



# Grays Bay Road and Port Project Impact Statement

*Volume 10 – Additional Assessments and Conclusions*



# Grays Bay Road and Port Impact Statement



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# Grays Bay Road and Port Fact Sheet

## Proponent

- **West Kitikmeot Resources Corp. (WKR):** established by the Kitikmeot Inuit Association in 2014 as an Inuit-owned and Inuit-led company to conduct mineral exploration, primarily on Inuit Owned Lands (IOL) in the Kitikmeot Region of Nunavut

## Location

- **Grays Bay Port** is located at approximately 67° 48' 21.62" N, 10° 52' 17.69" W
- Nearest communities to the port: Kugluktuk (approximately 180 km west) and Cambridge Bay (approximately 280 km northeast)
- Southern end of **Grays Bay Road** is located at Jericho Station; approximately 66° 01' 6.36" N, 111° 28' 28.27" W

## Components and Activities

- Development and operation of a **deep water port** at Grays Bay on the Coronation Gulf including two large vessel wharves, a medium vessel wharf, a barge landing area with two berths, and a small craft harbour for approximately 24 vessels
- Construction and operation of an **Aerodrome** at the port
- Construction and operation of a 230 km **all-season controlled access road** (Grays Bay Road), including the construction and operation of Jericho Station
- Construction and operation of a **winter road** connecting Jericho Station to the Tibbitt Contwoyto Winter Road (TCWR) alignment on Contwoyto Lake (*Tahikyoak*)

## Phases

- **Construction phase** of the Project will take approximately five years to complete (both pre-construction and construction) with a proposed starting date in September 2029
- **Operations and Maintenance phase** of the Project will start in 2035 and will continue in perpetuity

## Knowledge Perspectives

- WKR, as well as the previous proponents, the Government of Nunavut and the Kitikmeot Inuit Association, have been engaging on the Project since 2016
- one primary source: *Kitikmiut Knowledge of the Proposed Kogloктоаkyok (Grays Bay) Port and Road Project* (Banci and Spicker 2024) that was compiled by the Kitikmeot Inuit Association and its consultants from the Naonaiyaotit Traditional Knowledge Project (NTKP), a repository of Inuit Knowledge maintained in a Geographic Information System (GIS)-based database
- Inuit, Indigenous, and community knowledge, as well as feedback from engagement, has been reviewed, considered, and integrated where appropriate into project planning and the IS

## Environment

- Two years of baseline studies building on decades of baseline work completed by previous proponents
- 11 volumes totalling over 7,000 pages of analysis
- With the implementation of mitigation, management, and enhancement measures, residual project and cumulative effects are predicted to be not significant
- Monitoring programs and ongoing engagement will inform adaptive management strategies

## Benefits

- **Economic – Transformative Benefits**
  - approximately **\$750 million** additional annual GDP growth by 2040 because of the Project
  - an estimated **670 jobs** in Nunavut each year during construction
  - an estimated **390 jobs** during operations and maintenance created by the Project and related expenditure
- **Community and Social – Supply Chain Resilience**
  - new transportation route to the western Arctic will strengthen supply chain resiliency by creating alternative access to essential goods
  - enhanced safety for both marine and land travel, supporting more reliable and secure movement within the Coronation Gulf and throughout the Northwest Passage
- **Sovereignty and Security – Strategic Presence**
  - first deep water port in the western Arctic
  - critical year-round strategic presence in the region

## VS.10 Volume Summary – Scope of the Additional Assessments and Conclusions

Grays Bay Road and Port Project (the “Project”) is a deep-water port and 230 km all-season road development being proposed by West Kitikmeot Resources Corp. (WKR), located within the Kitikmeot region of Nunavut. The port will be located within the Coronation Gulf, approximately 50 km south of the North West Passage route through the Arctic and will connect via the all-season road to the closed Jericho Mine site at Jericho Station, on the northwest side of Contwoyto Lake, NU. The all-season road will connect seasonally to the Tibbiett to Contwoyto Winter Road (TCWR) annually. WKR has prepared an Impact Statement (IS) to identify and assess potential environmental and socio-economic effects resulting from the Project that meets the requirements outlined in the Nunavut Agreement and the Nunavut Impact Review Board (NIRB) *Guidelines for the Preparation of an Impact Statement for West Kitikmeot Resources Corp’s Grays Bay Road and Port Proposal* (NIRB File No. 24XN038; NIRB 2026; IS Guidelines).

This volume of the IS presents additional assessments and summaries to supplement the Valued Component (VC) assessments presented in Volumes 5 to 9 and concludes with an overall summary of conclusions for the IS. Additional assessments presented in this volume of the IS are included to satisfy the following factors of the IS Guidelines (NIRB 2026):

- Holistic Discussion (Section 7.4 of the IS Guidelines; see Section 31 Holistic Assessment)
- Cumulative Effects Assessment (Section 7.4.3 of the IS Guidelines; see Section 32 Cumulative Effects Assessment Overview)
- Transboundary Impacts (Section 7.4.4 of the IS Guidelines; see Section 33 Transboundary Effects Assessment)
- Accident and Malfunctions Assessment (Section 8.4 of the IS Guidelines; see Section 34 Accidents and Malfunctions)
- Impacts of the Environment on the Project (Section 7.4.2 of the IS Guidelines; See Section 35 Effects of the Environment on the Project)

As noted in the relevant sections, these additional assessments are closely linked to the VC assessments and are intended to supplement or summarize those assessments.

Through the Project-specific engagement program delivered between 2016 and 2025, including community meetings, workshops, community-based primary research, the Project-specific Inuit Knowledge report, compiled from the NTKP database, and through a review of publicly available information, Kitikmiut, other Indigenous groups, and other potentially affected communities shared information, expressed concerns, and provided recommendations which have informed these additional assessments. The combined Inuit Knowledge and western scientific information knowledge base is critical so the Project assessment reflects Kitikmiut perspectives, lived experience, and observed environmental conditions. Continued knowledge sharing, collaboration, and incorporation of new information over the life of the Project will be essential to refine predictions, improve adaptive management, and enhance Project outcomes for Inuit and other potentially affected communities.

## **VS.10.1 Holistic Assessment**

The Holistic Assessment considers the potential for collective and cumulative impacts to natural and human systems as a result of the Project, and the capability of these systems to maintain their structure and functions and support biological and ecological diversity as well as the culture, health and well-being of Nunavummiut. Inuit, Indigenous, and Community values and perspectives have been considered alongside western science to form the foundation of project design and the IS. WKR understands that at the heart of Inuit, Indigenous, and Community Knowledge is the interconnectedness of all beings; this principle is a key consideration for the IS and the foundation on which the Holistic Assessment is based.

Organized in three parts, the first part of the Holistic Assessment reviews the VC assessments which form the basis of the Impact Statement and acknowledges the interconnectedness of the individual VCs. Next, the following Holistic VCs are introduced to facilitate a systems-based evaluation of project and cumulative effects on terrestrial, marine, and social, cultural and health systems:

- Land and Freshwater Environment - This Holistic VC was selected in recognition of potential Project and cumulative effects on the land, high places and fresh water, the interconnectedness of animals, rocks, and earthen features, land, plants, and water systems, and importance of these features to Kitikmiut, other Indigenous groups, and other potentially affected communities.
- Ocean Environment - This Holistic VC was selected in recognition of potential Project and cumulative effects on living and non-living features of the ocean and their social, cultural, scientific, and economic significance to Kitikmiut, other Indigenous groups, and other potentially affected communities.
- Human Environment - This Holistic VC was selected in recognition of the potential Project and cumulative changes on the social, cultural and health conditions that may affect the well-being of Kitikmiut, other Indigenous groups and other potentially affected communities.

The assessment then extends beyond the Holistic VCs to examine the potential collective impacts of the Project and reasonably foreseeable induced activities on the environment and people to understand how impacts to terrestrial, marine and social, cultural and health systems may affect community objectives and desired outcomes with an emphasis on avoiding unacceptable impacts and enhancing social benefits.

With the implementation of mitigation, management and enhancement measures, residual project and cumulative effects are not predicted to affect the capability of terrestrial, freshwater and ocean systems to maintain their structure and functions. Biological and ecological diversity and Inuit culture, health and well-being will also continue to be supported so unacceptable effects can be avoided. The Project will be developed in consideration of community values and objectives to achieve desired outcomes.

The Holistic Assessment is not intended to be read as a stand-alone assessment but brings together the work done in other sections of the IS in a succinct summary through a systems-based style of assessment to highlight the interconnectedness of key elements.

## VS.10.2 Cumulative Effects Assessment Overview

The Cumulative Effects Assessment Overview summarizes how cumulative effects were assessed for the Project, the regional context shaping those effects, and the key outcomes across all VCs. Cumulative effects arise when the Project's effects interact with effects from past, present, proposed, and reasonably foreseeable activities, as well as natural processes such as climate change.

A Project Inclusion List identified 129 physical activities (e.g., mines, exploration, roads, communities, marine traffic) with potential interactions. Cumulative effects were analyzed in two parts for each VC:

- Past, present, and reasonably foreseeable physical activities
- Reasonably Foreseeable Induced (RFI) activities (i.e., projects that would likely not happen without the Port and Road being operational); RFI activities include possible future expansions of the Project, three candidate mines (Izok, Hackett, High Lake), and associated access roads, air traffic, and marine shipping.

For context, the Kitikmeot Region is vast, remote, and lightly developed. The Project footprint is extremely small relative to the Kitikmeot Region. Human activities are sparse and widely separated, reducing the likelihood of cumulative effects under current conditions. Cumulative effects become more relevant in certain future scenarios:

- Resource development in the Slave Geological Province could increase road, marine, and air traffic, particularly if the three RFI mines proceed.
- Potential southern road connections could create a continuous all-season route to the Arctic coast, increasing access and long-term human use.
- Under the RFI scenario, additional mining-related traffic could increase substantially, although total land disturbance from induced mines remains extremely small (<0.02% of the region).

Remote conditions, long distances from the Project, and relatively low activity levels mean cumulative effects are currently rare, though they could emerge depending on future development choices. The only established regional threshold (from the Bathurst Caribou Range Plan) was applied to evaluate cumulative habitat disturbance for caribou, indicating that while the Project alone does not elevate risk, RFI projects could contribute to increased risk within the range.

Project-specific mitigation, management and enhancement measures are generally sufficient for managing effects, although in some cases, future regional measures may be beneficial. Regional land-use planning and resource management frameworks (e.g., Bathurst Caribou Range Plan, Slave Geological Province studies, shipping frameworks, Nunavut Land Use Plan) offer ways to manage cumulative effects beyond project-specific commitments.

Overall, cumulative effects are currently limited due to the region's remoteness and sparse activity. More meaningful cumulative effects emerge only in future scenarios where GBRP supports additional mine development, increased transportation, or new regional infrastructure. Even then, effects remain generally low to moderate and not significant. Positive cumulative effects (e.g., employment, non-traditional land use opportunities) may be realized for several socio-economic VCs.

## VS.10.3 Transboundary Effects Assessment

The Transboundary Effects Assessment outlines how the Project may generate effects that cross territorial or provincial borders. Under Nunavut Impact Review Board (NIRB) guidance, transboundary effects are defined as project-related impacts occurring outside the Nunavut Settlement Area (NSA) or impacts within the NSA that originate from project activities occurring outside it.

While project infrastructure is located entirely within the Kitikmeot Region of the NSA, the Project does have the potential to result in transboundary effects related to the following:

- Physical activities that cross the NSA boundary (e.g., marine vessel routes connecting to Quebec, Inuvik, or Tuktoyaktuk; use of the Tibbitt to Contwoyto Winter Road (TCWR), allowing project-related trucking between Nunavut and the Northwest Territories (NT))
- Migratory and wide-ranging wildlife species (e.g., individual species whose movements naturally cross geographic boundaries beyond the NSA)
- Socio-economic factors (e.g., project-related employment opportunities and requirements for materials, equipment and services that may be met from other territories and provinces)

Through Project-specific engagement, the Project-specific Inuit Knowledge report and a review of publicly available information, Kitikmiut, other Indigenous groups and other potentially affected communities shared information, concerns, and recommendations related to transboundary effects. Comments highlighted extensive concerns about how the Project may affect wildlife, cultural practices, and overall well-being with many groups expressing concerns specific to caribou populations and potential disruptions to long-standing harvesting rights and cultural continuity.

The assessment identifies several VCs with potential for transboundary effects including: caribou, birds, other terrestrial wildlife, marine mammals, Traditional Land, Marine, and Resource Use (TLMRU), food security and sovereignty, community health and well-being, employment and economy, and infrastructure and services. The remaining VCs are predicted not to experience transboundary effects as their project-related changes remain within locally defined assessment areas inside the NSA.

For biophysical VCs, potential transboundary effects arise mainly from sensory disturbance, movement alterations, and cumulative pressures on migratory species. Migratory caribou may experience cross-jurisdictional effects due to their extensive ranges and the influence of the Project combined with cumulative disturbances in both Nunavut and NT. However, residual effects on migratory birds, muskox, moose, grizzly bears, and wolverine are predicted to be low or negligible, with potential effects generally localized and limited by distance to the border and existing natural movement patterns. For marine mammals, transboundary effects may occur through underwater noise and vessel collision risk associated with marine shipping routes that extend into the Inuvialuit Settlement Region and beyond. These effects are expected to be brief, low in frequency, and not significant due to limited traffic volumes and mitigation measures.

Socioeconomic transboundary effects may occur through changes to harvested wildlife availability, cross-border worker travel, community health dynamics, shifts in employment and income distribution, and increased demand on infrastructure such as the TCWR, health and emergency services in Yellowknife, and regional transportation networks. Although these effects may involve both adverse and positive outcomes, the Project includes mitigation measures and management plans aimed at reducing adverse influences and supporting adaptive management over the project life.

In summary, while transboundary effects are possible for select VCs through ecological connectivity, workforce mobility, and shared infrastructure, the majority of transboundary effects are predicted to be low in magnitude and manageable with planned mitigation, monitoring, and ongoing engagement with Kitikmiut, other Indigenous groups and other potentially affected communities.

## **VS.10.4 Accidents and Malfunctions**

Accidents and malfunctions resulting from the construction, operations and maintenance of the Project are events that are not part of any planned activity or normal operation of the Project but have a reasonable probability of occurrence and have the potential to result in adverse environmental effects. During project-specific engagement activities, Kitikmiut, other Indigenous groups, other potentially affected communities and Canadians emphasized the collective concern about accidents and malfunctions that may occur during all phases of the Project. It was understood that accidents and malfunctions may occur; however, the expectation is that WKR ensures that all possible measures are taken to prevent these incidents.

The following potential accidents or malfunctions were assessed:

- Terrestrial and aquatic hazardous material spill
- Marine hazardous materials spill
- Fire or explosion
- Handling, storage and use of explosives (accidental discharge or detonation)
- Vehicle or mobile equipment accident
- Aircraft accident
- Marine vessel accident

The assessment of each scenario considered the risk of occurrence and detailed mitigation and emergency response measure, then determined the significance of residual effects of the accident or malfunction to VCs using the same significance criteria used in the individual VC assessments.

Management Plans (see Volume 11) will be developed with input from Inuit, Indigenous governments and organizations, users, and regulators to reduce the likelihood of occurrence and potential effects of accidents and malfunctions, should they occur.

Given the mitigations and emergency response measures that will be in place during construction and operations and maintenance phases of the Project, the likely residual effects of the majority of the accidental events identified are determined to be not significant. The exception for this would be an incident that resulted in loss of life or significant injury, or an incident that resulted in a change in the way individual traditional land users use an area or resources, based on the effects or perceived effects to the value of the affected area or resource. If individual traditional land users select to no longer use an area due to the perceived effects of an incident then the effect to those users may be significant.

## **VS.10.5 Effects of the Environment on the Project**

Local conditions and natural hazards could potentially adversely affect or damage Project infrastructure, resulting in failures, malfunctions, or accidental events, which in turn could result in adverse effects to the environment. Kitikmiut, other Indigenous groups, and other potentially affected communities shared information, expressed concerns, and provided recommendations related to weather events and natural hazards. A Climate Change Risk Assessment (CCRA) (Appendix 12B; see Volume 5, Section 12.3 for a summary) considered permafrost, severe weather events and sea conditions and included adaptive strategy recommendations to address these high-risk climate hazards and improve the resilience of the Project. The scope of assessment in this section focuses on geotechnical hazards and unfavourable geological conditions with findings summarized below:

- Terrain instability and permafrost thaw can damage project infrastructure (e.g., roads, airstrip, culverts), causing settlement, structural failures, and embankment instability, but these risks are reduced through geotechnical investigations, design measures to maintain ground thermal conditions, and ongoing monitoring and maintenance.
- Although there is a low potential for seismic activity in the region, seismic events could damage foundations, roads, airstrip, and utilities, potentially interrupting services or delaying project activities, with impacts varying by earthquake magnitude and proximity.
- Weak zones and faults may occur in quarries or borrow pits, but they are not expected to affect project infrastructure due to the above-ground design and nature of the Project.

The Project is being designed and engineered with consideration of environmental conditions, including climate and geological conditions. With the application of mitigation and management measures, environmental conditions are not expected to damage project infrastructure or result in a substantial change to project schedules. WKR will continue engaging with Kitikmiut, other Indigenous groups, and other potentially affected communities to integrate new information into planning and adaptive management.

## VS.10 Ilaliutihimayut Ihivgiugutit uvalu Iniqtigutit

Aadlat naunaiyainiq tuniyauyuq uumani makpiraangani IS-mi ilaliutihimayuuq quviagigiami hapkuat ihumaaluutigiyauyut uumangga IS-kut Maliktakhangit (NIRB 2026):

- Ukpiginikkut Uqautiginiq (Titiraqhimayuuq 7.4 haffumani IS Atugahat; takulugu Titiraqhimayuuq 31 Ukpiginikkut Naunaiyautit)
- Katitiqhimayut Hulaqutit Ihivgiugutit (Titiraqhimayuuq 7.4.3 haffumani IS Atugahat; takulugu Titiraqhimayuuq 32 Katitiqhimayut Hulaqutit Ihivgiugutit)
- Kikliitigut Hulaqutit (Titiraqhimayuuq 7.4.4 haffumani IS Atugahat; takulugu Titiraqhimayuuq 33 Kikliitigut Hulaqutit Ihivgiugutit)
- Aaniqnikkut uvalu Ihuangitumik Ihivgiugutit (Titiraqhimayuuq 8.4 haffumani IS Atugahat; takulugu Titiraqhimayuuq 34 Aaniqnikkut uvalu Ihuangitumik Ihivgiugutit)
- Hulaqutit Avatingnun haffumunga Havaamun (Titiraqhimayuuq 7.4.2 haffumani IS Maligahani; Takulugu Titiraqhimayuuq 35 Hulaqutit Avatingnun Havaaghamun)

Titiraqhimayuuq ihuaqtuni titiraqhimayuni, hapkua ilaliutihimayut ihivriurutit qanitukkut atadjutiqaqtut hapkununga VCkunun ihivriurutinun uvalu piyauhimayut ilaliutilugit uvaluuniin naittumik tahapkua ihivriurutit.

### VS.10.1 Ukpiriyakkut Naunaiyainiq

Tamna Inuuhirmun Ukpignarnikkut Qauyihaidjutikhaq ihumagiyait piniarungnaqhiyut katitiqhimayut katitiqhimayut ayungnautiqarniaqtun idjuhianun inungnunlu hanaqidjutikhangit naunairutingnik talvanga Havaaqharni, pigiaqaqtunik ukuninga hanaqidjutikharnik munagiyaangat napaqtirutikhangit auladjutikhangitlu ikayuutikharniklu uumayunik avatiliqinikkutlu allatqiinguyut pitquhingitlu, inuuhirinikkutlu inuuhirinikkutlu Nunavunmiunun. Inuit, Nunaqaqqaqhimayut, Nunallaallu ukpiriyait ihumagiyailu ihumagiyauyut uataanit nalunaqtunik naunaiyainiq piliuriami tunngavikhanganik havauhikhamut piliurninnga IS-mullu. WKR kangiqhimayait uumatingani Inuit, Nunaqaqqaqhimayut, Nunallaamilu Qauyimayait atadjutiqaqtut tamaita inuuyut; una hivunikhaliurutikhaq ihumagiyauluaqtuq IS-kut tun'ngavigiyaalu talvani Ukpiriyakkut Naunaiyainiq tunnganiqaqtuq

Ihuaqhaqtauhimayuuq pingahunik ilanganik, hivuliq ilanga Ukpiginikkut Naunaiyainiq ihivriurutit VCkut ihivriurutit kitut pidjutauyut Hulaqutinun Uqaqtainun uvalu ilitaqhiblutik atadjutiqaqtut attautinun VCnun. Tuklia, hapkua Ukpiginikkut VCs ilituripkaqtayut pidjutigilugit auladjutinun-pihimayut ihivriurutit havaaghamun uvalu katitiqhimayut hulaqutit nunamun, tariumun, inungnun, pitquhikkut uvalu aaniaqtailinikkut:

- Nuna uvalu Tariup Imanga Avatingit - Una Ukpiginikkut VC tikuaqtayuuq ilitagidjutigibluq Havaaghaq uvalu amigaiquumiyut hulaqutit nunamun, puqtuniit uvalu imariktut imaq, atadjutit hugadjat, uyaqqat, uvalu nunami idjuhiit, nunat, nauhimayut, uvalu imaq auladjutit, uvalu akhuugutit hapkua qanuginiit hapkununga Kitikmiut, aalat Nunaqaqqaqtut katimayit, uvalu aalat hulaqutauniaqtut nunallaat.

- Tariumi Avatingit - Una Ukpiginikkut VC tikuaqtauhimayuq ilitaridjutigiblugu Havaaghaq uvalu katitiqhimayut hulaqutait uumayunun uvalu uumangitut qanuginiit tariumi uvalu inmi inungnun, pitquhikkut, nalunaqtuliqinikkut, uvalu maniliuqnikkut anginiqhait Kitikmiut, aalat Nunaqaqaaqtut katimayiit, uvalu aalat hulaqutauniaqtut nunallaat.
- Inungnun Avatingit -Una Ukpiginikkut VC tikuaqtauuyuq ilitaridjutigiblugu Havaaghaq uvalu amigaiqpaliayut aalanguqtiritit inungnun, pitquhikkut uvalu aaniaqtailinikkut qanuginiit tapkua hulaqutiginiaqtait inuuhiqattiarnirmun Kitikmiut, aalat Nunaqaqaaqtut katimayiit uvalu aalat hulaqutauniaqtut nunallaat.

