Construct ice road using best management practices (Project-specific ice-road engineered design plans and QA/QC plans) and build up the snow cover (and supplement with ice if required) on the snowpack ramp to protect underlying vegetation and terrain.
- Implement speed limits on the ice road and limit public use to minimize disturbance of wildlife. During the winter stage of the Project, signage will be installed to limit public use of the ice road, and after seasonal demobilization, snow barriers will be established to discourage public use.
- On the ice road, wildlife will have the right of way at all times.
- Snowbanks along the ice road will not exceed 1 m in height and will have regular gaps to avoid entrapment of crossing wildlife.
- No Project-generated wastes will remain at the Site. All waste will be separated, removed from the Site and disposed of appropriately (as outlined in the Waste Management Plan [Appendix D]).
- Clean work areas will be kept at all times and the GNWT's Safety in Grizzly and Black Bear Country guidelines (GNWT ENR 2017) will be followed.
- Wildlife-proof containers will be used to temporarily store food, attractants, and waste prior to removal and appropriate off-site disposal.
- Inuvialuit Wildlife Monitors will be present during all Project activities and advise of any wildlife concerns.
- Active work will be temporarily suspended if bears, caribou or wolverine are observed close to the Project area.
- All on-site staff will receive bear awareness training.
- A self-contained barge camp may be anchored at the Site to serve as winter and/or summer camp, or a self-contained winter camp may be located on land or river ice to house crews and serve as a staging area during the winter scope of work; an office trailer, fuel storage area and equipment/supplies staging area will be in previously disturbed areas of the Site, where possible.
- Clearing of vegetation (if required) will be limited to the area of the excavation, soil treatment cells and staging area. Vegetation and organic layer will protect the underlying permafrost outside the soil treatment areas.
- Use of trucks and heavy equipment will be restricted, where possible, to flat terrain, avoiding sensitive slopes on land.
- Protect trails and work areas, as needed with wood and/or drill mats.

- Creating a thermal break beneath the ETC units to limit heat transfer to the underlying soil - this may involve placing polystyrene foam insulation (i.e., Blue Board), or an air gap (pipes buried in a gravel/fill pad or I-beams to create an elevated platform upon which the treatment units sit).
- Sewage and greywater disposal will be at an approved facility (e.g., in Inuvik).
- The fuel storage and refuelling areas will be bermed and lined and be 30 m away from the ordinary high-water mark of the Arvoknar Channel, with the exception of fuel tanks for the winter camp generators, if a winter camp will be placed on the river ice, or the integrated fuel tanks on the barge, potential anchored at the Site.
- The Project-specific Wildlife Management and Monitoring Plan (Appendix C), Waste Management Plan (Appendix D), Spill Contingency Plan (Appendix E), Emergency Response Plan (Appendix F), Erosion and Sediment Control Plan (Appendix G), Permafrost Protection Plan (Appendix H) and Reclamation, Closure and Monitoring Plan (Appendix I) will be implemented, made available to all Project staff and contractors, and followed at all times.
- The Migratory Bird Regulations (Government of Canada [GOC] 2022) and ECCC's Guidelines to Avoid Harm to Migratory Birds and Fact Sheet: Nest Protection Under the Migratory Birds Regulations (ECCC 2023a,b, internet site) will be reviewed and followed. If active bird nests are encountered, a species-specific no-disturbance buffer area will be established until the nest has been abandoned.
- The PWNHC has been contacted, and it was determined there are no known heritage sites in the Project area (or its vicinity). Should suspected heritage resources be found during Project activities, work will cease in the immediate vicinity. Regulators and the PWNHC will be notified.
- All permits, licences and authorizations, including all terms and conditions, will be adhered to.
- Wildlife Monitors will report all wildlife observations and encounters to the Tuktoyaktuk, Aklavik or Inuvik HTCs on a regular basis (in accordance with their requirements (Wildlife Management and Monitoring Plan [Appendix C]).

8.0 SOIL TREATMENT TECHNOLOGY

WSP proposes that soil treatment be completed using on-site ex-situ thermal treatment by ETC. This technology, patented in 1999 by ICG Thermal Inc. of Calgary, Alberta, involves transfer of a heated airstream (between approximately 300 and 450°C) to excavated soil containing concentrations of PHCs above the proposed SQOs for the Site to volatilize and subsequently destroy CoCs. This technology has been successfully deployed in the Mackenzie Delta (i.e., at West Channel, EISC Registry File [11/23-03]; in the Peel watershed, Yukon; in Alaska; as well as in northeast British Columbia.

9.0 ALTERNATIVES

Several methodologies were investigated as part of a remedial options assessment (Table E-1 of the RAP, Appendix B), including soil excavation and off-site disposal, on-site ex-situ thermal treatment, and biodegradation, but were not determined to be potentially as effective as ETC for PHCs.

While other options were available for soils containing barite above the proposed SQOs, based on discussions with affected parties during community engagement, the propensity for ongoing shoreline erosion at this Site, and the low anticipated volume of soil (100 m^3), excavated for off-site disposal was selected as the remedial option for barite.

10.0 BIOPHYSICAL ENVIRONMENT

10.1 Physical Environment

10.1.1 Climate

The region where the Project is located is classified as having a high subarctic ecoclimate (ESWG 1996).

In general, the region experiences very cold winters and cool summers. Daylight hours vary from near total darkness during December to January, to 24 hours of daylight from approximately mid-May to mid-July. Based on the Inuvik Airport weather station, the mean annual daily temperature is -7.0˚C, and daily average temperatures range from -24.9˚C in January to 14.2˚C in July (GOC ENR 2024, internet site). The Inuvik area receives an average 240.6 millimetres of precipitation a year, approximately 50% of which falls as snow (GOC ENR 2024, internet site).

10.1.2 Physiography

The Site is within the Mackenzie Delta physiographic region, in the Mackenzie Delta Low Arctic north (LA*n*) Ecoregion, which includes the northernmost part of the Mackenzie Delta, and is within the Tundra Plains LA*n* Southern Arctic Ecoregion (Ecosystem Classification Group [ECG] 2012). The Mackenzie Delta LA*n* Ecoregion is characterized by nearly level floodplains with low and wet alluvial deposits with many shallow ponds and channels of the Mackenzie River (ECG 2012). The region is influenced by active fluvial processes (flooding, sediment deposition and reworking of the sediments by storm surges along the coastline) and calcium-rich soils that are saline in areas influenced by storm surges and tides. Tall willow shrublands are dominant in slightly elevated areas, whereas shorter willows, sedges, cotton-grasses, reed bent-grass and horsetails are common in the lower areas (ECG 2012).

10.1.3 Topography and Drainage

The Mackenzie Delta LA*n* Ecoregion has surface elevations ranging from sea level to 25 metres above sea level (masl) (ECG 2012). The entire delta is subject to flooding, near the head of the delta flooding occurs during spring breakup, particularly when ice jams occur, and near the coast flooding occurs because of storm surges (Rampton 1988).

10.1.3.1 Bank Erosion

The Site is in a topographically low-lying area of in the Mackenzie Delta (Figure A1, Appendix A) adjacent to the Arvoknar Channel of the Mackenzie River with ground surface elevations of less than 3 masl. The southern boundary of the Site has been eroded by the Arvoknar Channel and a bank, followed by a gently sloping, shallow beach, is present along the entire southern boundary. Portions of the former operating areas on the Site are fully submerged by the Arvoknar Channel, including the former flare pit, camp sump and part of the drilling waste sump (WSP 2024b). Since 2007, the southern boundary of the Site has experienced between approximately 20 and 65 m of shoreline erosion with the most erosion associated with the former remedial excavation areas (average rate of erosion between 1.2 and 3.8 metres per year [m/yr]) (Figure A5, Appendix A). As of 2024, the shoreline was approximately 7.5 m from the nearest excavation extents for barite. It is expected that erosion may continue at the Site, though the rate is uncertain, and in some cases sedimentation may occur. Currently, drainage is generally south towards the Arvoknar Channel and to the north towards low-lying areas on the Site.

While site-specific bathymetry data have not been collected, real-time hydrometric data are collected from a sensor operated by the Government of Canada (GoC) approximately 14.5 km southeast (upstream) of the Site (GoC ENR 2023, internet site). Five-year daily-mean water depths measured at the sensor typically range from approximately 9.5 m (in winter months) to 11.4 m (in May, during freshet).

At the time when aerial imagery (obtained in 2024) used in Figure A5 (Appendix A) was taken, the mean-daily water depth was recorded as being approximately 9.7 m at the upstream sensor. As shown in Figure A5 (Appendix A), the water level is well below the top of the riverbank at the Site and generally follows the shallow, sloped toe of the bank. According to Light Detection and Ranging (LiDAR) data collected in 2023 and 2024, as well as on-site observations, the elevation gain between the toe and top of the riverbank is approximately 1.5 m to 2 m, demonstrating that the current erosional effects are predominantly confined to soils at depths of less than 3 mbgs on the Site; and erosion is likely the highest during periods of above-average water levels in the channel (i.e., spring freshet).

Given seasonal water levels, aerial photography and on-site observations, it is expected that erosion will continue laterally across the Site and in the near-surface soils.

10.1.4 Bedrock Geology

The Mackenzie Delta is about 200 km long and 65 km wide, extending to the north-northeast (Rampton 1988). The region is characterized by Mesozoic and Cenozoic rocks that were deposited in the Beaufort-Mackenzie Basin and underlay unlithified floodplain and delta deposits (Rampton 1987).

The rivers in the area drain a range of bedrock terrain. On the west side of the Mackenzie Delta is the Yukon Coastal Plain, which consists of folded and faulted Mesozoic rocks. On the east side of the Mackenzie Delta is an unlithified coastal plain that is underlain by Proterozoic and lower Palaeozoic clastics and carbonates which are in turn overlain by Cretaceous clastic sediments (Solomon 2003).

10.1.5 Surficial Deposits

The Mackenzie Delta surface is marked by a complex network of lakes and anastomosing channels (i.e., the channels are separated by semi-permanent islands). Lakes cover between 15% and 30% of the delta. Thermokarst lakes with thick permafrost are most common in the upper delta. The lakes usually contain sediments discharged from the channels (Rampton 1988).

Surficial soils in the region consist of alluvial floodplain and delta deposits comprising silt, clay, fine sand, minor gravel, coarse sand and organic sediments that may be more than 20 m thick (Rampton 1987).

Dominant soils of the Mackenzie Delta LA*n* Ecoregion are characterized by calcareous fine-loamy and fine-silty alluvium and include Regosolic Static Cryosols, Gleyed Cumulic Regosols and Gleysolic Static Cryosols (ECG 2012).

Results from the winter 2024 field program indicate that the dominant soil grain size is fine-grained, where 94% or more of soil particles were less than 75 micrometres. The soil types were identified as clayey silt and silty clay, with some occurrences of silt and sand from the surface extending to 7.5 mbgs (WSP 2024b).

10.1.6 Permafrost

The Mackenzie Delta LA*n* Ecoregion is characterized by continuous permafrost with scattered permafrost features such as drained lakes, low-centre polygons and pingos (ECG 2012). In the Mackenzie Delta, permafrost thickness is generally less than 90 m thick, and contains deep unfrozen zones (taliks), which may extend to the base of the permafrost. The depth of the active layer generally ranges from 0.3 to 1.0 mbgs but is largely a function of ground surface insulation, vegetation cover, level of ground disturbance and winter snow cover (Heginbottom 1998).

Records collected between 2007 and 2010 from three historical thermistors prior to Site remediation in 2011 indicated that the permafrost depths were approximately 2, 1.6 and 1.5 mbgs on the south edge of the drilling

waste sump, centre of drilling waste sump and north of the drilling waste sump, respectively (IEG 2007, 2009, 2012a, 2012b).

The approximate depth to the base of the active layer (i.e., depth to permafrost) was also noted on available borehole logs completed during historical site investigations dating back to 2007 (i.e., September 2007, August 2010, April 2011 and August 2022). The approximate depth to permafrost ranged from 0.7 to 5.2 mbgs in boreholes advanced during the 2022 ESA activities, with the deepest observed from a borehole directly adjacent to the Arvoknar Channel in an area subject to significant erosion. The approximate depth to permafrost at other borehole locations advanced in 2022 to the west, where less erosion is visible along the shoreline of the channel, ranged from 1.7 to 2.5 mbgs. The approximate depth to permafrost ranged from 0.7 to 2.2 mbgs at boreholes advanced within areas of historical site activities (WSP 2023a).

10.1.7 Site Hydrology/Hydrogeology

The Mackenzie Delta is a dynamic complex of lakes, islands, braided and anastomosing channels and oxbows. Ice covers the waters of the delta for approximately eight months of the year and can reach thicknesses of up to 2.5 m. Ice breakup typically occurs in late April to early May, and ice movement occurs prior to the peak water levels in the spring. Water levels recede in late summer and fall. The spring breakup is the major hydrological event of the year (Mackenzie River Basin Committee [MRBC] 1981). The Site is bordered to the south by the Arvoknar Channel of the Mackenzie River, and to the north, east and west by small surface ponds.

In 2022, the shallow groundwater depths within the previously disturbed area of the Site ranged from 0.81 to 1.31 mbgs (WSP 2023a). Based on topography and historical groundwater monitoring events, the inferred groundwater flow direction was southwest. However, given the potential for groundwater wells to heave from frost, water level measurement data may not be reliable. In addition, given the intermittent presence of groundwater, it is likely that groundwater flow is limited and only present for portions of the summer months.

10.1.8 Groundwater and Surface Water Quality

Between 2007 and 2022, multiple groundwater monitoring and sampling events have been conducted, with multiple instances of groundwater wells being completely dry. Where sufficient water was available to be sampled, the analysis of contaminants of potential concern (CoPCs) generally identified low or non-detectable concentrations. In samples where concentrations of CoPCs were identified, they were either singular detections (e.g., detected in one sampling event or in one well), below generic guidelines in the most recent groundwater monitoring and sampling event, or in concentrations consistent with background conditions. Based on these factors, remedial efforts for the Site are targeted towards CoCs identified in soil, and groundwater is not affected by historical operations and not considered a target for remediation. Additional details are included in the RAP (Appendix B, Section 4.0).

Surface water quality data at the Site was obtained in 2004 and 2007 before remediation, in 2011 during the remedial program, and in 2022 and 2024. Historically, surface water samples exceeded the historically applied guidelines for turbidity and select metals. Surface water samples collected in 2022 and 2024 did not exceed the historically applied guidelines and/or background ranges. Additional details are summarized in the RAP (Appendix B, Section 4.0).

10.2 Biological Environment

10.2.1 Species of Conservation Concern

The Government of Canada's *Species at Risk Act* (SARA; 2002) was enacted to prevent Canadian indigenous species, subspecies and distinct populations of wildlife from becoming extirpated or extinct, to provide for the

recovery of endangered or threatened species, and to encourage the management of other species to prevent them from becoming at risk. The enactment established the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as an independent body of experts responsible for assessing and identifying species-at-risk (SAR). It provided that COSEWIC's assessments were to be reported to the Minister of the Environment and to the Canadian Endangered Species Conservation Council and it authorized the Governor in Council to establish the official list of SAR based on that process. It required that the best available knowledge be used to define long and short-term objectives in a recovery strategy for endangered and threatened species and it provides for action plans to identify specific actions. The SARA (2002) created prohibitions to protect listed threatened and endangered species and their critical habitat. Species can be listed under three schedules. Schedule 1 is the official list of species that are classified as extirpated, endangered, threatened and of special concern. Species listed in Schedule 2 are species that had been designated as endangered or threatened and have yet to be re-assessed by COSEWIC using revised criteria. Once these species have been re-assessed, they may be considered for inclusion in Schedule 1. Species listed in Schedule 3 are species that had been designated as special concern and have yet to be re-assessed by COSEWIC using revised criteria. Once these species have been re-assessed, they may be considered for inclusion in Schedule 1 (SARA 2024, internet site).

In addition to federal legislation, the GNWT established the NWT Species General Status Ranking Program which produces the General Status Ranks of Wild Species in the NWT (Working Group on General Status of NWT Species 2021). Under this program, species' ranks are reviewed and published every five years. The 2021 report presents the general status ranks for 8,228 species known or expected to be present in the NWT.

Species may be ranked as 'at risk' (have been assessed in detail and ranked by the NWT Species at Risk Committee [SARC] or COSEWIC as 'threatened' or 'endangered'), 'may be at risk' (may be at risk of extinction or extirpation and candidates for detailed risk assessments), 'sensitive' (may require protection to keep from becoming at risk), 'secure' (not at risk or sensitive), 'undetermined' (insufficient information to determine status), 'not ranked' (not ranked under program), 'alien' (introduced through human activities), 'extirpated / extinct' (no longer found in the NWT / world), 'vagrant' (infrequent and/or unpredictable occurrences outside normal distribution range) and 'presence expected' (species not yet recorded but expected to occur in the NWT) (Working Group on General Status of NWT Species 2021).

The NWT Species General Status Ranking Program provides species ranks to the NWT SARC, which was established under the SARA (NWT) to assesses the biological status of species that may be at risk in the NWT, to identify threats and positive influences on species and their habitats, and to recommend whether a species should be added to the NWT list of SAR (NWT SARC 2024, internet site).

The following sections include summaries of species potentially occurring in the Project area that are currently listed territorially and/or federally.

10.2.2 Vegetation

Vegetation in the Mackenzie Delta LA*n* Ecoregion predominantly consists of relatively tall willow (*Salix spp*.) shrubland on elevated areas (1 or 2 m above the water table), with shorter willows, sedges (*Carex spp*.), cotton-grass (*Eriophorum angustifolium*), reed bent-grass (*Deyeuxia quadriseta)* and horsetail (*Equisetum arvense*) on areas where the water table is near surface, and sedge, cotton-grass, horsetail marshes with scattered willows where the water table is at or above the surface (ECG 2012).

The only vascular plant species currently listed by the NWT SARC does occur in the ISR – the hairy braya (*Braya pilosa*). It is listed territorially as 'threatened', and as 'endangered' under the federal SARA and COSEWIC.

However, this species is endemic to Cape Bathurst (Conference of Management Authorities 2024, internet site), over 300 km northeast of the Site.

10.2.3 Avian Wildlife

The vast majority of birds that are found in and around the Mackenzie Delta are migratory waterfowl and shorebirds that are present from May to October. The delta provides important nesting, breeding and staging habitat for avian wildlife, in addition to key subsistence harvesting areas for Inuvialuit hunters.

Based on the Aklavik, Inuvik and Tuktoyaktuk Community Conservation Plans (AICCP 2016; ICCP 2016; TCCP 2016), the Site is within or near the following Special Designated Lands recognized for avian species, their habitat, and/or subsistence harvesting (Figure A6a and A6b; Appendix A).

- Spring Goose Harvesting Areas (304C): considered a key area for subsistence hunting of geese in the spring.
- Fall Goose Harvesting Areas (312C): considered a key area for subsistence harvesting of waterfowl during the fall.
- Kendall Island Bird Sanctuary (706E): valuable waterfowl breeding and staging grounds within the outer Mackenzie Delta. The islands of the outer delta are important staging grounds from late August to late September for several species of shorebirds. Shallow Bay area is an important staging area for greater white-fronted geese (*Anser albifrons*), Canada geese (*Branta canadensis*), cackling geese (*Branta hutchinsii*) and lesser snow geese (*Anser caerulescens*). Black brants (*Branta bernicla*) also migrate west through the outer Mackenzie Delta. Large numbers of shorebirds migrate through the delta area. Small islands south of Kendall Island support a colony of lesser snow geese. Tundra swans (*Cygnus columbianus*), greater white-fronted geese, sandhill cranes (*Grus canadensis*), black brant, ducks and shorebirds, nest and moult throughout this area. This area is considered a sensitive harvesting area.
- Mackenzie River Delta Key Migratory Bird Habitat (715C): considered an important nesting and breeding habitat for migratory birds from May to September.

At least 125 bird species may be found in the Mackenzie Delta region (AICCP 2016; ICCP 2016; TCCP 2016). Several of these species are listed federally and/or territorially. Table L below provides a summary of these listed species.

Table L: Avian Species of Conservation Concern Potentially Occurring at the Site

Common Name	Scientific Name	NWT SAR[1]	COSEWIC[2]	SARA[3]
Bank swallow	*Riparia riparia*	n/a	Threatened	Threatened
Barn swallow	*Hirundo rustica*	n/a	Special concern	Threatened
Eskimo curlew	*Numenius borealis*	n/a	Endangered	Endangered
Harris's sparrow	*Zonotrichia querula*	n/a	Special concern	Special concern
Horned grebe (western population)	*Podiceps auritus*	n/a	Special concern	Special concern
Hudsonian godwit	*Limosa haemastica*	n/a	Threatened	Under consideration
Lesser yellowlegs	*Tringa flavipes*	n/a	Threatened	Under consideration
Red-necked phalarope	*Phalaropus lobatus*	n/a	Special concern	Special concern

Common Name	Scientific Name	NWT SAR[1]	COSEWIC[2]	SARA[3]
Rusty blackbird	*Euphagus carolinus*	No status	Special concern	Special concern
Short-eared owl	*Asio flammeus*	No status	Threatened	Special concern

Notes:

[1] *Conference of Management Authorities. 2024. NWT List of Species at Risk. Species listed under the Species at Risk (NWT) Act.*

[2] *Species recommended by the COSEWIC for listing under Schedule 1 of the federal SARA.*

[3] *Species listed under Schedule 1 of the federal SARA.*

n/a – not applicable

Both subspecies of the red knot (*Calidris canutus islandica* and *Calidris canutus rufa*) breed on the central and high arctic islands of the ISR hundreds of kilometres northwest of the Site. They may cross through the general area of the Site during migration. The *islandica* subspecies is listed as 'not at risk' by COSEWIC and as 'special concern' under SARA while the *rufa* subspecies is listed as 'endangered' through both COSEWIC and SARA. NWT SAR lists the status of both subspecies as 'not applicable'.

Most of the birds found in and around the Mackenzie Delta are migratory. They will be wintering in southerly locations during the winter months and may be using the Site and surrounding area for nesting, breeding, and staging habitat during the summer months.

10.2.4 Mammals

Terrestrial wildlife in the vicinity of the Site may include moose (*Alces alces*), barren-ground caribou (*Rangifer tarandus groenlandicus*), muskox (*Ovibos moschatus*), grizzly bear (*Ursus arctos*), wolverine (*Gulo gulo*), grey wolf (*Canis lupus*), arctic fox (*Vulpes lagopus*), red fox (*Vulpes vulpes*), lynx (*Lynx canadensis*), mink (*Neovision vison*), beaver (*Castor canadensis*), muskrat (*Ondatra zibethicus*), snowshoe hare (*Lepus americanus*) and small mammals.

Polar bears (*Ursus maritimus*) may be encountered in the vicinity of the Site. Typically, they are restricted to high arctic areas with sea ice in summer and, in winter, they may be found in coastal onshore areas with maternity dens along the Yukon North Slope, Herschel Island, Kay Point, eastern Mackenzie Delta coastal and offshore areas (as defined by the Mainland Coastal Polar Bear Denning Areas [323C]; TCCP 2016).

Based on the Aklavik, Inuvik and Tuktoyaktuk Community Conservation Plans (AICCP 2016; ICCP 2016; TCCP 2016), the Site is within or near to the following Special Designated Lands recognized for terrestrial and marine mammals and their habitat (Figures A6a and A6b; Appendix A).

- Winter Wolverine Harvesting Areas (314C): key area for subsistence harvesting of wolverine during the winter.
- Critical Grizzly Bear Denning Areas (322C): considered important for denning grizzly bears from October to May.
- Mainland Coastal Polar Bear Denning Areas (323C): considered important for polar bear denning from October to March.
- Kendall Island Bird Sanctuary (706E): important area for polar bears and caribou. This area is considered a sensitive harvesting area.
- Mackenzie River Delta Key Migratory Bird Habitat (715C): important denning habitat for grizzly bears from October to May and polar bears from November to April.

At least 39 mammal species may be found in the Mackenzie Delta region (AICCP 2016; ICCP 2016; TCCP 2016). Several of these species are listed federally and/or territorially. Table M below provides a summary of these listed species.

Table M: Mammal Species of Conservation Concern Potentially Occurring at the Site

Common Name	Scientific Name	NWT SAR[1]	COSEWIC[2]	SARA[3]
Barren-ground caribou	*Rangifer tarandus groenlandicus*	Threatened	Threatened	Under consideration
Polar bear	*Ursus maritimus*	Special concern	Special concern	Special concern
Grizzly bear (western population)	*Ursus arctos*	No status	Special concern	Special concern
Wolverine	*Gulo gulo*	No status	Special concern	Special concern

[1] *Conference of Management Authorities. 2024. NWT List of Species at Risk. Species listed under the Species at Risk (NWT) Act.*

[2] *Species recommended by the COSEWIC for listing under Schedule 1 of the federal SARA.*

[3] *Species listed under Schedule 1 of the federal SARA.*

Of the species listed in Table M, grizzly bears will be hibernating during the winter months and may be encountered at the Site during the summer months of the Project. Polar bears are restricted to areas with sea ice during summer months; however, polar bears may be using the general area around the Site and female polar bears may be denning in maternity dens during the winter months in on- and off-shore areas along the coast north and west of the Site. The Cape Bathurst Herd of barren-ground caribou may be wintering near the Site, and the Tuktoyaktuk Peninsula Herd of barren-ground caribou may be wintering to the northeast of the Site and wolverine may be encountered year-round (Conference of Management Authorities 2024, internet site). More details on some of these species are provided in Section 14.5.

10.2.5 Freshwater Fish

The Mackenzie Delta provides important feeding, spawning, and overwintering habitat for anadromous and freshwater fish species, in addition to providing a major conduit for fish migration from spawning areas in the delta/upstream of the delta to overwintering areas in the delta or the nearshore Beaufort Sea.