Ihivgiugutit pidjutiqaqtut avatiinun Ukpiginikkut VCs ihivgiugiangani katitiqhimayut hulaqutait Havaaghaq uvalu ihuaqumik tautuknaqtut hulidjutit avatingnun uvalu inungnun kangiqhiyaangini qanuq hulaqutait nunamun, tariumun uvalu inungnun, pitquhikkut uvalu aaniaqtailinikkut auladjutit hulaqutauniaqtut nunallaanun tikinahuagutinun uvalu piimayuyut qanuginiit akhuugutigilugit pittaililugit ihuangitut hulaqutit uvalu ihuaqhiyuumiqlugit inungnun ikayuutit.

Atulingnikkut ihuaqhaidjutit, munagidjutit uvalu ihuaqhiyuumiqnikkut aktilaangit, ilakuit havaaghat uvalu katitiqhimayut hulaqutait itqungniaqtaungitut hulaqutigilugit piyaangnirit nunap, tariup imanga uvalu tariuq auladjutait pihimalugit idjuhiit uvalu auladjutait. Uumayuvallit uumayuvalluilu aalatqiiknigit Inuit ilitquhiit, aaniagitaagani inuuhiqatiaqnikhalu ikayuqtauhimaaqniaqut naamagitut aktuqngit atugitaagani. Tamna Havaaghaq pivallianiaqtun ihumagilugit nunalaani upigiyainik hivunikhangitlu iniqtigiyangat ihumagiyayut iniqtirutikhangit.

Ukpiginikkut Naunaiyainiq taiguaqtaungittuq avallituumik naunaiyainiq kihimi atauttimuqittiyuq havaangit piyait aadlani ilagiyangani IS-mi naittumik ukunuuna timiqutigiyayut-ittut qanurittaakhaanik naunaiyainiq naunairiami atayut akhuurutaayut ilagiyangit.

## **VS.10.2 Katitiqhimayut Ayungnautiqaqtunik** **Ihivriudjutikhang Naittumik**

Tamna Katitiqhimayut Ayungnautiqaqtunik Ihivriudjutikharnik Naittumik titiraqhimayuq qanuq katitiqhimayut ayungnautiqaqtunik ihivriudjutikharnik Havaaghaq, avikturvingmi naunairutingnik aulativakhimayut tapkuninga ayungnautiqaqtunik, naunaituniklu naunairutingnik avatingni tamaini VCngitni. Katitiqhimaqtunik ayungnautiqaqtunik aulavakhimayut taima Havaaghangit ayungnautiqaqtunik ilauqagumik ayungnautiqaqtunik kingulirmi, hadjamimun, tukhiqtauhimayunik, naunaituniklu tautuminaqtunik hulilukaaktunik, unalu nunami hanaqidjutikharnik taimaitunik hilaup allanguqtiginikkut.

Havaaqhangit Ilaahimayut Titiraqhimayut ilitagihimayut 129nik iqaiyalinqinikkut hulilukaaktunik (imaatun itun, uyaraqhiuqtunik, qiniqhiayunik, apqutingnik, nunalaangit, tariumi aulavikharnik) taima ilaulukaarniaqtun hulilukaaktunik. Angikliyuumiqtuq qanuriliurutingit ihivriuqtauyut malruuknik ilanganik tamarmiknut VC-mut:

- Taimani, taja, naamaktuniklu timimi hulijutunik
- Ihuaqtumik Ihumagiyayut Pidjutaayut (RFI) hulidjutit (imaa havaaghat tapkua atulimaitunaqhiyut tulakvikhaq uvalu Apquti aulapkaqtaungitpata); RFI hulidjutit ilauyut hivungani angikliyuumiqlugit Havaaghat, pingahut uyarakhuiqtit (Izok, Hackett, High Lake), ilauyullu apqutit, tingmitit auladjutait, uvalu umiakktut umiakuuqtitiyut.

Naunaiyautinun, Kitikmeoni angiyuq, unghahiktuq, mikiyumiklu pivalliahimayuuq. Tamna Havaaqhaq nayugakhaa mikitqiyayuuq talvanga Kitikmeotmi Avikturviangani. Inuit hulidjutait ikitpalaat uvalu unghahiktumik, ikikliyuumigutiyut amigaiquyuuminikkut hulaqutainun ataani tadjamin qanuginiitigut. Angikliyuumiqtuq qanuriliurutingit akhuurutaayuuq ilanginnut hivuniqui qanurittaakhaanik.

- Ikayuutikkut pivalladjutit uvani Slave Geological Province amigaiquyuuminiaqtut apqutit, tariukktut, uvalu tingmitikkut auladjutait, ukualuat pingahut RFI uyarakhuiqviiit aulahimaaqata.
- Piniarungnaqhiyut hivuraani apqutit atadjutait pidjutauniaqtut aulahimaaqtumik tamaat ukiutigut apqutit hamunga Ukiuqtaqtup hinaanun, amigaiquyuumilugit piyaangnirit uvalu hivituyumik-kikliqaqtut inungnun atuqtauniq.
- Ataani RFI ihumagiyayuyumi, ilaliutihimayut uyagakhiuqnikkut ilauyut amigaiquyuuminiaqtut angiyumik, taimaali attautimun nunatigut ulapiqutaayut uyarakhuiqtinin mikiyut (<0.02% aviktungniini).

Unghahiktut qanuginiit, unghahiktut Havaaghamin, uvalu ikitpalaat hulidjutit aktilaangit naunaiyautaa amigaiqpalianikkut hulaqutait taja atuqtauluangit, kihimi nuiniaqtut qanuginiitigut hivuniptingni pivallianikkut piyakhat. Avaliituuq havaktauhimayuuq aviktungniini kiklikhaa (hamanga Kingauk Tuktut Nayugainun Upalungaiyautit) iliugaqtaayuuq naunaiyagiangani amigaiquyuumiyut nayugait hulaqutinun tuktunun, naunaiyautayuuq taimaali Havaaghaq avalitumik qulvaqtingitait qayangnautit, RFI havaaghat ikayuutauniaqtut amigaiquyuumilugit qayangnautit nayugaini.

Havauhikhaq-ihuaqtumut ingattaqtailiniq, munariniq unalu ihuarhainiq qanuriliurutingit nakuuyut munarigiami qanuriliurutingit, kihimi ilaani, hivuniqui avikturhimayuni qanuriliurutingit ikayuutauniaqtuq. Aviktuqniini nunat atuqniitigut upalungaiyautit uvalu ikayuutikkut munagidjutikkut tungavikhat (imaa Qingautmi Tuktut Nayugaitigut Upalungaiyautit, Slave Geological Province naunaiyautit, umiakuuqtitinikkut tungaviit, Nunavunmi Nunatigut Atunniitigut Upalungaiyautit) tunihiyut qanugiliugutighanik munagiyaangani amigaiqpaliayut hulaqutit qulaani havaanun-kitunun uqariiqhimayunun.

Tamainun, amigaiquyuumiyut hulaqutait taja kikliqaqtut pidjutigiblugit aviktungniit unghahingniitigut uvalu ikitpalaat hulidjutit. Amigaiguuumidjutikhanik pidjutaunguyut hivunirmi qanurinningini Apqutikhaani Apqutikhaani Apqutikhaani Tulaktaqvikhaanilu Havaktauyukhami (GBRP) ikayuutauhunguyuuq aallanik uyarakhivringni pivalladjutikhanik, amigaiguuumidjutikhanik ingilradjutikhanik, uvaluuniit nutaanik avikturini nappaqtirutikhanik. Talvangalu, hulaqutit mikiyut qitqani uvalu angivalaangit. Nakuuyut

amigaiqpaliayut hulaqutit (imaa havaaghat, pitquhiungitun nunat atuqniitigut piyakhat) ilituriyauniaqtut amigaitut inugiangnikkut-maniliungnikkut VCs.

## **VS.10.3 Nunat Kikliitigut Hulaqutit Ihivgiugutit**

Tamna Nunat Kikliitigut Hulaqutit Ihivgiugutit titiraqhimayut qanuq Havaktakhaq pidjutiqaqniaqtuq hulaqutunik tapkua avatiinun aviktuqhimayut uvaluuniin aviktuqniit kikliini. Ataani Nunavunmi Avatilirinirmut Katimayit (NIRB) maliktakhait, avatingnut avatingnut aktuutauniit naunaiqtauyut havaakhanut pidjutiqaqtunik aktuqtauniit atuqtauyut ahiani Nunavunmi Nunataarviup Nayugaani (NSA) uvaluuniit aktuqtauniit iluani NSA piyut havaakhanit hulipkaidjutainit hilataani.

Havaakhaq nappaqtirutikhanut nayugaqaqtuq tamaat Kitikmeoni Avikturnianni NSA-mi, tamna Havaakhaq pidjutiqaqtunik avatingnut nunanut aktuutauyunik pidjutiqaqtunik hapkununga:

- Iqaiyaqnikkut hulidjutit tapkua ikaaughu NSA kikliini (imaa tariumi umiat aulaviit atayut Quebecmun, Inuvikmun, uvaluuniin Tuktoyaktummun; atuqniit Tibbitt hamunga Contwoyto Ukiumi Apqut (TCWR), pipkaiyut havaaghanun-ilauyut aghaluutitutuq qitqani Nunavunmi uvalu Nunatsiami (NT))
- Tikitpaktut uvalu angiyut hugadjat (imaa attautit hugadjat kitut aulaviit inmi ikaaqtutik nunatigut kikliitigut avataani NSA)
- Inugiangnikkut-maniliungnikkut pidjutit (imaa Havaakhanut-pidjutiqaqtut havaakhat atuqtakhat imaalu pitqujauhijamut tamajakhat, ingilrutit kivgaqtuidjutikhallu pijauniarunaqhiyut aallanit avikturniinnit avikturniinnilu)

Haffumuuna Havaaghanun-kitunun ilauqatigiingnirmun, Havaaghanun-kitunun Inuit Ilihimayaitigut uniudjutit uvalu ihivriurutit inungnun piinialgit kangiqhidjutit, Kitikmiut, aalat Nunaqaqaaqtut katimayit uvalu aalat hulaqutauniaqtut nunallaat uqautigiyaat kangiqhidjutit, ihumaaluutit, uvalu pitquidjutit ilauyut kikliitigut hulaqutit. Uqautaingit naunairutiqaqtun anginirmik ihumagiyaayunik talvuuna qanuq tamna Havaaqhaq ayungnautiqarniaqtun uumayunik, pitquhiliqinikkut atuqtakharnik, tamaatlu inuuhirikharnik amigaitunik katimayunik ilitugipkaivakhimayut ihumaluutigiyainik talvuuna tuktunik amihuaryuiniklu ayungnautiqarniaqtun hivutunigaalukmik anguniarnikkut pidjutikharnik pitquhiliqinikkutlu aulahimaarnikkut.

Tahapkununa tutkikhakhikhimayunik kanugilidjutivaktunik VCs pihimayunik pidjutitaktunik avaatingnut avaatingnut akturnutavaktunik ilauhimayut: tuktunik, kupanuanik, alauyunik avaatingnut nungumanginiklu nirginitik, tagiup nirginitik, Ingilgangnitanik Nunatuttukanik, Taryumi, imakmiutaniklu Atugakhanik Atuktauvaktunik (TLMRU), nikiikhaqatiarniq ataniudjutavaktuniklu, nunalingni inuhikgingnaktumik uvunalu nakukgutavaktuniklu, havagiyaayukhanik uvunalu maniliuknikmunlu, uvunalu hungnayayukhanik uvunalu havakpauhijutiniklu. Ilakuit VC-guyut nalautaaqtauyut atugitaagani kikligiyaini aktuqniqmik havaamikni pijutiqaqtunik aalaguqnginik aulainaqmata nunagiyaayumi naunaiyaqngini nunani iluani NSA-mi.

Uumayuvallit VCs, piniarungnaqhiyut avatingnut aktungnarniit pivaktut mihingnautikkut ulapiqtauyunit, ingilravingit aallanguqtirutit, amigaiguuuyullu ayuqhautit tikitpaktun huradjanut. Ingilgayanginik tuktunik atuktauvaktunik avaatingnut malikgalingnik nakungikgativaktunik pilakivaktunik avaatingnut nungumanginiklu nungumanginiklu uvunalu pidjutiqiyumikpaktunik tahapkunani Havagiyaayukhanik

atadjutiglugit pilingnik kauhimayuvaktunik nalukhaktuvaktunik tamangni Nunavutmi talvanilu nunainilu NT. Kihiani, ilavaluit nakungikgutigivaktunik tikitpaktunik tikmijanik, umingmaknik, tuktuvainik, akhanik, tahapkuningalu kalviknik pihimayunik havakhikhimayunik ikkikliyumikpaktunik naliak ikkiklivaliavaktuniklu, pilakivaktunik nakungikgutigivaktunik tahapkununa nayugainik uvunalu kiklivikhaqaqhutik unghaktuyunik avaatingnut imalu ilidjuhikgivakgainik ingilgayanginik ingilgayanginik ilidjuhikgivakgainik ilidjuhikgivakgainiklu. Tariumi huradajat, avatingnun kikliinun hulaqutit atuqtauniaqtut imap ataani nivyaangnikkut uvalu umiat tuluqnikkut qayangnautit ilauyut tariumi umiakkut aulaviit tapkua hivituyut hamunga Inuvialuit Nunainun uvalu avataanun. Hapkua hulaqutait niriuktauyut hivikittumik, ikitpalaqaqhutiklu, uvalu angivalaangitut pidjutigiblugit ikitpalaangnikkut aghaluutit uvalu ihuaqhainikkut aktilaangit.

Inuuhiqmi manikhaqhiurutinilu nunainaani aktuqngit atulaaqtut aalaguqnginik agunahuaqniqmi uumayunik qahaknginik, avatingnut nunanit havaktut aulaaqnginik, nunagiyaayumi aaniagitaagani qanurinigini, aalaguqnginik havaktut manikhaakhalu tuniuqhainiginik, amigaiqpalianiginiklu piyumayaunigit hanayakhat ilaa TCWR-guyuuq, aaniaqtailinik upaluqnaqtuqaqat ikayuutunik Yalunaimi, nunamilu aularutinut havaqatiriigutit. Taimaali hapkua hulaqutait ilauniaqtut tamangnik ihuangitumik uvalu nakuunikkut qanugininik, Havaaghaq ilauyut ihuaqhainikkut aktilaangit uvalu munagidjutikkut upalungaiyautit tugaaqhimayut ikiliyuumiqlugit ihuiguuutit uvalu ikayuutikhat hungiutinikkut munagidjutit atuqtilugu havaap auladjutaani.

Naittumik, taimaalu avatingnun kikliitigut hulaqutait piyaaqtut tikuaqtauhimayunun VCnun haffumuuna nunatigut atadjutit, havaktut auladjutait, uvalu atuqatigiikhutik igluqpangnik, amigaitut kikliitigut hulaqutait itqungniaqtauyut mikiyut anginiqhait uvalu munagiyuminaqtut upalungaiyaqhimayutit ihuaqhaidjutit, munagidjutit, uvalu aulahimaaqtumik ilauqatigiikniq hapkununga Kitikmiut, aalat Nunaqaqaaqtut katimayit uvalu aalat hulaqiniaqtut nunallaat.

## **VS.10.4 Aaniqtut uvalu Ihuitumik Auladjutit**

Pijaqqurniit ahiruqtiqhimajullu pidjutaajut nappaqtirninganit, aulapkaidjutainnit munaqhidjutikhainniklu Havaktaujukhami hulidjutit ilaungittut parnaktauhimaajuni hulidjutikhani aulapkaidjutaaniluunniit Havaktaujukhami kihimi piniarungnarhidjutiqaqtuq piniarungnarhiluni pidjutiqaqtaaqtuqlu nakuungittunik avatimun hulaqutinik. Havaktautilugit havaaghanun-kitunun ilauqatigiingnikkut hulidjutit, Kitikmiut, aalat Nunaqaqaaqtut katimayit, aalat hulaqiniaqtut nunallaat uvalu Kanatamiut uqautigiyait katitihimayut ihumaaluutit aaniqnikkut uvalu ihuitumik tapkua atuqtauyut tamaini havauhitigut haffuma Havaaghap. Kangiqhimayuyuuq aaniqtuqaqat uvalu ihuitumik atuqtauniaqtut; kihimi, niriuktauyut tapkua WKR pihimalugit tamaita aktilaangit havaktauyut pittailiyaangani hapkua hulaqutit.

Hapkua pidjutauniaqtut aaniqnikkut uvaluuniin ihuitumik ihivgiuqtauyut:

- Nunami uvalu imakmi hivuuganaqtut hunat kuviyut
- Tariumi hivuuganaqtut hunat kuviyut
- Ikualaaqnikkut uvaluuniin qagaqtaunikkut
- Tiguhiniq, tutquumaniq uvalu atuqniit qagaqtautinik (piniqmik qagaqtauniq uvaluuniin qagaqtauyuuq)

- Aghaluutit uvaluuniin ingilgayaaqtut tamayat aaniqtut
- Tingmitikkut aaniqtut
- Tariumi qayakkut aaniqniq

Ihivgiugutit attautinun qanugiliugutinun ihumagiyaayut qayangnautit qanugiliugutinun uvalu naunaiyaqhimayut ihuaqhaidjutit uvalu qilamiuqnikkut kiudjutit aktilaangit, uvalu ihumaliugutigiblugit anginiqhait hulaqutit aaniqnikkut uvaluuniin ihuitumik hapkununga VCkunun atuqhugit aadjikiikumik anginiqhakkut qanuginiit atuqtauyut attautinun VCnun ihivgiugutini.

Munagidjutikkut Upalungaiyautit (takulugu Makpiraq 11) havaktauniaqtut uqagahaitigut Inuit, Nunaqaqaaqtut kavamait uvalu katimayit, atuqtut, uvalu maligaliqiyit ikiliyuumigianganani pidjutaayut uvalu hulaqutauniaqtut aaniqnikkut uvalu ihuitumik aulayut, atuqtaukpata.

Ihuaqhautikhangit imaalu amigaqhuutiqaqqan kiudjutikhanik maliqatqujauhijamajut atuqtaulirniaqtut nappaqtiqtautilugit imaalu aulapkaidjutikhanut munaqhidjutikhanullu havaktaunikhanut Havaakhaq, ilakungit pidjutauniarunaqhijut amigaittunut pijaquqhimaittumik hulipkaidjutainut naunaiqtaujut angivallaangittut. Pidjutigiblugit hapkua hulaqutit tapkua pidjutiqaqtut inuuhuiqniqmik uvaluuniin angiyumik aaniqniqmik, uvaluuniin qanugilidjut tapkua pidjutiqaqtut aalanguqtiqniqmik qanuq attautit pitquhikkut nunamik atuqtut atungnirit nayugait uvaluuniin ikayuutit, pihimayut hulaqutinun uvaluuniin ihumagiyaayut hulaqutait qanuginiitigut hulaqutainun nayugait uvaluuniin ikayuutit. Attautit pitquhikkut nunamik atuqtut piumagumik atugungnaiqlugu nayugaa pidjutaayuq hulaqutainun hulaqutinun hulaqutinun hulaqutainun anginiqhauniaqtuq.

## **VS.10.5 Aktuanit Avatauyumit Havaami**

Nunalaani qanuritmangaangit unalu nunamin amingnaqtun ayungnautiqarniaqtun aihuruqtilunikluuniit Havaaqhangit napaqtiqhimayunik, naunairutiqarniaqtun ihualuangitunik, ihualuangitumik aulaniaqtun, unaluuniit ayungnautiqaqtunik hulilukaaktunik, taima naunairutiqarniaqtun ayungnautiqarniaqtun avatiptingnun. Kitikmiut, allatlu Nunaqaqqaqhimayunik katimayit, allatlu ayungnautiqarniaqtun nunalaangit iliqatigiikpakhimayut naunairutingnik, ilitugipkaivakhimayut ihumagiyanik, tunihimaaqhutiklu atuqtakharnik aulahimayut talvuuna hilarlungnikkut qillaminuaq amingnaqtuniklu. Hilaup Aalanguqtirninga Qayangnaqtunik Qauyihaidjutikhaq (CCRA) (Appendix 12B; takulugu Volume 5, Section 12.3 naittumik) ihumagiyaat nunap qiqumania, hilarlukuarniq tariurlu qanuritmangaat ilaayullu hungiutinikkut qanuriliurutikhat pitquyauhijamajut ihuaqhautikhainik hapkuat qayangnaqpiaktut hilaup qayangnarniit ihuaqhiyuumirlugillu hakugingningit Havaakhap. Qanuriniga ilituqhaqniqani uvani uiguani ihumagiyaqaqtuq nunap qanurinigani aannirutaulaaqtunik nakuugituniklu uyaqat qanuriniginik naniyauyulu naitumik uqauhiuyut aaliuyuni:

- Nunap ihuilidjutaa unalu nunap qiqumania mahaktirnia hungiutittaaqtuq havaakhmut nappaqtiqritikhanut (e.g., apqutit, milviit, turhuat), nunap qiqhuqtitlugu, nappaqtiqritingit ihuirutivaktut, imaalu hinaani ihuirutivaktut, kihimi hapkuat qajangnarniit ikigliuummiqaktut talvuuna nunap qanurinningit qaujihaqtaunikkut, qanurinnikhainut ihuaqhautikhanut nunap uunaqutaa qanurinnianut, imaalu aullaranginnaqtumik munaqhidjutikhainnik munaqhidjutikhainniklu.

- Piqalluanguinmat piniaruknaqhiuq kayumiktipkainikkut avikturhimanirmi, kayumiktipkainikkut huungiutittaaqtuq tunngavinik, apqutinik, milviknik, pauwatuutiniklu, ulapiqutauttaaqtuq havagutitik kinguvaqtipkailuniluunniit havaktaujukhani hulinirnik, hulaqutiqarlunilu aallakkiikniqarhuni nunap haningarninganin qanittuanilu.
- Hakuiqtut kikliit uvalu ihuanguinirit atuqtauniaqtut uyagakhiuqvingni uvaluuniin atukirnikkut uyarakhiuqvingni, kihimi niriuktaungitut hulaqutigilugit havaaghap igluqpait pidjutigiblugu qulaani nunap idjuhia uvalu idjuhia Havaaghap.

Tamna Havaaqhaq havakhimayuq hanayauvakhimayurlu ihumagiplugit avatiliqinikkut atuqtakharnik, ilauyutlu hilaup qanuritmangaangit nunam qanuritmangaangitlu. Iliurainnnga ihuarhainiqmut munariniqmullu qanuriliurutingit, avatinga qanurittaakhaanik ihumagiyauyuq ahiruqtiriami havauhikhaq aulapkaitjutikhanik pipkaidjutiluniluunniit angiyumik aadlangurniq havauhikhamut naunaitkutanganut. WKR aulahimaaqtumik havaqatiginiqtaait Kitikmiut, aalat Nunaqaqaqtut katimayit, uvalu aalat hulaqutauniaqtut nunallaat ilaulugit nutaat kangiqhidjutit upalungaiyautinun uvalu hungiutinikkut munagidjutit.













## VS.10 Évaluations et conclusions supplémentaires

D'autres évaluations présentées dans ce volume de l'ERE sont incluses pour répondre aux critères suivants des Lignes directrices pour l'élaboration d'un ERE (CNER 2026) :

- Discussion globale (paragraphe 7.4 des Lignes directrices pour l'élaboration d'un ERE; voir la section 31 Évaluation globale)
- Évaluation des effets cumulatifs (alinéa 7.4.3 des Lignes directrices pour l'élaboration d'un ERE; voir la section 32 Aperçu de l'évaluation des effets cumulatifs)
- Répercussions transfrontalières (alinéa 7.4.4 des Lignes directrices pour l'élaboration d'un ERE; voir la section 33 Évaluation des effets transfrontaliers)
- Évaluation des accidents et des défaillances (paragraphe 8.4 des Lignes directrices pour l'élaboration d'un ERE; voir la section 34 Accidents et défaillances)
- Répercussions de l'environnement sur le projet (alinéa 7.4.2 des Lignes directrices pour l'élaboration d'un ERE; voir la section 35 Effets de l'environnement sur le projet)

Comme indiqué dans les sections concernées, ces évaluations supplémentaires sont étroitement liées aux évaluations des CV et visent à compléter ou à résumer ces évaluations.

### VS.10.1 Évaluation globale

L'évaluation globale tient compte du potentiel d'effets collectifs et cumulatifs sur les systèmes naturels et humains résultant du projet, ainsi que la capacité de ces systèmes à maintenir leur structure et leurs fonctions, à soutenir la diversité biologique et écologique ainsi que la culture, la santé et le bien-être des Nunavummiuts. Les valeurs et perspectives inuites, autochtones et communautaires ont été prises en compte parallèlement à la science occidentale, depuis la conception de projets et l'ERE. WKR comprend qu'au cœur du savoir inuit, autochtone et communautaire se trouve l'interconnexion de tous les êtres; ce principe est un facteur clé à prendre en compte pour l'ERE et le fondement sur lequel repose l'évaluation globale.

Organisée en trois parties, la première partie de l'évaluation globale passe en revue les évaluations des CV qui constituent le fondement de l'ERE et reconnaît l'interconnexion des CV individuelles. Ensuite, les CV générales suivantes sont introduites pour faciliter une évaluation systémique des répercussions du projet et des effets cumulatifs sur les systèmes terrestres, marins, sociaux, culturels et de santé :

- Milieu terrestre et d'eau douce – Cette CV générale a été sélectionnée en reconnaissance des répercussions potentielles du projet et des effets cumulatifs sur la terre, les hauteurs et l'eau douce, l'interconnexion des animaux, des roches et des éléments terrestres, des terres, des plantes et des systèmes d'eau, ainsi que l'importance de ces caractéristiques pour les Kitikmiuts, d'autres groupes autochtones et d'autres communautés potentiellement concernées.

- Milieu océanique – Cette CV globale a été sélectionnée en reconnaissance des répercussions potentielles du projet et des effets cumulatifs sur les caractéristiques vivantes et non vivantes de l’océan ainsi que leur importance sociale, culturelle, scientifique et économique pour les Kitikmiuts, d’autres groupes autochtones et d’autres communautés potentiellement concernées.
- Milieu humain – Cette CV globale a été sélectionnée en reconnaissance des changements potentiels et des changements cumulatifs que le projet apporte aux conditions sociales, culturelles et sanitaires pouvant affecter le bien-être des Kitikmiuts, d’autres groupes autochtones et d’autres communautés potentiellement concernées.

L’évaluation va ensuite au-delà des CV globales pour examiner les répercussions collectives potentielles du projet et les activités raisonnablement prévisibles induites sur l’environnement et les personnes, afin de comprendre comment les répercussions sur les systèmes terrestres, marins et sociaux, culturels et de santé peuvent affecter les objectifs communautaires et les résultats souhaités, en mettant l’accent sur l’évitement des répercussions inacceptables et l’amélioration des avantages sociaux.

Avec la mise en œuvre de mesures d’atténuation, de gestion et d’amélioration, les effets résiduels du projet et les effets cumulatifs ne devraient pas affecter la capacité des systèmes terrestres, d’eau douce et océaniques à maintenir leur structure et leurs fonctions. La diversité biologique et écologique ainsi que la culture, la santé et le bien-être des Inuits continueront également d’être soutenus afin d’éviter des répercussions inacceptables. Le projet sera développé en tenant compte des valeurs et des objectifs communautaires afin d’atteindre les résultats souhaités.

L’évaluation globale n’est pas destinée à être lue comme une évaluation autonome, mais regroupe le travail effectué dans d’autres sections de l’ERE dans un résumé succinct à travers un style d’évaluation systémique afin de mettre en lumière l’interconnexion des éléments clés.

## **VS.10.2 Aperçu de l’évaluation des effets cumulatifs**

L’aperçu de l’évaluation des effets cumulatifs résume comment les effets cumulatifs ont été évalués pour le projet, le contexte régional qui façonne ces effets, ainsi que les principaux résultats pour toutes les CV. Les effets cumulatifs surviennent lorsque les répercussions du projet interagissent avec des effets issus des activités passées, présentes, proposées et raisonnablement prévisibles, ainsi qu’avec des processus naturels tels que les changements climatiques.

Une liste d’inclusion de projet a repéré 129 activités physiques (par exemple, mines, exploration, routes, communautés, trafic maritime) susceptibles d’avoir des interactions avec le projet. Les effets cumulatifs ont été analysés en deux parties pour chaque CV :

- Activités physiques passées, présentes et raisonnablement prévisibles
- Activités raisonnablement prévisibles induites (c’est-à-dire des projets qui ne se réaliseraient probablement pas si le port et la route n’étaient pas exploités); les activités raisonnablement prévisibles induites incluent d’éventuelles expansions futures du projet, trois mines candidates (Izok, Hackett, High Lake), ainsi que les routes d’accès, le trafic aérien et le transport maritime connexes.

Pour contexte, la région de Kitikmeot est vaste, isolée et peu développée. L’empreinte du projet est extrêmement faible par rapport à la région de Kitikmeot. Les activités humaines sont rares et très dispersées, ce qui réduit la probabilité d’effets cumulatifs dans les conditions actuelles. Les effets cumulatifs deviennent plus pertinents dans certains scénarios futurs :

- Le développement des ressources dans la province géologique des Esclaves pourrait augmenter la circulation routière, maritime et aérienne, surtout si les projets des trois mines raisonnablement prévisibles induits se concrétisent.
- Des connexions routières potentielles au sud pourraient créer une route continue praticable en toute saison vers la côte arctique, augmentant ainsi l’accès et l’utilisation humaine à long terme.
- Dans le scénario de l’activité raisonnablement prévisible induite, la circulation supplémentaire liée à l’exploitation minière pourrait augmenter considérablement, bien que la perturbation totale des terres causée par les mines induites reste extrêmement faible (<0,02 % de la région).

L’isolement et les grandes distances du projet ainsi que les niveaux d’activité relativement faibles font que les effets cumulatifs sont actuellement rares, bien qu’ils puissent émerger en fonction des choix futurs d’aménagement. Le seul seuil régional établi (issu du Plan pour l’aire de répartition du caribou de Bathurst) a été appliqué pour évaluer la perturbation cumulée de l’habitat pour le caribou, indiquant que, bien que le projet seul n’augmente pas le risque, les projets raisonnablement prévisibles induits pourraient contribuer à un risque accru dans l’aire de répartition.

Les mesures d’atténuation, de gestion et d’amélioration propres au projet sont généralement suffisantes pour gérer les effets, bien que dans certains cas, des mesures régionales futures puissent être bénéfiques. Les cadres régionaux de planification de l’utilisation des terres et de gestion des ressources (par exemple, le Plan pour l’aire de répartition du caribou de Bathurst, les études de la province géologique des Esclaves, les cadres de navigation, le plan d’aménagement du Nunavut) offrent des moyens de gérer les effets cumulatifs au-delà des engagements propres aux projets.

Dans l’ensemble, les effets cumulatifs sont actuellement limités en raison de l’isolement de la région et du peu d’activités dans celle-ci. Des effets cumulatifs plus importants n’émergent que dans de futurs scénarios où le PAGB soutient l’aménagement de mines supplémentaires, l’augmentation des transports ou de nouvelles infrastructures régionales. Même dans ce cas, les effets restent généralement faibles à modérés et sont peu importants. Des effets cumulatifs positifs (par exemple, emploi, occasions d’utilisation de terres non traditionnelles) peuvent être obtenus pour plusieurs CV socio-économiques.

### **VS.10.3 Évaluation des effets transfrontaliers**

L’évaluation des effets transfrontaliers décrit comment le projet peut générer des effets au-delà des frontières territoriales ou provinciales. En vertu des lignes directrices de la Commission du Nunavut chargée de l’examen des répercussions, les effets transfrontaliers sont définis comme des répercussions liées au projet survenant à l’extérieur de la région d’établissement du Nunavut (REN) ou des répercussions ressenties dans la REN, mais qui proviennent des activités de projet se déroulant en dehors de celle-ci.

Bien que l'infrastructure du projet soit entièrement située dans la région de Kitikmeot de la REN, le projet a le potentiel d'entraîner des effets transfrontaliers associés aux points suivants :

- Activités physiques qui franchissent la frontière de la REN (par exemple, routes de navires maritimes reliant Québec, Inuvik ou Tuktoyaktuk; utilisation de la route Tibbitt à Contwoyto Winter Road [TCWR], permettant le transport routier lié au projet entre le Nunavut et les Territoires du Nord-Ouest)
- Espèces animales migratrices et à large aire de répartition (par exemple, espèces individuelles dont les déplacements traversent naturellement les frontières géographiques au-delà de la REN)
- Facteurs socio-économiques (par exemple, opportunités d'emploi liées aux projets et besoins en matériaux, équipements et services pouvant être couverts par d'autres territoires et provinces)

Grâce à la mobilisation propre au projet, au rapport sur le savoir inuit propre au projet et à l'examen des renseignements publics, des renseignements communiqués par les Kitikmiuts, d'autres groupes autochtones et d'autres communautés potentiellement concernées ainsi que leurs préoccupations et leurs recommandations relativement aux effets transfrontaliers. Les commentaires ont mis en lumière de nombreuses préoccupations quant à la manière dont le projet pourrait affecter la faune, les pratiques culturelles et le bien-être général, de nombreux groupes exprimant des préoccupations propres aux populations de caribous et aux perturbations potentielles des droits de récolte de longue date et de la continuité culturelle.

L'évaluation identifie plusieurs CV pouvant subir potentiellement des effets transfrontaliers, notamment : le caribou, les oiseaux, d'autres éléments de la faune terrestre, les mammifères marins, l'utilisation traditionnelle des terres, des zones marines et des ressources, la sécurité et la souveraineté alimentaires, la santé et le bien-être communautaires, l'emploi et l'économie, ainsi que les infrastructures et services. On prévoit que les CV restantes ne subiront pas de répercussions transfrontalières, car leurs changements liés au projet demeurent dans des zones d'évaluation définies localement au sein de la REN.

Pour les CV biophysiques, les répercussions transfrontalières potentielles proviennent principalement de perturbations sensorielles, d'altérations de mouvement et de pressions cumulatives sur les espèces migratrices. Le caribou migrateur peut subir des répercussions inter-juridictionnelles en raison de sa vaste aire de répartition et de l'influence du projet, combinée aux perturbations cumulées tant au Nunavut que dans la partie continentale des Territoires du Nord-Ouest. Cependant, les effets résiduels sur les oiseaux migrateurs, le bœuf musqué, l'orignal, l'ours grizzli et le carcajou sont considérés comme faibles ou négligeables, avec des effets potentiels généralement localisés et limités par la distance aux frontières et aux schémas de déplacement naturels existants. Pour les mammifères marins, des répercussions transfrontalières peuvent survenir par les bruits sous-marins et les risques de collision avec des navires associés aux routes maritimes qui s'étendent dans la région désignée des Inuvialuits et au-delà. Ces répercussions devraient être brèves, peu fréquentes et pas importantes en raison de volumes de circulation limités et de mesures d'atténuation.

Des effets socio-économiques transfrontaliers peuvent survenir du fait de changements dans la disponibilité de la faune récoltée, des déplacements transfrontaliers des travailleurs, de la dynamique de la santé communautaire, de changements dans l'emploi et la répartition des revenus, ainsi que d'une demande accrue sur des infrastructures telles que la TCWR, les services de santé et d'urgence à Yellowknife, ainsi que sur les réseaux de transport régionaux. Bien que ces répercussions puissent entraîner à la fois des effets négatifs et positifs, le projet comprend des mesures d'atténuation et des plans de gestion visant à réduire les influences négatives et à soutenir la gestion adaptée tout au long de la durée de vie du projet.

En résumé, bien que des répercussions transfrontalières soient possibles pour certaines CV du fait de la connectivité écologique, de la mobilité de la main-d'œuvre et des infrastructures partagées, on prévoit que la majorité des répercussions transfrontalières seront de faible ampleur et gérables grâce à des mesures d'atténuation planifiées, un suivi et une mobilisation continue auprès des Kitikmiuts, d'autres groupes autochtones et d'autres communautés potentiellement concernées.

## **VS.10.4 Accidents et défaillances**

Les accidents et défaillances résultant de la construction, de l'exploitation et de la maintenance du projet sont des événements qui ne font pas partie d'une activité planifiée ou de l'exploitation normale du projet, mais qui ont une probabilité raisonnable de survenue et peuvent entraîner des effets environnementaux négatifs. Lors des activités de mobilisation propres au projet, les Kitikmiuts, d'autres groupes autochtones, d'autres communautés potentiellement concernées et des Canadiens ont souligné l'inquiétude collective concernant les accidents et dysfonctionnements qui pourraient survenir à toutes les étapes du projet. Il est entendu que des accidents et des défaillances peuvent survenir; cependant, on s'attend à ce que WKR veille à ce que toutes les mesures possibles soient prises pour éviter ces incidents.

Les accidents ou défaillances potentiels suivants ont été évalués :

- Déversement terrestre et aquatique de matières dangereuses
- Déversement marin de matières dangereuses
- Incendies ou explosions
- Manipulation, stockage et utilisation d'explosifs (décharge ou détonation accidentelle)
- Accident de véhicule ou d'équipement mobile
- Accident d'aéronef
- Accident de navire

L'évaluation de chaque scénario a pris en compte le risque de survenue ainsi que les mesures détaillées d'atténuation et d'intervention en cas d'urgence, puis a déterminé l'importance des effets résiduels de l'accident ou de la défaillance pour les CV en utilisant les mêmes critères d'importance que ceux utilisés dans les évaluations individuelles des CV.

Des plans de gestion (voir le volume 11) seront élaborés avec la contribution des Inuits, des gouvernements et organisations autochtones, des utilisateurs et des organismes de réglementation afin de réduire la probabilité de survenue et les effets potentiels d'accidents et de défaillance, s'ils surviennent.

Étant donné les mesures d'atténuation et d'intervention d'urgence qui seront mises en place pendant les phases de construction, d'exploitation et de maintenance du projet, les effets résiduels probables de la majorité des événements accidentels identifiés sont jugés non importants. L'exception à cela serait un incident ayant entraîné la mort ou des blessures graves, ou un incident ayant entraîné un changement dans la façon dont les utilisateurs traditionnels des terres se servent d'une zone ou d'une ressource, en fonction des effets ou des effets perçus sur la valeur de la zone ou de la ressource concernée. Si les utilisateurs traditionnels des terres choisissent de ne plus utiliser une zone en raison des effets perçus d'un incident, l'effet pour ces utilisateurs peut être important.

## **VS.10.5 Effets de l'environnement sur le projet**

Les conditions locales et les dangers naturels pourraient potentiellement affecter ou endommager l'infrastructure du projet, entraînant des défaillances, des dysfonctionnements ou des événements accidentels, ce qui pourrait à son tour avoir des répercussions négatives sur l'environnement. Les Kitikmiuts, d'autres groupes autochtones et d'autres communautés potentiellement concernées ont communiqué des renseignements, exprimé des préoccupations et fourni des recommandations concernant les événements météorologiques et les dangers naturels. Une évaluation des risques liés aux changements climatiques (annexe 12B; voir le volume 5, section 12.3 pour obtenir un résumé de l'évaluation) a examiné le pergélisol, les événements météorologiques sévères et les conditions de la mer et a inclus des recommandations de stratégie adaptée pour faire face à ces dangers climatiques à haut risque et améliorer la résilience du projet. La portée de l'évaluation dans cette section porte sur les risques géotechniques et les conditions géologiques défavorables, avec des résultats résumés ci-dessous :

- L'instabilité du terrain et le dégel du pergélisol peuvent endommager les infrastructures du projet (par exemple, routes, pistes d'atterrissage, ponceaux), provoquant des dégradations, des défaillances structurelles et une instabilité des remblais, mais ces risques sont réduits grâce à des enquêtes géotechniques, des mesures de conception pour maintenir les conditions thermiques du sol, ainsi qu'à une surveillance et un entretien continus.
- Bien que le risque d'activité sismique dans la région soit faible, les événements sismiques pourraient endommager les fondations, les routes, la piste d'atterrissage et les services publics, pouvant interrompre les services ou retarder les activités du projet, avec des répercussions variant selon la magnitude et la proximité du séisme.
- Des zones faibles et des failles peuvent apparaître dans les carrières ou les bancs d'emprunt, mais elles ne devraient pas avoir d'incidence sur l'infrastructure du projet en raison de la conception en surface et de la nature du projet.

Le projet est conçu en tenant compte des conditions environnementales, notamment des conditions climatiques et géologiques. Avec l'application de mesures d'atténuation et de gestion, les conditions environnementales ne devraient pas endommager les infrastructures du projet ni entraîner un changement substantiel des calendriers du projet. WKR continuera de consulter les Kitikmiuts, d'autres groupes autochtones et d'autres communautés potentiellement concernées afin d'intégrer de nouveaux renseignements dans la planification et la gestion adaptée.



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## Abbreviations

ANFO	ammonium nitrate and diesel fuel oil
BCH	Bathurst Caribou Herd
BCRP	Bathurst Caribou Range Plan
CAC	criteria air contaminant
CCRA	Climate Change Risk Assessment
CEA	Cumulative Effects Assessment
CLDF	Cumulative Land Disturbance Framework
ERP	Emergency Response Plan
ESCP	Erosion and Sediment Control Plan
GN	Government of Nunavut
GNWT	Government of Northwest Territories
HMSP	Health and Medical Services Plan
HTA	Hunters and Trappers Association
HTO	Hunters and Trappers Organization
HVC	Holistic Valued Component
IAG	Inuit Advisory Group
IOL	Inuit Owned Land
IS	Impact Statement
LAA	Local Assessment Area
NAVWARNs	Navigational Warnings
NIRB	Nunavut Impact Review Board
Non-TLMRU	Non-Traditional Land, Marine, and Resource Use
NOTMARs	Notices to Mariners
NSA	Nunavut Settlement Area

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NT.....Northwest Territories

NTKP.....Naonaiyaotit Traditional Knowledge Project

NU.....Nunavut

PDA.....Project Development Area

PDA.....Project Development Area

PIL.....Project Inclusion List

Project.....Garys Bay Road and Port

Project, the.....Grays Bay Road and Port Project

RAA.....Regional Assessment Area

RFI.....Reasonably Foreseeable Induced

RFI.....Reasonably Foreseeable Induced

RHO.....Regional Historical Overview

RMERP.....Risk Management and Emergency Response Plan

ROW.....right-of-way

SCP.....Spill Contingency Plan

SGP.....Slave Geological Province

SOPEP.....Shipboard Oil Pollution Emergency Plan

TCWR.....Tibbitt to Contwoyto Winter Road

TLMRU.....Traditional Land, Marine, and Resource Use

TSB.....Transportation Safety Board of Canada

VC.....Valued Component

WKR.....West Kitikmeot Resources

## Symbols and Units of Measure

km..... kilometre

km/h..... kilometres per hour

km<sup>2</sup> ..... square kilometre

L ..... litre

m ..... metre

m<sup>3</sup> ..... cubic metre

## 31 Holistic Assessment

This section of the Impact Statement (IS) presents a holistic assessment of potential project effects in which the interconnectedness of selected Valued Components (VC) and pathways of effects are examined to improve understanding of how the Grays Bay Road and Port Project (the Project) may affect Nunavummiut, in particular Inuit of the Kitikmeot Region (hereafter referred to as Kitikmiut), other Indigenous groups, and potentially affected communities.

### 31.1 Context and Approach

West Kitikmeot Resources Corp. (WKR), previous proponents, the Government of Nunavut and the Kitikmeot Inuit Association, have been engaging Kitikmiut, other Indigenous groups, and potentially affected communities on the Project since 2016. In preparing the IS, WKR engaged with Inuit organizations, Elders, land users, other affected Indigenous groups, and representatives from other potentially affected communities to understand what values and perspectives should guide the Project.

As explained in Volume 3, Section 5, Inuit, Indigenous, and Community values and perspectives have been considered alongside western science to form the foundation of project design and the IS. WKR understands that at the heart of Inuit, Indigenous, and Community Knowledge is the interconnectedness of all beings; this principle is a key consideration for the IS and the foundation on which the holistic assessment is based.

The *Guidelines for the Preparation of an Impact Statement for West Kitikmeot Resources Corp's Grays Bay Road and Port Proposal* (NIRB File No. 24XN030; IS Guidelines), issued by the Nunavut Impact Review Board (NIRB) (NIRB 2026) requires separate VC assessments as well as a holistic discussion and analysis in order to meaningfully and effectively understand the significance of potential project impacts on Kitikmiut, other Indigenous groups, and other potentially affected communities. For this holistic discussion, the IS Guidelines encourage consideration of VCs that are interconnected; potential individual and collective impacts; potential impacts or changes to the function of key systems; potential impacts to community objectives and desired outcomes; and any associated mitigation measures or monitoring programs (see Section 7.4 of the IS Guidelines).

Drawing on the findings presented in other sections of the IS, the Holistic Assessment considers the potential collective and cumulative impacts to ecological and social systems as a result of the Project, and the capability of these systems to maintain their structure and functions and support biological and ecological diversity as well as the culture, health and well-being of Nunavummiut.

The Holistic Assessment draws from the VC assessments (Volumes 5 to 9), to understand potential interactions with the Project (i.e., effects pathways), proposed mitigation, and residual effects on individual VCs. A Regional Historical Overview (RHO) (Volume 3, Section 6) provides a qualitative narrative of the regional natural and human history of the Kitikmeot Region with the objective of providing an improved understanding of the geographic context of the Project and changes in the natural and human landscape that have occurred in the region over time. The RHO, which summarizes approximately 13,000 years of history, provides context for the VC assessments, including cumulative effects

assessments, and, by extension, this Holistic Assessment. The Cumulative Effects Assessment Overview (Volume 10, Section 32) and Transboundary Effects Assessment (Volume 10, Section 33) provide additional perspectives and context to the Holistic Assessment.