Common species that may be found and/or harvested within the vicinity of the Site include Arctic cisco (*Coregonus autumnalis*), Arctic grayling (*Thymallus* arcticus), broad whitefish (*Coreganus nasus*), inconnu (*Stenodus leucichthys*), Dolly Varden (*Salvelinus malma*), lake trout (*Salvelinus namaycush*), lake whitefish (*Coreganus clupeaformis*), least cisco (*Coregonus sardinella*), burbot (*Lota lota*) and northern pike (*Esox lucius*).

Based on the Aklavik, Inuvik and Tuktoyaktuk Community Conservation Plans (AICCP 2016; ICCP 2016; TCCP 2016), the Site is within or near the following Special Designated Lands recognized for fish, fish habitat and/or subsistence harvest (Figure A6a, Appendix A).

- Central Mackenzie Estuary (718D): used extensively by feeding anadromous whitefish and as overwintering and nursery areas for a variety of fish.

At least 28 freshwater fish species may be found in the Mackenzie Delta region (AICCP 2016; ICCP 2016; TCCP 2016). Table N below provides the only species that is listed federally and/or territorially in the general area of the Site.

Table N: Freshwater Fish Species of Conservation Concern Potentially Occurring at the Site

Common Name	Scientific Name	NWT SAR[1]	COSEWIC[2]	SARA[3]
Dolly Varden	*Salvelinus malma*	n/a	Special concern	Special concern

[1] *Conference of Management Authorities. 2024. NWT List of Species at Risk. Species listed under the Species at Risk (NWT) Act.*

[2] *Species recommended by the COSEWIC for listing under Schedule 1 of the federal SARA.*

[3] *Species listed under Schedule 1 of the federal SARA.*

n/a – not applicable

Many of the fish species that occur within the vicinity of the Site may be encountered in the Mackenzie River and its channels during the proposed Project activities.

10.2.6 Insects

Numerous insect species are found in and around the Mackenzie Delta. Table O provides a summary of insect species that are listed federally and/or territorially that may potentially occur in the general Project area.

Table O: Insect Species of Conservation Concern Potentially Occurring at the Site

Common Name	Scientific Name	NWT SAR[1]	COSEWIC[2]	SARA[3]
Suckley's cuckoo bumble bee	*Bombus suckleyi*	No status	Threatened	Under consideration
Transverse lady beetle	*Coccinella transversoguttata*	No status	Special concern	Special concern

[1]Conference of Management Authorities. 2024. NWT List of Species at Risk. Species listed under the Species at Risk (NWT) Act.

[2]Species recommended by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) for listing under Schedule 1 of the federal Species at Risk Act (SARA).

[3]Species listed under Schedule 1 of the federal SARA.

Insects will be dormant during the winter months and may be using the Site and surrounding area during the summer months.

11.0 TRADITIONAL AND OTHER LAND USES

While this Site is in a remote area, Inuvialuit from surrounding communities are likely to travel in this area and may visit the Site. The Aklavik, Inuvik and Tuktoyaktuk Community Conservation Plans (AICCP 2026; ICCP 2026; TCCP 2016) classify the general area of the Site as Management Category C, D and E Lands:

- Category C: where cultural or renewable resources are of particular significance and sensitivity during specific times of the year. These lands and waters shall be managed so as to eliminate, to the greatest extent possible, potential damage and disruption.
- Category D: where cultural or renewable resources are of particular significance and sensitivity throughout the year. As with Category C, these lands and waters shall be managed so as to eliminate, to the greatest extent possible, potential damage and disruption.
- Category E: where cultural or renewable resources are of extreme significance and sensitivity. There shall be no development on these areas. These lands and waters shall be managed to eliminate, to the greatest extent possible, potential damage and disruption.

As described in Sections 10.2.3, 10.2.4 and 10.2.5, the Site is on or near Special Designated Lands (listed in Table P), that consider land, aquatic and marine resources important to the Inuvialuit (AICCP 2016; ICCP 2016; TCCP 2016; Figures A6a and A6b, Appendix A).

Table P: Special Designated Lands and Management Categories

Former Wellsite Name	Special Designated Lands	Management Categories
Unipkat I-22	304C – Spring Goose Harvesting Areas 312C – Fall Goose Harvesting Areas 314C – Winter Wolverine Harvesting Areas 322C – Critical Grizzly Bear Denning Areas 323C – Mainland Coastal Polar Bear Denning Areas 706E – Kendall Island Bird Sanctuary 715C – Mackenzie River Delta Key Migratory Bird Habitat 718D – Central Mackenzie Estuary	C, D, E

12.0 COMMUNITY ENGAGEMENT AND CONSULTATION

Shell initiated community consultations with the Inuvik, Aklavik and Tuktoyaktuk HTCs and CCs and Elders Committees in the spring of 2022 regarding planned wood piling removal at the Site, and consultations have been ongoing since. The most recent community consultations occurred in-person during the week of 24 March 2025 in Tuktoyaktuk and Aklavik and virtually with the Inuvik HTC on 2 Aprill 2025 and 12 May 2025, and Tuktoyaktuk HTC on 9 May 2025. Consultations have taken the form of:

- letters describing planned work;
- letters describing the work completed;
- teleconferences;
- in-person meetings;
- Open Houses (first held in November 2024); and
- Virtual Open House (https://open-house-northernprogram.hub.arcgis.com/).

Shell provided an introductory letter for the Project to the Inuvik, Aklavik and Tuktoyaktuk HTCs and CCs on 7 March 2025, and held face-to-face and virtual meetings between 24 March and 12 May 2025, seeking feedback, comments and offering to arrange meetings to facilitate additional discussions. In response to questions and subsequent discussions during the meeting in Tuktoyaktuk, the approach to on-site barite management was changed (Section 6.3.3) and a follow-up letter sent to the Tuktoyaktuk HTC and CC on 23 April 2025.

A summary of the consultations to-date is provided in Appendix K, along with examples of letters provided to the communities in March and April 2025, and a letter of support received from the Tuktoyaktuk HTC. Additional in-person meetings and Open Houses are planned for the fall of 2025. The Shell Virtual Open House, developed to extend the reach of the information provided in the Open Houses, will be updated and re-advertised to all Inuvialuit communities for the 2025 Open Houses.

13.0 CO-MANAGEMENT, INUVIALUIT ORGANIZATIONS AND GOVERNMENT ENGAGEMENT AND CONSULTATION

Shell will be submitting a Request for Review of the proposed Project to the Fish and Fish Habitat Protection Program, DFO, to determine the requirement of an authorization under the *Fisheries Act*.

Shell will be submitting a Type B Water Licence application for the Project to the IWB.

Shell will consult with the GNWT ECC to determine if an amendment to existing LUP#N2010X0022 will be required for the proposed Project activities.

In October 2023, information about previously recorded heritage resources in the vicinity of the Site was provided by the PWNHC Yellowknife, NWT (Smethurst 2023, pers. comm.). The closest known archaeological site is approximately 11 km northeast of the Site. This archaeological site is classified as prehistoric and comprises scatter (lithic). Given the distance and location of this archaeological site, no interactions with any proposed Project activities are expected.

Between October 2023 and May 2024, WSP consulted with the Scientific Services Office, GNWT Education, Culture and Employment to determine if a Scientific Research Licence was required for a similar remediation project at West Channel (EISC Registry File [11/23-03]), and it was determined that there is no licensing required for this type of project and is thus not required for the proposed Project.

WSP was in contact with Transport Canada's Navigation Protection Program, and it was determined that no notification (i.e., No Interference with Navigation Notification of Work) will be required for the winter ice road construction and maintenance component of the Project due to the nature of the work. The pump will be portable, temporarily placed in the river (through ice cover), only on an as needed basis and always supervised. Therefore, water intake is considered an activity and not a works (nothing is being placed or constructed). In addition, the use of a barge camp (registered commercial vehicle) is considered a vessel at anchor and not considered a work (Chamberlain 2025, pers. comm.). No notification is required for the summer works as all summer remediation activities will be a minimum of 10 m away from the ordinary high-water mark of the Arvoknar Channel and no part of the channel will be obstructed during the Project.

14.0 RESIDUAL EFFECTS AND SIGNIFICANCE DETERMINATION

Residual effects are the effects that remain after the implementation of all mitigation measures and are the expected consequences of the Project on the selected VCs. To assess residual effects resulting from the Project, each effect was characterized based on residual effect criteria (Table Q), and their significance determined. The direction of a residual effect (i.e., adverse or positive) was not included in this assessment as only adverse effects were considered in the assessment. The Ecological Context of a residual effect was not rated separately but was considered as part of the Magnitude characteristic.

The significance of the anticipated residual effects was assessed using a qualitative approach, which uses best professional judgment of experienced environmental assessment specialists, supplemented by available data from regulatory agencies and community knowledge.

Table Q: Effects Criteria and Levels for Determining Significance

Effects Criteria	Effects Level Definition		
Magnitude (amount of change relative to baseline conditions)	Low	Medium	High
	For physical VCs: No violations of quality standards and guidelines. For ecological VCs: Affects individuals within a year-class or cohort of a population or stock within the range of natural variability.	For physical VCs: Occasional violations of quality standards and guidelines. For ecological VCs: Affects a portion of a year-class or cohort of a population so that it is noticeable above background conditions.	For physical VCs: Persistent violations of quality standards and guidelines. For ecological VCs: Loss of a whole year-class or cohort of a population or stock.

Effects Criteria	Effects Level Definition		
Geographic Extent (geographic area within which the residual effect is expected to occur)	Localized	Within Project area[1]	Regional
	Effect is localized within specific area.	Effect extends to the entire Project area, but not beyond.	Effect extends beyond the Project area.
Frequency (how often the residual adverse effect is expected to occur)	Infrequent	Frequent	Continuous
	Effect occurs several times at sporadic intervals.	Effect occurs many times on a regular basis.	Effect occurs continuously.
Duration (length of time over which the residual effect is expected to persist)	Short-term	Medium-term	Long-term
	For physical VCs: Less than the duration of the Project. For ecological VCs: Recovery within two years or less.	For physical VCs: The entire duration of the Project. For ecological VCs: Recovery within two to five years.	For physical VCs: Extending past the duration of the Project. For ecological VCs: Recovery in more than five years.
Reversibility (can the residual effect be reversed once the activity ceases)	Fully reversible	Partially reversible	Irreversible
	Residual effect diminishes to baseline conditions.	Residual effect partially diminishes, but not to baseline conditions	Residual effect will not diminish to baseline conditions.

Note:

[1] For the purpose of this assessment, the Project area considers the maximum area to be used during the Project.

The Environmental Impact Screening Guidelines (EISC 2023, internet site) consider the following aspects when making a significance determination:

- whether a proposed development could have significant adverse environmental effects;
- whether a proposed development could have significant adverse effects on wildlife or wildlife habitat; and
- whether a proposed development could have significant adverse effects on resource harvesting.

Significance Determination: Based on these aspects, significance in this PD was determined as follows: **Significant residual effects** are those that are predicted to cause a change in a VC that may alter its status or integrity beyond an acceptable level (e.g., where it is not sustainable or is unavailable to contribute to ecological function or cultural use). A residual effect that does not meet this criterion is considered **Not Significant**.

Confidence Level: A precautionary approach to the evaluation of residual effects was adopted for this assessment to recognize areas of uncertainty and subsequently using conservative assumptions. Where a high degree of uncertainty regarding a residual effect was evident, the Confidence Level in the assessment prediction was assessed as Low. A High Confidence Level was assigned to predictions that had direct, site-specific data to support the predictions or based on past experience (i.e., professional judgement).

14.1 Spatial and Temporal Scope

The Project area refers to the disturbed area of the Project and will be the primary focus of the assessment. For the purpose of this assessment, the Project area considers the maximum area to be used during the Project and, therefore, reflects the zone of influence of Project activities.

This area will include the ice road extension to connect the Site with the existing public ice road between Aklavik and Inuvik and the area of remediation at the Site (Figures A1 to A8, Appendix A). It excludes the portion of the existing public ice road between Aklavik and Inuvik.

The temporal scope of the Project is determined through the work schedule described in Section 6.4. The field program is anticipated to be executed both during winter months starting in December 2025 with ice road reconnaissance, the summer fall of 2026, and may take up to 16 weeks (ice road construction and remediation work) during the winter 2026 and up to 12 weeks during the summer of 2026 (continued remediation work [if required] and post-remedial groundwater monitoring well and thermistor installation). Post-remedial monitoring will be completed as day trips in the summer of 2027 and wood piling removal during the winter of 2028 may take up to 16 weeks.

Effects potentially lasting beyond the Project schedule were considered and it is anticipated that the potential for long-term effects are limited to the localized effects of the ground disturbance.

14.2 Selection of Valued Components

The VCs are environmental, cultural and/or social attributes considered important in project decisions.

For this PD, based on sensitivity to Project effects, their importance to Inuvialuit, and their territorial or national importance, VCs were chosen for each environmental and socio-economic component, as listed in Table R, to assist in the analysis of the potential effects as a result of the Project.

Table R: Project Environmental or Socio-economic Components and Corresponding Valued Components

Environmental or Socio-economic Component	Valued Component(s)
Soils and Terrain	Sensitive terrain Permafrost Soil quality
Vegetation	Vegetation communities
Wildlife and Wildlife Habitat	Polar bear Grizzly bear Wolverine Barren-ground caribou Migratory birds
Aquatic Resources	Water quality Fish and fish habitat
Traditional Land Use	Subsistence harvest

14.3 Soils and Terrain

The VCs for the soil and terrain component were selected based on their sensitivity to disturbance from the Project's activities. For the purpose of this effects assessment, soils and terrain are represented by three VCs:

- sensitive terrain;
- permafrost; and
- soil quality.

14.3.1 Sensitive Terrain

Sensitive terrain may be affected as a result of Project traffic (e.g., heavy equipment and pick-up trucks in winter) on the snowpack ramp that will be constructed to access the Site, and heavy equipment and pick-up truck activity for soil remediation at the Site. Potential Project effects may include soil compaction/disturbance (Table S).

The following mitigation measures will be implemented to avoid or minimize the potential for effects on sensitive terrain.

- Establish barge camp potentially anchored at the Site or a winter camp on land (on a compacted ice pad of a minimum thickness of 15 cm) or river ice.
- Use track-mounted or low ground-bearing heavy equipment where possible.
- Minimize overall vehicle use (trucks and heavy equipment) to the extent feasible and, where possible, travel around the Site on paths/trails that are either existing or established at the outset of the work.
- Keep travel to level terrain and avoid traversing steep slopes in mobile equipment/vehicles.
- Protect trails and work areas, as needed with wood and/or drill mats.
- Use snow to compact the ramp to the Site for the protection of underlying terrain to a minimum thickness of 15 cm. If required, use water to strengthen the ramp.
- Spread all snow berms created at the Site and level them at time of demobilization to allow the Site to drain.
- Minimize access to the shoreline by mobile equipment/vehicles (i.e., restrict to mobilization/demobilization).
- Recontour disturbed areas as part of reclamation activities.
- Locate office trailer, soil treatment area, fuel storage area and equipment/supplies staging area in previously disturbed areas of the Site, where possible.

It is anticipated that there may be residual effects of the Project on sensitive terrain. They are predicted to be of low magnitude, localized in their geographic extent, infrequent in their occurrence, of medium-term duration and fully reversible. Therefore, the effects are predicted to be Not Significant. The confidence level for this prediction is high.

14.3.2 Permafrost

The Mackenzie Delta is underlain by discontinuous to continuous permafrost with low to medium ice content. Short-term effects on permafrost are expected during the ex-situ thermal remediation of soils exceeding the proposed SQOs for PHCs. The treated soils will be used to backfill the excavation (once they meet proposed SQO criteria). Details on permafrost and permafrost protection are provided in the RAP (Appendix B) and in the Project-specific Permafrost Protection Plan (Appendix H) which will be implemented during all Project activities. Potential Project effects may include permafrost melting (Table S).

The following mitigation measures will be implemented to avoid or minimize the potential for effects on permafrost.

- Establish barge camp potentially anchored at the Site or a winter camp on land (on a compacted ice pad of a minimum thickness of 15 cm) or river ice.

- Locate office trailer, soil treatment area, fuel storage area and equipment/supplies staging area in previously disturbed areas of the Site, where possible.
- Use track-mounted or low ground-bearing heavy equipment where possible.
- Minimize overall vehicle use (trucks and heavy equipment) to the extent feasible and, where possible, travel around the Site on paths/trails that are either existing or established at the outset of the work.
- Keep travel to level terrain and avoid traversing steep slopes in mobile equipment/vehicles.
- Protect trails and work areas, as needed with wood and/or drill mats.
- Creating a thermal break beneath the ETC units to limit heat transfer to the underlying soil - this may involve placing polystyrene foam insulation (i.e., Blue Board), or an air gap (pipes buried in a gravel/fill pad or I-beams to create an elevated platform upon which the treatment units sit).
- Use snow to compact the ramp to the Site for the protection of underlying terrain to a minimum thickness of 15 cm. If required, use water to strengthen the ramp.
- Spread all snow berms created at the Site and level them at time of demobilization to allow the Site to drain.
- Minimize access to the shoreline by mobile equipment/vehicles (i.e., restrict to mobilization/demobilization).
- Recontour disturbed areas as part of reclamation activities.
- Excavation of soils with COC concentrations above the proposed SQOs will be completed in stages, limiting the duration of permafrost exposure.
- The permafrost at the base of the excavation will be insulated, as necessary, to limit deterioration if exposed during the summer. At a minimum, extruded polystyrene insulation (or soil) will be temporarily placed at the base of the excavation and topped with soil fill. Additional protection measures may be implemented as required.
- The successfully treated soil will be aerated or hydrated and quenched (summer only) as necessary, to reduce the temperature of the soil prior to using it to backfill the excavations.
- Clearing of vegetation (if required) will be limited to the area of the excavation, soil treatment cells and staging area. Vegetation and organic layer will protect the underlying permafrost outside the soil treatment areas.
- Prevent surface water from entering an open excavation, using grading, ditches or berms and prevent precipitation from entering the excavation, using tarps or other cover.
- Install pre- and post-remedial thermistors for thermal monitoring to evaluate pre-remediation baseline conditions and monitor post-remediation permafrost.
- The Permafrost Protection Plan (Appendix H) will be implemented during all phases of the Project.

It is anticipated that there may be residual effects of the Project on permafrost. They are predicted to be of moderate magnitude, localized in their geographic extent, frequent in their occurrence, of medium-term duration and partially reversible. Therefore, the effects are predicted to be Not Significant. The confidence level for this prediction is moderate.

14.3.3 Soil Quality

Shell is proposing remediating soil at a site that has been adversely affected by historical activities. This will contribute positively to the environmental conditions at and around the Site. Soil quality can be affected as a result of accidental spills of fuel or hazardous materials during Project activities. Appropriate regulatory agencies will be contacted immediately in the event of an emergency. In the event of a spill, the Spill Contingency Plan (Appendix E) will be implemented, and the NWT's 24-Hour Spill Report Line [(867) 920-8130] will be contacted for reportable quantities. Other safety, contingency and emergency response procedures will be followed, as outlined in the Spill Contingency Plan. This Project-specific Spill Contingency Plan contains information on spill containment procedures and all relevant contact information. In addition, equipment will be clean and free of oil and grease and maintained free of fluid leaks.

Potential Project effects may include spills/contamination (Table S).

The following mitigation measures will be implemented to avoid or minimize the potential for effects on soil quality.

- On-site fuel storage will consist of one double-walled fuel truck (18,200 L) and one fuel tank at the Site (100,000 L), potentially an integrated fuel tank on the barge (800,000 L) or 1,000 L fuel tanks for the winter camp generators.
- All storage containments will be securely stored in a designated bermed and lined storage area, 30 m from the ordinary high-water mark of the Arvoknar Channel, with the exception of fuel tanks (approximately 1,000 L each) for the potential winter camp generators (if on the river ice), or the integrated fuel tank (800,000 L) on the barge camp, potentially anchored at the Site.
- Spill kits will be located wherever fuel is stored or used.
- Portable drip trays and appropriately sized fuel transfer hoses will be used when refuelling motorized equipment.
- A designated fuel monitor will conduct daily visual inspections to check for leaks or damage to any fuel storage containment and refuelling equipment. Leaks or damage will be immediately addressed.
- Regular maintenance and checks of all motorized equipment will be undertaken to avoid preventable leaks.
- Drip trays will be placed under all equipment when not in use.
- If soils containing concentrations of CoCs above the proposed SQOs requires hauling to an off-site disposal location, soil will be placed in closed 1 m^3 mega sacks and staged temporarily in the secondary containment (i.e., fuel storage area) to prevent infiltration, runoff, and vertical migration of dissolved CoCs pending removal from site via winter road or barge. An internal berm will be constructed between the fuel tanks and the soil storage area to minimize the potential for spills within the bermed area impacting soils stored therein. The containment capacity of the bermed fuel storage area will be increased throughout the Project as required if the volume of materials stored within the secondary containment increases.
- Soils impacted by accidental spills during the Project will be treated by the on site ETC units. In the unlikely event that contaminated soils stored in the fuel storage area are impacted by a spill, the mega sacks will be cleaned with spill pads and/or re-bagged.

It is anticipated that there may be residual effects of the Project on soil quality. They are predicted to be of low magnitude, localized in their geographic extent, infrequent in their occurrence, of medium-term duration and fully reversible. Therefore, the effects are predicted to be Not Significant. The confidence level for this prediction is high. It is also anticipated that, upon Project completion, soil quality will be positively affected.

14.4 Vegetation

Selection of VCs for vegetation was based on ecosystem function and process, including soil protection, local and regional biodiversity, and provision of wildlife habitat. For the purpose of this effects assessment, vegetation is represented by one VC: vegetation communities (as there are no listed plants potentially occurring at the Site).

14.4.1 Vegetation Communities

Based on site observations, the vegetation within the Project area is dominated by willows and brush; however, previously disturbed areas of the Site are mostly free of vegetation. In areas of the Site less disturbed by past human activities and outside of the zone of routine flooding/sedimentation, vegetation is present. Limited disturbance to vegetation communities is expected as a result of the constructed snowpack ramp and associated traffic, and soil remediation at the Site.

Potential Project effects on vegetation may include (Table S):

- alteration/loss of habitat;
- damage/removal of vegetation; and
- introduction of invasive species.

The following mitigation measures will be implemented to avoid or minimize the potential effects on vegetation.

- Use track-mounted or low ground-bearing heavy equipment where possible.
- Minimize overall vehicle use (trucks and heavy equipment), and where possible, travel around the Site on paths/trails that are either existing or established at the outset of the work.
- Keep travel to level terrain and avoid traversing steep slopes in mobile equipment/vehicles.
- Protect trails and work areas, as needed with wood and/or drill mats.
- Clearing of vegetation (if required) will be limited to the area of the excavation, soil treatment cells and staging area. While a majority of the Site remains free of vegetation, care will be taken to minimize any additional unnecessary site clearing and cleared areas will be kept to a minimum.
- Use snow to compact the ramp to the Site for the protection of underlying vegetation to a minimum thickness of 15 cm. If required, use water to strengthen the ramp.
- Spread all snow berms created at the Site and level them at time of demobilization to allow the Site to drain.
- Locate office trailer, soil treatment area, fuel storage area and equipment/supplies staging area in previously disturbed areas of the Site, where possible. Locate potential winter camp (if on land) on a compacted ice pad of a minimum thickness of 15 cm) or on river ice.
- Travel with trucks and equipment on flat terrain, avoiding sensitive slopes and shorelines, where feasible.
- All equipment and vehicles will be cleaned of soil and seeds before mobilizing to the Site to avoid accidental introduction of invasive vegetation species.
- Recontour disturbed areas as part of reclamation activities to facilitate natural revegetation; additional revegetation measures (e.g., reseeding with a native seed mixture) may be implemented.

It is anticipated that there may be residual effects of the Project on vegetation communities. They are predicted to be of low magnitude, localized in their geographic extent, infrequent in their occurrence, of medium-term duration and fully reversible. Therefore, the effects are predicted to be Not Significant. The confidence level for this prediction is high.

14.5 Wildlife and Wildlife Habitat

Wildlife VCs were selected for the detailed Project effects assessment based on their likelihood of using the general Project area, sensitivity to Project effects, community importance and conservation status:

- polar bear;
- grizzly bear;
- wolverine;
- barren-ground caribou; and
- migratory birds.

Direct disturbance of wildlife VCs is expected to be minimal and primarily restricted to sensory (i.e., noise, olfactory and/or visual) disturbances. Wildlife habitat disturbances may occur as indirect habitat alteration via sensory disturbance (i.e., the effects of noise, light, dust and human presence on undisturbed adjacent habitats) or as direct habitat disturbance caused by vegetation clearing (if required) and on-site remediation activities. Winter and summer activities may overlap with the presence of wildlife VCs.

Potential Project effects on wildlife may include (Table S):

- sensory disturbance (all wildlife VCs);
- indirect habitat alteration (barren-ground caribou and migratory birds);
- direct habitat disturbance (barren-ground caribou and migratory birds); and
- negative human-animal encounters (polar bear, grizzly bear and wolverine).

The following mitigation measures will be implemented to avoid or minimize the potential effects on wildlife and wildlife habitat.

- Implement the Project-specific Wildlife Management and Monitoring Plan (Appendix C).
- Wildlife Monitors will continuously assess the proposed Project area and advise on any wildlife concerns.
- Wildlife Monitors will work in alternating shifts to ensure monitoring takes place during all work activities.
- If using a winter camp, a perimeter fence or, if a fence is not possible, night- and day-shift Wildlife Monitors will be used.
- Locate office trailer, soil treatment area, fuel storage area and equipment/supplies staging area in previously disturbed areas of the Site, where possible. Locate potential winter camp (if on land) on a compacted ice pad of a minimum thickness of 15 cm) or on river ice.
- Crews will keep the Site clean at all times, and food, attractants and waste will be temporarily stored in wildlife-proof containers and removed from the Site regularly as described in the Project-specific Waste Management Plan (Appendix D).

- Crews will be instructed to not feed or harass wildlife, and workers will not be allowed to hunt, trap or have dogs on the Project.
- Project activities will cease if bears or caribou are observed in proximity to the Site (i.e., within 500 m) or if wolverine are seen within 250 m of the Site; activities will only resume once the animals have left the area.
- Limit disturbance in potential nesting areas. Avoid any active nests by implementing species-specific setback distances as described in the Waste Management Plan (Appendix D).
- To mitigate potential effects on nesting bank swallows, follow ECCC's pamphlet on Bank swallow in sandpits and quarries (ECCC 2016; Appendix C of the Wildlife Management and Monitoring Plan [Appendix C]).
- The Migratory Bird Regulations (GOC 2022) and ECCC's Guidelines to Avoid Harm to Migratory Birds and Fact Sheet: Nest Protection Under the Migratory Birds Regulations (ECCC 2023a,b, internet site) will be reviewed and followed.
- On the ice road, wildlife will have the right of way at all times; speed limits will be implemented and communicated through signage.
- If wildlife is observed in proximity to the ice road, their location will be communicated to all Project staff.
- Implement all applicable ice road measures (in Section 6.3.2).
- Snowbanks along the ice road will not exceed 1 m in height and will have regular gaps (e.g., every 30 m) to avoid entrapment of crossing wildlife.
- The ice road will be abandoned at the end of the winter work to limit public access to the Site.
- Crews will receive bear awareness training and will follow the Project-specific Wildlife Management and Monitoring Plan including GNWT's Safety in Grizzly and Black Bear Country guidelines (GNWT ENR 2017).
- Helicopter transportation (during 2027 post-remedial monitoring activities) will follow all requirements in the GNWT guidelines for flying low (GNWT 2019), and the Canadian Aviation Regulations (2025) (e.g., adhere to flight altitudes, avoid hovering).

14.5.1 Polar Bear

Polar bears are designated as Special Concern by COSEWIC and are listed under Schedule 1 of the federal SARA as Special Concern (Table M). The species is also listed as Special Concern under the territorial *Species at Risk (NWT) Act* (Conference of Management Authorities 2024, internet site).

Polar bears in the NWT are distinguished into four subpopulations that are shared with Alaska, Yukon and Nunavut, and exact numbers for the NWT part of their ranges are difficult to estimate (NWT SARC 2021). Polar bears are restricted to areas with sea ice during summer months. During the winter months, polar bears of the Southern Beaufort Sea subpopulation (shared with Alaska and Yukon) may be using the general area around the Site and females may use maternity dens (e.g., in the Mainland Coastal Polar Bear Denning Areas [323C], TCCP 2016).

Climate-change-related losses in sea ice in the range of the Southern Beaufort Sea have been associated with declines in survival and reproduction in the Alaskan portion of their range. Evidence suggests that declines in sea ice habitat are also occurring in the NWT range, and this is likely negatively affecting polar bears of this subpopulation in the NWT (NWT SARC 2021).

The TCCP (2016) identifies Site 323C – Mainland Coastal Polar Bear Denning Areas as important for polar bear denning from October to March and Site 715C – Mackenzie River Delta Key Migratory Bird Habitat as important polar bear denning areas from November to April (Figures A6a and A6b, Appendix A).

The potential for negative bear-human encounters exists for the Project during the winter months (potentially resulting in injury or fatality on both sides). Stored fuels and chemicals as well as food and waste products can be attractive to bears and lead to negative encounters with humans. Additional potential adverse effects on polar bears that may be caused by the Project include sensory disturbance that may result in habitat avoidance.

Polar bears (or signs of polar bears) were not observed during any previous site visits.

The potential for negative bear encounters will be minimized using Wildlife Monitors. The Wildlife Monitors will patrol the Site thoroughly upon first arrival and on a continual basis during workdays to ensure that encounters are avoided. If bears (or signs of bears) are seen within 500 m of the Site, active work will cease temporarily until the animal moves out of the area and the Wildlife Monitor determines the work can proceed. Additionally, risks of bear encounters will be reduced through the maintenance of a clean work site, and the use of appropriate bear-proof containers for the temporary storage of food and waste. The Project-specific Waste Management Plan (Appendix D) will be implemented during all Project activities. Any helicopter site access (post-remedial monitoring) will follow applicable guidance (e.g., in the GNWT guidelines for flying low) (GNWT 2019) and the Canadian Aviation Regulations (2025) (e.g., adhere to flight altitudes, avoid hovering).

All personnel at the Site will receive bear awareness training and the Project-specific Wildlife Management and Monitoring Plan (Appendix C) will be implemented and reviewed daily.

It is anticipated that there may be residual effects of the Project on polar bears. They are predicted to be of low magnitude, localized in their geographic extent, infrequent in their occurrence, of short-term duration and fully reversible. Therefore, any effects that may occur are predicted to be Not Significant. The confidence level for this prediction is high.

14.5.2 Grizzly Bear

Grizzly bears are designated as Special Concern by COSEWIC and are listed under Schedule 1 of the federal SARA as Special Concern (Table M). The species has no status under the territorial *Species at Risk (NWT) Act* (Conference of Management Authorities 2024, internet site).

The TCCP (2016) describes grizzly bears as a furbearing species with important habitat in the Mackenzie Delta and along other major watercourses. Important denning habitat is known to occur in esker areas and on south-facing slopes. The TCCP (2016) identifies Site 322C – Critical Grizzly Bear Denning Areas and Site 715C – Mackenzie River Delta Key Migratory Bird Habitat as important habitat for grizzly bears from October to May (Figures A6a and A6b, Appendix A).

The range of grizzly bears in the NWT includes most of the mainland and their presence is increasing on Arctic islands. The estimated population size in the NWT is 4,000 to 5,000 bears (NWT SARC 2017a) with highest densities in the Mackenzie and Richardson mountains and lowest north of the treeline in the Mackenzie Delta, on the central barrens, and on Arctic islands (NWT SARC 2017a). Based on recent data, the grizzly bear population in the NWT appears to be stable and may be increasing in certain areas (NWT SARC 2017a).

The potential for negative bear encounters will be minimized using Wildlife Monitors. The Wildlife Monitors will patrol the Site thoroughly upon first arrival and on a continual basis during the workday to ensure that encounters are avoided. If bears (or signs of bears) are seen within 500 m of the Site, active work will cease temporarily until

the animal moves out of the area and the Wildlife Monitor determines the work can proceed. Additionally, risks of bear encounters will be reduced through the maintenance of a clean work site, and the use of appropriate bear-proof containers for the temporary storage of food and waste. The Project-specific Waste Management Plan (Appendix D) will be implemented during all Project activities. Any helicopter site access will follow applicable guidelines.

All personnel at the Site will receive bear awareness training and the Project-specific Wildlife Management and Monitoring Plan (Appendix C) will be implemented and reviewed daily.

It is anticipated that there may be residual effects of the Project on grizzly bears. Residual effects are predicted to be of low magnitude, localized in their geographic extent, infrequent in their occurrence, of short-term duration and fully reversible. Therefore, any effects that may occur are predicted to be Not Significant. The confidence level for this prediction is high.

14.5.3 Wolverine

Wolverine are designated as Special Concern by COSEWIC and are listed under Schedule 1 of the federal SARA as Special Concern (Table M). The species has no status under the territorial *Species at Risk (NWT) Act* (Conference of Management Authorities 2024, internet site).

The TCCP (2016) describes that wolverine fur is important for local use and wolverine play an important part in maintaining balanced ecosystems and identifies a key area for subsistence harvesting of wolverine during the winter (i.e., Winter Wolverine Harvesting Areas, Site 314C; Figure A6a, Appendix A).

Wolverines occur across most of the NWT except the High Arctic islands (NWT SARC 2014). They occur at low densities and the population in the ISR is considered to be stable; however, recent declines have been detected in the NWT central barrens and may be related to barren-ground caribou population declines (NWT SARC 2014).

Negative wolverine encounters are extremely rare, and the likelihood will be further minimized using Wildlife Monitors. The Wildlife Monitors will patrol the Site thoroughly upon first arrival and on a continual basis during the workday to ensure that encounters are avoided. If a wolverine is seen within 250 m of the Site, active work will cease temporarily until the animals move out of the area and the Wildlife Monitors determine that the work can safely proceed. Additionally, risks of wolverine encounters will be reduced through the maintenance of a clean work site, and the use of appropriate bear-proof containers for the temporary storage of food and waste. The Project-specific Waste Management Plan (Appendix D) will be implemented during all Project activities. Any helicopter site access will follow applicable guidelines.

All personnel at the Site will receive wildlife awareness training and the Project-specific Wildlife Management and Monitoring Plan (Appendix C) will be implemented and reviewed daily.

It is anticipated that there may be residual effects of the Project on wolverines. Residual effects are predicted to be of low magnitude, localized in their geographic extent, infrequent in their occurrence, of short-term duration and fully reversible. Therefore, any effects that may occur are predicted to be Not Significant. The confidence level for this prediction is high.

14.5.4 Barren-Ground Caribou

Barren-ground caribou are designated as Threatened by COSEWIC and are Under Consideration for Schedule 1 of the federal SARA (Table M). The species is also listed as Threatened under the territorial *Species at Risk (NWT) Act* (Conference of Management Authorities 2024, internet site).

Barren-ground caribou undergo seasonal migrations, often travelling long distances throughout the year (NWT SARC 2017b). Herds calve and summer in tundra habitats along the Arctic coast before migrating southwards in the fall to winter in areas below the treeline. Once spring arrives, herds migrate northwards back to their calving grounds (NWT SARC 2017b).

Calving grounds are an important habitat area for barren-ground caribou, with the calving/post-calving season considered a sensitive period (Nagy 2011). Other important seasons include the late summer and fall when barren-ground caribou (particularly females) regain their body condition to successfully breed, survive the winter, and/or calve the following spring, and the winter season, which barren-ground caribou spend below the treeline in areas where they can better survive harsh Arctic winters (Nagy 2011).

The TCCP (2016) describes that barren-ground caribou herds in the region are valued for subsistence harvest year-round.

The Tuktoyaktuk Peninsula Herd's year-round range is generally limited to the Tuktoyaktuk Peninsula (GNWT ECC 2024a, internet site). The herd was declining for several years; however, the size of the herd has increased recently and was estimated at approximately 3,000 animals in 2021 (GNWT ECC 2024b, internet site). Their traditional calving grounds are at the northern tip of the peninsula and the animals will migrate south in the fall. The likelihood of overlap with Project activities is minimal as the herd typically uses an area well east of the Project area.

The Cape Bathurst Herd utilizes the Cape Bathurst and Tuktoyaktuk peninsulas (GNWT ECC 2024a, internet site) east of the Mackenzie River. The herd's calving grounds are on the Cape Bathurst Peninsula (east of the Tuktoyaktuk Peninsula), and their winter range may include the most southern parts of the Tuktoyaktuk Peninsula. The herd's numbers have been increasing over the past decade and were estimated at approximately 4,900 animals in 2021 (GNWT ECC 2024b, internet site). It is assumed that the herd may potentially use the general Project area.

Mitigation measures for barren-ground caribou will include the use of Wildlife Monitors to conduct continuous patrols of the Site during the workdays to scout for any caribou (or signs of caribou) in the vicinity. If caribou are observed within 500 m of the Site, active work will cease temporarily until the animals move out of the area and the Wildlife Monitor determines the work can proceed. If vehicles travelling on the ice road encounter caribou, the traffic will stop and wait at least five minutes for the caribou to move off the ice road. If the caribou do not move off within five minutes, the vehicle can start moving slowly to encourage the caribou to move off the ice road. Vegetation disturbance will be limited to the extent practicable. Any helicopter site access will follow applicable guidelines.

It is anticipated that there may be residual effects of the Project on barren-ground caribou. They are predicted to be of low magnitude, localized in their geographic extent, infrequent in their occurrence, of medium-term duration, and fully reversible. Therefore, the effects are predicted to be Not Significant. The confidence level for this prediction is high.

14.5.5 Migratory Birds

As most of the birds found in and around the Mackenzie Delta are migratory, they will be wintering in southern locations during the winter months and may be using the Site and surrounding area for nesting, breeding and habitat during the summer months of the Project.

The TCCP (2016) identifies Sites 304C and 312C – considered a key area for subsistence hunting of geese in the spring and fall, respectively, Site 706E – Kendall Island Bird Sanctuary as valuable waterfowl breeding and

staging grounds within the outer Mackenzie Delta, and Site 715C – Mackenzie River Delta Key Migratory Bird Habitat considered an important nesting and breeding habitat for migratory birds from May to September (Figure A6b, Appendix A).

As ground-nesting birds, most waterfowl species may be affected directly by sensory disturbance (during the summer) and/or disturbance of nesting habitat, such as clearing or damage of vegetation or excavation of unvegetated areas (during winter and summer).

Clearing of vegetation is anticipated for the excavation and the immediate area needed to conduct the ex-situ thermal treatment. Direct disturbance or the loss or alteration of habitat resulting from the Project is predicted to be localized to the excavation and the immediate surrounding area. During the summer months, potential sensory disturbance may result in habitat avoidance.

Mitigation measures for birds will include the use of Wildlife Monitors to conduct continuous patrols of the Site during the workdays to scout for any birds (or signs of birds) in the vicinity. Personnel working on the Project will be made aware of the potential presence and conservation status of birds, in particular bank swallows and will be encouraged to consult ECCC's pamphlet on the bank swallow (ECCC 2016; Appendix C of the Wildlife Management and Monitoring Plan [Appendix C]). The Migratory Bird Regulations (GOC 2022) and ECCC's Guidelines to Avoid Harm to Migratory Birds and Fact Sheet: Nest Protection Under the Migratory Birds Regulations (ECCC 2023a,b, internet site) will be reviewed and followed. If active nests of any bird species are encountered within the Project area, they will be addressed through establishing a species-specific no disturbance buffer zone (i.e., a setback). The buffer zone will be determined using a setback distance appropriate for the species, the intensity of the disturbance, and the surrounding habitat until the young have naturally and permanently left the vicinity of the nest area. Any helicopter site access will follow applicable guidelines, including the following for birds.

- Avoid known concentrations of birds by a lateral distance of at least 1.5 km.
- Avoid the seaward side of seabird colonies and areas used by flocks of coastal migrating waterfowl by 3 km.
- Avoid excessive hovering or circling over areas of high bird concentrations.
- If avoidance is not possible, maintain a minimum flight altitude of 1,100 m over these areas.
- Inform pilots of these recommendations and of areas of high bird concentrations.

It is anticipated that there may be residual effects of the Project on migratory birds and their habitat. They are predicted to be of low magnitude, localized in their geographic extent, infrequent in their occurrence, of medium-term duration, and fully reversible. Therefore, the effects are predicted to be Not Significant. The confidence level for this prediction is high.

14.6 Aquatic Resources

The VCs for the aquatic resources component were selected based on their sensitivity to disturbance from the Project's activities. For the purpose of this effects assessment, aquatic resources are represented by two VCs:

- water quality; and
- fish and fish habitat.

Potential effects on aquatic resources may include (Table S):

- disturbance of sediment;
- increase in turbidity; and
- contaminant spills into nearby water bodies at the Site or on the ice road.

The following mitigation measures will be implemented to avoid or minimize potential effects on aquatic resources:

- Implement the Project-specific Spill Contingency Plan (Appendix E) and Emergency Response Plan (Appendix F). Keep spill response equipment easily accessible.
- Store fuel and hazardous materials in bermed, lined areas a minimum of 30 m from the ordinary high-water mark of the Arvoknar Channel, with the exception of fuel tanks (approximately 1,000 L each) for the potential winter camp generators (if located on the river ice) or the integrated fuel tank (800,000 L) on the barge camp (potentially anchored at the Site).
- Minimize overall vehicle use (trucks and heavy equipment), and where possible, travel around the Site on paths/trails that are either existing or established at the outset of the work.
- Limit traffic on steep slopes, wherever possible.
- Install erosion control measures, including silt fence, blankets, and mats as needed (as described in the Erosion and Sediment Control Plan (Appendix G).
- Maintain/install monitoring wells to allow for sampling and analysis of groundwater during and after remediation.
- Ponded water in topographic lows (including excavations) within the proposed construction area will be treated using an on-site water treatment system. Treated water will be sampled for laboratory analysis of CoCs prior to discharge to the terrestrial environment (minimum of 30 m from any waterbody), in line with any permit / licence conditions resulting from the Project's approval by regulatory authorities (i.e., discharge criteria in the future IWB Water Licence). Any treated water that does not meet the discharge criteria imposed by the IWB Water Licence will be stored in drums or tanks within the secondary containment area for off-site disposal at an approved facility.
- Implement speed limits on the ice road and limit public use to minimize auditory disturbance of fish.
- Implement DFO's Interim Code of Practice: End-of-pipe Fish Protection Screens for Small Water Intakes in Freshwater (DFO 2020) for water withdrawals during ice road construction and, if required during snowpack ramp construction.
- All snow berms created at the Site will be spread and levelled at time of demobilization to allow the Site to drain.
- Implement all applicable ice road measures (in Section 6.3.2).

14.6.1 Water Quality

Water quality may be affected from ice road construction and use, river transport by boat or barge and the remediation activities. There will be no instream remediation work at the Site. The remedial excavation is

anticipated to come within 10 m of the high-water mark at the time of the work; however, that portion of the excavation will be completed in winter under frozen conditions. The Erosion and Sediment Control Plan (Appendix G) will be implemented throughout the Project to mitigate any adverse effects from these activities. Boat and barge access to the Site during summer will be based on traditional site access procedures and the landing areas used in the past will be re-used (if present) or a landing area will be selected based on experience of the boat operator.

Accidental fuel spills at the Site, traffic accidents or leaks on the ice road and leaks from boats on the water have the potential to affect water quality. Drip trays and spill kits will be used for all refuelling activities in designated refuelling areas. Spill kits will be available on vehicles travelling the ice road and in boats traveling on the river and motors will be kept in good working order. The Spill Contingency Plan (Appendix E) will be implemented and made available to all staff and contractors working at the Site. This includes responses to spills on ice and snow, on the land under non-frozen conditions and in open water. Despite the above precautions, in the event of an accidental spill of a reportable quantity of fuel or hazardous material that is released into a waterbody, it will be immediately reported to the NWT 24-hour spill line.

It is anticipated that there may be residual effects of the Project on water quality. They are predicted to be of low magnitude, localized in their geographic extent, infrequent in their occurrence, of medium-term duration and fully reversible. Therefore, any effects that may occur are predicted to be Not Significant. The confidence level for this prediction is high.

14.6.2 Fish and Fish Habitat

The Mackenzie Delta is frequented by a large variety of anadromous and freshwater fish species using the area for different life stages. The potential water quality effects (Section 14.6.1) resulting from the ice road construction and use, river transport by boat or barge and the remediation activities could potentially affect the fish present in the area and their habitat.

Vehicle traffic on the ice road and boat/barge traffic on the river can potentially adversely affect fish through auditory disturbance. Mitigation measures to be used to limit potential effects on fish during Project activities include:

- Reduce traffic to necessary vehicles/boats and trips.
- Limit public use of the ice road.
- Implement speed limits on the ice road.

In addition, fish will be protected by following DFO's Measures to Protect Fish and Fish Habitat (DFO 2023), DFO's Interim Code of Practice: End-of-pipe Fish Protection Screens for Small Water Intakes in Freshwater (DFO 2020) during construction and maintenance of the ice road and remediation activities.

The TCCP (2016) identifies Site 718D – Central Mackenzie Estuary as being used extensively by feeding anadromous whitefish and as overwintering and nursery areas for a variety of fish (Figure A6a, Appendix A).

It is anticipated that there may be residual effects of the Project on fish and fish habitat. They are predicted to be of low magnitude, localized in their geographic extent, infrequent in their occurrence, of medium-term duration and fully reversible. Therefore, any effects that may occur are predicted to be Not Significant. The confidence level for this prediction is high.

14.7 Traditional Land Use

For the purpose of this effects assessment, traditional land use is represented by one VC: subsistence harvest.

14.7.1 Subsistence Harvest

Potential effects on subsistence harvest may include harvesting interference. The Site is on or near the Special Designated Lands listed in Section 11.0 that consider land, aquatic and marine resources important to the Inuvialuit (AICCP 2016; ICCP 2016; TCCP 2016).

The following mitigation measures will be implemented to avoid or minimize potential effects on subsistence harvest.

- Advise HTCs and CCs of Project schedule and any possible interference with traditional harvesting; and schedule meetings with Tuktoyaktuk, Inuvik and Aklavik HTCs and CCs.
- There will be effective communication between Project team, field crew members, Inuvialuit communities and other affected parties prior to, during and after the Project.

As described in Section 12.0 and Appendix K, past and ongoing consultations with the Aklavik, Tuktoyaktuk and Inuvik HTCs and CCs informed the communities of the Project, collected their input and feedback into Project approach and Shell will regularly inform them of all upcoming work and associated schedules that may affect harvesting activities in the general vicinity.

It is anticipated that there may be residual effects of the Project on subsistence harvest. They are predicted to be of low magnitude, localized in their geographic extent, infrequent in their occurrence, of medium-term duration and fully reversible. Therefore, any effects that may occur are predicted to be Not Significant. The confidence level for this prediction is high.

14.8 Effects and Mitigation Summary

The residual effects that may occur as a result of the Project were considered for all physical works and activities during the Project's life cycle. Effects were identified and assessed, taking into consideration applicable mitigation measures and standard practices.

Applicable mitigation measures have been identified to avoid or minimize adverse effects. Under the *Canadian Environmental Assessment Act* (2012), mitigation is defined as the measures for the elimination, reduction or control of adverse environmental effects of a project. Mitigation of adverse effects has been introduced at the Project design stage, and adverse effects will be avoided to the extent practical.

Table S provides a summary of potential Project effects on VCs, mitigation measures to be implemented to avoid or minimize those effects, the anticipated residual effects characteristics (i.e., after mitigation) and predicted significance.

Table S: Summary of Potential Effects, Proposed Mitigation, Residual Effect Characteristics and Predicted Significance

VC	Potential Effects	Proposed Mitigation	Residual Effect Characteristics	Predicted Significance
Sensitive terrain	Soil compaction /disturbance	■ Establish barge camp anchored at the Site or a winter camp on land (on a compacted ice pad of a minimum thickness of 15 cm) or river ice. ■ Use track-mounted or low ground-bearing heavy equipment where possible. ■ Minimize overall vehicle use (trucks and heavy equipment) to the extent feasible and, where possible, travel around the Site on paths/trails that are either existing or established at the outset of the work. ■ Use snow to compact the ramp to the Site for the protection of underlying terrain to a minimum thickness of 15 cm. If required, use water to strengthen the ramp. ■ Spread all snow berms created at the Site and level them at time of demobilization to allow the Site to drain. ■ Keep travel to level terrain and avoid traversing steep slopes in mobile equipment/vehicles. ■ Protect trails and work areas, as needed with wood and/or drill mats. ■ Minimize access to the shoreline by mobile equipment/vehicles (i.e., restrict to mobilization/demobilization). ■ Recontour disturbed areas as part of reclamation activities. ■ Locate office trailer, soil treatment area, fuel storage area and equipment/supplies staging area in previously disturbed areas of the Site, where possible. ■ Minimize overall truck and equipment use to the extent feasible.	■ low magnitude ■ localized geographic extent ■ infrequent occurrence ■ medium-term duration ■ fully reversible	Not significant
Permafrost	Permafrost melt	■ Establish barge camp anchored at the Site or a winter camp on land (on a compacted ice pad of a minimum thickness of 15 cm) or river ice. ■ Locate office trailer, soil treatment area, fuel storage area and equipment/supplies staging area in previously disturbed areas of the Site, where possible. ■ Minimize overall truck and equipment use to the extent feasible. ■ Use track-mounted or low ground-bearing heavy equipment where possible. ■ Minimize overall vehicle use (trucks and heavy equipment), and where possible, travel around the Site on paths/trails that are either existing or established at the outset of the work. ■ Keep travel to level terrain and avoid traversing steep slopes in mobile equipment/vehicles. ■ Protect trails and work areas, as needed with wood and/or drill mats. ■ Creating a thermal break beneath the ETC units to limit heat transfer to the underlying soil - this may involve placing polystyrene foam insulation (i.e., Blue Board), or an air gap (pipes buried in a gravel/fill pad or I-beams to create an elevated platform upon which the treatment units sit). ■ Use snow to compact the ramp to the Site for the protection of underlying terrain to a minimum thickness of 15 cm. If required, use water to strengthen the ramp.	■ moderate magnitude ■ localized geographic extent ■ frequent occurrence ■ medium-term duration ■ partially reversible	Not significant

VC	Potential Effects	Proposed Mitigation	Residual Effect Characteristics	Predicted Significance
		■ Spread all snow berms created at the Site and level them at time of demobilization to allow the Site to drain. ■ Minimize access to the shoreline by mobile equipment/vehicles (i.e., restrict to mobilization/demobilization). ■ Recontour disturbed areas as part of reclamation activities. ■ Excavation of soils with COC concentrations above the proposed SQOs will be completed in stages, limiting the duration of permafrost exposure. ■ The permafrost at the base of the excavation will be insulated, as necessary, to limit deterioration if exposed during the summer. At a minimum, extruded polystyrene insulation (or soil) will be temporarily placed at the base of the excavation and topped with soil fill. Additional protection measures may be implemented as required. ■ The successfully treated soil will be aerated or hydrated and quenched (summer only) as necessary, to reduce the temperature of the soil prior to using it to backfill the excavations. ■ Clearing of vegetation (if required) will be limited to the area of the excavation, soil treatment cells and staging area. Vegetation and organic layer will protect the underlying permafrost outside the soil treatment areas. ■ Prevent surface water from entering an open excavation, using grading, ditches or berms and prevent precipitation from entering the excavation, using tarps or other cover. ■ Install pre- and post-remedial thermistors for thermal monitoring to evaluate pre-remediation baseline conditions and monitor post-remediation permafrost. ■ The Project-specific Permafrost Protection Plan (Appendix H) will be implemented during all phases of the Project.		
Soil quality	Spills/contamination	■ Implement the Project-specific Spill Contingency Plan (Appendix E). ■ On-site fuel storage will consist of one double-walled fuel truck (18,200 L) and one double-walled fuel tank (100,000 L) at the Site, potentially an integrated fuel tank on the barge (800,000 L) or 1,000 L fuel tanks for the winter camp generators. ■ All storage containments will be securely stored in a designated bermed and lined storage area 30 m from the ordinary high-water mark of the Arvoknar Channel, with the exception of fuel tanks (approximately 1,000 L each) for the potential winter camp generators (if on the river ice). ■ Locate spill kits wherever fuel is stored or used. ■ Use portable drip trays and appropriately sized fuel transfer hoses when refuelling motorized equipment. ■ A designated fuel monitor will conduct daily visual inspections to check for leaks or damage to any fuel storage containment and refuelling equipment. Leaks or damage will be immediately addressed. ■ Regular maintenance and checks of all motorized equipment will be undertaken to avoid preventable leaks. ■ Place drip trays under all equipment when not in use.	■ low magnitude ■ localized geographic extent ■ infrequent occurrence ■ medium-term duration ■ fully reversible	Not significant