The Holistic Assessment is influenced and informed by Inuit, Indigenous and Community values and perspectives as incorporated throughout the IS. The Holistic Assessment is not intended to replace the individual VC assessments (Volumes 5 to 9) and should not be considered a stand-alone assessment, as it aims to present a complementary perspective of Project effects from a systems perspective. The individual VC assessments analyze potential effects of the Project (and cumulative effects with other projects and activities) on individual components in ecological and social systems and present mitigation, management and enhancement measures to address those effects. The significance of residual effects is determined based on pre-established thresholds which represent unacceptable levels of change within the VC. Acknowledging the interconnectedness of ecological and social VCs, the Holistic Assessment evaluates potential impacts of the Project through a broader lens with a focus on collective effects on the systems within which the VCs reside and whether these collective effects combine to result in unacceptable changes to the culture, health and well-being of Nunavummiut.

Systems-type assessments may offer an advantage over conventional VC-based analyses when it comes to holistic assessments as they acknowledge complex interconnections between the project and other system components, at multiple temporal and spatial scales can occur. However, although systems thinking is an established research field and potential applications in impact assessment have begun to emerge (see, for example, Meadows 2008; Ehrlich 2021; Gordon et al. 2025), the application of a systems-based framework for a project-level assessment in a regulatory application in Nunavut is relatively untested. Holistic assessments can present many challenges, as the “systems” they analyze are often characterized by complexity, emergence, change, uncertainty, feedbacks, and cross-scale effects, among other variables. The Holistic Assessment presented here should be read with these considerations in mind and not be viewed as a definitive (or necessarily exhaustive) account of all potential system interactions or outcomes. Ongoing monitoring, stakeholder engagement, and adaptive management are important strategies WKR will use to meaningfully address potential project interactions and effects over time.

The Holistic Assessment is organized into three parts, reflecting a tiered systems approach of ever more expansive scope in reflection of the complexity of ecological and human systems and their interactions. This approach, and the overall structure of this section, is based on a customized method unique to this Project, as precedence on holistic assessments in regulatory project-level impact assessment are limited and otherwise still evolving.

The first part of the Holistic Assessment (Section 31.2) reviews the VC assessments completed in Volumes 5 to 9 of the IS, with a focus on potential and residual (i.e., post-mitigation) project effects on individual components within ecological and social systems. Linear pathways of effects between project components and activities and the VC are investigated and specific mitigation, management and enhancement measures are proposed to reduce adverse effects and/or enhance positive effects on the VC (refer to the individual VC assessments or the consolidated list of mitigation, management and enhancement measures in Volume 1 for specific details). The significance of residual effects is determined based on pre-established criteria informed primarily (although not exclusively) by western

science and regulatory thresholds. Linkages among VCs are recognized, although for most VCs, these interconnections are not factored into the VC assessment conclusions.

Next, Holistic VCs are introduced to facilitate a systems-based evaluation of potential Project and cumulative effects on terrestrial, marine, and social, cultural and health systems (Section 31.3). These Holistic VCs explore the interdependencies of the individual components (i.e., traditional VCs) to better understand how the combined effects of the Project and cumulative effects of other projects and activities may affect the ecological and social systems in which the individual components reside. Mitigation, management and enhancement measures proposed by the Project to address effects at the VC level are reviewed through a lens of mitigating potential systems-level effects.

While the Holistic VCs are broad and capture many interdependencies among individual elements, the holistic assessment of Project and cumulative effects cannot be isolated within a specific ecological or social system and so the assessment then extends beyond the Holistic VCs to examine the collective system. Section 31.4 evaluates the potential collective impacts of the Project and reasonably foreseeable induced activities on the environment and people in the context of key issues raised during engagement to understand how impacts to terrestrial, marine and social, cultural and health systems may affect community objectives and desired outcomes.

The use of technical terms, tables, figures, quotes and bibliographic references are reduced to the extent practical in this section to maintain a conversational tone for the narrative. For additional details on the effects analyses, including quantitative and qualitative methods used, conclusions, and references on which the Holistic Assessment is based, refer to the VC analyses and other IS sections referenced above.

## **31.2 Valued Component System**

As per the IS Guidelines, the IS is largely structured around the assessment of impacts on ecosystemic and socio-economic VCs that represent living and non-living components that sustain life on earth including the social, cultural, and health aspects of the human environment (see Volumes 5 to 9). These VCs were selected in consideration of the IS Guidelines, ongoing engagement, Inuit, Indigenous, and Community Knowledge, understanding of effects pathways and receptors, and professional judgment. Based on the individual VC assessment analyses, residual project and cumulative adverse effects were found to be not significant for each VC. Various monitoring programs are proposed to verify effects predictions and the effectiveness of proposed mitigations over time.

Although it may seem most VCs are assessed independently of one another, each VC assessment recognizes interrelated VCs. This section of the Holistic Assessment highlights relevant interdependencies among VCs, which are integral to the health, stability and well-being of ecological and human systems. Table 31.1 summarizes the potential effects pathways and residual effects on the assessed VCs and highlights pertinent relationships among VCs (see VC assessments in Volumes 5 to 9 for more details). Arrows are used to depict the nature of the VC relationships, with a right-headed arrow used where a primary VC may affect a linked VC, a left-headed arrow used where a linked VC may affect a primary VC, and a double-headed arrow where the primary VC and linked VC have the potential to affect each other. Predicted residual effects are characterized as either adverse (“A”), positive (“P”), or neutral (“N”).

Table 31.2, based on Table 31.1, presents a tabular visualization of the many interconnections among the VCs (where a VC may support or impact another VC). This information is presented in recognition of aspects of holistic assessment already appearing in the individual VC assessments.

**Table 31.1 Valued Component Summary and Relationships**

Primary Valued Component	Effect Pathways	Predicted Residual Effects	Linked Valued Component
<b>Ecosystemic VCs</b>			
Air Quality (Volume 5, Section 11)	<ul style="list-style-type: none"> <li>Change in air quality due to dust and atmospheric emissions</li> </ul>	<ul style="list-style-type: none"> <li>Change in air quality (A)</li> </ul>	→Vegetation →Caribou →Birds →Other Terrestrial Wildlife →Water Resources →Freshwater Fish and Fish Habitat →Traditional Land, Marine, and Resource Use →Community Health and Well-being
Noise and Vibration (Volume 5, Section 13)	<ul style="list-style-type: none"> <li>Increased noise and vibration levels from blasting and operation of equipment</li> </ul>	<ul style="list-style-type: none"> <li>Increased noise levels causing annoyance to permanent residences, seasonal residences, and land users (A)</li> <li>Increased vibration levels causing annoyance to permanent residences, seasonal residences, and land users (A)</li> </ul>	→Caribou →Birds →Other Terrestrial Wildlife →Marine Fish and Fish Habitat →Marine Mammals →Traditional Land, Marine, and Resource Use →Community Health and Well-being ↔Non-Traditional Land, Marine, and Resource Use
Terrain, Soils and Permafrost (Volume 6, Section 14)	<ul style="list-style-type: none"> <li>Change in terrain, soils, and permafrost due to ground disturbance</li> </ul>	<ul style="list-style-type: none"> <li>Change in landforms and terrain conditions (A)</li> <li>Change in soil properties (A)</li> <li>Change in terrain stability (A)</li> </ul>	→Vegetation →Caribou →Birds →Other Terrestrial Wildlife →Water Resources →Traditional Land, Marine, and Resource Use

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Primary Valued Component	Effect Pathways	Predicted Residual Effects	Linked Valued Component
Vegetation (Volume 6, Section 15)	<ul style="list-style-type: none"> <li>• Change in vegetation and wetlands due to clearing, ground disturbance, dust deposition and/or altered drainage and soil conditions</li> </ul>	<ul style="list-style-type: none"> <li>• Change in vegetation community diversity (A)</li> <li>• Change in species diversity (A)</li> <li>• Change in wetland function (A)</li> </ul>	<ul style="list-style-type: none"> <li>←Air Quality</li> <li>↔Terrain, Landforms and Soils</li> <li>↔Caribou</li> <li>→Birds</li> <li>→Other Terrestrial Wildlife</li> <li>←Water Resources</li> <li>→Freshwater Fish and Fish Habitat</li> <li>→Traditional Land, Marine, and Resource Use</li> <li>→Food Security and Food Sovereignty</li> <li>→Community Health and Well-being</li> </ul>
Caribou (Volume 6, Section 16)	<ul style="list-style-type: none"> <li>• Change in range disturbance, habitat and movement due to clearing and ground disturbance; noise, artificial lighting, and dust causing sensory disturbances; presence of infrastructure (obstructions)</li> <li>• Change in mortality risk due to increased access for hunting and/or traffic</li> <li>• Change in health due to pollutant emissions</li> </ul>	<ul style="list-style-type: none"> <li>• Change in range disturbance (A)</li> <li>• Change in habitat (A)</li> <li>• Change in movement (A)</li> <li>• Change in mortality risk (A)</li> <li>• Change in health (N)</li> </ul>	<ul style="list-style-type: none"> <li>←Air Quality</li> <li>←Noise and Vibration</li> <li>←Terrain, Soils and Permafrost</li> <li>↔Vegetation</li> <li>↔Other Terrestrial Wildlife</li> <li>←Water Resources</li> <li>↔Traditional Land, Marine and Resource Use</li> <li>→Food Security and Food Sovereignty</li> <li>→Community Health and Well-being</li> <li>↔Non-traditional Land, Marine, and Resource Use</li> </ul>

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Primary Valued Component	Effect Pathways	Predicted Residual Effects	Linked Valued Component
<p>Birds (Volume 6, Section 17)</p>	<ul style="list-style-type: none"> <li>• Change in habitat due to clearing and ground disturbance, and noise, artificial lighting, and dust causing sensory disturbances</li> <li>• Change in mortality risk due to clearing and ground disturbance (disturbance of nests), collisions with infrastructure/ vehicles/ equipment/vessels due to lighting; and changes in habitat and access affecting hunting, egg collection and/or predator-prey dynamics</li> </ul>	<ul style="list-style-type: none"> <li>• Change in habitat (A)</li> <li>• Change in mortality risk (A)</li> </ul>	<p>←Air Quality ←Noise and Vibration ←Terrain, Soils, and Permafrost ←Vegetation ←Water Resources ←Freshwater Fish and Fish Habitat →Traditional Land, Marine, and Resource Use →Food Security and Food Sovereignty →Community Health and Well-being</p>
<p>Other Terrestrial Wildlife (Volume 6, Section 18)</p>	<ul style="list-style-type: none"> <li>• Change in habitat and movement due to clearing and ground disturbance, noise, artificial lighting, and dust causing sensory disturbances; presence of infrastructure (obstructions)</li> <li>• Change in mortality risk due to habitat changes; collisions with infrastructure/ vehicles/equipment/vessels; increased access for hunting and trapping; and/or increased human-wildlife conflict</li> </ul>	<ul style="list-style-type: none"> <li>• Change in habitat (A)</li> <li>• Change in movement (A)</li> <li>• Change in mortality risk (A)</li> </ul>	<p>←Air Quality ←Noise and Vibration ← Terrain, Soils, and Permafrost ←Vegetation ↔ Caribou ↔ Birds ←Water Resources ↔Freshwater Fish and Fish Habitat →Traditional Land, Marine, and Resource Use →Food Security and Food Sovereignty →Community Health and Well-being →Employment and Economy →Non-traditional Land and Resource Use</p>

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Primary Valued Component	Effect Pathways	Predicted Residual Effects	Linked Valued Component
<p>Water Resources (including groundwater, surface water quantity, and surface water quality) (Volume 7, Section 19)</p>	<ul style="list-style-type: none"> <li>• Changes to surface water quantity, surface water and sediment quality, and groundwater quality due to ground disturbance, water withdrawals and discharges at lakes and streams, exposure of rock and borrow materials, and/or installation of infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>• Changes to surface water quantity (A)</li> <li>• Changes to surface water and sediment quality (A)</li> <li>• Changes to groundwater quality (A)</li> </ul>	<ul style="list-style-type: none"> <li>← Air Quality</li> <li>↔ Terrain, Soils, and Permafrost</li> <li>→ Vegetation</li> <li>→ Caribou</li> <li>→ Birds</li> <li>→ Other Terrestrial Wildlife</li> <li>→ Freshwater Fish and Fish Habitat</li> <li>→ Traditional Land, Marine, and Resource Use</li> <li>→ Food Security and Food Sovereignty</li> <li>→ Community Health and Well-being</li> <li>→ Non-traditional Land, Marine, and Resource Use</li> </ul>
<p>Freshwater Fish and Fish Habitat (Volume 7, Section 20)</p>	<ul style="list-style-type: none"> <li>• Alteration, disruption, and destruction of fish habitat due to clearing, instream work, and/or sediment deposition</li> <li>• Change in fish health, growth or survival due to instream work, water withdrawals, blasting, introduction of invasive species/disease and/or increased fishing pressure</li> </ul>	<ul style="list-style-type: none"> <li>• Change in fish habitat (A)</li> <li>• Change in fish health, growth or survival (A)</li> </ul>	<ul style="list-style-type: none"> <li>← Air Quality</li> <li>← Vegetation</li> <li>→ Birds</li> <li>→ Other Terrestrial Wildlife</li> <li>← Water Resources</li> <li>← Marine Water and Sediment (Anadromous Fish)</li> <li>→ Traditional Land, Marine, and Resource Use</li> <li>→ Food Security and Food Sovereignty</li> <li>→ Community Health and Well-being</li> <li>↔ Non-traditional Land, Marine, and Resource Use</li> </ul>

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<b>Primary Valued Component</b>	<b>Effect Pathways</b>	<b>Predicted Residual Effects</b>	<b>Linked Valued Component</b>
Marine Water and Sediment (Volume 8, Section 21)	<ul style="list-style-type: none"> <li>• Change in marine water and sediment quality due to blasting, dredging, installation of infrastructure and vessel traffic</li> </ul>	<ul style="list-style-type: none"> <li>• Change in marine water quality(A)</li> <li>• Change in marine sediment quality (A)</li> </ul>	<ul style="list-style-type: none"> <li>→Freshwater Fish and Fish Habitat (Anadromous Fish)</li> <li>→Marine Fish and Fish Habitat</li> <li>→Marine Mammals</li> <li>→Traditional Land, Marine, and Resource Use</li> <li>→Non-traditional Land and Resource Use</li> </ul>
Marine Fish and Fish Habitat (Volume 8, Section 22)	<ul style="list-style-type: none"> <li>• Change in habitat, behaviour, and mortality and/or injury risk due to blasting, dredging, installation of infrastructure and associated physical and sensory disturbances</li> </ul>	<ul style="list-style-type: none"> <li>• Change in habitat (A)</li> <li>• Change in behaviour (A)</li> <li>• Change in mortality and/or injury risk (A)</li> </ul>	<ul style="list-style-type: none"> <li>←Noise and Vibration</li> <li>→ Birds (Marine Birds)</li> <li>↔Freshwater Fish and Fish Habitat (Anadromous Fish)</li> <li>←Marine Water and Sediment</li> <li>→Marine Mammals</li> <li>→Traditional Land, Marine, and Resource Use</li> <li>→Food Security and Food Sovereignty</li> <li>→Community Health and Well-being</li> <li>→Non-traditional Land, Marine, and Resource Use</li> </ul>
Marine Mammals (Volume 8, Section 23)	<ul style="list-style-type: none"> <li>• Change in habitat due to underwater noise, artificial lighting, and changes to water and sediment quality associated with port construction and shipping activity</li> <li>• Change in mortality and/or injury risk due to underwater noise and vessel strikes</li> </ul>	<ul style="list-style-type: none"> <li>• Change in habitat (A)</li> <li>• Change in behaviour (A)</li> <li>• Change in mortality and/or injury risk (A)</li> </ul>	<ul style="list-style-type: none"> <li>←Noise and Vibration</li> <li>↔ Birds (Marine Birds)</li> <li>↔Freshwater Fish and Fish Habitat (Anadromous Fish)</li> <li>←Marine Water and Sediment</li> <li>↔Marine Fish and Fish Habitat</li> <li>↔Traditional Land, Marine, and Resource Use</li> <li>→Food Security and Food Sovereignty</li> <li>→Community Health and Well-being</li> </ul>

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Primary Valued Component	Effect Pathways	Predicted Residual Effects	Linked Valued Component
<b>Socio-economic VCs</b>			
Traditional Land, Marine and Resource Use (TLMRU) (Volume 9, Section 24)	<ul style="list-style-type: none"> <li>• Change in TLMRU due to loss or alteration of country foods and other harvested resources and species of cultural importance; sensory disturbances affecting species and/or quality of user experience; change in access; and/or change in cultural practices or governance systems that inform TLMRU</li> </ul>	<ul style="list-style-type: none"> <li>• Change in quality, quantity, or distribution of resources involved in or required for TLMRU (A)</li> <li>• Change to specific areas of cultural importance (A)</li> <li>• Change in access to resources or the sites or areas where TLMRU occurs (P/A)</li> <li>• Change to cultural practices, laws, and governance systems that inform how TLMRU occurs (P/A)</li> </ul>	<ul style="list-style-type: none"> <li>← Air Quality</li> <li>← Noise and Vibration</li> <li>← Terrain, Soils and Permafrost</li> <li>↔ Vegetation</li> <li>↔ Caribou</li> <li>↔ Birds</li> <li>↔ Other Terrestrial Wildlife</li> <li>↔ Water Resources</li> <li>↔ Freshwater Fish and Fish Habitat</li> <li>← Marine Water and Sediment</li> <li>↔ Marine Fish and Fish Habitat</li> <li>↔ Marine Mammals</li> <li>↔ Food Security and Food Sovereignty</li> <li>↔ Community Health and Well-being</li> <li>↔ Employment and Economy</li> <li>↔ Infrastructure and Services</li> <li>↔ Non-traditional Land, Marine and Resource Use</li> <li>↔ Heritage Resources</li> </ul>

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Primary Valued Component	Effect Pathways	Predicted Residual Effects	Linked Valued Component
<p>Food Security and Food Sovereignty (Volume 9, Section 25)</p>	<ul style="list-style-type: none"> <li>• Change in the traditional food system due to changes affecting availability, quality, or access to country foods; employment or economic changes affecting participation in traditional food harvesting</li> <li>• Change in the market food system due to infrastructure improving connectivity and opportunities for community resupply, and/or changes in income and community resupply resilience</li> </ul>	<ul style="list-style-type: none"> <li>• Change in traditional food system (P/A)</li> <li>• Change in market food system (P/A)</li> </ul>	<ul style="list-style-type: none"> <li>↔Vegetation</li> <li>↔Caribou</li> <li>↔Birds</li> <li>↔Other Terrestrial Wildlife</li> <li>←Water Resources</li> <li>↔Freshwater Fish and Fish Habitat</li> <li>↔Marine Water and Sediment</li> <li>↔Marine Fish and Fish Habitat</li> <li>↔Marine Mammals</li> <li>↔Traditional Land, Marine, and Resource Use</li> <li>↔Community Health and Well-being</li> <li>↔Employment and Economy</li> <li>↔Infrastructure and Services</li> <li>↔Non-traditional Land, Marine and Resource Use</li> </ul>

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Primary Valued Component	Effect Pathways	Predicted Residual Effects	Linked Valued Component
<p>Community Health and Well-being (Volume 9, Section 26)</p>	<ul style="list-style-type: none"> <li>• Change in access to health infrastructure and services due to increased demand</li> <li>• Change in community and personal health and safety due to the presence of out-of-region workers</li> <li>• Change in mental and emotional health, coping mechanisms, and family and community dynamics due to employment, income and working conditions</li> <li>• Change in health from exposure to pollutant emissions to air, soil, water and country foods and noise</li> </ul>	<ul style="list-style-type: none"> <li>• Change in access to health infrastructure and services (P/A)</li> <li>• Change in rates of communicable diseases (A)</li> <li>• Change in mental health, emotional health, and coping mechanisms (P/A)</li> <li>• Change in family and community dynamics and cohesions (P/A)</li> <li>• Change in community and personal safety (A)</li> <li>• Change in health from exposure to pollutants and hazards (A)</li> </ul>	<ul style="list-style-type: none"> <li>←Noise and Vibration</li> <li>←Vegetation</li> <li>←Caribou</li> <li>←Birds</li> <li>←Other Terrestrial Wildlife</li> <li>←Water Resources</li> <li>←Freshwater Fish and Fish Habitat</li> <li>←Marine Fish and Fish Habitat</li> <li>←Marine Mammals</li> <li>↔Traditional Land, Marine, and Resource Use</li> <li>↔Food Security and Food Sovereignty</li> <li>↔Employment and Economy</li> <li>↔Infrastructure and Services</li> </ul>
<p>Employment and Economy (Volume 9, Section 27)</p>	<ul style="list-style-type: none"> <li>• Change in economic activity and development opportunities due to Project employment and expenditures and ongoing operation of the Road and Port</li> <li>• Change in employment and competition for workers due to Project labour demands</li> <li>• Change in community resupply resilience through changes in access and demand</li> </ul>	<ul style="list-style-type: none"> <li>• Change in economic development and opportunities (P)</li> <li>• Change in employment (P/A)</li> <li>• Change in education and training (P/A)</li> <li>• Change in contracting and business opportunities (P)</li> <li>• Change in cost of living (P/A)</li> </ul>	<ul style="list-style-type: none"> <li>↔Other Terrestrial Wildlife</li> <li>↔Traditional Land, Marine, and Resource Use</li> <li>↔Food Security and Food Sovereignty</li> <li>↔Community Health and Well-being</li> <li>↔Infrastructure and Services</li> <li>↔Non-traditional Land, Marine and Resource Use</li> </ul>

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Primary Valued Component	Effect Pathways	Predicted Residual Effects	Linked Valued Component
<p>Infrastructure and Services (Volume 9, Section 28)</p>	<ul style="list-style-type: none"> <li>Increased demands on community Infrastructure, access to public services or utilities, and accommodations from Project workforce and activities</li> <li>New land and marine-based infrastructure for use for community resupply due to Project construction and operation</li> </ul>	<ul style="list-style-type: none"> <li>Change in community infrastructure and access to public services or utilities (P/A)</li> <li>Change in accommodation and housing availability (P/A)</li> <li>Change in transportation infrastructure (P/A)</li> <li>Change in community resupply (P/A)</li> </ul>	<p>↔Traditional Land, Marine, and Resource Use ↔Food Security and Food Sovereignty ↔Community Health and Well-being ↔Employment and Economy →Non-traditional Land, Marine and Resource Use</p>
<p>Non-traditional Land, Marine, and Resource Use (Volume 9, Section 29)</p>	<ul style="list-style-type: none"> <li>Change in land use designation and/or access to and use of commercial resources due to Project construction and operation</li> <li>Change in marine navigation due to Port construction and operations</li> <li>Change in experience of the natural environment due to clearing and construction, ongoing presence of infrastructure, and dust, noise and light emissions</li> </ul>	<ul style="list-style-type: none"> <li>Change in land use designation (N/P)</li> <li>Change in access to and use of commercial resources (P/A)</li> <li>Change in marine navigation (P)</li> <li>Change in experience of the natural environment (A)</li> </ul>	<p>←Noise and Vibration ↔Caribou ↔Birds ↔Other Terrestrial Wildlife ↔Water Resources ↔Freshwater Fish and Fish Habitat ↔Marine Fish and Fish Habitat ↔Marine Mammals ↔Traditional Land, Marine, and Resource Use ↔Employment and Economy ←Infrastructure and Services ↔Food Security and Food Sovereignty</p>

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Primary Valued Component	Effect Pathways	Predicted Residual Effects	Linked Valued Component
Heritage Resources (Volume 9, Section 30)	<ul style="list-style-type: none"> <li>Change in heritage resources due to ground disturbance during construction and/or unauthorized impacts/collection of resources due to creation of new access opportunities</li> </ul>	<ul style="list-style-type: none"> <li>Change in heritage resources</li> </ul>	<ul style="list-style-type: none"> <li>↔Traditional Land, Marine, and Resource Use</li> <li>→Community Health and Well-being</li> </ul>

Notes:

← = VC may be affected by changes to the Linked VC

↔ = VC and Linked VC (including predicted residual effects) may affect each other

→ = Changes to the VC may affect the Linked VC

A = Adverse effect

P = Positive effect

N = Neutral effect

Climate and/or climate change is directly or indirectly linked to all VCs and is therefore not included as a VC or Linked VC.