VC	Potential Effects	Proposed Mitigation	Residual Effect Characteristics	Predicted Significance
		■ If soils that do not meet the proposed SQOs (after treatment) require hauling to an offsite disposal location, place soil in closed 1 m^3 mega sacks and stage temporarily in the secondary containment (i.e., fuel storage area) to prevent infiltration, runoff, and vertical migration of dissolved CoCs pending removal from Site via winter road or barge. An internal berm will be constructed between the fuel tanks and the soil storage area to minimize the potential for spills within the bermed area impacting soils stored therein. The containment capacity of the bermed fuel storage area will be increased throughout the Project as required if the volume of materials stored within the secondary containment increases. ■ Soils impacted by accidental spills during the Project will be treated by the on site ETC units. In the unlikely event that contaminated soils stored in the fuel storage area are impacted by a spill, the mega sacks will be cleaned with spill pads and/or re-bagged.		
Vegetation communities	Alteration/loss of habitat; damage/removal of vegetation; introduction of invasive species	■ Use track-mounted or low ground-bearing heavy equipment where possible. ■ Minimize overall vehicle use (trucks and heavy equipment) to the extent feasible and, where possible, travel around the Site on paths/trails that are either existing or established at the outset of the work. ■ Keep travel to level terrain and avoid traversing steep slopes in mobile equipment/vehicles. ■ Protect trails and work areas, as needed with wood and/or drill mats. ■ Clearing of vegetation (if required) will be limited to the area of the excavation, soil treatment cells and staging area. ■ Use snow to compact the ramp to the Site for the protection of underlying vegetation to a minimum thickness of 15 cm. If required, use water to strengthen the ramp. ■ Spread all snow berms created at the Site and level them at time of demobilization to allow the Site to drain. ■ Locate office trailer, soil treatment area, fuel storage area and equipment/supplies staging area in previously disturbed areas of the Site, where possible. Locate potential winter camp (if on land) on a compacted ice pad of a minimum thickness of 15 cm) or on river ice. ■ Travel with trucks and equipment on flat terrain, avoiding sensitive slopes and shorelines, where feasible. ■ All equipment and vehicles will be cleaned of soil and seeds before mobilizing to Site to avoid accidental introduction of invasive vegetation species. ■ Recontour disturbed areas as part of reclamation activities to facilitate natural revegetation; additional revegetation measures (e.g., reseeding with a native seed mixture) may be implemented.	■ low magnitude ■ localized geographic extent ■ infrequent occurrence ■ medium-term duration ■ fully reversible	Not significant
Polar bear	Sensory disturbances; negative human-bear encounters	■ Implement the Project-specific Wildlife Management and Monitoring Plan (Appendix C). ■ Wildlife Monitors will continuously assess the proposed Project area and advise on any wildlife concerns. ■ Wildlife Monitors will work in alternating shifts to ensure monitoring takes place during all work activities.	■ low magnitude ■ localized geographic extent ■ infrequent occurrence ■ short-term duration ■ fully reversible	Not significant

VC	Potential Effects	Proposed Mitigation	Residual Effect Characteristics	Predicted Significance
Grizzly bear	Sensory disturbances; negative human-bear encounters	■ If using a winter camp (on land or river ice), a perimeter fence or night- and day-shift Wildlife Monitors will be used. ■ Locate office trailer, soil treatment area, fuel storage area and equipment/supplies staging area in previously disturbed areas of the Site, where possible. Locate potential winter camp (if on land) on a compacted ice pad of a minimum thickness of 15 cm) or on river ice. ■ Crews will keep the Site clean at all times, and food, attractants and waste will be temporarily stored in wildlife-proof containers and removed from the Site regularly as described in the Project-specific Waste Management Plan (Appendix D). ■ Crews will be instructed to not feed or harass wildlife, and workers will not be allowed to hunt, trap or have dogs on the Project. ■ Project activities will cease if bears or caribou are observed in proximity to the Site (i.e., within 500 m) or if wolverine are seen within 250 m of the Site; activities will only resume once the animals have left the area. ■ Limit disturbance in potential nesting areas. Avoid any active nests by implementing species-specific setback distances. ■ To mitigate potential effects on nesting bank swallows, follow ECCC's pamphlet on Bank swallow [*Riparia riparia*] in sandpits and quarries (ECCC 2016; Appendix C of the Wildlife Management and Monitoring Plan [Appendix C]). ■ The Migratory Bird Regulations (GOC 2022) and ECCC's Guidelines to Avoid Harm to Migratory Birds and Fact Sheet: Nest Protection Under the Migratory Birds Regulations (ECCC 2023a,b, internet site) will be reviewed and followed. ■ On the ice road, wildlife will have the right of way at all times; speed limits will be implemented and communicated through signage. ■ If wildlife is observed in proximity to the ice road, their location will be communicated to all Project staff. ■ Implement all applicable ice road measures (in Section 6.3.2). ■ Snowbanks along the ice road will not exceed 1 m in height and will have regular gaps (e.g., every 30 m) to avoid entrapment of crossing wildlife. ■ The ice road will be abandoned at the end of the winter work to limit public access to the Site. ■ Crews will receive bear awareness training and will follow the Project-specific Wildlife Management and Monitoring Plan including the GNWT's Safety in Grizzly and Black Bear Country guidelines (GNWT ENR 2017). ■ Helicopter transportation (during 2027 post-remedial monitoring activities) will follow all requirements in the GNWT guidelines for flying low (GNWT 2019) and the Canadian Aviation Regulations (2025) (e.g., adhere to flight altitudes, avoid hovering).	■ low magnitude ■ localized geographic extent ■ infrequent occurrence ■ short-term duration ■ fully reversible	Not Significant
Wolverine	Sensory disturbances; negative human-wolverine encounters		■ low magnitude ■ localized geographic extent ■ infrequent occurrence ■ short-term duration ■ fully reversible	Not Significant
Barren-ground caribou	Sensory disturbances; indirect habitat alteration; direct habitat disturbance		■ low magnitude ■ localized geographic extent ■ infrequent occurrence ■ short-term duration ■ fully reversible	Not significant
Migratory birds	Sensory disturbances; indirect habitat alteration; direct habitat disturbance		■ low magnitude ■ localized geographic extent ■ infrequent occurrence ■ medium-term duration ■ fully reversible	Not significant
Water quality	Disturbance of sediment / increase in turbidity / contaminant spills into nearby water bodies at the Site or on the ice road.	■ Implement the Project-specific Spill Contingency Plan (Appendix E) and Emergency Response Plan (Appendix F). Keep spill response equipment easily accessible. Store fuel and hazardous materials in bermed, lined areas a minimum of 30 m from the ordinary high-water mark of the Arvoknar Channel, with the exception of fuel tanks (approximately 1,000 L each) for the potential winter camp generators (if located on the river ice).	■ low magnitude ■ localized geographic extent ■ infrequent occurrence ■ medium-term duration	Not significant

VC	Potential Effects	Proposed Mitigation	Residual Effect Characteristics	Predicted Significance
		■ Minimize overall vehicle use (trucks and heavy equipment), and where possible, travel around the Site on paths/trails that are either existing or established at the outset of the work. ■ Limit traffic on steep slopes, wherever possible. ■ Install erosion control measures, including silt fence, blankets, and mats as needed (as described in the Project-specific Erosion and Sediment Control Plan (Appendix G). ■ Maintain/install monitoring wells to allow for sampling and analysis of groundwater during and after remediation activities. ■ Ponded water in topographic lows (including excavations) within the proposed construction area will be treated using an on-site water treatment system. Treated water will be sampled for laboratory analysis of CoCs prior to discharge to the terrestrial environment (minimum of 30 m from any waterbody), in accordance with discharge criteria in the future IWB Water Licence. ■ Implement speed limits on the ice road and limit public use to minimize auditory disturbance of fish. ■ Implement DFO's Interim Code of Practice: End-of-pipe Fish Protection Screens for Small Water Intakes in Freshwater (DFO 2020) for water withdrawals during ice road construction and, if required during snowpack ramp construction. ■ All snow berms created at the Site will be spread and levelled at time of demobilization to allow the Site to drain. ■ Implement all applicable ice road measures (in Section 6.3.2).	■ fully reversible	
Fish and fish habitat	Sensory and physical disturbances; habitat disturbances.		■ low magnitude ■ localized geographic extent ■ infrequent occurrence ■ medium-term duration ■ fully reversible	Not significant
Subsistence harvest	Harvesting interference	■ Advise HTCs and CCs of Project schedule and any possible interference with traditional harvesting; and schedule meetings with Tuktoyaktuk, Inuvik and Aklavik HTCs, CCs and Elders. ■ There will be effective communication between Project team, field crew members, Inuvialuit communities and other affected parties prior to, during and after the Project.	■ low magnitude ■ localized geographic extent ■ infrequent occurrence ■ medium-term duration ■ fully reversible	Not significant

15.0 CUMULATIVE EFFECTS

Cumulative effects refer to those effects resulting from the residual effects of the Project interacting with the residual effects of other past, present and reasonably foreseeable projects and activities on the selected VCs. When residual project effects interact spatially and temporally, their combined effects can result in cumulative effects on a VC. This section assesses if the anticipated residual effects from the proposed Project interact cumulatively with residual effects on the same VC resulting from past, present, and reasonably foreseeable projects and activities within and surrounding the Project area (as summarized in Table T). The Cumulative Effects Assessment (CEA) for the Project follows the guide for proponents developed for CEA in the ISR (Kavik-Axys Inc. 2002). The four steps to evaluate possible cumulative impacts are as follows.

1) Negative effects on VC should be determined. This step is based on the assessment of the proposed mitigation and anticipated environmental impacts, which included a prediction of the significance of the residual effects, as well as an assessment of the environmental or social consequence.

2) Determine whether these residual effects act cumulatively with the effects of other activities. For the Project effects to act cumulatively, there must be other human activities affecting the same VC. Two factors that are considered are the temporal and spatial scope of the activities. Typically, activities that interact in either scope are considered in a CEA.

3) Determine how the Project-specific effects contribute to the cumulative effects. This involves an analysis of the relevance of the interactions between activities.

4) Assess the need for further mitigation measures if the cumulative effects are anticipated to be significantly negative.

Potential Project-specific effects assessed on the selected VCs for the Project, as discussed in Section 14, completes Step 1 of the CEA. When considered individually, residual effects of this Project on each VC are predicted to be not significant. However, the identification of a residual effect indicates some possibility that negative cumulative effects may occur. The CEA must, therefore, consider these and potential effects from past, current, and reasonably foreseeable activities that may interact with the Project.

15.1 Past, Current and Potential Future Activities

Past, current and potential (reasonably foreseeable) future activities considered by this CEA, in addition to the Project, are listed in Table T below. Past activities include those that have occurred; current activities include those that are occurring or have been applied for/or approved; and reasonably foreseeable activities include those that are proposed or that are expected to occur.

Table T: Summary of Past, Current and Potential Future Site Activity

Date(s)	Description and Location
Past Activities	
Prior to 1972	No known development
1972 to 1993	Drilling and abandonment of exploratory well at the Site. Re-entered in 1996 for additional well abandonment activities. Site features included flare pit, well centre, drilling waste sump, camp sump and pilings (Komex/IEG 2005).
2002	Geophysical survey to map former drilling sump, and surface soil and water sampling (IEG 2009).

Date(s)	Description and Location
2004	Site visit and soil and surface water sampling (IEG 2009).
2007	Phase II ESA including soil, sediment, groundwater and surface water sampling at the Site (IEG 2007, 2009).
2010	Phase II ESA for delineation of impacts in soil at the Site (IEG 2012a).
2011	Remedial activities to excavate the flare pit, camp sump, and the drilling waste sump at the Site (IEG 2012b).
2012 and 2013	Groundwater monitoring and sampling at the Site (IEG 2012c; 2013).
2014 and 2015	Monitoring of shoreline erosion and maintenance activities at the Site (IEG 2015; 2016).
2016	Removal of exposed wood pilings and re-contouring shoreline at the Site (IEG 2017)
2019	Soil sampling, debris removal, monitoring well decommissioning at the Site (IEG 2020).
2021	Shoreline and wood piling survey and wood piling sampling at the Site (Golder 2022). Work at former wellsites by other companies.
2022	Soil, groundwater, surface water and sediment sampling at the Site (WSP 2023a). Work at former wellsites by other companies.
2023	Removal of 132 wood pilings and stockpile sampling at the Site (WSP 2023b). Work at former wellsites by other companies.
2024	Removal of 108 wood pilings and soil, surface water and sediment sampling at the Site (WSP 2024a,b). Work at former wellsites by other companies.
Current Activities	
2025	Staged summer and winter ESAs at Shell's former wellsites in the ISR. Work at former wellsites by other companies.
Potential Future Activities	
2025 to 2026	Proposed ice road construction and on-site remediation at the Site. Staged summer and winter ESAs at Shell's former wellsites in the ISR. Work at former wellsites by other companies.
2026 to 2030	Post remedial monitoring and wood pilling removal at the Site. Staged summer and winter ESAs at Shell's former wellsites in the ISR. Work at former wellsites by other companies.

15.2 Interaction of Activities

Step 2 of the CEA, the determination of the possible interaction of activities in the area and the potential for cumulative effects, is determined by comparing the spatial and temporal scope of the known activities. The relevance of this interaction is assessed using a qualitative approach, which uses best professional judgment of experienced environmental assessment specialists, supplemented by available data and community knowledge.

It is generally assumed that the analysis of any spatial interaction of activities is useful only in the case of temporal interaction. The analysis of temporal interactions of other current and reasonably foreseeable activity on the area considers the effects conservatively. This approach assumes that, if logical, the current and reasonably foreseeable activities may be considered to interact temporally.

Spatial interaction is indicated by any activities that overlap or are adjacent. Generally, the zone of influence (the distance from an activity in which an effect on a VC is measurable) of Project activities is along the ice road (Figure A2, Appendix A) and within the area of the proposed remediation (Figure A5, Appendix A) and adjacent to the Arvoknar Channel.

15.2.1 Possible Project Interactions

Use of the Site for oil and gas exploration resulted in site features including a well centre, a drilling waste sump, a camp sump, a drilling flare pit, a former fuel storage area and/or wood pilings used to support surface infrastructure above the ground. The Project is not expected to result in any further significant effects on any identified VCs. Therefore, interaction between the Project and the past activities is not expected to contribute to cumulative effects at the previously disturbed Site.

15.2.2 Positive Effects of Project

Shell is proposing remediating soil at a site that has been adversely affected by historical activities. This will contribute positively to the environmental conditions in and around the Site, with Project-specific mitigation measures so that VCs such as soil, permafrost, vegetation communities, polar bears, grizzly bears, wolverines, caribou, migratory birds, water quality, fish and fish habitat, and traditional land use are protected from any future negative impacts.

15.3 Potential Cumulative Effects

The determination of potential cumulative effects, comprising Step 3 of the CEA, involves an analysis of the Project-specific effects using the VCs to assess the significance of any cumulative effects. Project VCs were organized according to the environmental components described in Section 14.0. The same effects criteria and levels for determining significance as described in Section 14.0 were used to assess cumulative effects and results are provided in Table U.

15.3.1 Soils and Terrain

Site-specific disturbances to terrain and soils in the Project area are predicted to be localized and affect mostly previously disturbed areas. Residual effects on sensitive terrain, permafrost and soil quality resulting from the Project, in combination with residual effects of other past, present and reasonably foreseeable future projects, are expected to result in cumulative effects that are Not Significant and will enhance soil quality at the Site.

15.3.2 Vegetation

The Project area is dominantly vegetated by willows and brush; however, the Site itself is mostly free of vegetation. Limited disturbance to vegetation communities is expected in the area of the excavations, immediate area needed to conduct the ex-situ thermal treatment, and where trucks and equipment travel on the Site.

Residual effects from the Project on vegetation communities, in combination with residual effects of other past, present and reasonably foreseeable future projects, are expected to result in cumulative effects that are Not Significant.

15.3.3 Wildlife and Wildlife Habitat

Wildlife species may be subjected to temporary, low-level sensory disturbances through use of heavy equipment and other Project activities. By using Wildlife Monitors, maintaining clean work area conditions, ceasing active work temporarily when caribou, bears, or wolverines are observed, and following vegetation mitigation measures to protect wildlife habitat, residual effects from the Project, in combination with residual effects of other past,

present and reasonably foreseeable future projects, are expected to result in cumulative effects that are Not Significant.

Migratory birds and their habitat may be adversely affected by sensory disturbance, and the removal and/or damage of vegetation, as a result of Project activities. Through avoiding the disturbance of active nesting areas and implementing wildlife specific mitigation measures, residual effects from the Project on migratory birds, in combination with residual effects of other past, present and reasonably foreseeable future projects, are expected to result in cumulative effects that are Not Significant.

15.3.4 Aquatic Resources

Accidental fuel spills at the Site, traffic accidents or leaks on the ice road or river have the potential to affect water quality. Implementation of the Spill Contingency Plan (Appendix E) and Emergency Response Plan (Appendix F) are expected to reduce the potential of accidental spills and if they should occur despite the precautions, they will be dealt with appropriately. With the implementation of these plans and other proposed mitigation measures for aquatic resources, it is predicted that residual effects from the Project on water quality, in combination with residual effects of other past, present and reasonably foreseeable future projects, will result in cumulative effects that are Not Significant.

Fish and fish habitat in the Mackenzie River East Channel and Arvoknar Channel may be adversely affected by ice road construction and use (during winter) and boat/barge access (during summer) and remediation activities as part of the Project. The remedial excavation is anticipated to come within 10 m of the high-water mark at the time of the work, however that portion of the excavation will be completed in winter under frozen conditions. Adverse effects from vehicle traffic on the ice road (in winter) will be mitigated by reducing traffic, limiting public use, imposing speed limits and spill response actions as per the Spill Contingency Plan (Appendix E). In addition, DFO's Interim Code of Practice: End-of-pipe Fish Protection Screens for Small Water Intakes in Freshwater (DFO 2020) will be followed during construction and maintenance of the ice road extension, snowpack ramp, and remediation activities. Adverse effects from the Project on fish and fish habitat, in combination with residual effects of other past, present and reasonably foreseeable future projects, are expected to result in cumulative effects that are Not Significant.

15.3.5 Traditional Land Use

The Project will be taking place during the winter and summer months and the Site is in or near the Special Designated Lands listed in Section 11.0. The Tuktoyaktuk, Inuvik and Aklavik HTCs and CCs will be informed of Project activities including anticipated start-up and end dates to avoid potential disturbance or disruptions of subsistence harvest activities and no cumulative effects on traditional land use are predicted as a result of the Project.

15.4 Mitigation of Cumulative Effects

Cumulative effects are predicted to be Not Significant; therefore, no additional mitigation measures are required. However, if residual effects of the Project are later considered to be contributing to cumulative effects (e.g., as identified through anticipated monitoring) adaptive management will be applied. These initiatives would be coordinated with regulators and potentially affected communities, as applicable.

15.5 Summary of Cumulative Effects

Table U below summarizes the assessed cumulative effects of the Project and their predicted significance. Incremental environmental disturbance effects may occur at the Site as a result of the interaction of individual

activities with the existing environment. The anticipated limited adverse effect of the proposed Project, in combination with past, current and reasonably foreseeable activities, is predicted to result in no significant cumulative effects. Additional mitigation is not considered to be practical or feasible.

Table U: Summary of Assessed Project Cumulative Effects and Predicted Significance

CEA Steps	Step 1		Step 2		Step 3		Step 4
VC	Project-specific effects		Possible interaction with other activities		Potential Cumulative Effects		Additional mitigation
	Anticipated residual effects	Predicted significance	Spatial	Temporal	Anticipated residual effects	Predicted significance	
Soils and Terrain							
Sensitive terrain	▪ low magnitude ▪ localized geographic extent ▪ infrequent occurrence ▪ medium-term duration ▪ fully reversible	Not significant	Expected	Expected	▪ low magnitude ▪ localized geographic extent ▪ infrequent occurrence ▪ medium-term duration ▪ fully reversible	Not significant	None
Permafrost	▪ moderate magnitude ▪ localized geographic extent ▪ frequent occurrence ▪ medium-term duration ▪ partially reversible	Not significant	Expected	Expected	▪ moderate magnitude ▪ localized geographic extent ▪ frequent occurrence ▪ medium-term duration ▪ partially reversible	Not significant	None
Soil quality	▪ low magnitude ▪ localized geographic extent ▪ infrequent occurrence ▪ medium-term duration ▪ fully reversible	Not significant	Expected	Expected	▪ low magnitude ▪ localized geographic extent ▪ infrequent occurrence ▪ medium-term duration ▪ fully reversible	Not significant	None
Vegetation							
Vegetation communities	▪ low magnitude ▪ localized geographic extent ▪ infrequent occurrence ▪ medium-term duration ▪ fully reversible	Not significant	Expected	Expected	▪ low magnitude ▪ localized geographic extent ▪ infrequent occurrence ▪ medium-term duration ▪ fully reversible	Not significant	None

CEA Steps	Step 1		Step 2		Step 3		Step 4
Wildlife							
Polar bear Grizzly bear Wolverine	▪ low magnitude ▪ localized geographic extent ▪ infrequent occurrence ▪ short -term duration ▪ fully reversible	Not significant	Expected	Expected	▪ low magnitude ▪ localized geographic extent ▪ infrequent occurrence ▪ short -term duration ▪ fully reversible	Not significant	None
Barren-ground caribou	▪ low magnitude ▪ localized geographic extent ▪ infrequent occurrence ▪ medium-term duration ▪ fully reversible	Not significant	Expected	Expected	▪ low magnitude ▪ localized geographic extent ▪ infrequent occurrence ▪ medium-term duration ▪ fully reversible	Not significant	None
Migratory birds	▪ low magnitude ▪ localized geographic extent ▪ infrequent occurrence ▪ medium-term duration ▪ fully reversible	Not significant	Expected	Expected	▪ low magnitude ▪ localized geographic extent ▪ infrequent occurrence ▪ medium-term duration ▪ fully reversible	Not significant	None
Aquatic Resources							
Water quality	▪ low magnitude ▪ localized geographic extent ▪ infrequent occurrence ▪ medium -term duration ▪ fully reversible	Not significant	Expected	Expected	▪ low magnitude ▪ localized geographic extent ▪ infrequent occurrence ▪ medium -term duration ▪ fully reversible	Not significant	None
Fish and fish habitat	▪ low magnitude ▪ localized geographic extent ▪ infrequent occurrence ▪ medium-term duration ▪ fully reversible	Not significant	Expected	Expected	▪ low magnitude ▪ localized geographic extent ▪ infrequent occurrence ▪ medium-term duration ▪ fully reversible	Not significant	None

CEA Steps	Step 1		Step 2		Step 3		Step 4
Traditional Land Use							
Subsistence harvesting	▪ low magnitude ▪ localized geographic extent ▪ infrequent occurrence ▪ medium-term duration ▪ fully reversible	Not significant	Not expected	Not expected	n/a	n/a	None

Note: n/a = Not applicable as no cumulative effect is expected

16.0 ASSESSMENT OF GREENHOUSE GAS EMISSIONS

The anticipated greenhouse gas emitted by the proposed Project can be divided into two groups: direct sources and indirect sources. Direct sources include equipment (ETC equipment, environmental drilling rig), vehicles (pickup trucks, water, sewage and fuel trucks, excavators, loaders, helicopter, boat), ice road construction (snowcat, graders, plow trucks), camp and camp operations. Table V below summarizes direct sources of greenhouse gas emissions for the Project and rough estimates of the emissions for one winter and summer field season and wood piling removal.

Table V: Direct Sources of Greenhouse Gas Emissions for the Project

Source	Estimated Fuel Burn (L) per Day	Location	Duration (Day)	Fuel Type	Emission Factor	Estimated CO2-e Emission (T)	Notes
Calculation	B		D		F	B * D * F	
Winter Mobilization							
Ice Road Construction & Maintenance	4,120	Inuvik to Site	60	Diesel	0.00268	662	Equipment: a, b, c, f
Equipment to-from Site	500	Inuvik & Calgary to Site	44	Diesel	0.00268	59	Equipment: f
Transport fuel to Site	500	Inuvik to Site	26	Diesel	0.00268	35	Equipment: f
Remediation							
Drill Rig	200	Site	5	Diesel	0.00268	3	Equipment: j
Excavators, Loaders, Skid Steers	2,432	Site	60	Diesel	0.00268	391	Equipment: d, e, f
ECT - Fuel	6,500	Site	60	Diesel	0.00268	1045	Process fuel estimate 770 m^3 diesel
Equipment Fuel to Site	500	Inuvik to Site	10	Diesel	0.00268	13	Equipment: f

Source	Estimated Fuel Burn (L) per Day	Location	Duration (Day)	Fuel Type	Emission Factor	Estimated CO2-e Emission (T)	Notes
Barge or Winter Camp	250	Site	100	Diesel	0.00268	67	Accommodation for up to 35 people
Hotel Nights	n/a	Inuvik	60	n/a	0.0075	0.5	Arrival and departure for crew rotations
Air Transport (km)	5000	Base to Inuvik	30	Jet-A	0.00015	23	Average 5000 km
Off-site Disposal - Calculated for 100 m^3 of soil[1]							
Excavators, Loaders, Skid Steers	1216	Site	5	Diesel	0.00268	16	Equipment: c, d, e
Trucks	500	Site to Alberta	40	Diesel	0.00268	54	Equipment: f
Summer Mobilization							
Drill Rig	200	Site	5	Diesel	0.00268	3	Equipment: j
Equipment Fuel to Site	500	Inuvik to Site	1	Diesel	0.00268	1	Equipment: f
Crew Boat	250	Inuvik to Site	14	Diesel	0.00268	9	Equipment: h
Barge Camp	250	Site	100	Diesel	0.00268	67	Accommodation for up to 35 people
Hotel Nights	n/a	Inuvik	60	n/a	0.0075	0.5	Arrival and departure for crew rotations
Air Transport (km)	5,000	Base to Inuvik	30	Jet-A	0.00015	23	Average 5000 km
Wood Piling Removal							
Ice Road Construction & Maintenance	4,120	Inuvik to Site	60	Diesel	0.00268	662	Equipment: a, b, c, f
Drill Rig	200	Site	60	Diesel	0.00268	32	Equipment: j
Winter Camp	250	Site	100	Diesel	0.00268	67	Accommodation for up to 35 people
Equipment to-from Site	500	Inuvik to Site	4	Diesel	0.00268	5	Equipment: f
Excavators, Loaders, Skid Steers	1,216	Site	60	Diesel	0.00268	196	Equipment: d, e, f
Equipment Fuel to Site	500	Inuvik to Site	5	Diesel	0.00268	7	Equipment: f
Hotel Nights	n/a	Inuvik	60	n/a	0.0075	0.5	Arrival and departure for crew rotations
Air Transport	5000	Base to Inuvik	30	Jet-A	0.00015	23	Average 5000 km

Source	Estimated Fuel Burn (L) per Day	Location	Duration (Day)	Fuel Type	Emission Factor	Estimated CO2-e Emission (T)	Notes
Miscellaneous Emissions	n/a	n/a	n/a	n/a	25%	866	25% misc emissions, additional mobilization events, light vehicles (ARGO/SHERP, pick-up trucks), office trailer, heater, etc.
Total						**4,330**	**Total CO_2-e emissions estimate**

Note:

[1]Calculated for 100 m^3 of soil transported from the Site to an Alberta landfill. Possible additional soil volumes for transportation unknown at this time.

Assumptions:

Kilograms of CO2-e Emitted	Notes	Source
2.68	per L of diesel burned	autolexicon.net, https://www.canada.ca/en/environment-climate-change/services/climate-change/pricing-pollution-how-it-will-work/output-based-pricing-system/federal-greenhouse-gas-offset-system/emission-factors-reference-values.html Table 4
0.15	per passenger km	ourworldindata.org, https://www.icao.int/environmental-protection/Carbonoffset/Pages/default.aspx
7.5	per hotel-camp night	circularecology.com

Equipment (or equivalent)	Diesel Combustion (L per day)	Source
(a) Cat 14G	840	Ritchie Specs (https://www.ritchiespecs.com/) – assume 10 hours working, 14 hours idle operation
(b) Cat D6M	680	Ritchie Specs (https://www.ritchiespecs.com/) – assume 10 hours working, 14 hours idle operation
(c) Cat 928	380	Ritchie Specs (https://www.ritchiespecs.com/) – assume 10 hours working, 14 hours idle operation
(d) Cat 320	656	Ritchie Specs (https://www.ritchiespecs.com/) – assume 10 hours working, 14 hours idle operation
(e) Cat 246	180	Ritchie Specs (https://www.ritchiespecs.com/) – assume 10 hours working, 14 hours idle operation
(f) Kenworth T800 & T880	500	Ritchie Specs (https://www.ritchiespecs.com/) – assume 12 hours working, 12 hours idle operation
(g) Delta Eagle River Tugboat	1,500	E. Gruben's Transport Ltd.
(h) Dennie Lennie - Crew Boat	250	E. Gruben's Transport Ltd.

Equipment (or equivalent)	Diesel Combustion (L per day)	Source
(i) Helicopter E135	1400	https://www.exclusiveaircraft.co.uk/sites/default/files/brochure/Eurocopter-EC135-Brochure_0.pdf,
(j) Environmental drill rig Marl M10	200	20 L per hour for 10 hours a day

Notes:
CO_2-e – carbon dioxide equivalent
kg – kilogram
km – kilometre
L – litres
m^3 – cubic metres
NAPL – non-aqueous phase liquid
T – tonnes
n/a – not applicable

To achieve (and potentially reduce) these estimates, the following mitigation measures will be implemented.

- Use an experienced crew.
- Turn off equipment and engines when not in use.
- Limit time of equipment use to what is necessary.
- Limit the number of people at the Site to what is necessary.
- Use efficient heating systems.
- Limit duration of Project to what is necessary by following detailed execution plan.

Indirect sources of greenhouse gas emissions for the Project include cargo shipments and laboratory services. Indirect sources of greenhouse gases will be mitigated by limiting travel and shipment of cargo and use of laboratory services to only what is necessary.

17.0 PROPOSED MITIGATION MEASURES TO ADDRESS POTENTIAL EFFECTS

A variety of proposed mitigation measures to address potential adverse environmental effects and adverse effects on subsistence harvesting have been proposed and are described throughout the previous sections of this PD, in particular in Sections 7.0 and 14.0. In summary, the following key mitigation measures will be implemented during all Project-related activities.

- Construct the ice road using best management practices (Project-specific ice-road engineered design plans and quality assurance and quality control plans) and build up the snow cover (and supplement with ice if required) on the snowpack ramp to protect underlying vegetation and terrain.
- A barge camp may be anchored at the Site in the later summer or early fall of 2025, or a winter camp may be located on land (on a compacted ice pad of a minimum thickness of 15 cm) or on river ice to house crews and

serve as a staging area during the winter scope of work; an office trailer, fuel storage area and equipment/supplies staging area will be in previously disturbed areas of the Site, where possible.

- Clearing of vegetation (if required) will be limited to the area of the excavation, soil treatment cells and staging area. Vegetation and organic layer will protect the underlying permafrost outside the soil treatment areas.
- Use of trucks and heavy equipment will be restricted, where possible, to flat terrain, avoiding sensitive slopes on land.
- Protect trails and work areas, as needed with wood and/or drill mats.
- Creating a thermal break beneath the ETC units to limit heat transfer to the underlying soil - this may involve placing polystyrene foam insulation (i.e., Blue Board), or an air gap (pipes buried in a gravel/fill pad or I-beams to create an elevated platform upon which the treatment units sit).
- Shorelines will be avoided wherever possible, except as required to complete the work and the site access ramp.
- Inuvialuit Wildlife Monitors will be present during the completion of the Project, and the Project-specific Wildlife Management and Monitoring Plan (Appendix C) will be implemented.
- Clean work areas will be maintained with appropriate wildlife-proof temporary waste storage and regular removal of waste for disposal at approved facilities in accordance with the Project-specific Waste Management Plan (Appendix D).
- The fuel storage area and refuelling areas will be bermed and lined at least 30 m away from the ordinary high-water mark of the Arvoknar Channel, with the exception of fuel tanks for the potential winter camp generators (if on the river ice) or the integrated fuel tanks on the barge camp (potentially anchored at the Site).
- Drip trays or secondary containment will be used at fuel storage and refuelling areas to contain any drips or accidental spills.
- Drip trays will be placed under all vehicles and equipment when not in use.
- Helicopter transportation (during 2027 post-remedial monitoring activities) will follow all requirements in the GNWT guidelines for flying low (GNWT 2019) and the Canadian Aviation Regulations (2025) (e.g., adhere to flight altitudes, avoid hovering).
- If active bird nests are encountered, a species-specific no-disturbance buffer area will be established until the nest has been abandoned.
- Should suspected heritage resources be found during Project activities, work will cease in the immediate vicinity and regulators and the PWNHC will be notified.
- The Project-specific Spill Contingency Plan (Appendix E), Emergency Response Plan (Appendix F), Erosion and Sediment Control Plan (Appendix G), Permafrost Protection Plan (Appendix H) and Reclamation, Closure and Monitoring Plan (Appendix I) will be implemented and made available to all staff.
- Advise HTCs and CCs of Project schedule and any possible interference with subsistence harvesting; and schedule meetings with Tuktoyaktuk, Inuvik and Aklavik HTCs and CCs.
- There will be effective communication between Project team, field crew members, Inuvialuit communities and other affected parties prior to, during and after the Project.

- All mitigation measures described in this PD will be implemented and terms and conditions of regulatory authorizations will be adhered to.

18.0 CLEAN-UP, RECLAMATION, DISPOSAL AND/OR DECOMMISSIONNING PLANS

Shell's objective for the Project is the excavation and on-site treatment of soil with PHC CoC concentrations above the proposed SQOs and the off-site disposal of an estimated 100 m^3 of soils containing barite barium at concentrations above the proposed SQOs at the Site. At this stage of the Project, no additional clean-up of the previously disturbed areas is expected to occur. Actions following the remediation activities are expected to consist of removing all equipment and generated wastes from the Site and the grading and recontouring of the excavated areas to facilitate natural revegetation. Waste management and disposal procedures for waste streams generated through this proposed Project are provided in the Waste Management Plan (Appendix D). Reclamation of the remediated area will be completed as outlined in the Reclamation, Closure and Monitoring Plan (Appendix I).

Spill and emergency response and reporting procedures are addressed in the Spill Contingency Plan (Appendix E) and Emergency Response Plan (Appendix F), respectively.

All areas will be inspected prior to final personnel and equipment demobilization to ensure equipment and waste materials have been removed from the Site.

Future monitoring (such as groundwater and permafrost monitoring) is anticipated and will be completed as required through the regulatory process (e.g., the terms and conditions of the IWB Water Licence and the ECC Land Use Permit) and as proposed in the RAP (Appendix B) and the Reclamation, Closure and Monitoring Plan (Appendix I) to record and report on the progress of site conditions.

19.0 OTHER ENVIRONEMENTAL SITE ASSESSMENTS

Previous assessments at the Site include an initial assessment in 1975, several ESAs, soil remediation, and post-remedial ESA and wood piling removal projects between 2002 and 2024.

2002: Surface soil and water samples were collected for salinity analysis, the results of which indicated that the soil had elevated chloride and sodium concentrations compared to the background, and that surface water total dissolved solid (TDS) and chloride concentrations exceeded the selected guideline for drinking water. The drilling waste sump exhibited several depressions and elevated electrical conductivity (EC) (IEG 2009).

2004: Additional sampling and analysis indicated elevated EC values for soil samples from the pond adjacent to the drilling waste sump which exceeded the Canadian Council of Ministers of the Environment (CCME) Parkland soil guideline; chloride concentrations were elevated in soil samples from the flare pit (IEG 2009).

2007: A Phase II ESA identified that PHC concentrations which exceeded the historically applied CCME and/or GNWT guidelines for parkland use in soil samples collected from east of the well centre (the drilling waste sump area) and northern lease boundary. The soil salinity analytical results indicated exceedances of EC and sodium adsorption ratio (SAR) compared to generic CCME guidelines; concentrations of barium and other metals in soil samples were also above the generic CCME guidelines; pH was elevated compared to the CCME criteria range; and chloride, sodium and potassium concentrations were elevated compared to the background range. Concentrations of toluene, TDS, pH, aluminum, arsenic, cadmium, chromium, copper, iron, lead and nickel exceeded generic CCME guidelines for groundwater (IEG 2007, 2009).

2010/2011: A supplemental Phase II ESA was conducted in 2010 to delineate the impacted areas that were identified in 2007 (IEG 2012a) and in 2011, soil exceeding parameters was excavated from the camp sump, drilling waste sump and flare pit, transported off site and disposed of at the Northern Rockies Landfill in Fort Nelson, British Columbia.

2013: Groundwater was sampled from one of the ten monitoring wells on the Site, as the remaining ones were damaged, dry or could not be located. Concentrations of chloride, cadmium, copper, iron, selenium, silver and zinc exceeded generic guidelines applied at the time. The analytical results for soil samples collected from two boreholes (advanced into the backfill material in the former drilling waste sump) exceeded the generic EC guideline, and the sulphate concentrations in the samples were greater than concentrations in the background samples. Soil samples collected from north of the remediated drilling waste sump had concentrations of EC and SAR greater than the generic guidelines applied at the time (IEG 2012c; 2013).

2014, 2015, 2016: Evidence of erosion was observed at the backfilled drilling waste sump, and the shoreline bounding the south side of the Site was extensively eroded (approximately 20 m) since 2011. Site maintenance in 2014 included the planting of willow stakes along the riverbank and reseeding sparsely vegetated areas with a native seed mix (IEG 2015). Site maintenance in 2015 included decommissioning of nine monitoring wells and existing thermistors (IEG 2016). In 2016, exposed wood pilings were removed (IEG 2017).

2019: Remaining monitoring wells were decommissioned. Soil samples were collected from nine borehole locations for PHCs analysis. The concentration of PHC in the analyzed soil samples were less than the generic guidelines applied at the time (IEG 2020).

2021: Sampled 12 wood pilings for analysis of PHCs, PAHs, preservatives and polychlorinated biphenyls to confirm if the wood pilings were treated to determine disposal options (Golder 2021). PHC concentrations in seven wood samples and chromium concentration in one wood sample were greater than the generic GNWT guideline for soil (Golder 2021).

2022: Soil samples collected from the drilling waste sump and well centre areas had concentrations of PHCs (at six boreholes), salinity (at three boreholes) and metals (at three boreholes) greater than generic guidelines and/or background ranges (WSP 2023a). Groundwater samples collected from the drilling waste sump area had concentrations of PHCs (at one borehole) and dissolved metal parameters (at two boreholes) greater than generic guidelines and/or background ranges. Hydrocarbon staining in soil was also observed in one borehole.

2023: One hundred and thirty-two (132) wood piling were entirely or partially removed while activities were conducted at the Site (EISC Registry File [10/22-01]). PHC concentrations were greater than the generic GNWT guidelines applied at the time in two analyzed cuttings samples collected during the removal of pilings and one sample collected from a wood piling. Concentrations of EC and/or select metals were greater than the historically applied guidelines in the analyzed samples from some cutting samples. Removed wood pilings were disposed at an approved facility (WSP 2023b).

2024: One hundred and eight (108) wood pilings were removed and disposed at an approved facility (EISC Registry File [10/22-01]. Concentrations of PHCs and barium in soil exceeded generic guidelines at several locations. Concentrations of VOCs and phenols in soil were less than the applied guidelines.

The status of wood piling removal is presented in Figure A3 (Appendix A) and the historical sampling locations are presented in Figure A4 (Appendix A).

20.0 VISUAL INFORMATION

Visual information has been provided in Figures A1 to A8 in Appendix A as follows.

- Figure A1: Site Location Plan;
- Figure A2: Site Location with Proposed Ice Road;
- Figure A3: Wood Piling Status and Areas of Former Site Activities;
- Figure A4: Site Plan with Historical Sampling Locations;
- Figure A5: Proposed Site Layout and Remedial Extents for Type B Petroleum Hydrocarbons and Barite (True Total Barium);
- Figures A6a and A6b: Site Location with Community Conservation Plan Designated Lands (from the Aklavik, Inuvik and Tuktoyaktuk Community Conservation Plans [AICCP 2026; ICCP 2026; TCCP 2016]); and
- Figures A7 and A8: Scale maps (1:250,000 and 1:50,000) of Project location.

Site photographs from the 2022 and 2024 field programs are provided in Appendix L.

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Chamberlain, G. 2025. Officer, Navigation Protection Program, Prairie and Northern Region Transport Canada / Government of Canada. E-mail: Gordon.Chamberlain@tc.gc.ca. 25 February 2025.

22.0 STATEMENT OF LIMITATIONS

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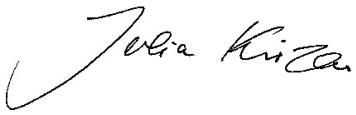

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APPENDIX A

Figures

APPENDIX A – FIGURES

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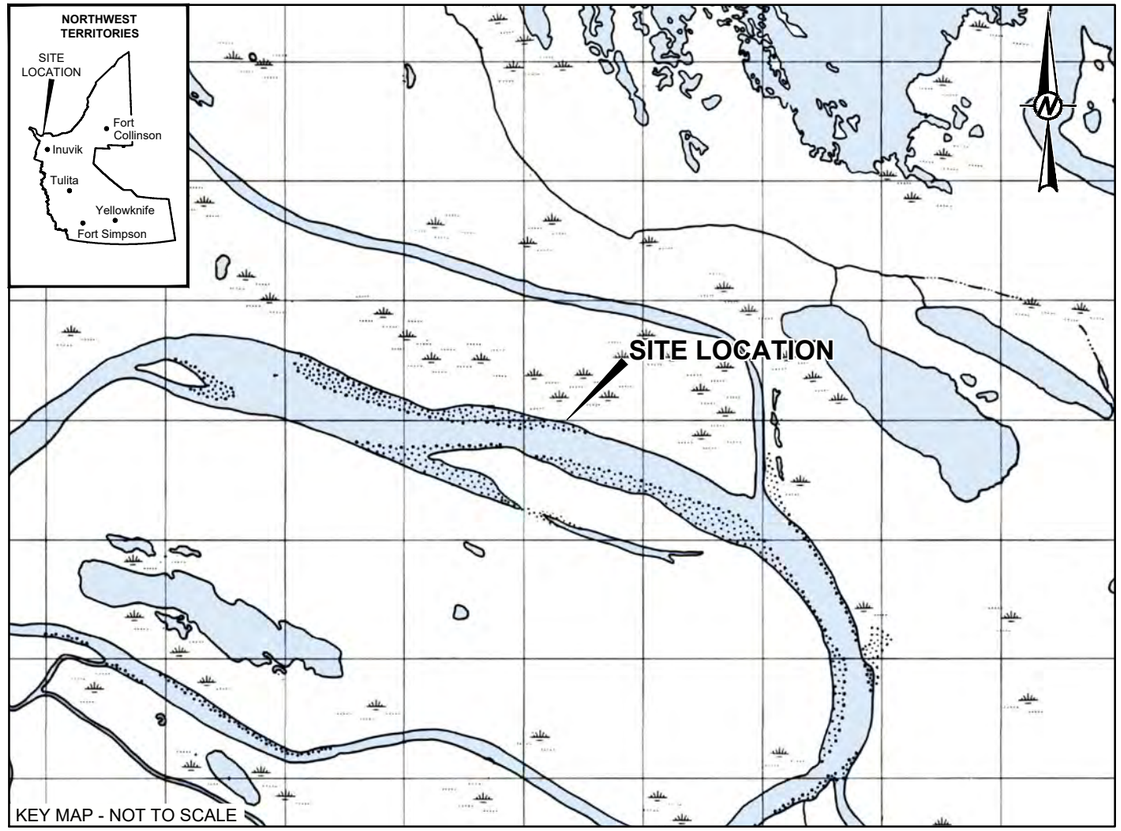

LEGEND

2024 SHORELINE

REFERENCE

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IMAGERY DATE: 4 JUNE 2019. GOOGLE EARTH IMAGE IS NOT TO SCALE. DATUM: NAD83, PROJECTION: UTM ZONE 8.

TOPOGRAPHIC MAP 107C/04OBTAINED FROM Canmatrix. © 1958 THE ARMY SURVEY ESTABLISHMENT, R.C.E. PROJECTION: TRANSVERSE MERCATOR; DATUM: NAD27;
COORDINATE SYSTEM: UTM ZONE 8. TOPOGRAPHIC MAP HAS BEEN SHIFTED FROM NAD27 TO NAD83 FOR MAPPING PURPOSES.

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(APPROX.) METRES

CLIENT
SHELL CANADA LIMITED

CONSULTANT
wsp

YYYY-MM-DD	2025-05-07
DESIGNED	SVilleneuve
PREPARED	APaull
REVIEWED	JKrizan
APPROVED	PKalita

PROJECT
SOIL REMEDIATION
FORMER UNIPKAT I-22 WELLSITE
INUVIALUIT SETTLEMENT REGION, NORTHWEST TERRITORIES

TITLE
SITE LOCATION PLAN

PROJECT NO.	PHASE-TASK	REV.	FIGURE
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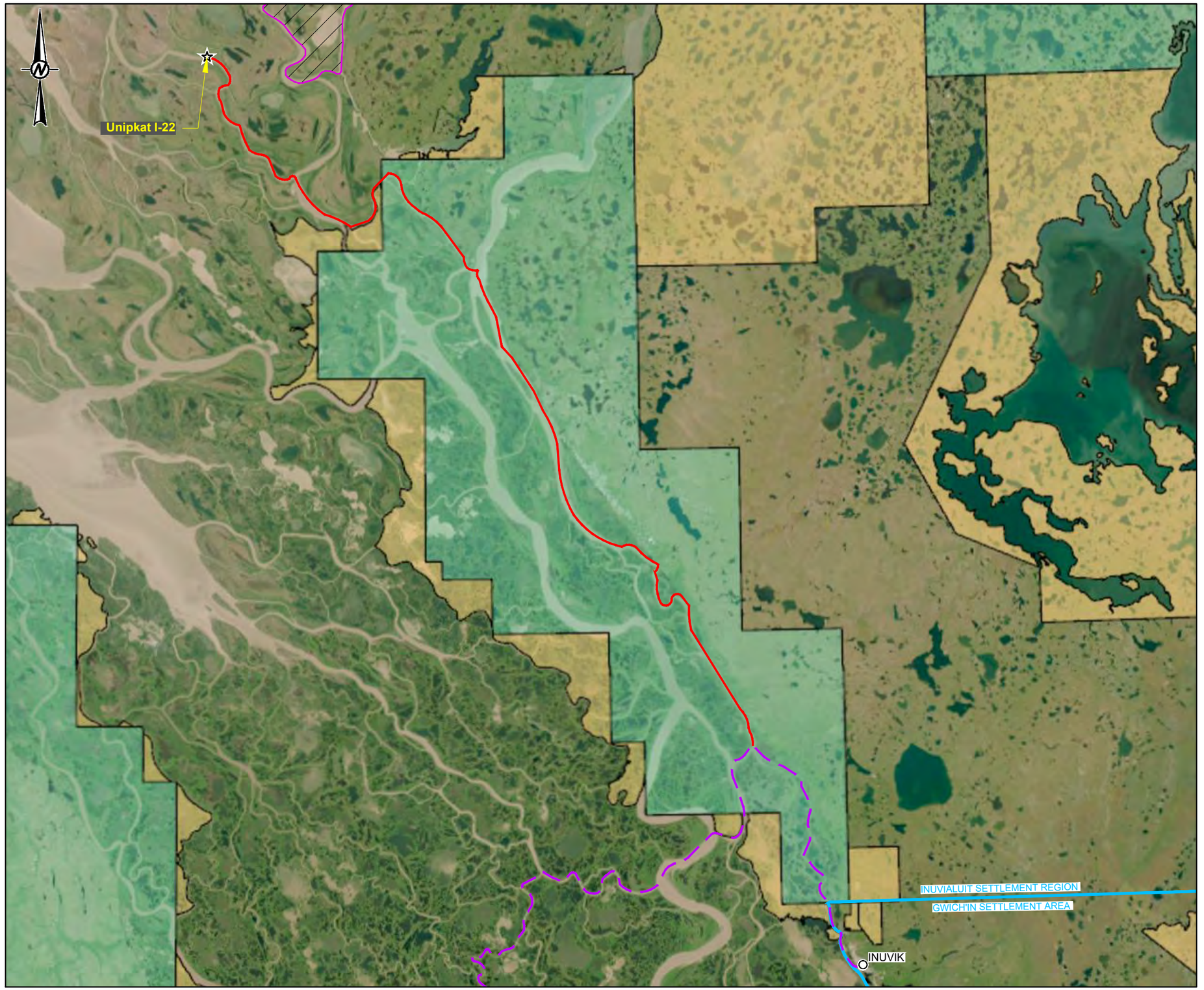

LEGEND

- SITE LOCATION
- CONSTRUCTED UNIPKAT I-22 ICE ROAD
- AKLAVIK ICE ROAD
- SETTLEMENT REGION BOUNDARY
- KENDALL ISLAND BIRD SANCTUARY

INUVIALUIT PRIVATE LANDS

- SURFACE TITLE
- SURFACE AND SUBSURFACE TITLE

NOTES

1. ALL LOCATIONS ARE APPROXIMATE.

REFERENCE

1. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENSE - CANADA
2. BASE MAP: EARTHSTAR GEOGRAPHICS
3. COORDINATE SYSTEM: NAD 1983 CSRS UTM ZONE 8N

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(APPROX.) KILOMETRES

CLIENT
SHELL CANADA LIMITED

PROJECT
SOIL REMEDIATION
FORMER UNIPKAT I-22 WELLSITE
INUVIALUIT SETTLEMENT REGION, NORTHWEST TERRITORIES

TITLE
SITE LOCATION WITH PROPOSED ICE ROAD

CONSULTANT

YYYY-MM-DD	2025-05-07
DESIGNED	SVilleneuve
PREPARED	APaull
REVIEWED	JKrizan
APPROVED	PKalita