**Table 31.2 Matrix of VC Interconnections**

Valued Component	Air Quality	Noise & Vibration	Terrain, Soils & Permafrost	Vegetation	Caribou	Birds	Other Terrestrial Wildlife	Water Resources	Freshwater Fish & Fish Habitat	Marine Water & Sediment	Marine Fish & Fish Habitat	Marine Mammals	TLMRU	Food Security & Food Sovereignty	Community Health & Well-being	Employment & Economy	Infrastructure & Services	Non-Traditional Land Marine, & Resource Use	Heritage Resources
Air Quality																			
Noise & Vibration																			
Terrain, Soils & Permafrost																			
Vegetation																			
Caribou																			
Birds																			
Other Terrestrial Wildlife																			
Water Resources																			
Freshwater Fish & Fish Habitat																			
Marine Water & Sediment																			
Marine Fish & Fish Habitat																			
Marine Mammals																			
TLMRU																			
Food Security & Food Sovereignty																			
Community Health & Well-being																			
Employment & Economy																			
Infrastructure & Services																			
Non-Traditional Land, Marine & Resource Use																			
Heritage Resources																			

Notes:

VC linkages, where present, are symbolized with green shading. Intersection of identical VCs are symbolized with grey shading.

## 31.3 Holistic Valued Component System

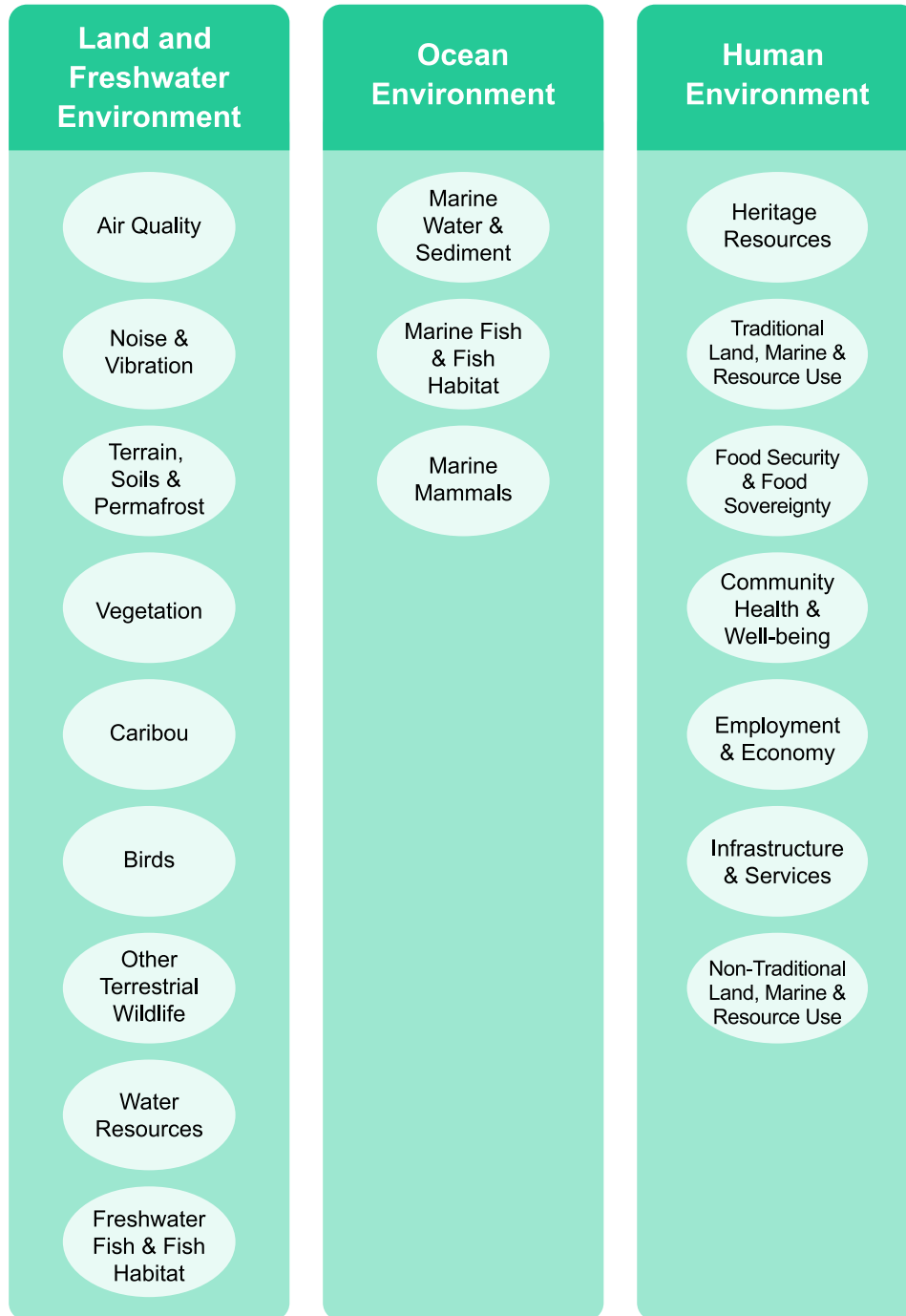
Inuit experience and culture reflect a holistic view of the ‘environment’ as land, ocean, wildlife and resources that are connected by people and their lifeways. There are four main categories for land features according to Inuit Knowledge: On the Land, High Places, Fresh Water, and Ocean (see Volume 3, Section 5.1). In consideration of these categories and the linkages between the primary VCs as summarized in Table 31.1 and Table 31.2, the following Holistic VCs were identified to help represent potential project and cumulative effects at a systems level:

- **Land and Freshwater Environment** - This Holistic VC was selected in recognition of potential Project and cumulative effects on the land, high places and fresh water, the interconnectedness of animals, rocks and earthen features, land, plants, and water systems, and importance of these features to Kitikmiut, other Indigenous groups, and other potentially affected communities.
- **Ocean Environment** - This Holistic VC was selected in recognition of potential Project and cumulative effects on living and non-living features of the ocean and their social, cultural, scientific, and economic significance to Kitikmiut, other Indigenous groups, and other potentially affected communities.
- **Human Environment** - This Holistic VC was selected in recognition of the potential Project and cumulative changes on the social, cultural and health conditions that may affect the well-being of Kitikmiut, other Indigenous groups and other potentially affected communities.

Figure 31.1 shows the relationship of the primary VCs to the Holistic VCs.

As indicated in Table 31.1, Table 31.2 and Figure 31.1, no VC exists in isolation, and likewise, Holistic VCs are also interconnected with effects on one potentially affecting others. Building on the VC assessments summarized in Section 31.2, this section of the Holistic Assessment examines effects through a broader lens, exploring the VC linkages further within their respective systems. However, as demonstrated in each of the Holistic VC discussions, relationships among VCs are not limited to their respective systems. Assessing the Holistic VCs in isolation still falls short of a fully integrated assessment of potential collective system impacts, which is presented in Section 31.4.

Figure 31.1 Organization of Holistic VCs



### 31.3.1 Effects on Land and Freshwater Environment

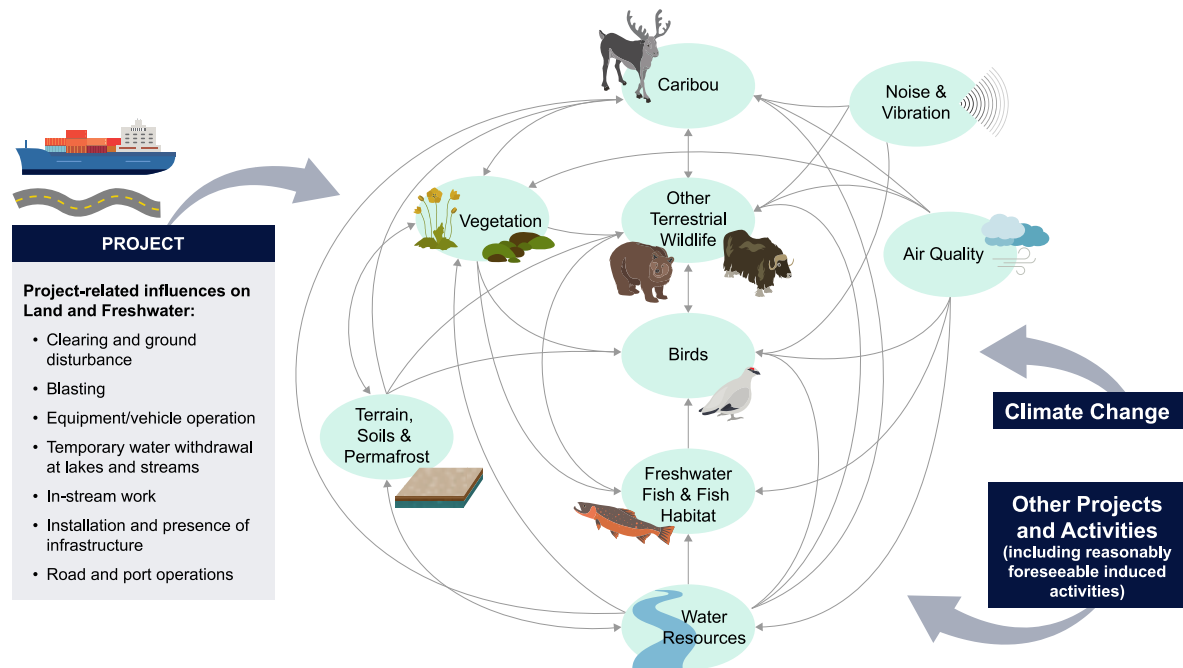
Terrain, soils, and permafrost are fundamental components of the Arctic landscape, providing a physical basis for Inuit and other Indigenous groups' mobility and traditional hunting practices on the land. Vegetation supports essential functions such as nutrient and water cycling, habitat, and carbon accumulation and is vital for the health and well-being of people, wildlife, and ecosystems. Wildlife (including birds) play vital roles in maintaining healthy ecosystems and are valued by Inuit for food, materials, cultural importance, and economic benefits. Terrestrial wildlife species of particular importance to Kitikmiut and other Indigenous groups and on which the IS focuses, include caribou (*tuktuit*; *Rangifer tarandus*), muskox (*omingmak*; *Ovibos moschatus*), moose (*tuktukvak*; *Alces alces*), grizzly bear (*akhak*; *Ursus arctos horribilis*), and wolverine (*kalvik*; *Gulo gulo*). Berries and other plants are also of importance to Kitikmiut and other Indigenous groups.

Caribou, in particular, are critical to the sustenance and cultural practices of Kitikmiut and other Indigenous groups, as they are a source of food, clothing, tools and shelter. Caribou also play a vital role in Arctic terrestrial ecosystems as they redistribute nutrients across their range and sustain multiple species (see Volume 6, Section 16.1). Birds (*kopanoak*) are important to Inuit because they provide sustenance from their harvest and their eggs, provide down used for insulating clothing, and the presence and departure of migratory species signify the changing of the seasons.

Water is regarded as essential for all life, supporting aquatic and terrestrial ecosystems, human health and traditional land and marine resource use (TLMRU). For Inuit, the freshwater environment is an essential resource relied upon for hunting, travel, and connection to the land. Freshwater fish are an important food source for wildlife, are valued by people for traditional, cultural, and recreational purposes, and are protected under the federal *Fisheries Act*.

As indicated in Table 31.1 and individual VC assessments in Volumes 5, 6, and 7 of this IS (and summarized in Figure 31.2), components of terrestrial and aquatic ecosystems are often closely linked, with potential for interconnected and cascading effects (i.e., an effect on one component of the environment can result in effects on another component of the environment). Land clearing, road building, quarrying and equipment use will result in ground disturbance and may lead to shifts in surface water drainage patterns and permafrost thaw, and affect landforms and terrain conditions, soil properties, terrain stability, vegetation communities, and wetland function. Changes in riparian vegetation could affect fish and fish habitat. Changes in air quality and water quality (e.g., due to dust deposition) may reduce vegetation and surface water quality, affecting drinking water, fish and foraging habitat for caribou and other wildlife. These effects will result in direct changes to wildlife habitat, which may, along with indirect changes to habitat (e.g., sensory disturbance associated with noise, lights and human presence) affect movement and mortality risk for wildlife. Mortality of wildlife may also occur due to vehicle collisions and indirect increase in wildlife harvesting due to change in hunter access and/or predator-prey dynamics. Where species may be linked through predator-prey dynamics, effects on one species may affect the other.

**Figure 31.2 Project and Cumulative Effects of Port and Road Activities on Land and Freshwater**



Climate changes, including increased temperatures, changes in precipitation, changes in water and ice quality and quantity, melting of permafrost, and habitat shifts, have already been observed by Inuit and other Indigenous groups. Climate changes are predicted to continue in the future and are expected to result in changes to: plant species growth, composition and diversity (including expansion of non-native and invasive species); community composition and diversity of freshwater fish; suitability and distribution of wildlife habitat; range and distribution of wildlife; prey availability; and wildlife mortality risk (e.g., through changes in habitat, extreme weather events and/or parasites and disease).

Mitigation, management, and enhancement measures will be implemented to reduce adverse effects on land and freshwater systems including designing the Project to reduce the extent of new physical disturbance; planning certain activities to avoid sensitive periods (e.g., caribou migration, bird nesting, fish spawning) and/or features (e.g., unique landforms, sensitive permafrost) where possible; implementing measures to control air, noise and light emissions; implementing an Erosion and Sediment Control Plan; and developing reclamation plans. An Aquatic Effects Management Plan will be developed to manage specific types of potential effects on fish and fish habitat and, if Fisheries and Oceans Canada determines the Project will result in the harmful alteration, disruption or destruction of fish habitat, a No Net Loss Plan will be developed to counterbalance unavoidable losses of fish habitat in the Project footprint. These measures will continue to be effective under various climate change prediction scenarios, although adaptive management will be important to detect and respond to potential future changes in effects given inherent uncertainty in long-term climate projections.

Most residual effects on the land and freshwater systems are expected to be long-term where built infrastructure will be permanent (e.g., the road). Progressive reclamation of areas not required for operations and maintenance will reduce the extent and duration of effects.

Other projects and activities, particularly those future activities which may be enabled by Project development (i.e., reasonably foreseeable induced activities) are expected to affect land and freshwater systems through similar pathways as the Project. Mitigation, management and enhancement measures implemented for the Project will reduce potential cumulative effects on land and freshwater systems and it is assumed other individual projects and proponents will implement similar measures to reduce their cumulative contributions to adverse effects.

As detailed in Volumes 5 to 7, residual project and cumulative adverse effects on individual VCs comprising the Land and Freshwater Holistic VC are predicted to be not significant. These effects predictions are largely based on the understanding that mitigations will be implemented and remain effective. Effects on individual VCs are predicted to range from low to high magnitude and will occur over various spatial and temporal scales, with many effects deemed to be irreversible given the permanence of project infrastructure.

Given the high degree of interdependencies among the VCs and variability in spatial and temporal scaling of effects, there is potential for combined effects on land and freshwater systems to be greater than predicted effects on the individual VCs. Climate change-induced changes to land and freshwater systems may also affect how the system may react to project-related changes and changes from other projects and activities over time. Changing variables, including potential new stressors introduced to the system as well as adaptations the system may make in response to changes, reduce the confidence in effects predictions at a systems level. Proposed follow-up and monitoring programs, including those described in the Air Quality Management Plan, Water Management Plan, and Wildlife Mitigation and Monitoring Plan will provide feedback on effects on land and freshwater systems, including whether any new effects may be emerging at a systems level. WKR will also continue to respond to questions and concerns from Kitikmiut, other Indigenous groups, and other potentially affected communities through its ongoing engagement efforts and information provided will be reviewed for incorporation into Project planning, including adaptive management and monitoring, as appropriate.

Residual effects of the Project and other projects and activities on the land and freshwater environment are not predicted to occur at levels that will threaten the ability of terrestrial and freshwater systems to maintain their structure and functions and to support biological and ecological diversity and health. This conclusion is based on consideration of the interdependencies among VCs in land and freshwater systems; the conclusions of separate VC analyses (including cumulative effects assessments) which assume effective implementation of mitigation, management and enhancement measures; and feedback that will come from follow-up and monitoring programs and engagement with Kitikmiut, other Indigenous groups and other potentially affected communities. However, residual effects on resources and areas used for traditional and/or commercial use may result in cascading effects to the human environment (see Sections 31.3.3 and 31.4).

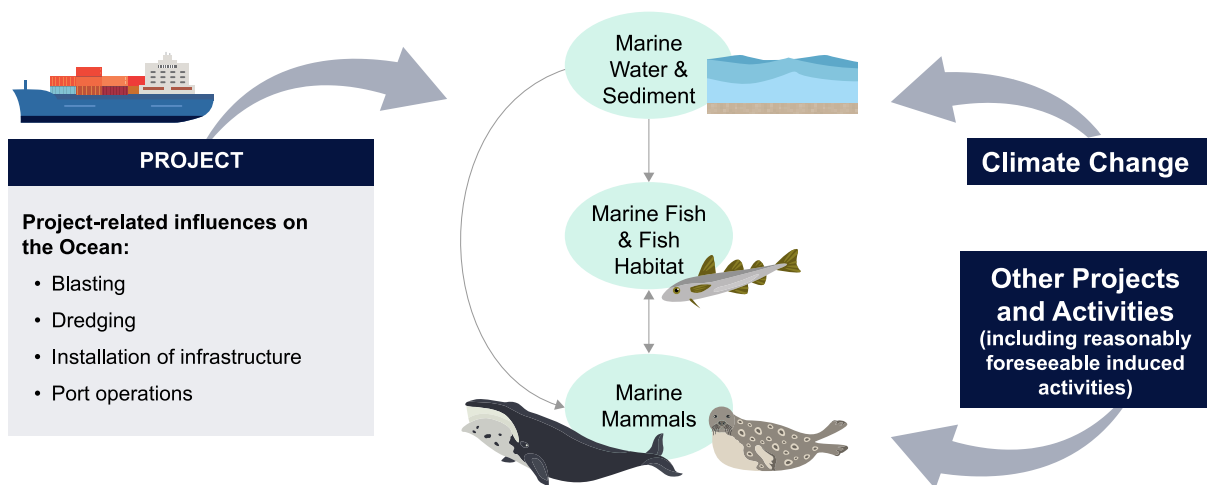
### 31.3.2 Effects on the Ocean Environment

For Inuit and other Indigenous groups, the ocean is an essential resource that is relied upon for harvesting, travel, and a connection to the land. It can also hold socio-economic value. The Project is predicted to interact with the habitat for various marine species of interest for harvesting by Kitikmiut and other Indigenous groups, including Arctic char (*ekalukpik*), tomcod (*kiugyuktok*), ringed seal (*nattik*), bearded seal (*ugyuk*), bowhead whale (*arvik*), beluga whale (*kilalugak*) and narwhal (*togaalik*).

The Port will result in the loss or alteration of marine habitat (riparian, intertidal and subtidal) because of the construction of marine-based infrastructure (e.g., large vessel wharves, medium vessel wharf, small craft harbour, barge landing area) and associated nearshore dredging, infilling and pile driving. Noise and disturbance from in-water construction activities (i.e., blasting, dredging, pile driving) may reduce habitat quality through sensory disturbance to marine fish and mammals. Construction activities will also disturb the seabed resulting in increased suspended sediments which may temporarily change water quality. The effects from noise and disturbance will be substantially reduced once the Construction phase is complete. During the Operations and Maintenance phase marine port use and operations will generate underwater noise and artificial light emissions and result in some limited disturbance of the seabed/shoreline from vessel propeller wash and vessel wake.

Underwater noise, artificial lighting, and a change in water and sediment quality may affect fish behaviour and increase risk of mortality and/or injury to fish. Similarly, these changes to the marine environment (including changes to fish) may affect marine mammal behaviour and increase risk of mortality and/or injury. These interactions are summarized in Figure 31.3.

**Figure 31.3 Project and Cumulative Effects of Port Activities on the Ocean Environment**



In addition to climate change observations noted in Section 31.3.1, Inuit observations and western science have reported changes in sea level, sea surface temperature and sea ice cover. Direct and indirect effects of climate change on the ocean may include: growth and expansion of marine vegetation; alteration of life history timings, distribution patterns, and predator-prey interactions for marine fish and wildlife; and changes in mortality and/or injury risk. Adaptive design and monitoring strategies have been incorporated into the Project to address uncertainties associated with climate change projections.

Mitigation measures will be implemented to reduce underwater noise, ice scour, ship wakes, siltation/sedimentation, and risk of vessel strikes. Marine intakes will be designed, installed, and operated to reduce potential impingement and entrainment of fish. An Aquatic Effects Management Plan will be developed to manage specific types of potential effects on fish and fish habitat and a No Net Loss Plan will be developed to counterbalance unavoidable losses of fish habitat in the Project footprint. A marine mammal monitoring program will be implemented to mitigate potential in-water effects on marine mammal species.

Other projects and activities, including reasonably foreseeable induced activities, may act cumulatively with Project-related residual effects on marine habitat, and species behaviour and mortality. Cumulative effects on marine water and sediment are predicted to be fairly localized, reducing the potential for cumulative effects with other projects and activities. The transitory nature of fish and marine mammals and marine vessels increases exposure to adverse cumulative effects over a larger geographic area.