PROJECT NO.	PHASE-TASK	REV.	FIGURE
CA0042726.0037	1000-2403	0	A2

LEGEND

- WELL MARKER
- MONITORING WELL
- THERMISTOR
- WOOD PILING REMOVED (2023)
- WOOD PILING REMOVED (2024)
- WOOD PILING PARTIALLY REMOVED, SHEARED
- WOOD PILING NOT FOUND DURING REMOVAL ATTEMPT
- PILING YET TO BE REMOVED
- PILING YET TO BE REMOVED (ASSUMED PRESENT)
- SOIL SAMPLE COLLECTED FROM BASE OF WOOD PILING LOCATION
- SHORELINE
- SITE ASSESSMENT AREA
- FORMER FACILITY (WELL CELLAR)
- AREA 1 - FORMER DRILLING RIG AND DRILLING MATERIAL STORAGE
- AREA 2 - FORMER DRILLING SUMP (FORMER SUMP EXCAVATION EXTENT)

0 5 10 20

1:400 METRES

NOTE(S)

1. ALL UNITS ARE IN METRES UNLESS OTHERWISE NOTED.
2. "A"- NUMBERED PILINGS ASSOCIATED WITH 2023 WINTER PROGRAM
3. "B" - NUMBERED PILINGS ASSOCIATED WITH 2024 WINTER PROGRAM

REFERENCE(S)

1. ORIGINAL DRAWING OBTAINED FROM CHALLENGER GEOMATICS LTD: DWG NO. 22-35141-002; SCALE: 1:1,250; DATE: SEPTEMBER 12, 2022.
3. COORDINATE SYSTEM: NAD 1983 CSRS UTM ZONE 8N

CLIENT
SHELL CANADA LIMITED

PROJECT
SOIL REMEDIATION
FORMER UNIPKAT I-22 WELLSITE
INUVIALUIT SETTLEMENT REGION, NORTHWEST TERRITORIES

TITLE
WOOD PILING STATUS AND AREAS OF FORMER SITE ACTIVITIES

CONSULTANT

YYYY-MM-DD	2025-05-02
DESIGNED	J.REDSTONE
PREPARED	J.REDSTONE
REVIEWED	J.KRIZAN
APPROVED	P.KALITA

PROJECT NO.	PHASE-TASK	REV.	FIGURE
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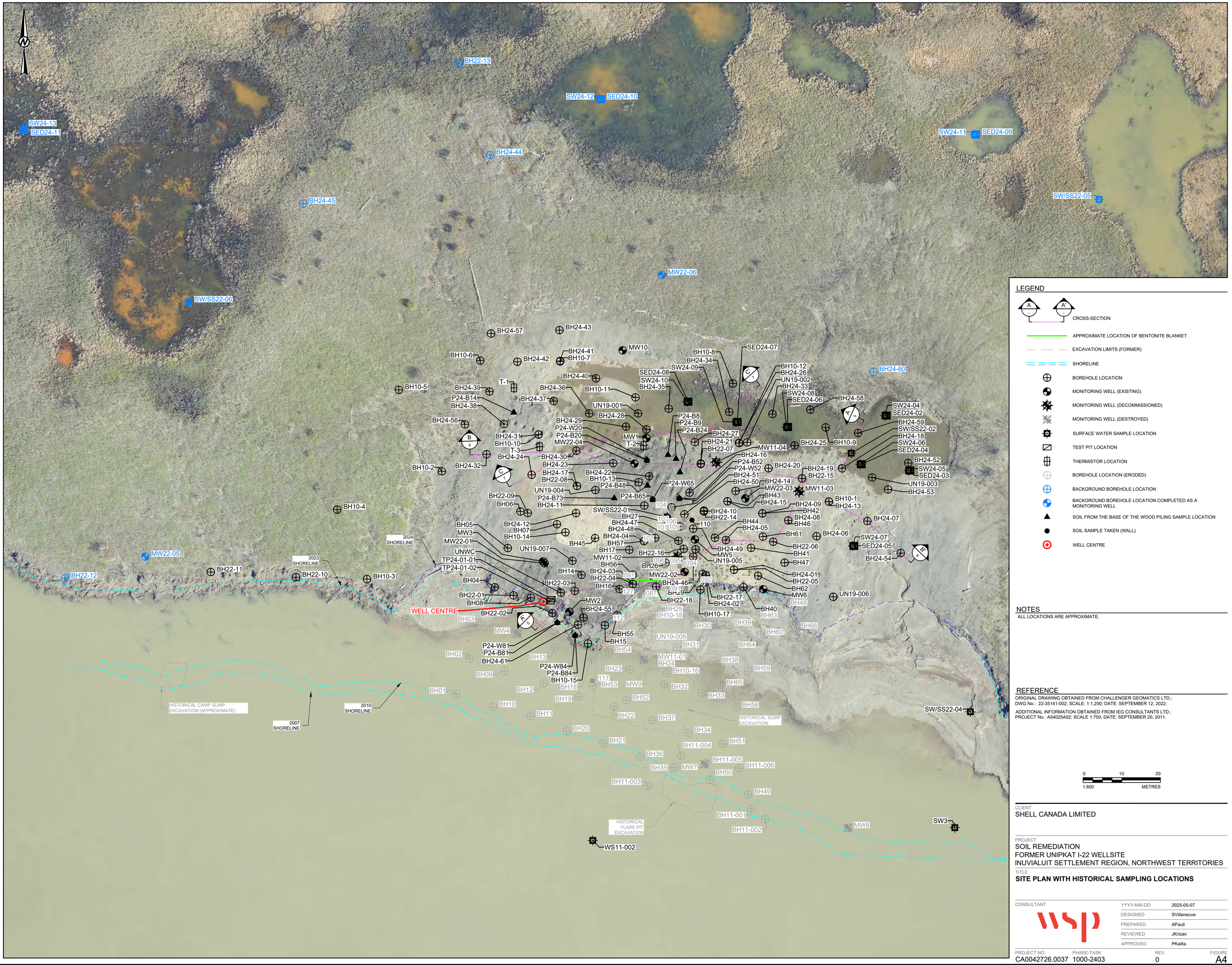

LEGEND

- CROSS-SECTION
- APPROXIMATE LOCATION OF BENTONITE BLANKET
- EXCAVATION LIMITS (FORMER)
- SHORELINE
- BOREHOLE LOCATION
- MONITORING WELL (EXISTING)
- MONITORING WELL (DECOMMISSIONED)
- MONITORING WELL (DESTROYED)
- SURFACE WATER SAMPLE LOCATION
- TEST PIT LOCATION
- THERMISTOR LOCATION
- BOREHOLE LOCATION (ERODED)
- BACKGROUND BOREHOLE LOCATION
- BACKGROUND BOREHOLE LOCATION COMPLETED AS A MONITORING WELL
- SOIL FROM THE BASE OF THE WOOD PILING SAMPLE LOCATION
- SOIL SAMPLE TAKEN (WALL)
- WELL CENTRE

NOTES

ALL LOCATIONS ARE APPROXIMATE.

REFERENCE

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CLIENT
SHELL CANADA LIMITED

PROJECT
SOIL REMEDIATION
FORMER UNIPKAT I-22 WELLSITE
INUVIALUIT SETTLEMENT REGION, NORTHWEST TERRITORIES

TITLE
SITE PLAN WITH HISTORICAL SAMPLING LOCATIONS

CONSULTANT
wsp

YYYY-MM-DD	2025-05-07
DESIGNED	SVilleneuve
PREPARED	APauli
REVIEWED	JKrizan
APPROVED	PKalita

PROJECT NO.	PHASE-TASK	REV.	FIGURE
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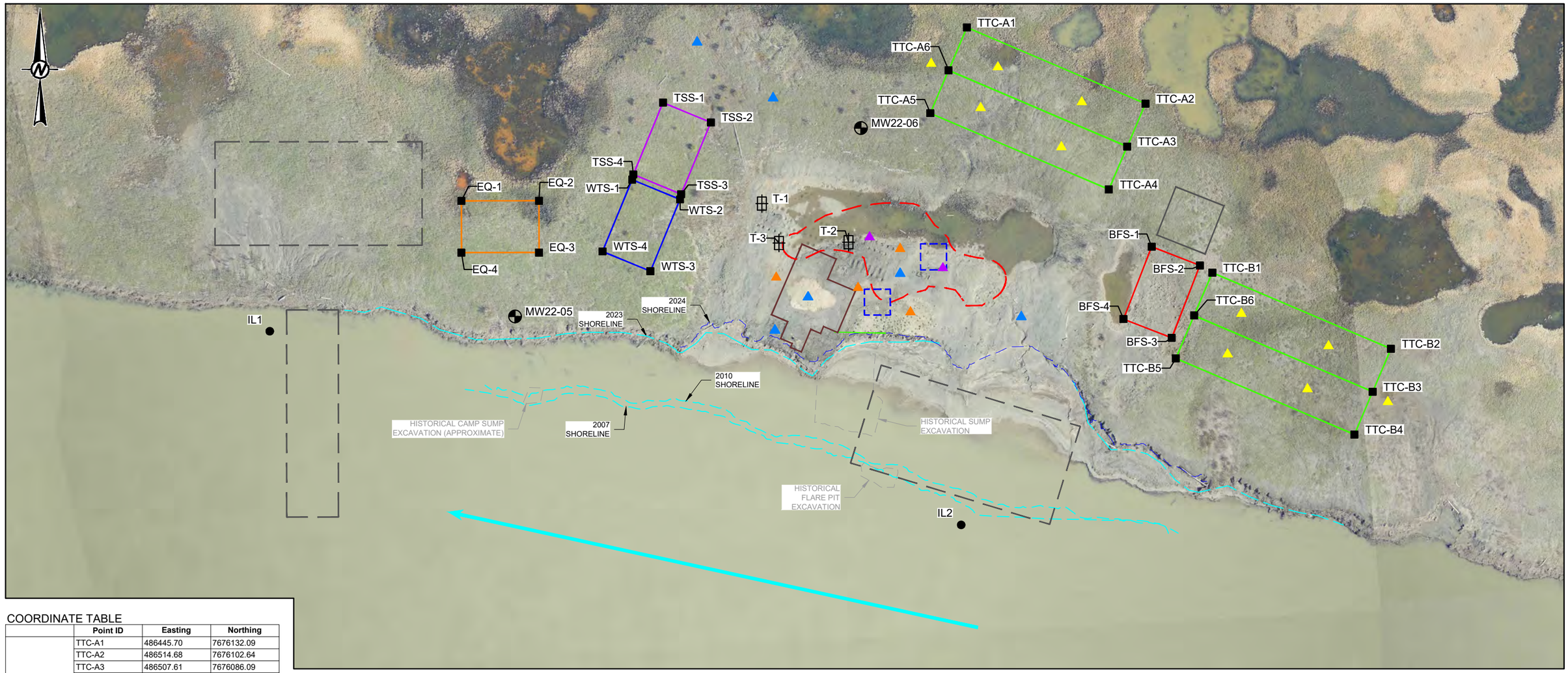

COORDINATE TABLE

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	TTC-A4	486500.54	7676069.53
	TTC-A5	486431.57	7676098.98
	TTC-A6	486438.63	7676115.53
	TTC-B1	486540.52	7676037.38
	TTC-B2	486609.50	7676007.94
	TTC-B3	486602.43	7675991.38
	TTC-B4	486595.36	7675974.83
	TTC-B5	486526.39	7676004.27
	TTC-B6	486533.45	7676020.83
Bermed Fuel Storage Area	BFS-1	486517.07	7676047.41
	BFS-2	486535.71	7676040.15
	BFS-3	486524.81	7676012.20
	BFS-4	486506.18	7676019.46
Temporary Soil Storage	TSS-1	486328.31	7676103.05
	TSS-2	486346.79	7676095.40
	TSS-3	486335.31	7676067.68
	TSS-4	486316.83	7676075.34
Water Treatment System	WTS-1	486316.40	7676073.30
	WTS-2	486334.88	7676065.65
	WTS-3	486323.40	7676037.93
	WTS-4	486304.92	7676045.58
Equipment Lay Down Area	EQ-1	486250.42	7676065.12
	EQ-2	486280.42	7676065.12
	EQ-3	486280.42	7676045.12
	EQ-4	486250.42	7676045.12
Water Intake Locations	IL1	486176.36	7676014.73
	IL2	486443.46	7675939.95

LEGEND

- AREA OF REMAINING WOOD PILES
- EXCAVATION LIMITS (FORMER)
- SHORELINE
- OVERALL EXCAVATION EXTENTS FOR SOIL WITH PHC CONCENTRATIONS EXCEEDING SQOs FROM SURFACE TO 3.0 mbgs
- OVERALL EXCAVATION EXTENTS FOR SOIL WITH PHC CONCENTRATIONS EXCEEDING SQOs FROM SURFACE TO 1.5 mbgs
- POTENTIAL LOCATIONS OF LAND, ICE OR BARGE-BASED CAMP
- BERMED FUEL AND HAZARDOUS WASTE STORAGE
- EQUIPMENT PARKING / LAY DOWN AREA
- THERMAL TREATMENT CELLS
- WATER TREATMENT SYSTEM AND TEMPORARY WATER STORAGE
- TEMPORARY SOIL STORAGE AND SEGREGATION AREA
- THERMAL TREATMENT OFFICE / CONTROL CENTER
- MONITORING WELL (EXISTING)
- THERMISTOR LOCATION
- WATER INTAKE LOCATIONS
- THERMISTOR TO MONITOR ETC TREATMENT CELLS
- POST-REMEDIAL GROUNDWATER MONITORING WELL
- PRE-REMEDIAL THERMISTOR
- POST-REMEDIAL THERMISTOR
- DIRECTION OF WATER CHANNEL FLOW

0 25 50
1:1,500 METRES

NOTES

1. ALL LOCATIONS ARE APPROXIMATE AND SUBJECT TO CHANGE BASED ON ACTUAL FIELD CONDITIONS.
2. GPS COORDINATES PROJECTION: TRANSVERSE MERCATOR; DATUM: UTM83; COORDINATE SYSTEM: UTM ZONE 8.

REFERENCE

ORIGINAL DRAWING OBTAINED FROM CHALLENGER GEOMATICS LTD.; DWG No.: 22-35141-002; SCALE: 1:1,250; DATE: SEPTEMBER 12, 2022.

ADDITIONAL INFORMATION OBTAINED FROM IEG CONSULTANTS LTD.; PROJECT No.: A04025A02; SCALE 1:750; DATE: SEPTEMBER 20, 2011.

CLIENT
SHELL CANADA LIMITED

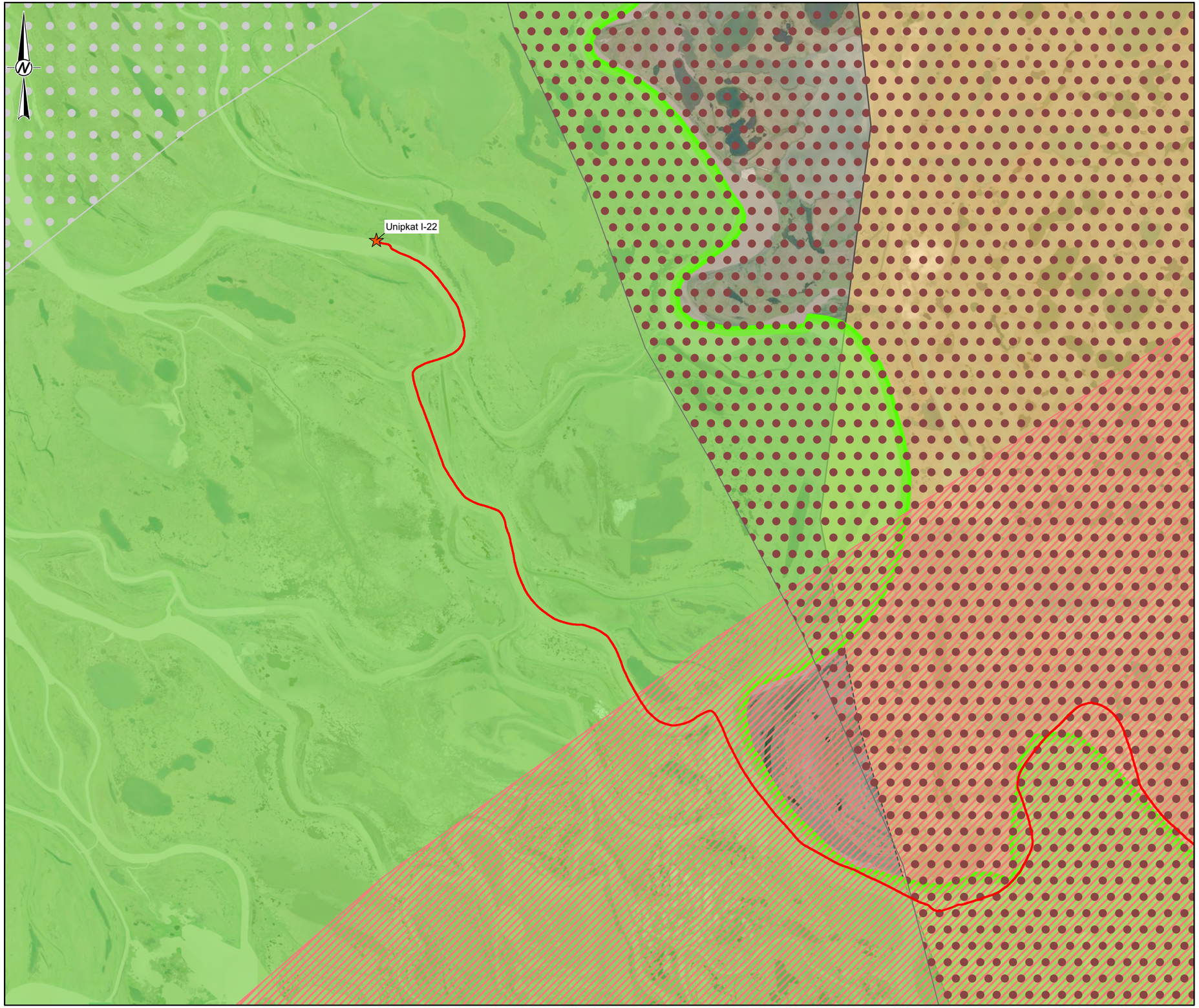
CONSULTANT
wsp

YYYY-MM-DD	2025-05-07
DESIGNED	SVilleneuve
PREPARED	APaull
REVIEWED	JKrizan
APPROVED	PKalita

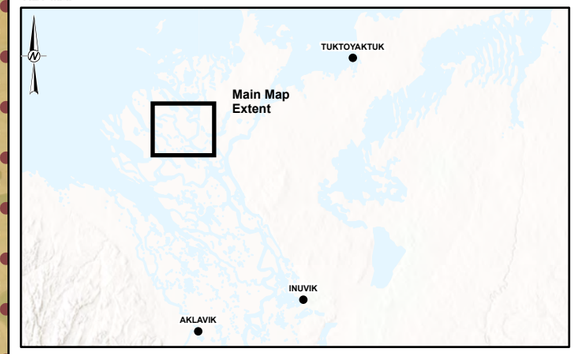
PROJECT
SOIL REMEDIATION
FORMER UNIPKAT I-22 WELLSITE
INUVIALUIT SETTLEMENT REGION, NORTHWEST TERRITORIES

TITLE
PROPOSED SITE LAYOUT AND REMEDIAL EXTENTS FOR TYPE B PETROLEUM HYDROCARBONS AND BARITE (TRUE TOTAL BARIUM)

PROJECT NO.	PHASE-TASK	REV.	FIGURE
CA0042726.0037	1000-2403	0	A5



KEY MAP



SCALE: 1:3,000,000

LEGEND

- SITE LOCATION
- PROPOSED ICE ROAD
- 303B - SPRING MOOSE HARVESTING AREAS
- 314C - WINTER WOLVERINE HARVESTING AREAS
- 322C - CRITICAL GRIZZLY BEAR DENNING AREAS
- 323C - MAINLAND COASTAL POLAR BEAR DENNING AREAS
- 718D - CENTRAL MACKENZIE ESTUARY

0 1,250 2,500 5,000

1:100,000 METRES

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

1. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - CANADA
2. BASE MAP: EARTHSTAR GEOGRAPHICS, STATE OF ALASKA, ESRI CANADA, ESRI, TOMTOM, GARMIN, FAO, NOAA, USGS, EPA, NPS, NRCAN, PARKS CANADA, ESRI, USGS
3. COORDINATE SYSTEM: NAD 1983 CSRS UTM ZONE 8N

CLIENT
SHELL CANADA LIMITED

PROJECT
SOIL REMEDIATION
FORMER UNIPKAT I-22 WELLSITE
INUVIALUIT SETTLEMENT REGION, NORTHWEST TERRITORIES

TITLE
SITE LOCATION WITH COMMUNITY CONSERVATION PLAN DESIGNATED LANDS

CONSULTANT

wsp

YYYY-MM-DD	2025-05-02
DESIGNED	J.REDSTONE
PREPARED	J.REDSTONE
REVIEWED	J.KRIZAN
APPROVED	P.KALITA

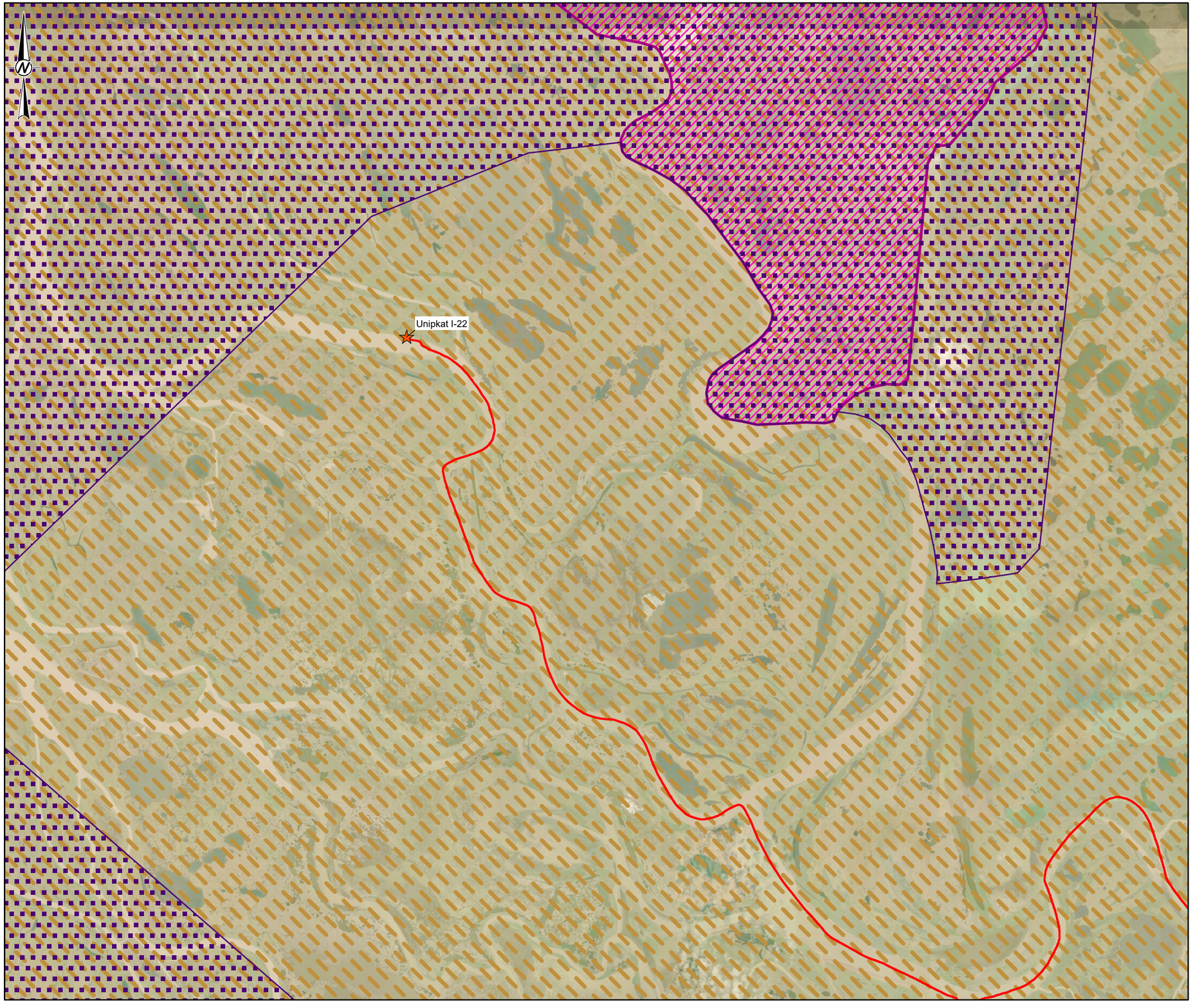
PROJECT NO.	PHASE-TASK	REV.	FIGURE
CA0042726.0037	1100.2403	0	A6a

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

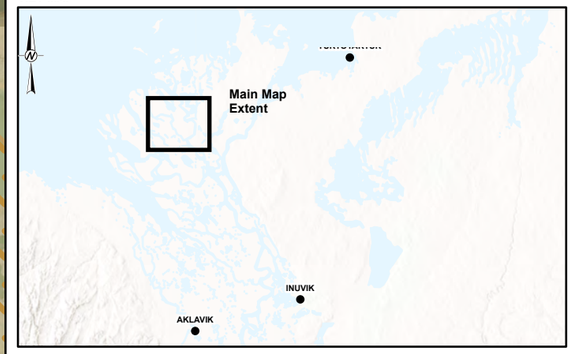
25mm

0

PATH: S:\Clients\Shell\Unipkat_I22\9b_PRO\CA0042726_0037\40_PROD\0001_RAP\CA0042726_0037-1100-2403HS-xxxx\CA0042726_0037-1100-2403-HS-0006A.aprx PRINTED ON: AT: 9:15:17 AM



KEY MAP



SCALE: 1:3,000,000

LEGEND

- SITE LOCATION
- PROPOSED ICE ROAD
- 304C - SPRING GOOSE HARVESTING AREAS - TUKTOYAKTUK
- 312C - FALL GOOSE HARVESTING AREAS
- 706E - KENDALL ISLAND BIRD SANCTUARY
- 715C - MACKENZIE RIVER DELTA KEY MIGRATORY BIRD HABITAT