As detailed in Volume 8, residual project and cumulative adverse effects on individual VCs comprising the Ocean Holistic VC are predicted to be not significant. These effects predictions are largely based on the understanding that mitigations will be implemented and remain effective. Effects on individual VCs are predicted to range from low to moderate magnitude and will occur over various spatial and temporal scales, with some effects deemed to be irreversible given the permanence of project infrastructure. Given the high degree of interdependencies among the VCs and variability in spatial and temporal scaling of effects, there is potential for combined effects on ocean systems to be greater than predicted effects on the individual VCs. Climate change-induced changes may also affect how the system may react to project-related changes and changes from other projects and activities over time. Changing variables, including potential new stressors introduced to the system as well as adaptations the system may make to respond to changes, reduce the confidence in effects predictions at a systems level.

Proposed marine follow-up and monitoring programs including assimilative capacity modelling for effluent discharge, and monitoring programs to confirm regulatory compliance and validate effects predictions (including monitoring of presence and behaviour of marine mammals relative to marine vessel activity) will provide feedback on VC responses to changes in the marine ecosystem. WKR will also continue to respond to questions and concerns from Kitikmiut, other Indigenous groups, and other potentially affected communities through its ongoing engagement efforts and information provided will be reviewed for incorporation into Project planning, including adaptive management and monitoring, as appropriate.

Residual effects of the Project and other projects and activities are not expected to result in long-term or permanent population-level effects or affect the marine ecosystem's ability to support biological and ecological diversity and health. This conclusion is based on consideration of the interdependencies among VCs in the ocean system; the certainty of effects pathways (particularly for marine water and

sediment quality); the conclusions of separate VC analyses (including cumulative effects assessments) which assume effective implementation of mitigation, management and enhancement measures; feedback that will come from follow-up and monitoring programs and engagement with Kitikmiut, other Indigenous groups and other potentially affected communities; and the ability of WKR to adapt management measures as needed. Residual effects on marine resources used for traditional and/or commercial use may, however, result in cascading effects on the human environment (see Sections 31.3.3 and 31.4).

### **31.3.3 Effects on the Human Environment**

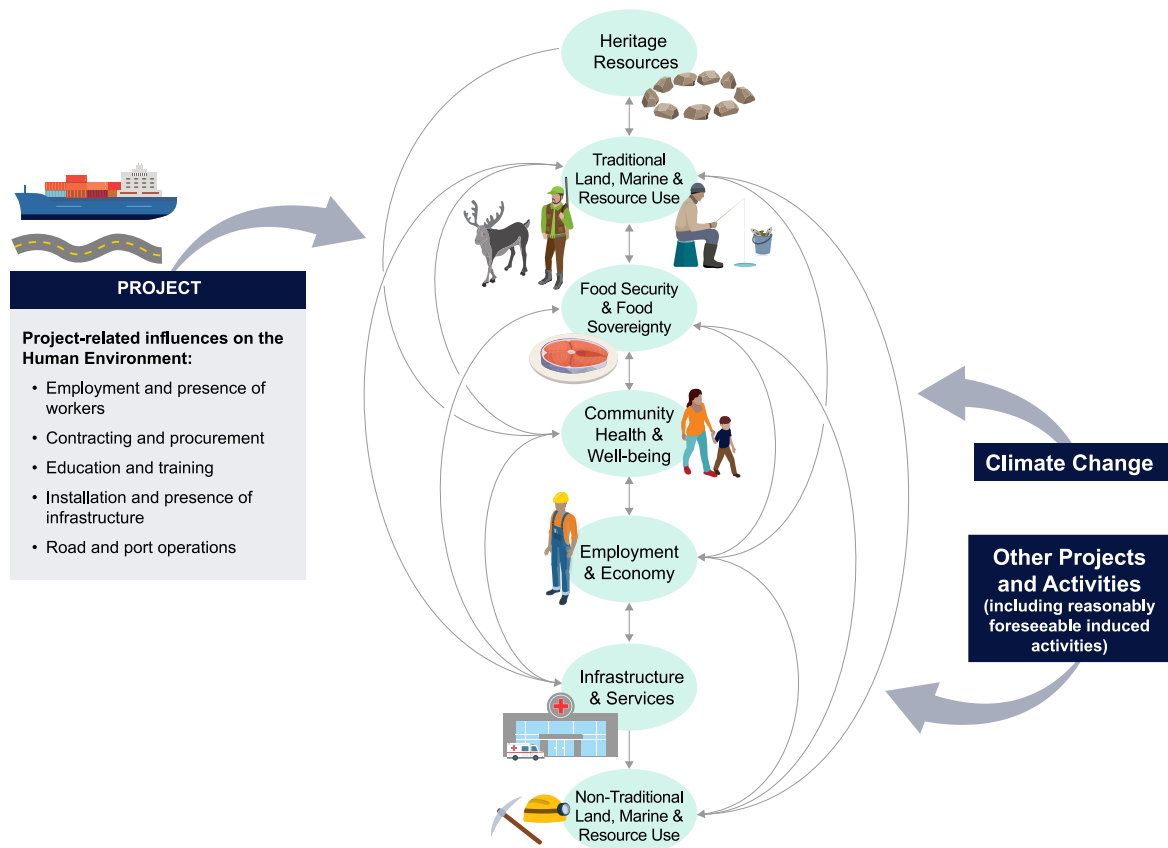
Volume 9 of the IS presents the assessment of Project and cumulative effects on TLMRU (Section 24), food security and food sovereignty (Section 25), community health and well-being (Section 26), employment and economy (Section 27), infrastructure and services (Section 28), non-traditional land, marine and resource use (Section 29), and heritage resources (Section 30). These individual VC assessments highlight the interdependence of ecosystemic and socio-economic VCs and many of the VCs in Volume 9 are already assessed through a holistic lens in recognition of potential cascading effects from interlinked VCs.

Several human environment VC assessments highlight the positive and adverse effects that may occur as a result of the Project. Overall, the Project is expected to contribute to improved health, economic growth, community well-being, and regional connectivity. Project activities and expenditures will stimulate increased economic activity, contributing to gross domestic product, and boosting territorial, and federal government revenues. Increased revenue, taxes, and funding could support health and social resources and programming, including mental health infrastructure and services. Employment opportunities are expected to alleviate personal and family financial pressures, which can enhance mental health outcomes and improve social determinants of health such as housing and food security. Project-related income may also help families address financial challenges and support their participation in harvesting activities. Infrastructure improvements will enhance connectivity within the Kitikmeot Region and with Yellowknife, facilitating more frequent and reliable resupply of goods.

However, while the Project brings opportunities, it may also introduce a range of challenges related to health service demand, communicable disease risk, family and community cohesion, safety, education, and pressure on local infrastructure. The Project, along with reasonably foreseeable induced activities, could increase competition for workers, and put additional demand on some local infrastructure and services. Rotational work schedules and time away from family could lead to stress, homesickness, and increased substance use by certain individuals, while also straining family and community cohesion. Although non-resident workers will not transit through Kitikmeot communities on their way to the Project site, they may temporally interact with residents in Yellowknife during transit and with resident workers in transit through Yellowknife and at the Project site. These interactions could potentially increase the risk of communicable diseases, and instances of racism, discrimination, harassment, and substance trafficking experienced by residents in Yellowknife and resident workers and ultimately affect community health and well-being.

Changes on the terrestrial and marine landscapes, as summarized in Sections 31.3.1 and 31.3.2, will not only affect ecological functions but may also affect TLMRU, which may include hunting, fishing, trapping, gathering, travel, habitation, and other cultural practices, and non-traditional land and resource use activities. Changes in traditional food systems may occur as a result of improved accessibility to harvested resources, changes to the quality, abundance and/or distribution of terrestrial, freshwater and/or marine resources, and direct and indirect (e.g., sensory disturbance) changes to harvesting sites or routes. Changes in market food systems may occur as a result of improved accessibility and supply chain stability of store-bought foods through Project-related infrastructure development and employment, income, and revenue. Changes in TLMRU and food security and food sovereignty are closely linked to community health and well-being. Figure 31.4 summarizes project and cumulative effects on the human environment.

**Figure 31.4 Cumulative Effects of Port and Road Activities on the Human Environment**



Climate change could have broad reaching ecosystemic and socio-cultural impacts. Changing climate conditions could affect the availability, distribution and stability of terrestrial, freshwater and marine resources (e.g., country foods) which could also lead to changes in traditional and non-traditional land, marine, and resource use. Warmer conditions could result in longer open water seasons (affecting community resupply) and in some cases increase opportunities for commercial and subsistence activities. However, drier conditions could increase wildfire risk and affect wildlife resources and community health and safety.

WKR will engage with Kitikmiut, other Indigenous groups, and other potentially affected communities throughout the lifetime of the Project. Measures will be implemented to enhance positive employment and economic effects for local and Inuit populations and reduce adverse effects on participation in traditional activities. Key mitigation, management, and enhancement measures to reduce or avoid adverse effects on TLMRU include those intended to mitigate potential adverse effects of the Project on the quality, quantity, or distribution of resources, access to resources and areas, change to sites and areas for TLMRU, and change to cultural practices, laws, and governance systems that inform how TLMRU occurs. A Road Management Plan will include clear access protocols to prevent unintentional restrictions, reduce conflict and the potential for illegal/overharvesting, and support safe and respectful use of Project infrastructure by harvesters. Several Project-specific plans and policies will be developed and implemented to reduce adverse effects and enhance benefits with a focus on reducing demands on local infrastructure and services. The plan to accommodate Project construction and operations workers at remote camps will not only reduce demands on local infrastructure and services but will also reduce non-local employees' interactions with communities in the Local Assessment Area and Regional Assessment Area, thereby mitigating community health and safety concerns.

Similar to project-related effects, effects of other projects and activities on the human environment VCs are predicted to have positive and adverse effects. Cumulative effects are expected to be long-term but not significant. While the Project will in some instances result in measurable changes from current conditions and trends, these changes are expected to be managed or mitigated through adjustments to programs, policies, plans or other mitigation.

Residual and cumulative effects are expected to result in both positive and adverse outcomes on the human environment, however, the Project is not expected to create an adverse change from current conditions and trends at the community level that cannot be avoided or reduced to an acceptable level through adjustments to programs, policies, plans, or through other mitigation, management, and enhancement measures. This conclusion is based on consideration of the interdependencies among VCs in the human environment system; separate VC analyses (including cumulative effects assessments) which assume effective implementation of mitigation, management and enhancement measures; and feedback that will come from follow-up and monitoring programs and engagement with Kitikmiut, other Indigenous groups and other potentially affected communities. WKR will establish a Socio-economic Monitoring Program which will guide the implementation of mitigation and management measures, measure the effectiveness of mitigation, and management and enhancement measures, measure how communities are experiencing effects (both positive and adverse), and help with the socio-economic development of Inuit communities. WKR will also continue to respond to questions and concerns from Kitikmiut, other Indigenous groups, and other potentially affected communities through its ongoing engagement efforts.

As indicated above in Sections 31.3.1 and 31.3.2, systems-level changes in the land and freshwater, and ocean systems may have cascading effects on the human environment. However, through ongoing monitoring, stakeholder engagement, and adaptive management strategies, WKR will be able to identify potential new/emerging socio-economic effects that may not have been previously identified and avoid unacceptable changes to communities.

## **31.4 Collective System**

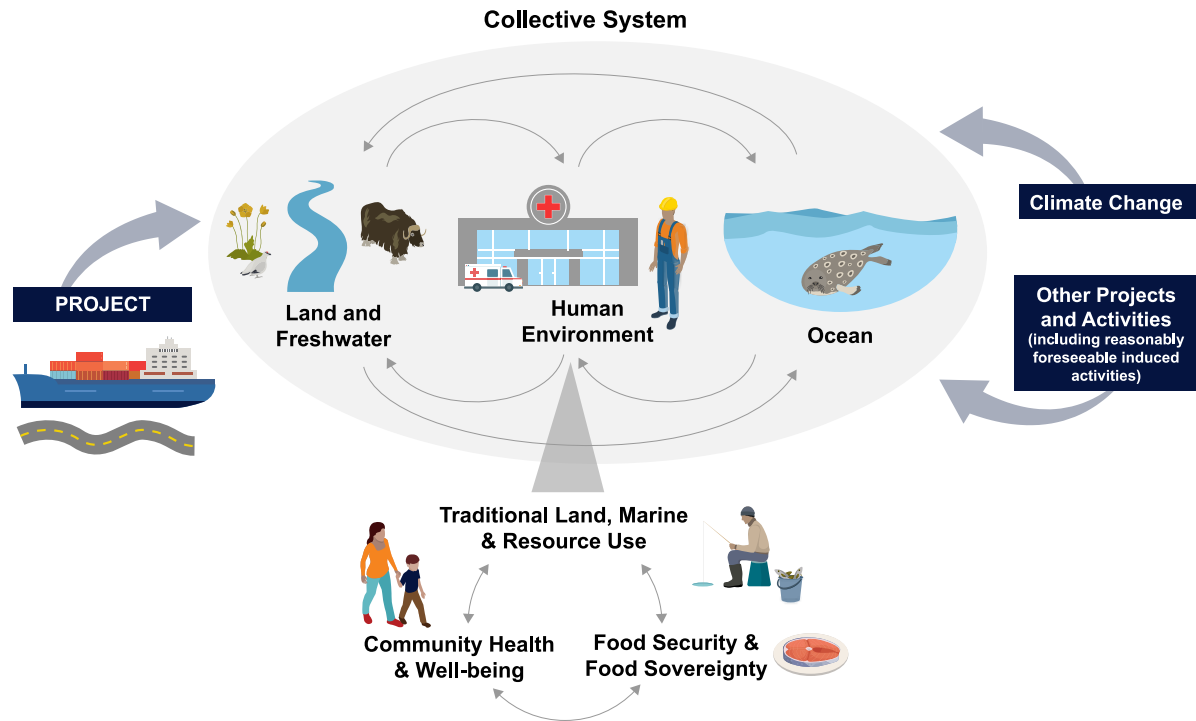
The Project includes development and operation of a deep water port at Grays Bay on the Coronation Gulf and the construction and operation of an approximately 230-kilometre all-season controlled access road (the Road) connecting the port to the northern terminus of the Tibbitt to Contwoyto Winter Road. Once constructed, the Project will create new or additional connections to the Kitikmeot Region by land and sea, meet the needs for improved community infrastructure and re-supply, strengthen Inuit and Canadian sovereignty and security over the Northwest Passage, and enhance economic development by unlocking the critical mineral wealth of the Kitikmeot Region. The Project aligns with the economic development and social objectives of the Kitikmeot Inuit Association and the Government of Nunavut and is consistent with ongoing territorial and federal strategies to support infrastructure development, increase defense presence and improve critical mineral access in the north.

The Project, and reasonably foreseeable induced activities that are likely to occur following Project development, will result in changes to the land and freshwater systems, the ocean, and the human environment. Due to the interconnected nature of these environments and the elements within, these changes may result in collective effects on biological and ecological diversity and health of communities.

Inuit, Indigenous, and Community Knowledge and engagement feedback has shaped the development of the IS and the Project, including the identification of mitigation, management, and enhancement measures and criteria for determining whether the Project is likely to have significant or unacceptable effects (see Volume 3, Section 5 for more information about the integration of Inuit, Indigenous, and community values and perspectives). Inuit, Indigenous, and Community Knowledge suggested that a significant adverse effect extends beyond simple Western scientific population models to encompass threats to sustenance, culture, and the ability to continue traditional harvesting practices. IAG members advised that negative effects on the ability of Inuit to harvest caribou and other wildlife and put country food on their tables is considered unacceptable (IAG 2025). Inuit, Indigenous, and Community Knowledge also strongly suggests that the loss of traditional way of life (i.e., cultural transference) would also be considered an unacceptable effect.

Kitikmiut, and Nunavummiut more generally, have a culture and way of life, expressed through Inuit languages, the harvesting and consumption of country foods, traditional clothing, and sharing and celebration with each other. TLMRU activities are central to the way of life, language, governance systems and well-being of Kitikmiut, and other Indigenous groups. As was made evident through effects assessments at the VC (Section 31.2) and Holistic VC (Section 31.3) levels, TLMRU, food security and food sovereignty, and community health and well-being are keystone components of the holistic assessment as they are most closely connected to individual elements in the natural and human systems, influenced by, and affecting change in these systems (Figure 31.5).

Figure 31.5 Summary of Collective System Impacts



As noted in each of the Holistic VC assessments, changes to the land, freshwater, and marine environments can affect TLMRU through potential effects on country foods and/or through changes in quality and/or access to areas of cultural importance. Changes to country foods and traditional harvesting areas, as well as changes to economic systems, and infrastructure and services, may affect TLMRU experiences and practices, which may in turn, affect food security and food sovereignty, and community health and well-being for Kitikmiut and other Indigenous groups. Impacts on harvesting ability and Inuit cultural practices can adversely affect family dynamics, community cohesion, and cultural continuity (see Figure 31.5).

The Project will create multi-use infrastructure that will develop new connections to the Kitikmeot Region by land and sea for the benefit of Kitikmiut and Canadians and will have long-lasting and far-reaching benefits, but also the potential for adverse effects which must be managed. With the implementation of mitigation, management, and enhancement measures, residual project and cumulative effects are not predicted to affect the capability of terrestrial, freshwater, and ocean systems to maintain their structure and functions and to support biological and ecological diversity and health. Protection of these resources, particularly wildlife and water resources, will also help mitigate potential adverse socio-economic effects including changes to TLMRU, food security and food sovereignty and community health and well-being. Additional measures, focusing on socio-economic aspects, will be implemented to mitigate adverse effects to the culture, health and well-being of Kitikmiut, other Indigenous groups, and other potentially affected communities and enhance social and economic benefits. The Project will also apply adaptive management strategies that will be informed through monitoring and ongoing engagement.

Follow-up and monitoring programs will help identify and inform adaptive management strategies, although in some cases, these programs will be focused on individual (i.e., VC-specific) impacts and alone may not capture the full complexity of systems-level effects or the need for integrated mitigation measures. Ongoing engagement with Kitikmiut, other Indigenous groups, and potentially affected communities will complement ecosystemic and socio-economic monitoring programs and provide important feedback on potential collective system impacts such that WKR can develop the Project in consideration of community values and objectives to achieve desired outcomes. These feedback mechanisms may also identify the need for supplemental mitigation, management and enhancement measures that may involve broader application and participation of other agencies and organizations.

In summary, an understanding of Project effects on VCs, and the role and context of VCs within the broader ecological and social systems, including interconnected relationships among systems, is essential to predicting and mitigating collective system impacts. However, given the dynamic and complex nature of systems, there remains much uncertainty associated with predicting effects at a systems level. Follow-up and monitoring programs, coupled with ongoing engagement, will provide important feedback to improve the understanding of collective impacts and inform adaptive management strategies to avoid unacceptable changes based on community values and perspectives.

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## 32 Cumulative Effects Assessment Overview

### 32.1 Introduction

Section 32 provides an overview of Cumulative Effects Assessment (CEA) information in this Impact Statement (IS). This includes why and how cumulative effects were assessed, what has and may happen that causes cumulative effects in the region, and general outcomes of the assessment of cumulative effects completed for each Valued Component (VC).

This section was prepared to compile CEA information in one place, versus throughout the IS, to provide an accessible and additional way to understand this information. This was done in recognition of the interest and importance of cumulative effects for the Grays Bay Road and Port (the Project). This was also done to provide, with minimal technical language, some basic information about cumulative effects as they are currently understood and assessed.

This section is further organized as follows:

- **Approach:** an overview of on what basis, how, and where (in the IS) cumulative effects are assessed
- **Regional and Future Perspectives:** establishes context for cumulative effects in the region now and into the future
- **Key Assessment Outcomes:** a summary of what was found for each VC CEA
- **Summary:** some final brief overall comments on the CEA information

### 32.2 Approach

#### 32.2.1 Why and How are Cumulative Effects Assessed

This section explains why cumulative effects were assessed, briefly discusses what cumulative effects are, explains how space and time were considered, describes the basis of assessing future induced projects, and explains how climate change was considered.

Some of the information is generally about any CEA and refers to projects. Some of the information is specific to the CEA in this IS and refers to the Project.

The CEAs were done because the Guidelines for the Preparation of an Impact Statement for West Kitikmeot Resources Corp's Grays Bay Road and Port Proposal (NIRB 2026; referred to further here as "the Guidelines") included these as a requirement. The CEAs were also done because the interest and concern of northerners for the future of the north was recognized. That interest includes the desire to direct and manage resources, notably in support of renewable resource harvesting and multi-generational community wellness.

The Guidelines provide some details on how the CEAs are to be done. That information was supplemented by knowledge, experience, precedence and other guidance. Generally, how CEAs are done is well established in Canada, with much formal (government and regulator) guidance and precedence, including projects previously reviewed by Nunavut Impact Review Board (NIRB) in Nunavut.

The Guidelines mention the assessment of cumulative effects throughout, mostly as described in section 7.4.3 Cumulative Effects Assessment. The Guidelines define a cumulative effect as:

*“...the accumulation of changes caused by human activities (e.g., past, existing proposed, and reasonably foreseeable activities, including activities associated with the project under assessment) and natural processes (including climate change). These changes occur over space and time and can be brought about by the combination of various effects that are additive or interactive. The combination and interaction between these types of effects can increase or decrease the impact of a single effect.”*

Stated differently, but still based on that definition, cumulative effects happen as follows. A project is proposed by a proponent. Possible adverse and beneficial direct effects of that project (i.e., those of the project being assessed under regulatory review) are assessed. One then looks for other types of built projects (those that have existed or exist now and those that may exist in the reasonably foreseeable future) and their activities (the term “physical activities” is used here to encompass these), or, more generally, human activity and presence on the land and water. Next, one determines whether the direct project effects may interact with the effects of other projects on the same VCs being assessed. Such interactions can happen in many ways. The most common is that they combine or “add”, that is, the effect from the interaction is greater than the effect from either alone.

Cumulative effects can occur in many ways, but there are a few basic and common ones, referred to here as “drivers”. These fundamentally reflect how effects can occur in the environment under certain combinations of project effects and VCs, given where they are, what they are, and how they move across the regional landscape. The following are examples of these:

- Long-distance transport of physical effects (e.g., air emissions, discharges into waterways)
- New or improved road access (i.e., increasing traffic or introducing traffic into regions previously not accessible other than possibly, if at all, by off-road vehicles and snow machines)
- Multiple users of the same resource (e.g., harvested species)
- Far-ranging species (e.g., some fish and wildlife)
- Overlap with a regionally distributed environmental feature (e.g., rare vegetation communities dispersed across a regional landscape)
- Economic/social/public infrastructure network (i.e., the dynamics of human/community interactions given transportation connections and movements of goods and people)

An assessment of cumulative effects has some unique features compared to the assessment of direct project effects. Most apparent are space (geographic area) and time, represented, respectively, by Regional Assessment Areas (RAA) and longer timelines extending into the past and future relative to now.