0 1,250 2,500 5,000

1:100,000 METRES

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

1. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - CANADA
2. BASE MAP: EARTHSTAR GEOGRAPHICS, STATE OF ALASKA, ESRI CANADA, ESRI, TOMTOM, GARMIN, FAO, NOAA, USGS, EPA, NPS, NRCAN, PARKS CANADA, ESRI, USGS
3. COORDINATE SYSTEM: NAD 1983 CSRS UTM ZONE 8N

CLIENT
SHELL CANADA LIMITED

PROJECT
SOIL REMEDIATION
FORMER UNIPKAT I-22 WELLSITE
INUVIALUIT SETTLEMENT REGION, NORTHWEST TERRITORIES

TITLE
SITE LOCATION WITH COMMUNITY CONSERVATION PLAN DESIGNATED LANDS

CONSULTANT

YYYY-MM-DD	2025-05-02
DESIGNED	J.REDSTONE
PREPARED	J.REDSTONE
REVIEWED	J.KRIZAN
APPROVED	P.KALITA

PROJECT NO.	PHASE-TASK	REV.	FIGURE
CA0042726.0037	1100.2403	0	A6b

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

0 25mm

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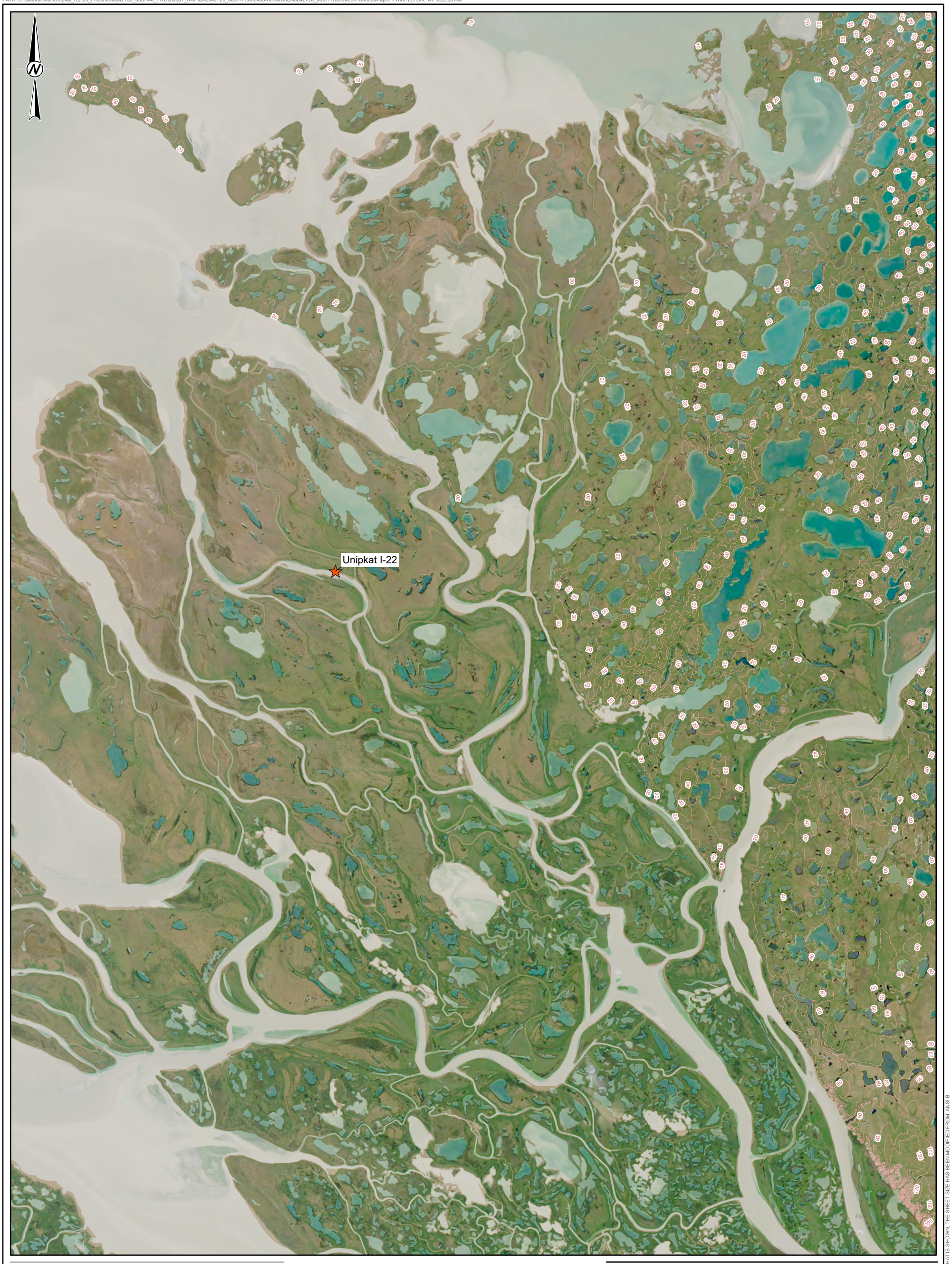


LEGEND

- SITE LOCATION
- CONTOUR (20 m INTERVAL)

0 2,000 4,000 8,000

1:250,000 METRES

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

1. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - CANADA
2. BASE MAP: EARTHSTAR GEOGRAPHICS
3. COORDINATE SYSTEM: NAD 1983 CSRS UTM ZONE 8N

CLIENT
SHELL CANADA LIMITED

PROJECT
SOIL REMEDIATION
FORMER UNIPKAT I-22 WELLSITE
INUVIALUIT SETTLEMENT REGION, NORTHWEST TERRITORIES

TITLE
1:250,000 SCALE MAP

CONSULTANT

YYYY-MM-DD	2025-05-02
DESIGNED	J.REDSTONE
PREPARED	J.REDSTONE
REVIEWED	J.KRIZAN
APPROVED	P.KALITA

PROJECT NO.	PHASE-TASK	REV.	FIGURE
CA0042726.0037	1100.2403	0	A7

LEGEND

★ SITE LOCATION

0 500 1,000 2,000

1:50,000 METRES

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

1. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - CANADA
2. BASE MAP:
3. COORDINATE SYSTEM: NAD 1983 CSRS UTM ZONE 8N

CLIENT
SHELL CANADA LIMITED

PROJECT
SOIL REMEDIATION
FORMER UNIPKAT I-22 WELLSITE
INUVIALUIT SETTLEMENT REGION, NORTHWEST TERRITORIES

TITLE
1:50,000 SCALE MAP

CONSULTANT wsp

YYYY-MM-DD	2025-05-02
DESIGNED	J.REDSTONE
PREPARED	J.REDSTONE
REVIEWED	J.KRIZAN
APPROVED	P.KALITA

PROJECT NO.	CONTROL	REV.	FIGURE
CA0042726.0037	1100.2403	0	A8

wsp.com

APPENDIX B

Remedial Action Plan

APPENDIX C

Wildlife Management and Monitoring Plan

APPENDIX D

Waste Management Plan

APPENDIX E

Spill Contingency Plan

APPENDIX F

Emergency Response Plan

APPENDIX G

Erosion and Sediment Control Plan

APPENDIX H

Permafrost Protection Plan

APPENDIX I

Reclamation, Closure and Monitoring Plan

APPENDIX J

Ice Cover Inspection Report

Ice Cover Inspection Report

Name of Designated Inspector		Signature of Designated Inspector	

Unipkat Ice Crossing

		Hazards requiring Inspection							
Date	Air Temperature (Celsius)	Wet Cracks	Surface Cracks (circle one)	Maintenance / Repair Flooding required (✔ if yes)	Description of Area Requiring Flooding	Snow Cover (circle one)	Plowing Required (✔ if yes)	Flooding along Snowbanks Present (✔ if yes)	Other Remarks
		Y / N	Few / Normal / Concern	☐		None / Minimal / Concern	☐	☐	
		Y / N	Few / Normal / Concern	☐		None / Minimal / Concern	☐	☐	
		Y / N	Few / Normal / Concern	☐		None / Minimal / Concern	☐	☐	
		Y / N	Few / Normal / Concern	☐		None / Minimal / Concern	☐	☐	
		Y / N	Few / Normal / Concern	☐		None / Minimal / Concern	☐	☐	

Name of Foreman/Lead Hand:		Name of Road Manager (Review):	
Signature of Foreman/Lead Hand:		Signature of Road Manager (Review):	

Ice Cover Inspection Report - Crossing Diagram

Notes:

1. Use numbered references from the first page of the inspection report to refer to specific areas on the crossing/winter road.

APPENDIX K

Community Engagement

APPENDIX K – Community Engagement

Table of Contents

1.0 PROPOSED SOIL REMEDIATION AT THE FORMER UNIPKAT I-22 WELLSITE 1

2.0 FOLLOW-UP ON PROPOSED SOIL REMEDIATION AT THE FORMER UNIPKAT I-22 WELLSITE 8

3.0 LETTER OF SUPPORT 10

4.0 ENGAGEMENT LOG 12

1.0 PROPOSED SOIL REMEDIATION AT THE FORMER UNIPKAT I-22 WELLSITE

Shell Canada Limited
Suite 4000, 500 Centre Street SE
Calgary, Alberta T2G 1A6
Tel (403) 691-3111
Internet www.shell.ca

6 March 2025

Inuvik Community Corporation
P.O. Box 1365
Inuvik, Northwest Territories
X0E 0T0
Email: iccmanager@inuvialuitcc.com

RE: PROPOSED SOIL REMEDIATION AT THE FORMER UNIPKAT I-22 WELLSITE

Shell Canada Limited (Shell) is pleased to provide the attached letter introducing the proposed soil remediation at the former Unipkat I-22 wellsite in the Inuvialuit Settlement Region, Northwest Territories.

The attached letter has been prepared by WSP Canada Inc. (WSP) on our behalf and with our support. Should you have any questions or comments, please do not hesitate to reach out to Dave Kliewer or Kyle Thompson, or the WSP contact listed within the attached documents.

Sincerely,

Dave Kliewer
External Relations Advisor
Shell Canada Limited
Office (403) 384-5893
Mobile (250) 329-4094
E-mail - Dave.Kliewer@shell.com

Kyle Thompson
Sr. Program Manager, Legacy Soil & Groundwater Projects
Shell Canada Limited
Office (403) 691-3174 ext. 3174
E-mail - Kyle.Thompson@shell.com

Attachments: Proposed Soil Remediation at the Former Unipkat I-22 Wellsite

6 March 2025 Project No. CA0042726.0037-1000.2406

Inuvik Community Corporation
P.O. Box 1365
Inuvik, Northwest Territories
X0E 0T0

PROPOSED SOIL REMEDIATION AT THE FORMER UNIPKAT I-22 WELLSITE

1.0 INTRODUCTION

On behalf of Shell Canada Limited (Shell), WSP Canada Inc. (WSP) is providing this letter to introduce the proposed future remediation at the former Unipkat I-22 wellsite, in the Inuvialuit Settlement Region (ISR), Northwest Territories (NWT) (the Site). The location of the Site is presented in Figure 1, and the Site history and proposed soil remediation at the Site are introduced below.

2.0 UNIPKAT I-22 SITE HISTORY

Unipkat I-22 (69°11'36.07"N, 135°20'33.88"W) is a former Shell wellsite that was drilled in 1972 and 1973, abandoned in 1996 and had historical infrastructure remaining on site that included a wellhead, drilling sump, camp and camp sump, flare pit and wood pilings. Currently, the only infrastructure remaining includes wood pilings, a metal well sign, partial drilling sump and monitoring wells. Remedial activities between 2011 and 2016, included the excavation and removal of soil from the camp sump, flare pit and part of the drilling sump. Activities completed between 2022 and 2024, included a Phase II environmental site assessment, ice road profiling and construction, wood pilings removal and additional environmental site assessment activities including borehole drilling, soil sampling and groundwater sampling. Results of the sampling programs identified exceedances in soil samples and wood pilings analytical results for some petroleum hydrocarbons, metals and polycyclic aromatic hydrocarbons (with some samples within background concentration ranges).

2.1 UNIPKAT I-22 PROPOSED REMEDIATION

Based on the results of previous work and the 2024 sample results, a Remedial Action Plan is being prepared to guide the future remediation of the Site. Proposed remedial objectives will focus on the protection of wildlife, avifauna and freshwater aquatic receptors while limiting further disturbance to the remaining natural tundra ecosystem. Subject to regulatory approval, on-site remediation is proposed to begin in the winter of 2026. Approximately 3,800 cubic metres (m^3) of soil containing petroleum hydrocarbons above the proposed remediation objectives are expected to be excavated and treated through enhanced thermal conduction (ETC) – the same technology currently used at West Channel. Soils that are considered untreatable (i.e., which do not or are not likely to meet the remedial endpoint after two treatment cycles), will be transported off site for disposal at an approved facility. Approximately 600 m^3 of surficial and near-surface soils containing barite above the proposed remediation objectives are expected to be managed on site. Soil samples will be collected from the extents of the remedial excavations as well as stockpiled soils and submitted for laboratory analysis to confirm

WSP Canada Inc.
201 Brownlow Avenue, Suite 26, Dartmouth, Nova Scotia, B3B 1W2, Canada T: +1 902 466 1668 F: +1 902 466 1669

compliance with proposed remediation objectives prior to being used to backfill the excavations. The efficacy of the ETC process will be assessed by collecting soil samples from the treated soil piles and submitted for laboratory analyses to confirm compliance with proposed remediation objectives.

A temporary ice road will be constructed for site access, and a self-contained temporary camp will be established (either on-land, river ice or via a frozen-in barge) to house expected work crew of approximately 25 people. The project is expected to include Inuvialuit employment and the supply of heavy equipment and site infrastructure by Inuvialuit companies. Permafrost protection measures will include beginning the remediation in the winter, limiting the amount of permafrost exposed to ambient air and using insulating ground cover.

Once remediation activities are complete, remaining wood pilings at the Site will be removed.

2.2 PLANNED COMMUNITY ENGAGEMENT AND CONSULTATION

Engagement and consultations with Inuvialuit communities are ongoing and will continue throughout all ongoing projects. This process includes email communications, written summaries of completed activities and planned work, video calls, and in-person meetings with the Hunters and Trappers Committees (HTCs), Community Corporations (CCs) and Elders in Inuvik, Aklavik and Tuktoyaktuk.

Shell and WSP are planning to travel to Inuvik, Aklavik and Tuktoyaktuk at the end of March 2025 prior to submitting the Project Description for the proposed remediation of the Site to the Environmental Impact Screening Committee and starting the permitting process. This in-person meeting is intended to provide an overview of the proposed soil remediation to the HTCs, CCs and Elders, to address potential questions and concerns and to gather feedback.

Shell is also preparing for a new round of Open Houses in the late fall of 2025 in Inuvik, Aklavik and Tuktoyaktuk to inform the interested public of ongoing and planned projects in the ISR and to collect input. To extend the reach of the provided information, the Shell Virtual Open House will be updated and re-advertised for the 2025 Open Houses.

CLOSURE

This letter is intended to provide information, and no action is required on your part. If you have any questions about the contents of this letter, please contact the undersigned at your convenience.

Yours truly,

WSP Canada Inc.

Stephanie Villeneuve, MSc
Environmental Scientist
WSP Canada Inc.
902-476-5769
stephanie.villeneuve@wsp.com

Julia Krizan, PhD
Senior Principal Biologist
WSP Canada Inc.
780-901-7357
julia.krizan@wsp.com

SV/JK/sh

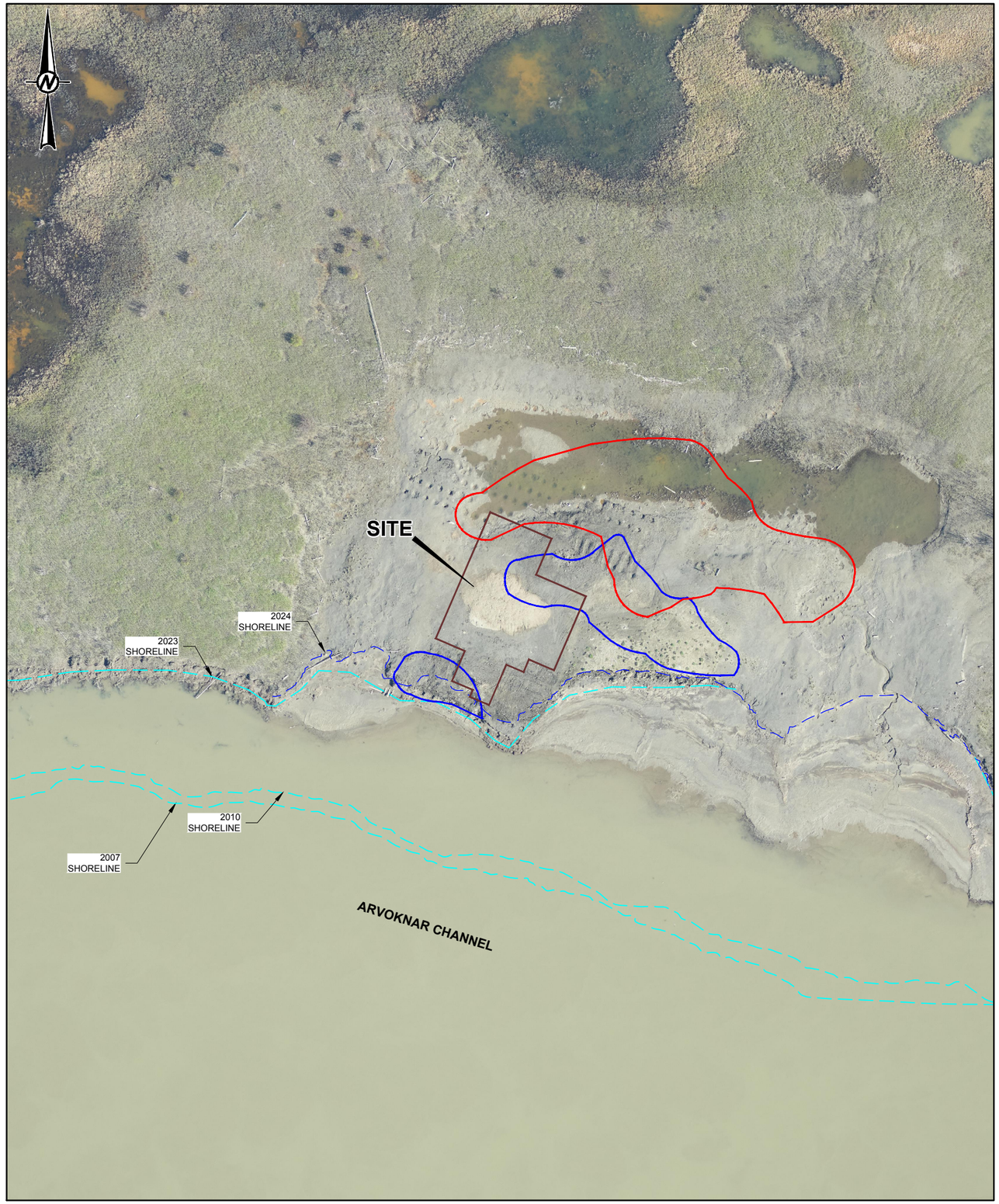
Attachments: Statement of Limitations
Figure 1

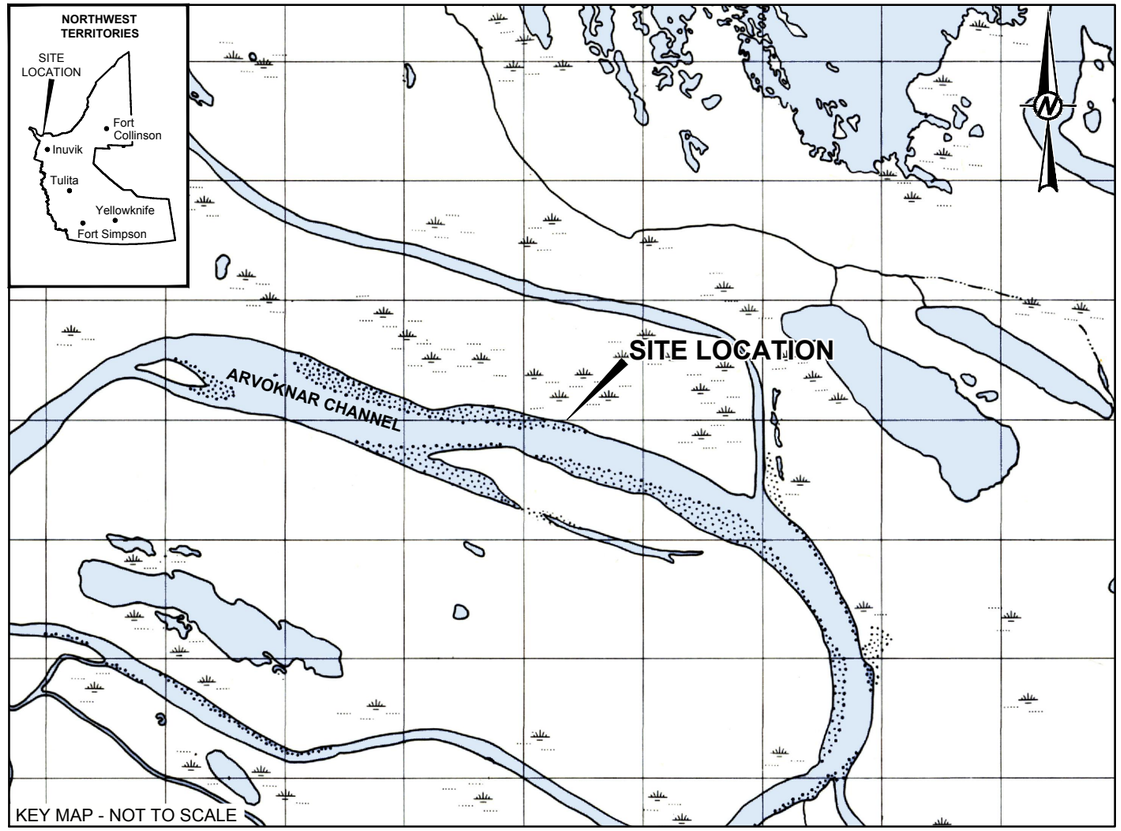
STATEMENT OF LIMITATIONS

This report was prepared for the exclusive use of Shell Canada Limited. The report, which specifically includes all tables and figures, is based on data and information collected during the Site investigation activities conducted by WSP Canada Inc. and is based solely on the conditions of the property at the time of the field investigations, supplemented by historical information and data obtained by WSP Canada Inc. as described in this report. However, it is never possible, even with exhaustive sampling and testing, to dismiss the possibility that part of a site may be contaminated and remain undetected.

The services performed as described in this report were conducted in a manner consistent with that level of care and skill normally exercised by other members of the engineering and science professions currently practicing under similar conditions, subject to the time limits and financial and physical constraints applicable to the services. Any use which a third party makes of this report, or any reliance on, or decisions to be made based on it, are the responsibilities of such third parties. WSP Canada Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

The content of this report is based on information collected during our investigation, our present understanding of the Site conditions, and our professional judgment in light of such information at the time of this report. This report provides a professional opinion and therefore no warranty is expressed, implied, or made as to the conclusions, advice and recommendations offered in this report. This report does not provide a legal opinion regarding compliance with applicable laws. With respect to regulatory compliance issues, it should be noted that regulatory statutes and the interpretation of regulatory statues are subject to change. The findings and conclusions of this report are valid only as of the date of this report. If new information is discovered in future work, including excavations, borings, or other studies, WSP Canada Inc. should be requested to re-evaluate the conclusions of this report, and to provide amendments as required.





LEGEND

- AREA OF REMAINING WOOD PILES
- SHORELINE
- OVERALL EXCAVATION EXTENTS FOR PHC IMPACTED SOIL FROM SURFACE TO 3.0 mbgs
- OVERALL EXCAVATION EXTENTS FOR BARITE IMPACTED SOIL FROM SURFACE TO 0.5 mbgs

REFERENCE

ORIGINAL DRAWING OBTAINED FROM CHALLENGER GEOMATICS LTD.; DWG No.: 22-35141-002; SCALE: 1:1,250; DATE: SEPTEMBER 12, 2022.

TOPOGRAPHIC MAP 107C/04OBTAINED FROM Canmatrix. © 1958 THE ARMY SURVEY ESTABLISHMENT, R.C.E. PROJECTION: TRANSVERSE MERCATOR; DATUM: NAD27; COORDINATE SYSTEM: UTM ZONE 8. TOPOGRAPHIC MAP HAS BEEN SHIFTED FROM NAD27 TO NAD83 FOR MAPPING PURPOSES.

0 25 50
(APPROX.) METRES

CLIENT
SHELL CANADA LIMITED

CONSULTANT
wsp

YYYY-MM-DD	2025-02-19
DESIGNED	AJardine
PREPARED	APaull
REVIEWED	JKrizan
APPROVED	JHyrich

PROJECT
SOIL REMEDIATION AT FORMER WELLSITE
UNIPKAT I-22

TITLE
SITE LOCATION PLAN AND PROPOSED SOIL REMEDIATION

PROJECT NO.	PHASE-TASK	REV.	FIGURE
CA0042726.0037	1000-2406	0	1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI B
25 mm
0

2.0 FOLLOW-UP ON PROPOSED SOIL REMEDIATION AT THE FORMER UNIPKAT I-22 WELLSITE

Shell Canada Limited
Suite 4000, 500 Centre Street SE
Calgary, Alberta T2G 1A6
Tel (403) 691-3111
Internet www.shell.ca

23 April 2025

Tuktoyaktuk Community Corporation
P.O. Box 350
Tuktoyaktuk, Northwest Territories
X0E 1C0

via email: manager@tukcommunitycorp.com

RE: FOLLOW-UP ON PROPOSED SOIL REMEDIATION AT THE FORMER UNIPKAT I-22 WELLSITE

Shell Canada Limited (Shell) is pleased to provide this letter as a follow-up to recent discussions with the Tuktoyaktuk Community Corporation, Hunters and Trappers Committee, and Elders Committee. These discussions took place during the meeting held on March 26, 2025, in Tuktoyaktuk and were scheduled, among other topics, to provide an overview of the proposed soil remediation at the former Unipkat I-22 wellsite, Inuvialuit Settlement Region, Northwest Territories (NWT; the Site).