Regional Assessment Areas are used to represent the distance from the project at which cumulative effects may occur, can be described, are measurable, or can at least be explained and assessed. As such, they provide a representation of at least where these effects may occur and inform those reviewing the IS and ultimately those making the regulatory decision for the Project.

Each VC section includes a description of its RAA and a map (figure) illustrating it. The size and shape of these follow common assessment conventions, are associated with the project being assessed, and are representative of possible cumulative effects. These often reflect compromises in consideration of available information and the extent and ability of analytical techniques to “follow” the effects while remaining measurable or at least discernible on the landscape. There are a few typical types of RAAs. One of the most common are a buffer (a distance set back from the project), which for the Project creates a mostly oval shaped RAA along the Project Disturbance Area (PDA, or “footprint”) due to the Project being dominated by a long linear component (the road) with a site component at each end (the port at the northern end and Jericho Station at the southern end). Another basis of an RAA is the adoption of other boundaries large enough to likely represent relevant effects. One such boundary is those for natural resource management (such as wildlife), and another are administrative (jurisdictional) borders.

Sometimes drivers extend beyond, and/or occur outside, the RAAs. This can happen if an interacting VC or activity moves beyond the RAA over very large distances. In these cases, the selected RAA nonetheless represents an area large enough to meaningfully describe and assess cumulative effects based on available information while remaining measurable or otherwise discernible.

Time is represented by a set of selected points in the past and future. Each of these represents a “snapshot” of conditions along the “arrow” of time. These include the past, present and future. The past includes human change on the land that in some way remains, including decommissioned projects. Reflecting current assessment practice, past and present conditions are combined into one as baseline conditions (at the time of this assessment’s preparation). As such, a historical baseline in the far past (e.g., pre-European colonization) is not used as another reference point against which to compare incremental project effects. However, a description of past up to present conditions is provided in the Regional Historical Overview (see Table 32.1) and the Baseline Conditions sub-sections in each VC assessment.

The following are timelines relevant to the CEA:

- Construction: 2030-2034 (5 years)
- Operations and Maintenance: 2035- (indefinite period)
- Project Design Life: 2035-2110 (75 years; this reflects an engineering period based on engineering design standards)
- Future Induced Mine Construction/Operation: 2035-2055 (20 years; see below for an explanation)
- Climate Change Scenarios: 2030’s, 2050’s and 2080’s (periods representing different future conditions)

Combining the consideration of space and time, other physical activities are identified within the likely largest RAA that the project's effects may interact with. Following research across multiple information sources, these are compiled and organized in chronological order (past to future) in a table and shown on maps in what is referred to as the Project Inclusion List (PIL).

The future then becomes the real focus. The future considers physical activities that are already known may happen. The term “reasonably foreseeable” refers to these, those words implying some possibility, though in many cases with some uncertainty if they really will happen and what exactly they would be in detail. In current common assessment practice, this is as far into the future that CEAs are expected to go. However, for the Project, the CEAs go one step further into the future with induced projects.

Induced projects may happen because the project being assessed (in this case, the Project) may help make them happen. To start, the Project, as proposed, and for which regulatory decision is sought, includes a road, a port, and some road and marine traffic to maintain the operation of that project. Otherwise, no other projects or activities occur until another proponent or user in the land or marine environment decides to use the basic infrastructure provided by the Project. So, the Project as proposed includes no induced projects.

The question then becomes who, if anyone, may propose such projects? And if so, what are the details describing what they do? There is no certainty if induced projects will happen (although for some the likelihood may be greater than for others) and no certainty on what exactly they may be aside of some general description, such as a mine. All this leads to two versions of induced futures. The first type, referred to in the CEAs as reasonably foreseeable induced (RFI), are assessed in a presumed “scenario” of a few selected projects. The other type, referred to as hypothetical futures, are not assessed. Neither version is commonly required in current CEAs by precedence and guidance.

However, due to the unique nature of the Project's purpose to support future human use, such as mineral resource development, the first version (RFI) is required in the Guidelines (sec. 7.2.1) to assess effects on VCs due to “*Components and activities induced by the proposed project development, which will occur in the reasonably foreseeable future.*”

The RFI projects are a unique feature for this IS and rare in CEAs in general. They reflect a future between reasonably foreseeable and hypothetical. The RFI projects are of three types:

1. West Kitikmeot Resources (WKR) has already identified possible future expansions of their own Project, such as a runway or fuel storage. These would all occur within the PDA of the assessed Project.
2. An expansion of the Project but outside the current PDA. That would be Phase 2 (a possible all-season road extension southward of the Project to the territorial border).
3. Other proponents have already proposed projects such as mines that, if built, likely would also include access roads connecting to the Project to support the development of those mines.

Therefore, those mines would be induced by the Project, that is, they likely would not happen unless the Project is operational and therefore available to facilitate the advancement of those mines. Of all the potentially feasible mines in the far future in this northern region, three have been selected as more likely to be developed if the Project becomes operational. These projects are already in the regulatory review process under NIRB but have not yet happened for various reasons. As such, at least some details and some degree of certainty of happening are known.

An RFI scenario is therefore assessed in which all three RFI mines are conservatively included at approximately the same future time, even though the timing of each relative to the others is unknown, assuming any happen. Due to the nature and location of the RFI projects (and their activities), many effects, and hence cumulative effects, are quite limited if there are any at all. Two of the three RFI mines are at large distances from the Project. Shipping associated with those projects, and shipping in general regardless, is still relatively infrequent and mostly separated by large distances. The larger such distances, and the less occurring at the same time, reduces the likelihood of cumulative effects (because of a lesser chance that the effects would overlap in space and time). For biophysical effects, they may occur at or close to the physical intersection of the mine access road, along the Project road, and for marine traffic at the Project port and along the same shipping lanes in the Coronation Gulf.

But those induced mines (and their access roads) are not the second version of induced futures, the *hypothetical* induced. Hypothetical induced goes beyond RFI in time to imagine any possible future. This could include, by other proponents, other mines, industrial activity (such as power generation), military use, aircraft, and other types of marine shipping, including internationally flagged ships transiting the Northwest Passage. However, there is uncertainty if, when and how of any of these may happen. As such, there are no available descriptive details adequate to support an assessment. That uncertainty and lack of details make such a future scenario highly speculative and of limited practical value in the context of a regulatory project application. While project environmental assessments have a planning role to assist understanding and help manage the future, they should be based more on certainty than speculation. Individual project proponents cannot forecast such futures.

Because such a hypothetical scenario is not assessed here, it does not mean that other future projects (such as mines) or activities (such as ships using the port) will not occur. They may happen, and if they do, they will reflect further outcomes WKR would welcome. Other non-regulatory project processes and initiatives, such as regional assessments (see Section 32.3), offer opportunities to assist forward-looking land and resource management and planning.

As such, the CEA for this Project focuses on the future (reasonably foreseeable) induced scenario, and not the hypothetical scenario. The RFI scenario is the only scenario that provides a degree of likelihood and understanding that is considered reasonable and appropriate. This is because the Project, as proposed does not produce a product, such as mined mineral concentrate. Any future production/transport of product would reflect the outcomes of *other* proponent projects. It is also important to note that WKR is not responsible for other proponents, nor are these parties under WKR's care or control when using WKR-owned infrastructure. Each proponent is responsible for meeting all applicable regulatory requirements (including safety obligations) and, consistent with their regulatory assessment responsibilities, for assessing and managing the effects of their own activities; for example, vessel movements within shipping lanes beyond the Port. Access to WKR's infrastructure is provided under

agreement, and all proponents must comply with their operational mitigations and commitments established to manage and reduce cumulative effects.

The RFI scenario includes information from the PIL (see Table 32.1), supplemented with quantified data from available sources. For the RFI mines some information came from earlier regulatory applications on the NIRB public registry. In summary, the induced mining projects include the following:

- Izok mine, part of the Izok Corridor Project and access road to the Project road
- Hackett mine, part of the Hackett River Project and access road to the Project road (road extends to B2Gold’s existing Goose Mine)
- High Lake mine, part of the Izok Corridor Project (it is so close to the Project road that a separate access road was not separately identified)
- Activity associated with those mines, including additional road traffic (e.g., trucks carrying concentrate) on the Project road, aircraft (e.g., passenger and freight) using the Project airstrip, and marine vessels (e.g., ships carrying concentrate) using the Project port

Climate change is recognized throughout the IS in various ways, generally as implications for both VCs and the Project. As mentioned above, NIRB’s definition of cumulative effects includes effects that interact with “...*natural processes (including climate change)*”, expanding current CEA practice beyond interactions with other physical (built and operated) projects and human activity. By current CEA convention and guidance, climate change is not considered a physical activity and so is not something for which potential effects interactions are assessed. Notwithstanding, natural processes, including climate change, are acknowledged and addressed in the VC assessments as appropriate and relevant. As such, climate change is always “present” in the VC assessments (even though that may not always be apparent) as another driver of change affecting baseline conditions for ecology, human use, and Project engineering. In this way climate change is a consideration in the overall CEA, even if it may not be readily apparent.

### **32.2.2 Where Cumulative Effects Assessment Information is in the Impact Statement**

All the information in this IS relevant to cumulative effects assessments are not found and assessed in one place (section or chapter). There is not “one CEA,” but many places where, in various ways, each provides information on cumulative effects. Section 32, as discussed in Section 32.1, is the closest in the IS to a single place, although it mostly summarizes information elsewhere.

However, the primary and “first place to go to” is found within each VC assessment (there are 23 VCs). While individually each provides useful information, collectively they all work together to provide a fuller picture of possible cumulative effects. Table 32.1 summarizes these places, organized by the following three columns:

- Information Type: A general classification of the information, unique to this table.
- Location in Impact Statement: The specific section the information is found in the IS.
- Description: A brief explanation of what the information is about.

**Table 32.1 Cumulative Effects Assessment Information in the Impact Statement**

Information Type	Location in Impact Statement	Description
Regional and Historical Setting	Section 1 Introduction Regional Context	Brief summary of features of the region the Project is within.
Regional and Historical Setting	Section 2 Project Components and Activities Future Development	Brief discussion of development opportunities.
Method	Section 9 Effects Assessment Methodology Section 9.4.3 Cumulative Effects Assessment	Describes the basic method used in the assessment of effects. This method follows the Guideline requirements and current conventional environmental assessment practice for regulatory project applications.
Method	Section 9 Effects Assessment Methodology Appendix 9A Project Inclusion List	Identifies other physical activities that may cause effects that may interact cumulatively with the Project's effects. The PIL first discusses regulatory definitions and information requirements, the types of physical activities included, the influence of spatial boundaries (how far from the Project), and temporal boundaries (how far back in time and into the future). The PIL then provides a table, organized by temporal category, physical activity type and name.
Method	Section 9 Effects Assessment Methodology Appendix 9A Project Inclusion List Attachment 9A1 Description of Physical Activities	A table, organized by temporal category and physical activity type (there are 11) and name, for 129 physical activities (rows in the table). The types are: aircraft, community, and marine. mine, mineral exploration, power utility, renewable resource harvesting, research, road, supply cache, and tourism.
Method	Section 9 Effects Assessment Methodology Appendix 9A Project Inclusion List Attachment 9A2 Spatial Metrics and Descriptive Information for RFI Physical Activities	A series of tables providing information, mostly quantification (numbers) of certain details (such as truck traffic) for RFI Physical Activities.
Method	Section 9 Effects Assessment Methodology Appendix 9A Project Inclusion List Attachment 9A3 Figures	Three figures (maps) showing the Physical Activities identified in the PIL.
Regional and Historical Setting	Section 7 Regional Historical Overview	A qualitative narrative of the regional natural and human history of Nunavut prior to the Project to provide an improved understanding of the geographic context of the Project, acknowledging and recognizing changes that have occurred in the region over time. The Regional Historical Overview (RHO) has three main parts: <ul style="list-style-type: none"> <li>• Natural History (since the last glaciation to today)</li> <li>• Human History (since Indigenous pre--European contact to today)</li> <li>• Regional Development Overview (description of key regional drivers of change from human activity since European contact and colonization)</li> </ul>

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Section 32: Cumulative Effects Assessment Overview  
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Information Type	Location in Impact Statement	Description
Assessment of Climate Effects on VCs: Inuit Perspectives	Section X.1.2 1.1.2 Influence of Consultation and Engagement and Inuit and Traditional Knowledge on the Assessment <sup>1</sup>	Each VC assessment section includes available Inuit and Indigenous information, including on cumulative effects.
Transboundary	Section X.3.6 Transboundary Effects	Discusses transboundary effects (if any) for each VC.
Assessment of Climate Effects on VCs: Climate	Section X.3.7 Effects of Climate Change on [VC name] <sup>1</sup>	Examines implications of climate change on VCs.
Assessment of Cumulative Effects on VCs	<p>Section X.4 Assessment of Cumulative Effects in the following<sup>1</sup>:</p> <ul style="list-style-type: none"> <li>• Section 11 Air Quality</li> <li>• Section 12 Climate</li> <li>• Section 13 Noise and Vibration</li> <li>• Section 14 Terrain, Soils and Permafrost</li> <li>• Section 15 Vegetation</li> <li>• Section 16 Caribou</li> <li>• Section 17 Birds</li> <li>• Section 18 Other Wildlife</li> <li>• Section 19 Water Resources</li> <li>• Section 20 Freshwater Fish and Fish Habitat</li> <li>• Section 21 Marine Water and Sediment</li> <li>• Section 22 Marine Fish and Fish Habitat</li> <li>• Section 23 Marine Mammals</li> <li>• Section 24 Traditional Land and Marine Resource Use</li> <li>• Section 25 Food Security and Food Sovereignty</li> <li>• Section 26 Community Health and Well-being</li> <li>• Section 27 Employment and Economy</li> <li>• Section 28 Infrastructure and Services</li> <li>• Section 29 Non-traditional Land and Marine Resource Use</li> <li>• Section 30 Heritage Resources</li> </ul>	<p>Each VC identifies potential cumulative effects with the Project, assesses the effects, identifies management measures for the effects, and evaluates the significance of effects. This includes definition of regional assessment areas within which potential cumulative effects are assessed, and identification of other physical activities that may interact with the Project.</p> <p>Each VC’s assessment of cumulative effects begins by evaluating potential cumulative interactions with past, present, and reasonably foreseeable physical activities. This is followed by a sub-section “Reasonably Foreseeable Induced” in which potential interactions with RFI physical activities are assessed. These are separated because of the differences in certainty, descriptive details, and assessment approach.</p>

Information Type	Location in Impact Statement	Description
Assessment of Cumulative Effects on VCs: Climate	Section 12 Assessment of Potential Effects on Climate	Examines climate conditions and Project greenhouse gas emissions.
Holistic Assessment	Section 31 Holistic VC Assessment	Examines the way the IS includes holistic concepts in the VC assessments and adopts a systems approach, including the use of three Holistic Valued Components (HVCs), each representative of effects interactions amongst multiple VCs, followed by observations of their collective outcomes. The HVCs are: <ol style="list-style-type: none"> <li>1. Cumulative Effect of Port Operations on Marine Renewable Resource Harvesting</li> <li>2. Cumulative Effect of Road Operations on Terrestrial Renewable Resource Harvesting</li> <li>3. Cumulative Effects on the Landscape Affecting Communities</li> </ol> This information both supplements and accompanies the VC assessments.
Transboundary	Section 33 Transboundary Summary	Summarizes transboundary effects for all VCs.

Note:

<sup>1</sup> “X” in a sub-section number is a generic reference to the specific number of a given VC assessment.

### 32.2.3 Summary of Approach

Based on above, the following summarizes how cumulative effects were assessed. Further details are provided in Section 9 Effects Assessment Methodology.

1. The Project Inclusion List was prepared.
  - Physical activities were identified, described and mapped within a large enough region to provide a representation of human use with effects that the Project effects on VCs may interact with. Just because a physical activity is identified here does not mean there *will* be a cumulative effect. Its presence suggests that it is a candidate for a cumulative effects interaction with the Project, meaning there *may* be a cumulative effect. Each VC assessment selects amongst these which ones may, for that VC, possibly have an interaction.
2. Further details were identified to describe the Reasonably Foreseeable Induced mines.
  - These were based on available publications and summarized as numerical averages and ranges during construction and operation for the 20-year span of time of 2035-2055. These included estimates for traffic (road, air and marine), fuel use, and labour. Traffic details included the number per year and active hours. Not all this information is necessarily relevant to a given VC. That which is useful and relevant is identified in each VC assessment.

3. Regional Assessment Areas were identified for each VC.
  - These were largely based on an area likely adequate to represent measurable or discernible cumulative effects, given the nature of the Project description and types of effects assessed for the VC.
4. The assessment of project-specific residual effects on VCs (caused by the Project), which precedes the assessment of cumulative effects, were examined.
  - Based on these outcomes and what was provided from Steps 1 to 3 above, some or all of Project effects were identified as possibly contributing to cumulative effects. Effects significance was not a factor in doing this (a Project effect did *not* have to be significant to be considered for cumulative effects).
5. Potential cumulative effects were assessed for each VC in two parts:
  - First, for cumulative effects with past, present, and reasonably foreseeable physical activities. The basis of these assessments followed the same as used for assessing the VC's Project residual effects. As such, one or a mix of qualitative (no or few numbers) and quantitative analysis (using numbers, such as from a model or mapping) was completed.
  - Second, for cumulative effects with reasonably foreseeable induced physical activities. The primary basis of assessment was qualitative (no or few numbers and based mostly on a written "narrative"), supplemented by limited quantitative data, mostly direct land disturbance, if relevant and available in the context of that VC assessment.
  - Various further sources of information were available for consideration (as identified in Table 32.1).

### **32.3 Regional and Future Perspectives**

The following provides an overall "picture" of the Project's region from a cumulative effects point of view. This includes a brief overview of regional scale and conditions, the reasonably foreseeable induced scenario, and regional management considerations and options.

The Project is proposed to be constructed and operated within a vast and relatively remote landscape largely unchanged by human use. Figure 32.1, reproduced from the PIL, shows this large regional scope that provides the context for the CEAs.<sup>1</sup>

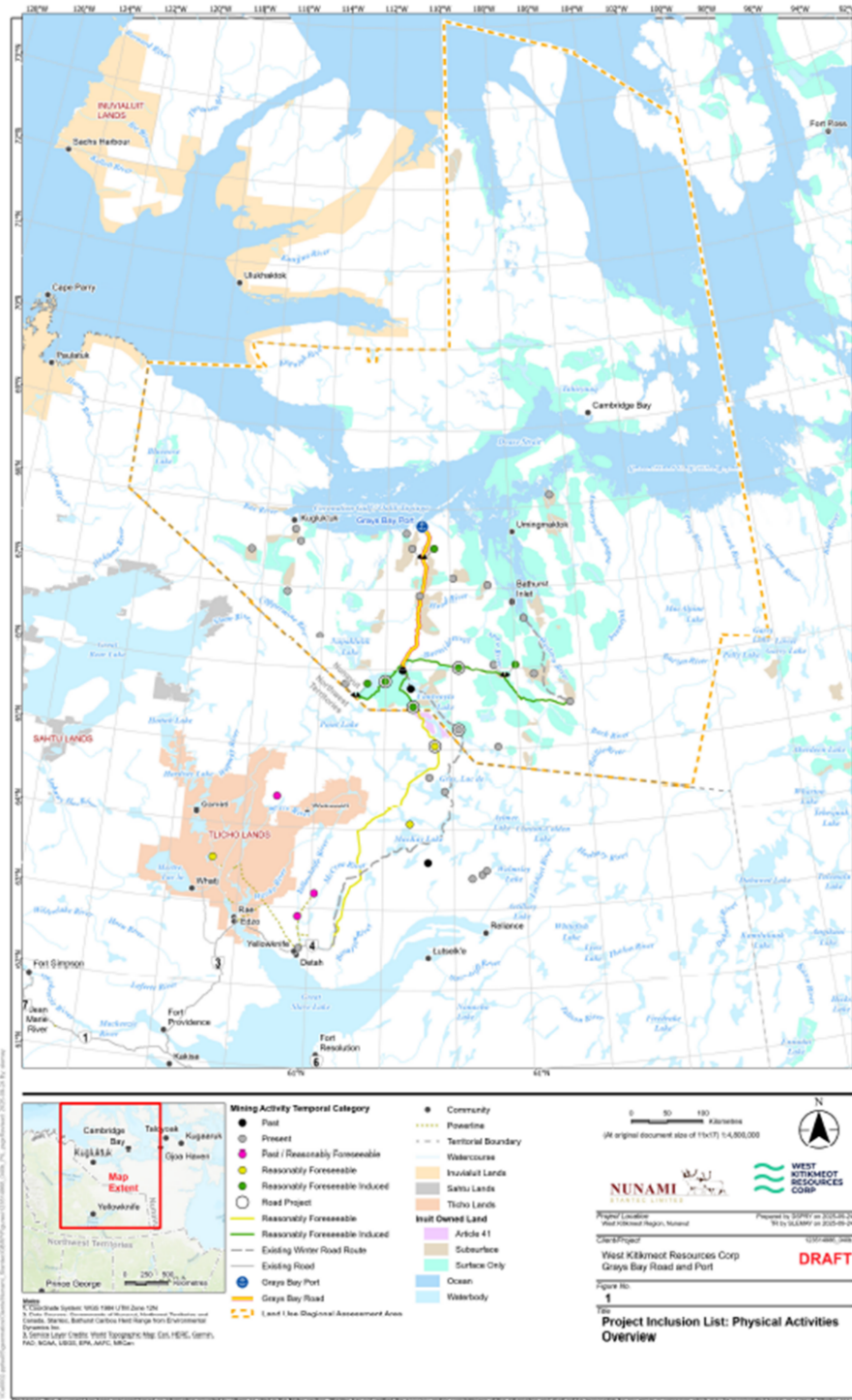
The Project PDA of 49.5 km<sup>2</sup> is in the Kitikmeot region of 447,727 km<sup>2</sup>. The Project port is far from other communities: 180 kilometres (km) to Kugluktuk to the west, 280 km to Cambridge Bay to the east, and 620 km to Yellowknife to the south. Once constructed, the Project, as proposed, will involve minimal activity (road, air, and marine). Such traffic during Project operations is limited to operations and maintenance, after which the Project waits for others to use it.

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<sup>1</sup> At such small map scales (i.e., showing very large areas) it is necessary, to appear at all, that the Project is exaggerated in size (and other roads) and as such some maps do not correctly portray the spatial extent of disturbance.

**Figure 32.1 Physical Activities Overview**

(reproduced from Section 9, Appendix 9A, Figure 1)



Some land and marine use and travel historically have occurred and are expected to continue. Such use however, is generally infrequent and separated by large distances. The Project is therefore separated from human activities more commonly associated with contributing to cumulative effects, notably major urban (community) populations and commercial (industry) resource production. The distances involved typically extend into the hundreds of kilometres separating the Project from other projects and forms of human use.