Based on questions raised during the meeting and the discussion that followed, soils containing barite at concentrations above the proposed soil quality objectives (SQOs) at the Site will not be managed (i.e., buried at depth) on site as originally proposed and instead will be excavated for off-site disposal at an approved facility outside the NWT. As barite is a naturally occurring mineral and does not pose any risks to humans, this management approach is proposed specifically for this Site, which is subject to active erosion by the Arvoknar Channel. It may not be the preferred approach at other sites in the region. Given the low volume of soil (approximately 100 cubic meters) exceeding the proposed SQOs for barite, no backfill is expected to be required and the excavated areas will be recontoured using balanced Site grading.

Should you have any questions or comments, please do not hesitate to reach out to Dave Kliewer or Kyle Thompson, contacts below.

Sincerely,

Dave Kliewer
External Relations Advisor
Shell Canada Limited
Office (403) 384-5893
Mobile (250) 329-4094
E-mail - Dave.Kliewer@shell.com

Kyle Thompson
Sr. Program Manager, Legacy Soil & Groundwater Projects
Shell Canada Limited
Office (403) 691-3174 ext. 3174
E-mail - Kyle.Thompson@shell.com

3.0 LETTER OF SUPPORT

Tuktoyaktuk Hunters and Trappers Committee

PO Box 286 Tuktoyaktuk, NT X0E-1C0 PH: 867-340-0057 FX: 867-977-2433
tuk.htc@outlook.com

May 12, 2025

Dave Kliewer
External Relations Advisor
Shell Canada Limited
Dave.Kliewer@shell.com

TO WHOM IT MAY CONCERN,

RE: LETTER OF SUPPORT FOR PLANNED 2025 ACTIVITIES AT SHELL SITES IN THE INUVIALUIT SETTLEMENT REGION (ISR), NWT.

The Tuktoyaktuk Hunters & Trappers Committee (THTC) Board of Directors held a meeting consultation with Shell Canada Limited and WSP on May 9th, 2025.

The THTC Board is in full support for Shell Canada Limited to move forward with the planned following activities:

1. Camp Farewell 2025-2028 PSQ: Submitted to EISC on April 3, 2025
    - EISC Registry File # 04/25-06
2. Unipkat I-22 Summer 2025 PSQ: Submitted to EISC on April 17, 2025
    - EISC Registry File # 04/25-18
3. Unipkat I-22 Proposed Remediation: Submitted to the EISC on May 9, 2025
    - EISC Registry File # 05/25-04
4. Camp Farewell Future Camp Operations
    - Not yet submitted to EISC Registry. Format of submission to be determined in consultation with the EISC.

If you have any additional information, please feel free to contact the office at 867-340-0057 or email tuk.htc@outlook.com

Sincerely,

Chukita Gruben
For:
Jim Elias, President
Tuktoyaktuk Hunters and Trappers Committee

4.0 ENGAGEMENT LOG

2025 Engagement Log
Unipkat I-22, Inuvialuit Settlement Region, Northwest Territories
Shell Canada Limited, WSP Canada Inc.

Name of Proponent Shell Canada Limited
Project Name Unipkat I-22

Date	Engagement Trigger	Engagement Activity Type	Initiated by	Attendees/ Contact with	Summary of Engagement	Issues and Concerns Raised by Affected Party	Proponent Response to Issue(s)/Proposed Mitigation[1]	Recommendation from Affected Party	Information materials provided to Affected Party (Y/N)	Written correspondence, meeting notes, and/ or minutes (Y/N)	Follow up Actions If Any		
											Action	Responsible Party	Date to Complete
6-Mar-25	Planned remediation activities	Email and letter	WSP	Aklavik, Inuvik, Tuk HTC and CCs	WSP provided a letter to introduce the proposed soil remediation at Unipkat I-22. WSP/Shell will also be in NWT week of March 24-28 and requested meetings with each HTC and CC, Elders.	n/a	n/a	n/a	n/a	Y - email and letter	n/a	n/a	n/a
6-Mar-25	Planned remediation activities	Email and letter	WSP	IRC	Provided copies of the remediation letters sent to the CCs to the IRC	n/a	n/a	n/a	n/a	Y - email and letter	n/a	n/a	n/a
14-Mar-25	Community consultation	Email/letter	WSP/Shell	Aklavik, Inuvik, Tuk HTC and CCs, IRC	WSP provided a letter summarizing the 2024 activities at Shell sites in the Inuvialuit Settlement Region. Following up with each organization with regards to in person meetings week of March 24-28.	n/a	n/a	n/a	n/a	Y - email and letter	n/a	n/a	n/a
24-Mar-25	Community consultation	Email	WSP	Inuvik CC, HTC	Following up on request for a meeting with the ICC and IHTC on 24 March 2025. IHTC responded that they provided the information to the board and are waiting for a response.	24 March 2025: IHTC Resource Person called WSP at 3:45pm to ask about the meeting.	24 March 2025: Since neither the ICC or IHTC responsed to request for a meeting, no meeting venue was arranged. Can we do a virtual meeting at noon April 2nd instead?	24 March 2025: IHTC agreed to the virtual meeting on 2 April 2025.	n/a	Y - emails	Arrange for virtual meeting 2 April 2025	Stephanie Villeneuve	28-Mar-25
25-Mar-25	Community consultation	In person	WSP/Shell	Aklavik CC, HTC, Elders	WSP/Shell held a meeting with the Aklavik CC, HTC and Elders. A summary of the 2024 activities, proposed 2025 activities, update on West Channel Remediation and proposed remediation at Unipkat I-22 was presented.	1) Soil is not being re-hydrated during winter work at West Channel, what is your plan for subsidence in the spring? 2) Impacts near the river at West Channel were pretty bad when they dug it up, still sure it hasn't reached the river? 3) Community member said they spoke with the IRC about speeding up the approval process for remediations. 4) Unipkat I-22 is near a Marine Protected Area. Noise is a pollution too, what are you doing about that? We do not want to scare away the beluga.	1) Some of the work planned for this summer will be to address any subsidence observed by the end of the summer. 2) It has not reached the river. The boundaries of those excavations may have changed some (as is expected) but we would not have stopped unless we had clean margins (sidewall, base). 3) While the approval process has it's challenges, we need it to be complete, the more eyes on the process the better as we want to get it right. 4) We are aware of that, and we are considering noise pollution and have added mitigation measures to all our applications. We can't avoid all noise if we are going to do a remediation but we have mitigations measures in place for this.	n/a	n/a	Y - meeting notes	1- Provide contact information for the Stokes Point work. 2 - Include graphs of analytical results in next meting presentation.	1 - Dave Kliewer 2 - Stephanie Villeneuve	n/a
26-Mar-25	Community consultation	In person	WSP/Shell	Tuk CC, HTC, Elders	WSP/Shell held a meeting with the Tuk CC, HTC and Elders. A summary of the 2024 activities, proposed 2025 activities, update on West Channel remediation and proposed remediation at Unipkat I-22 was presented.	1) (picture on screen of a ponded sum) Is that a failed drilling waste sump? 2) Will you cover/fill the collapsed sumps? Or leave them like that? 3) Can you speed up the assessment process? Get more that two sites done per winter? Can you bring in external contractors to help? 4) Why are you proposing to bury the barite at Unipkat I-22? Why not just remove it? Don't make excuses, you should just take it away. It is your garbage, everything you bring in you should take it back out again. 5) Can you include Wildlife Monitor training to the community training this year?	1) There is a difference between a collapse sump cap which may or may not indicate a failed sump, where material is no longer encapsulated. The question is if the encapsulation method (permafrost) is failing. 2) That all depends on the assessment work and if we identify that any further work is required. 3) It is challenging to get out here in winter. We are always pushing to get more done. We have ~100 employed here this winter. Local availability of contractors and logistical challenges make it hard. This is the first time community has asked us to accelerate the pace by bringing in external contractors. 4) Cost savings is not the driver here. We are not talking about a bag of barite, that we would remove. This is mixed in with soil exceeding Soil Quality Objectives. We do not want the remedy to the problem to be worse that the issue we are trying to deal with. 5) Yes we can.	Remove the barite-impacted soil from the Site rather than bury it.	n/a	Y - meeting notes	1 - Add Wildlife Monitor training 2 - Provide the TCC and THTC with a follow up letter on modified plan to now remove the barite impacted soil from Unipkat I-22.	1 - Stephanie Villeneuve 2 - Stephanie Villeneuve and Julia Krizan	2 - April 2025
2-Apr-25	Community consultation	Virtual (Teams)	WSP/Shell	Inuvik HTC	WSP/Shell held a meeting with the Inuvik HTC. A summary of the 2024 activities, proposed 2025 activities, update on West Channel Remediation and proposed remediation at Unipkat I-22 was presented.	1) Good to hear you are doing all the testing at the wellsites. We don't get any of those results, don't know if there are health concerns at the other sites. Samples were taken at Parsons Lake 3-4 years ago and we never saw any results. 2) We are hearing that some sumps are leaking. 3) We have community members passing away from cancer. These sites were active decades ago and maybe caused by what is on the land. 4) For Wildlife Monitors, we the HTC would like the opportunity to provide WM services, give us the opportunity rather than the bigger companies.	1) Parsons Lake are not Shell sties so we can't speak to those results. We will take this into consideration for the Shell sites. We will start to share results when we can. 2) That is part of the reason we are doing the assessments, to see if there has been any release of material and if this posses any risk. Even ponded sumps may still be contained if the material around it is 'tight' and providing containment. 3) The NWT is tracking rates of certain cancers. 4) If there are companies in Inuvik that provide Wildlife Monitor services (like Elias Services in Tuk, or the HTC), please let us know and we may be able to hire them through IMG-WSP.	n/a	n/a	Y - meeting notes	1) Follow up with Patricia about the Wildlife Monitor services. 2) Share more results with the communities.	1) Stephanie Villeneuve	1) 3 April 2025

2025 Engagement Log
Unipkat I-22, Inuvialuit Settlement Region, Northwest Territories
Shell Canada Limited, WSP Canada Inc.

Name of Proponent Shell Canada Limited
Project Name Unipkat I-22

Date	Engagement Trigger	Engagement Activity Type	Initiated by	Attendees/ Contact with	Summary of Engagement	Issues and Concerns Raised by Affected Party	Proponent Response to Issue(s)/Proposed Mitigation[1]	Recommendation from Affected Party	Information materials provided to Affected Party (Y/N)	Written correspondence, meeting notes, and/ or minutes (Y/N)	Follow up Actions If Any		
											Action	Responsible Party	Date to Complete
23-Apr-25	Community consultation	Email/letter	WSP/Shell	Tuk CC, HTC, IRC	Shell provided letter to describe changed approach to barite containing soil above criteria at Unipkat I-22. This soil will be removed and transported off site for appropriate disposal outside the NWT.	n/a	n/a	n/a	n/a	Y -email and letter	n/a	n/a	n/a
23-Apr-25	Community consultation	Email	WSP	Aklavik, Inuvik, Tuk HTCs	We have received a request from the Environmental Impact Screening Committee to provide them with evidence of HTC support for our upcoming proposed activities in the Inuvialuit Settlement Region. As such, we would like to have a virtual meeting with the HTC to review the proposed activities that we discussed during the recent meeting held between March 25th and April 2nd, and request HTC support. Would the HTC be available for a lunchtime meeting between April 24th and May 2nd?	n/a	n/a	n/a	n/a	Y - email	n/a	n/a	n/a
30-Apr-25	Community consultation	Phone call	WSP	Aklavik, Inuvik, Tuk HTCs	Follow up phone call to the Aklavik, Inuvik and Tuk HTCs to ask about the virtual meetings proposed in the email from April 23, 2025.	Aklavik HTC: Is dealing with a situation and asked that WSP call back May5th. Called the Aklavik HTC on May 5th, they are closed until further notice. Inuvik HTC: Spring is a busy time of year, it is a waiting game. When the Resource Person hears back from the board, they she will let me know. Sent follow up email with cc to the EISC on May 5th. Tuk HTC: No response from the board yet, will send out reminder to the board and let me know what dates they suggest. May 2, 2025 - Tuk HTC trying to arrange virtual meetin May 9th at 12 pm.	n/a	n/a	n/a	n/a	n/a	n/a	n/a
9-May-25	Community consultation	Zoom meeting	WSP	Tuk HTC Shell - Dave Kliewer WSP - Julia Krizan, Stephanie Villeneuve, Patrick Kalita	Shell presented a Power Point slide deck reviewing the proposed activities in the ISR either currently submitted to the EISC or planned for summer 2025 submission, including: - Camp Farewell 2025-2028 PSQ: Submitted to EISC on April 3, 2025 (EISC Registry File # 04/25-06) - Unipkat I-22 Summer 2025 PSQ: Submitted to EISC on April 17, 2025 (EISC Registry File # 04/25-18) - Unipkat I-22 Proposed Remediation: Submitted to the EISC on May 9, 2025 (EISC Registry File # 05/25-04) - Camp Farewell Future Camp Operations, not submitted yet - format of submission to be determined in consultation with the EISC.	**Camp Farewell 2025-2028 PSQ:** Question: Storing the winter camp at Camp Farewell, will that occur after the waterfowl have left? **Unipkat I-22 Summer 2025 PSQ:** Question: Are you storing fuel well away from the water? **Unipkat I-22 Proposed Remediation:** Question: When you remediate the site, are you going to leave a big hole? Question: Are you going to clean-up the ground around the pilings after you remove them? They were probably treated with creosote, is the soil around them contaminated? Question: There is surface water in the area for PHC excavations. What are you planning to do to manage that? Looks like quite a lot of water there. Question: Soil with PHCs, is any of that leaching to the water/river? Question: Will there be monitoring for some year after the remediation? Question: Are you using any Wildlife Monitors? Comment: We really appreciate that you listened to our concerns regarding the barite at this site in the meeting in March and that you are taking the barite soil off site. **Camp Farewell Future Camp Operations, not submitted yet to the EISC:** There were no comments or questions regarding these proposed activities.	**Camp Farewell 2025-2028 PSQ:** Dave: No, it will probably occur before the waterfowl are gone for the season however a wildlife sweep will be conducted first by a Wildlife Monitor. The winter camp will be stored on the existing gravel pad. **Unipkat I-22 Summer 2025 PSQ:** Julia: There will not be fuel stored at Unipkat I-22 for the proposed summer activities. Fuel stored for the proposed remediation will be more than 30 m from the river channel. **Unipkat I-22 Proposed Remediation:** Dave: Remediation and treatment of the PHCs in soil is occurring on the site and will be used to backfill the excavations. The soil containing barite will be excavated for off-site disposal, the plan is to grade and re-contour the area to match the surrounding land. Patrick: So far, we have sampled the pilings and the soil and have not identified soil issues around the pilings. Dave: We have samples of that surface water, and it is not above criteria. We will do the same as we are currently doing at the West Channel remediation – collect the site contact water, treat it on site, sample for laboratory analysis to confirm below the discharge criteria the get approval from the Water Resources Officer to discharge to land. Patrick: Not that we have found. We have sampled boreholes from across the site and delineated the area. We will also sample the sides of the excavations to confirm. Dave: Yes, the Water Licence from the Inuvialuit Water Board will stipulate how long we have to monitor this site for. Dave: Yes, we always have Wildlife Monitors for all activities. Any on Inuvialuit Private Land we also have Environmental Monitors.	May 12, 2025: Tuk HTC provided a letter in support of all four projects presented.	Y - power Point slides	Y - email, meeting notes	1- Immediately following the meeting, Stephanie emailed the Tuk HTC a copy of the Power Point slides and requested written support of the proposed activities.	Stephanie Villeneuve	9-May-25

2025 Engagement Log
Unipkat I-22, Inuvialuit Settlement Region, Northwest Territories
Shell Canada Limited, WSP Canada Inc.

Name of Proponent Shell Canada Limited
Project Name Unipkat I-22

Date	Engagement Trigger	Engagement Activity Type	Initiated by	Attendees/ Contact with	Summary of Engagement	Issues and Concerns Raised by Affected Party	Proponent Response to Issue(s)/Proposed Mitigation[1]	Recommendation from Affected Party	Information materials provided to Affected Party (Y/N)	Written correspondence, meeting notes, and/ or minutes (Y/N)	Follow up Actions If Any		
											Action	Responsible Party	Date to Complete
12-May-25	Community consultation	Teams meeting	WSP	Inuvik HTC Shell - Dave Kliewer WSP - Julia Krizan, Stephanie Villeneuve	Shell presented a Power Point slide deck reviewing the proposed activities in the ISR either currently submitted to the EISC or planned for summer 2025 submission, including: - Camp Farewell 2025-2028 PSQ: Submitted to EISC on April 3, 2025 (EISC Registry File # 04/25-06) - Unipkat I-22 Summer 2025 PSQ: Submitted to EISC on April 17, 2025 (EISC Registry File # 04/25-18) - Unipkat I-22 Proposed Remediation: Submitted to the EISC on May 9, 2025 (EISC Registry File # 05/25-04) - Camp Farewell Future Camp Operations, not submitted yet - format of submission to be determined in consultation with the EISC. May 20, 2025: WSP follow-up email to ask if the board has an questions regarding the proposed activities presented and provided in the Power Point slides.	**Camp Farewell 2025-2028 PSQ:** There were no comments or questions regarding these proposed activities. **Unipkat I-22 Summer 2025 PSQ:** There were no comments or questions regarding these proposed activities. **Unipkat I-22 Proposed Remediation:** Question: We get questions from our membership about work happening now and in the future. Is most of this work spoken for? Lots of people looking for work with small businesses. Question: Can we use the ice road to Unipkat I-22 for cabins the HTC is building? **Camp Farewell Future Camp Operations, not submitted yet to the EISC:** There were no comments or questions regarding these proposed activities.	**Unipkat I-22 Proposed Remediation:** Dave: WSP is Prime Contractor that manages the work on Shell's behalf. Their mandate is to subcontract as much locally as possible. The main large subs are EGT, NWI and IMG-WSP. Small sub-contractors can sub to those bigger organizations. Typically, the work is contracted about a year out. We are open to anyone that wants to have a conversation about opportunities. Julia: We cannot directly hire Wildlife Monitors, needs to be a business offering those services. Dave: Our name and contact information is available to start a conversation about getting a business into the system for work. Dave: We can't prevent anyone from using the ice road. We have signage and a check-in hut to know who and what is on the ice road. We would ask that you let us know so we can make sure the road is safe to use.	n/a	Y - power Point slides	Y - email, meeting notes	1-Following the meeting, Stephanie emailed the Inuvik HTC a copy of the Power Point slides and requested written support of the proposed activities.	Stephanie Villeneuve	13-May-25

Notes:

[1]Indicate if issue(s) was resolved
ACC - Aklavik Community Corporation
AHTC - Aklavik Hunters and Trappers Committee
CC - Community Corporation
HTC - Hunters and Trappers Committee
n/a - not applicable
N - no
NWT - Northwest Territories
IRC - Inuvialuit Regional Corporation
JPL Contracting Ltd.
Shell - Shell Canada Limited
Tuk – Tuktoyaktuk
WSP - WSP Canada Inc.
Y - yes

wsp.com

APPENDIX L

Site Photographs

APPENDIX L – Site Photos

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1.0 UNIPKAT I-22 SITE PHOTOS 2022

Photo 1 – Unipkat I-22 well centre sign, facing south (6 August 2022).

Photo 2 – Site survey total station set up, facing northwest (6 August 2022).

CLIENT	**Shell Canada Limited**
CONSULTANT	wsp
DATE	May 2025
PREPARED	ML
REVIEWED	AB
PROJECT	**Unipkat I-22, Inuvialuit Settlement Region, Northwest Territories**
TITLE	**Site Photographs**
PROJECT NO	CA0042726.0037

Photo 3 – Wood platform / debris along shoreline, facing north (21 August 2022).

Photo 4 – Former PVC pipe along eroded shoreline, facing southeast (6 August 2022).

CLIENT	**Shell Canada Limited**
CONSULTANT	wsp
DATE	May 2025
PREPARED	ML
REVIEWED	AB
PROJECT	**Unipkat I-22, Inuvialuit Settlement Region, Northwest Territories**
TITLE	**Site Photographs**
PROJECT NO	CA0042726.0037

Photo 5 – Exposed pilings in Arvoknar Channel, facing south (6 August 2022).

Photo 6 – Exposed pilings likely from former rig platform, facing north (6 August 2022).

CLIENT
Shell Canada Limited

CONSULTANT

PROJECT
Unipkat I-22, Inuvialuit Settlement Region, Northwest Territories

TITLE
Site Photographs

DATE	May 2025
PREPARED	ML
REVIEWED	AB

PROJECT NO CA0042726.0037

Photo 7 – South eroded shoreline and drilling BH22-18, facing south (25 August 2022).

Photo 8 – Unloading drilling equipment at Unipkat I-22, facing southeast (17 August 2022).

CLIENT	**Shell Canada Limited**
CONSULTANT	wsp
PROJECT	**Unipkat I-22, Inuvialuit Settlement Region, Northwest Territories**
TITLE	**Site Photographs**
DATE	May 2025
PREPARED	ML
REVIEWED	AB
PROJECT NO	CA0042726.0037

Photo 9 – MW22-03 well development, facing northwest (21 August 2022).

Photo 10 – SS/SW22-02 surface water and sediment location, facing northeast (22 August 2022).

CLIENT	**Shell Canada Limited**
CONSULTANT	wsp
DATE	May 2025
PREPARED	ML
REVIEWED	AB
PROJECT	**Unipkat I-22, Inuvialuit Settlement Region, Northwest Territories**
TITLE	**Site Photographs**
PROJECT NO	CA0042726.0037

2.0 UNIPKAT I-22 SITE PHOTOS 2023

Photo 11 – Ice Road Pre-Construction - Ice thickness measurements along proposed route (19 December 2023).

Photo 12 – Ice Road Pre-Construction - Crew completing ice thickness measurements by snowmobile (19 December 2023).

3.0 UNIPKAT I-22 SITE PHOTOS 2024

Photo 13 – Ice Road Construction - Loader widening road between KM-80 and KM-85 (26 February 2024).

Photo 14 – Ice Road Construction - Tandem axle plow truck opening section of road between KM-85 and KM-92 (26 February 2024).

CLIENT	**Shell Canada Limited**
CONSULTANT	
DATE	May 2025
PREPARED	AP
REVIEWED	VA
PROJECT	**Unipkat I-22, Inuvialuit Settlement Region, Northwest Territories**
TITLE	**Site Photographs**
PROJECT NO	CA0042726.0037

Photo 15 – Loader NWI-350 clearing snow with bucket at the haul truck staging area (5 March 2024).

Photo 16 – Clearing the camp location at the Site (6 March 2024).

CLIENT
Shell Canada Limited

CONSULTANT

PROJECT
Unipkat I-22, Inuvialuit Settlement Region, Northwest Territories

TITLE
Site Photographs

DATE	May 2025
PREPARED	AH
REVIEWED	PT

PROJECT NO CA0042726.0037

Photo 17 – View of the camp units and water tank at the Site (15 March 2024).

Photo 18 – Sea-can containers staged at the Site (15 March 2024).

Photo 19 – Fuel truck at the Site (16 March 2024).

Photo 20 – Light plant at the Site (16 March 2024).

CLIENT	**Shell Canada Limited**
CONSULTANT	wsp
DATE	May 2025
PREPARED	AH
REVIEWED	PT
PROJECT	**Unipkat I-22, Inuvialuit Settlement Region, Northwest Territories**
TITLE	**Site Photographs**
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Photo 21 – Cleared drilling location at northeast end of the Site (19 March 2024).

Photo 22 – Wood pile removal using Texoma Auger drill rig V-017 at northeast of the Site (20 March 2024).

CLIENT	**Shell Canada Limited**
CONSULTANT	
PROJECT	**Unipkat I-22, Inuvialuit Settlement Region, Northwest Territories**
TITLE	**Site Photographs**
DATE	May 2025
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REVIEWED	PT
PROJECT NO	CA0042726.0037

Photo 23 – Wood Piling Removal – Extracted intact wood pile (23 March 2024).

Photo 24 – Wood Piling Removal - CAT 330 exposing existing pilings (26 March 2024).

CLIENT	**Shell Canada Limited**
CONSULTANT	
PROJECT	**Unipkat I-22, Inuvialuit Settlement Region, Northwest Territories**
TITLE	**Site Photographs**
DATE	May 2025
PREPARED	AP
REVIEWED	VA
PROJECT NO	CA0042726.0037

Photo 25 – Backfilling BH24-19 with bentonite (22 March 2024).

Photo 26 – Collecting soil sample from an auger at BH24-25 (22 March 2024).

CLIENT	**Shell Canada Limited**
CONSULTANT	wsp
PROJECT	**Unipkat I-22, Inuvialuit Settlement Region, Northwest Territories**
TITLE	**Site Photographs**
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PREPARED	AH
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Photo 27 – Soil from BH24-31 at 1.5 mbgs with black stain and hydrocarbon odour (27 March 2024).

Photo 28 – Drilling BH24-55, facing southeast (28 March 2024).

CLIENT	**Shell Canada Limited**
CONSULTANT	wsp
PROJECT	**Unipkat I-22, Inuvialuit Settlement Region, Northwest Territories**
TITLE	**Site Photographs**
DATE	May 2025
PREPARED	AH
REVIEWED	PT
PROJECT NO	CA0042726.0037

Photo 29 – Leveling the surface around BH24-01 and -02 to create safe drilling rig access (4 April 2024).

Photo 30 – Demobilization of camp support equipment (12 April 2024).

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