What does appear so far represents the relatively slow and separated buildup over time of various projects and other human presence. Future possible infrastructure south of the Project, notably the reasonably foreseeable all-season road from Yellowknife to the territorial border, combined with the RFI project of Phase 2, would provide all-season road access between the southern road network and the central Arctic coast. The implications of this are likely substantial to human use, although highly uncertain on specific details. The term “Arctic Economic and Security Corridor” (GNWT n.d.a) has recently been recognized as reflecting such access to provide “...*a generational opportunity to foster long-term economic resiliency and sustainable development...*”.

Cumulative effects acting at a regional scale are currently rare. The addition of the Project to this landscape introduces direct project effects, but given above, still relatively few cumulative effects. Cumulative effects therefore, are of greater possibility in a future that the Project and possibly other physical activities (in the Canadian arctic and elsewhere) may bring about. Again, of greatest interest, and an important part of the Project’s benefit, are commercial mines in the Slave Geological Province (SGP), which overlaps much of the mainland area (as shown in Figure 32.1) between the coast to the north and Great Slave Lake to the south. The mineral potential of the SGP has long been recognized as high in Canada, including for critical minerals. The diamond mines in the Northwest Territories represent an example of the implications of resource development, although that future is now diminishing as these mines advance to the end of their producing lives.

Given what is stated above, mine projects and an all-season connection to the south have been recognized as of the greatest interest and concern. The selected RFI scenario of three mines (Izok, Hackett, High Lake) and their access roads (seen as the dots and green lines on Figure 32.1, respectively) would represent an area of approximately 17 km<sup>2</sup>. By then, the total land disturbance remains negligible, accounting for less than 0.02% of the Kitikmeot Region. Two of the mines are far from the Project road. Based on their access roads, Izok is 101 km away, and Hackett is 149 km away. The Hackett road also then continues for another 111 km to the existing B2Gold Goose project. High Lake is almost adjacent (220 metres) to the Project road.

It is also recognized that while such areas represent a relatively minor change in the region, they also, during RFI operations, come with activity in the form of additional road, marine, and air traffic:

- **Road:** Approximately seven to 60 concentrate trucks could each year move along the mine access roads and use the Project road, with an average of 31. An estimated 1000 vehicles could use the Tibbitt to Contwoyto Winter Road (TCWR) to and from the Project road during the TCWR’s winter operational period (December-March on average).<sup>2</sup>

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<sup>2</sup> An average of 6,605 northbound trucks used the TCWR annually from 2002-2012. The TCWR is approved to transport 12,000 trucks per year and cumulative demand on the TCWR is not anticipated to exceed its capacity due to safety requirements.

- **Marine:** Approximately four Arctic and Offshore Patrol Ships, a tanker, two cargo ships and 30 concentrate ships (bulk carriers) by 2040 could make the Project a port of call each year (only during ice-free conditions, on average, a five-month period of late June through October). Concentrate ships represent the greater number of ships, about six a month, or about one to two a week. Ship traffic at shipping channels in and beyond the Coronation Gulf (where the port is located, approximately mid-way in the Gulf), however are “split” approximately by numbers west and east of the Gulf. As such, approximately only three concentrate ships could each month pass regions west and east of the Gulf.
- **Air:** Approximately on average 35 medium passenger aircraft (e.g., Dash 7, Dash 8) could use the Project airstrip each year.

Cumulative effects assessments offer one opportunity to plan for the future, especially in regions still early in their overall development. There are however limits to what any individual proponent can do, and as reflected in environmental assessments through the prediction of future effects and management of such effects.

As with other regions in Canada, there are options to supplement or accompany regulatory project-specific assessments to assess and manage regional-scale effects, including cumulative.

The following are examples of these, with some still in early stages of development and still evolving:

- Co-management institutions; e.g., Nunavut Wildlife Management Board (NWMB n.d.)
- Land use plans; e.g., Draft Nunavut Land Use Plan (NLUP; NPC 2023)
- Regional Monitoring; e.g., Nunavut General Monitoring Plan (NGMP; GN n.d.), Northwest Territories Cumulative Impact Monitoring Program (CIMP; GNWT n.d.b)
- Natural resource management plans; e.g., Bathurst Caribou Range Plan (BCRP; GNWT 2019)
- Regional assessments; e.g., Regional Study of the Slave Geological Province (MVEIRB 2023), National Framework for Assessing the Cumulative Effects of Marine Shipping (TC 2022)

Over time, such initiatives can improve the understanding of project and resource development, effects, and ultimately advance effects management. Cumulative effects begin at individual projects and activities, and so there also begins the opportunity to address such effects within the means of each proponent. This starts by first addressing their effects (as they must do anyway, as described and committed to in their environmental assessments and permits) by the implementation of mitigation measures. To go beyond that requires regional-scale multi-party-led and supported collaborative programs, given the cost, time, data, and complexity involved.

One specific key opportunity to manage cumulative effects as a possible outcome of such programs are regional thresholds, representing limits of human disturbance or an unacceptable degree of effects. Such thresholds may also be used in project CEAs. Generally, there are few thresholds available, and fewer still tailored to the context of a given region’s geography, ecology and human use. The BCRP provides one threshold from its Cumulative Land Disturbance Framework (CLDF), based on the area of disturbance (and, so, the reduction in caribou habitat) and correlated with degrees of risk to the Bathurst caribou herd. This analysis was presented in the assessment of potential effects on caribou (Section 16), which determined that in the Framework’s Range Assessment Area 1 in Nunavut, the addition of the

Project on the landscape did not increase that risk, but the further addition of the RFI projects could increase that risk. The CLDF thresholds were then considered with other analyses to assist the evaluation of effects on the herd.

WKR is not aware of other thresholds for other VCs, specifically for the region. WKR believes, however, that the CEAs conducted for this IS, along with the other information provided, offer substantial and meaningful insight into two outcomes. First, regarding potential effects directly by the Project that serve to inform NIRB and other parties as the basis of the proposed Project for which regulatory approval is sought. And second, regarding at least one possible future (the RFI scenario) that may assist NIRB and other parties in continuing to develop plans, programs and policies to manage Nunavut's future.

## **32.4 Key Assessment Outcomes**

As mentioned above in Section 32.2.2, the assessment of cumulative effects for each VC is the essential and primary place where these effects are assessed. Table 32.2 summarizes selected information for each VC relevant to understanding the scope and outcomes of these assessments.

In this way, selected key CEA information can be found in a single location across 23 VC assessments, spanning 23 sections and five Volumes (5 to 9), totalling hundreds of pages.

The table combines some information discussed earlier here on the method (to help understand how cumulative effects may happen and how assessed) with a general summary of effects. The table also introduces a new generic (applicable to all VCs) and generalized ranking of cumulative effects, based on the VC assessments, regarding Project contribution and overall regional outcomes (see the table footnotes for definitions).

**Table 32.2 Summary of Cumulative Effects Assessments for Valued Components**

Valued Component	Cumulative Effects Drivers	RAA Basis	Spatial Extent of Interactions	Primary Interacting with Other Physical Activities	Primary Project Effects	Cumulative Effect / Magnitude Characterization			Mitigation Measures	Overall Significance
						Primary	Project	Overall		
<b>Ecosystemic VCs</b>										
Air Quality	Long-distance transport of physical effects	Linear Buffer (airshed)	<30 km	Road traffic, Marine Traffic	Air emissions in the vicinity of the port, road dust	Marine vessel and port emissions	Low	Low	Project	Not significant
Climate	Long-distance transport of physical effects	NA	>30 km	Road traffic, Marine Traffic	Power generation emissions	GHG emissions	Low	Low	Project	Not significant
Noise and Vibration	Long-distance transport of physical effects	Linear Buffer (airshed)	<30 km	Road traffic, Marine Traffic, Power	Sound levels	Ship, Traffic noise	Low	Low	Project	Not significant
Terrain, Soils and Permafrost	Overlap and regionally distributed	Linear Buffer (region)	PDA	Mine Access Roads	Direct disturbance cover loss	Access roads in PDA	Low	Low	Project	Not significant
Vegetation	Overlap and regionally distributed	Linear Buffer (region)	PDA	Mine Access Roads	Direct disturbance cover loss	Access roads in PDA	Low	Low	Project	Not significant
Caribou	New or improved road access, Far-ranging species	Management Region (BCRP Range Assessment Area 1)	>30 km	Mine Access Roads, Road Traffic, Mines	Direct disturbance cover loss (habitat), dust, road vehicle sensory disturbance (noise, light), direct mortality, hunting pressure	Habitat loss	Low	Moderate	Project, Regional	Not significant
Birds	Far-ranging species	Linear Buffer (region)	<30 km	Mine Access Roads, Mines	Direct disturbance cover loss (habitat), road vehicle sensory disturbance (noise, light), direct mortality, hunting pressure	Habitat loss	Low	Low	Project	Not significant
Wildlife	New or improved road access, Far-ranging species	Linear Buffer (region)	<30 km	Mine Access Roads, Road Traffic, Mines	Direct disturbance cover loss (habitat), road vehicle sensory disturbance (noise, light), direct mortality, hunting pressure	Habitat loss	Low	Low	Project	Not significant
Water Resources	Long-distance transport of physical effects	Linear Buffer (watersheds)	<30 km	Mine Access Roads	Flow and quality change	Sediment discharge	Low	Low	Project	Not significant
Freshwater Fish and Fish Habitat	Mobile ecological receptor	Linear Buffer (watersheds)	<30 km	Mine Access Roads	Habitat loss and water quality change	Sediment discharge, habitat loss	Low	Low	Project	Not significant
Marine Water and Sediment	Long-distance transport of physical effects	Topography (Coronation Gulf)	<30 km	Marine traffic	Sediment discharge	Sediment discharge	Low	Low	Project	Not significant
Marine Fish and Fish Habitat	Far-ranging species	Topography (Coronation Gulf)	>30 km	Marine traffic	Habitat change, noise	Noise, collision	Low	Low	Project	Not significant
Marine Mammals	Far-ranging species	Topography (Coronation Gulf)	>30 km	Marine traffic	Habitat change, noise, collision	Noise, collision	Low	Low	Project	Not significant

Valued Component	Cumulative Effects Drivers	RAA Basis	Spatial Extent of Interactions	Primary Interacting with Other Physical Activities	Primary Project Effects	Cumulative Effect / Magnitude Characterization			Mitigation Measures	Overall Significance
						Primary	Project	Overall		
<b>Socio-economic VCs</b>										
Traditional Use	Multiple users of the same resource, Far-ranging species	Jurisdictional (West Kitikmeot)	>30 km	Road traffic, Marine traffic, Mines, Communities	Road access, Air access, Shipping access, land disturbance	Land disturbance	Low	Low	Project	Not significant
Food Security and Sovereignty	Multiple users of the same resource, Far-ranging species	Jurisdictional (West Kitikmeot)	>30 km	Road traffic, Marine traffic, Mines, Communities	Employment, Air access, Shipping access, Road access	Employment, Air access, Shipping access, Road access	Mod (+/-)	Mod (+/-)	Project	Not significant
Community Health and Wellbeing	Multiple users of same resource	Jurisdictional (West Kitikmeot)	>30 km	Road traffic, Marine traffic, Mines, Communities	Employment, Air access, Shipping access, Road access	Employment, Air access, Shipping access, Road Access	Low-Mod	Low	Project	Not significant
Employment and Economy	Multiple users of same resource	Jurisdictional (West Kitikmeot)	>30 km	Road traffic, Marine traffic, Mines, Communities	Employment, Air access, Shipping access, Road access	Employment, Air access, Shipping access, Road access	Low	High (+)	Project	Not significant
Infrastructure and Services	Multiple users of same resource	Jurisdictional (West Kitikmeot)	>30 km	Road traffic, Marine traffic, Mines, Communities	Air access, Shipping access, Road access	Air access, Shipping access, Road access	Low	Low	Project	Not significant
Non-Traditional Use	Multiple users of same resource	Jurisdictional (Kitikmeot)	>30 km	Road traffic, Marine traffic, Mines, Communities	Air access, Shipping access, Road access, land disturbance	Air access, Shipping access, Road access, land disturbance	Low	High (+)	Project	Not significant
Heritage Resources	Overlap and regionally distributed	Linear Buffer (PDA)	PDA	Mine Access Roads, Mines	Land disturbance	Land disturbance	Low	Low	Project	Not significant

Notes:

<p><b>Cumulative Effects Drivers</b></p> <ul style="list-style-type: none"> <li>• Long-distance transport of physical effects</li> <li>• New or improved road access</li> <li>• Multiple users of the same resource</li> <li>• Mobile ecological receptor</li> <li>• Overlap and regionally distributed</li> <li>• Economic/social/public infrastructure network</li> </ul> <p><b>Spatial Extent of Interactions</b></p> <ul style="list-style-type: none"> <li>• PDA</li> <li>• &lt;30 km (30 km was chosen as it represents the maximum RAA distance from the Project amongst many VCs)</li> <li>• &gt;30 km</li> </ul>	<p><b>Cumulative Effects / Magnitude Characterization</b></p> <ul style="list-style-type: none"> <li>• “Project”: Project contribution alone to cumulative effects (“+”: positive effect; “+/-”: positive and negative effects)</li> <li>• “Overall”: all interacting physical activities up to and including the RFI scenario</li> <li>• Adverse <ul style="list-style-type: none"> <li>– Low: No, immeasurable or negligible effects, project-specific mitigation measures adequate; unlikely long-term decline in VC state</li> <li>– Moderate (Mod): Some, measurable, noticeable perceived effects; project-specific mitigation measures may need to be supplemented by regional measures; possible long-term decline in VC state</li> <li>– High: Substantial, measurable, readily discernible effects; regional mitigation measures required; likely long-term decline in VC state</li> </ul> </li> <li>• Positive <ul style="list-style-type: none"> <li>– Low: No or minor improvement</li> <li>– Moderate: Some improvement</li> <li>– High: Substantial improvement</li> </ul> </li> </ul>	<p><b>RAA Basis</b></p> <ul style="list-style-type: none"> <li>• Linear Buffer</li> <li>• Jurisdictional</li> <li>• Management</li> <li>• Far-ranging species movements</li> <li>• Topography</li> </ul> <p><b>Primary Interacting Other Physical Activities</b></p> <ul style="list-style-type: none"> <li>• Road traffic</li> <li>• Marine traffic</li> <li>• Power (generation)</li> <li>• Mine Access Roads</li> <li>• Mines</li> <li>• Communities</li> </ul> <p><b>Mitigation Measures</b></p> <ul style="list-style-type: none"> <li>• Project specific (as identified in the IS for the Project)</li> <li>• Regional (regional/collaborative initiatives; see Section 32.3)</li> </ul>
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## 32.5 Summary

Potential cumulative effects are assessed for all VCs. Information and other assessments relevant to cumulative effects are also provided in various other sections. The assessment of cumulative effects followed the direction from the Guidelines and reflects current assessment practice.

The Project is in a remote region relative to other land uses, but is not remote by historical or traditional standards. The Project, as proposed, represents a relatively small land use disturbance with few activities. Cumulative effects may result from road and marine transport supporting five years of construction. Following construction, the Project is operational indefinitely, awaiting its use in support of other projects and activities by other proponents.

Cumulative effects could become more likely if mines, as induced projects, are developed in the region that connects by road to the Project road, accompanied by increased shipping and air traffic. Additional road, air and marine traffic may also occur in support of other uses, such as tourism and security. Cumulative effects could also become more likely if the Project is connected to southern all-season roads. Climate change is recognized as having potential implications to assessed effects.

A conjectured future (reasonably foreseeable induced) scenario based on three possible producing mines using the Project infrastructure was developed and assessed. Such mines are already recognized as likely candidates if the Project becomes operational. Additional development scenarios were not assessed as no clear descriptions are available on which to base an assessment.

As a privately owned Project access to the Road and Port will be controlled by WKR. This provides the unique opportunity to require third-party users to adhere to mitigation measures (protocols and procedures) that contribute to the reduction and management of cumulative effects. Key measures include, but are not limited to, the following:

- Prior to using the road all commercial and Community Users (anyone using the road for non-industrial and non-security uses) will be required to sign an Access and/or Code of Conduct Agreement, which will include road use rules and expectations, including those measures implemented for the protection of wildlife.
- Users seeking access to the road for harvesting purposes will require prior approval (permit) from the Kitikmeot Inuit Association and the Hunters and Trappers Association. If no approval process is in place, WKR anticipates that use of the road for harvesting purposes would be prohibited.
- Vessels calling at the Port will be subject to speed restrictions and will be required to follow established navigation routes.
- Vessels calling at the Port will be required to follow specific operational protocols for the protection of marine mammals.

Additional regional measures, led by the government, could inform future planning. One currently available regional-based management plan, including thresholds, was recognized for the Bathurst caribou herd.

While a variety of potential cumulative effects were recognized, adverse effects generally were minimal. The large separation of human use by distance and time makes such effects less likely. Positive socio-economic cumulative effects were also identified arising from the Project and potential future resource development. Both Project contribution to cumulative effects and overall (regional) cumulative effects were generally low to moderate, with some high as positive effects (benefits). No Project or cumulative effects were concluded as significant.

## **32.6 Knowledge and Literature Cited**

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## 33 Transboundary Effects Assessment

### 33.1 Introduction

The Nunavut Impact Review Board (NIRB) and the Impact Statement (IS) Guidelines (NIRB 2026) for the Project (NIRB File No. 24XN038) define Transboundary Impacts as:

*“those impacts in the Regional Study Area that are linked directly to the activities of a proposed project or related works conducted inside the designated area, which occur across provincial, territorial, or international boundaries, or could result in impacts within the designated area from project related works that may occur outside the designated area”.*

The designated area is defined under the Nunavut Planning and Project Assessment Act as *“the area that consists of the Nunavut Settlement Area and Outer Land Fast Ice Zone”* (GN 2013).

Triggers for transboundary considerations in this assessment include (NIRB 2026):

- Location of associated activities or components of a project referred to the NIRB;
- Proposed project components in the designated area that other Indigenous groups also have rights;
- Potential negative impacts on the well-being of Canadians outside of the designated area;
- Potential negative impacts on the rights of other Indigenous groups, including harvesting rights and/or
- Potential for negative impacts to resources outside of the designated area (e.g., water, air, and migratory species such as caribou, marine mammals, fish, and birds).

### 33.2 Influence of Engagement and Inuit, Indigenous, and Community Knowledge on the Assessment

Through the Project-specific engagement program delivered between 2016 and 2025, including community meetings, workshops, community-based primary research, the Project-specific Inuit Knowledge report, compiled from the *Naonaiyaotit* Traditional Knowledge Project (NTKP) database, and through a review of publicly available information, Kitikmiut, other Indigenous groups, and other potentially affected communities shared information, expressed concerns, and provided recommendations related to transboundary effects. This feedback has been considered and summarized by VC topic in Table 33.1, and where applicable, has been integrated into the assessment of transboundary effects that follows.

**Table 33.1 Summary of Inuit, Indigenous, and Community Knowledge and Engagement Feedback**

Topic	Comment	WKR Response	Where Addressed
Caribou	<ul style="list-style-type: none"> <li>• Gwich'in representatives in Inuvik commented that while caribou are sometimes tolerant of infrastructure, other times they are not. They recommended that flexible mitigation and monitoring measures be implemented to protect caribou, including from non-local harvesters (NIRB 2025a).</li> <li>• Community members in Inuvik commented that the Project would impact them if the road resulted in effects to caribou migration (NIRB 2025a).</li> <li>• Community members in Inuvik commented that they rely on caribou harvesting due to the high cost of living (NIRB 2025a).</li> <li>• Community members in Yellowknife expressed concern about potential effects to the Bathurst and Bluenose caribou herds, including changes to their populations, calving grounds, and migration routes. They commented that measures were needed to protect the herds and conserve cultural practices for harvesting caribou (NIRB 2025a).</li> <li>• Community members in Yellowknife identified that the area around Contwoyto Lake is an important caribou calving area and summer range for caribou that were historically harvested by Dene families (NIRB 2025a).</li> <li>• Community members in Yellowknife expressed concern for effects to caribou from increased poaching (NIRB 2025a).</li> <li>• Community members in Yellowknife identified the south side of Contwoyto Lake is a critical caribou calving area (NIRB 2025a).</li> <li>• Community members in Yellowknife commented that the Bluenose and Bathurst caribou herds used to migrate to the Yellowknife area. However, mining development and forest fires have redirected their migration to other areas. Caribou that are now seen are skinny, whereas they used to be fat (NIRB 2025a).</li> <li>• Community members in Yellowknife commented that caribou populations are at a critical low (NIRB 2025a).</li> </ul>	<p>WKR acknowledges these observations and concerns and has incorporated these into this assessment Section 33 Transboundary Effects Assessment, and also other VC assessments as applicable.</p> <p>WKR commits to continued engagement on transboundary effects during the advancement of project design, planning, and monitoring throughout the life of the Project.</p>	<p>See Sections 33.4.3 and Volume 6, Section 16.6 for an assessment of potential transboundary effects on Caribou.</p> <p>See also Volume 6, Section 16 for an assessment of Project residual effects on Caribou.</p>

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Topic	Comment	WKR Response	Where Addressed
Caribou (cont'd)	<ul style="list-style-type: none"> <li>• Community members in Yellowknife commented that people never used to waste caribou meat, but it is increasingly becoming a problem. Increased wolf predation has also resulted in smaller herd sizes (NIRB 2025a).</li> <li>• The Tłıchǵ Government shared that they rely on the Bathurst caribou herd to exercise their harvesting rights, practice the Tłıchǵ language, and culture (NIRB 2024).</li> <li>• Tłıchǵ Government expressed concern regarding the Projects potential effects on caribou, caribou migration, and harvesting rights (NIRB 2024).</li> <li>• The Tłıchǵ Government shared that the proposed road could disrupt the Bathurst caribou natural migration from its calving and summer ranges. The Tłıchǵ Government shared that the changes to migration may affect the herds health (NIRB 2024).</li> <li>• The Tłıchǵ Government expressed concern that the change in migration of the Bathurst caribou herd may affect their ability to harvest (NIRB 2024).</li> <li>• The Tłıchǵ Government expressed concern regarding illegal and over harvesting of the Bathurst caribou herd (NIRB 2024).</li> <li>• Athabasca Denesųliné Né Né Land Corporation shared that the Bathurst and Beverly caribou herds have been an important part of their culture, well-being, food security, and sovereignty for thousands of years (NIRB 2024).</li> <li>• Athabasca Denesųliné Né Né Land Corporation expressed concern regarding the Bathurst caribou population decline and the long-term survival of the herd (NIRB 2024; 2025b).</li> <li>• Athabasca Denesųliné Né Né Land Corporation expressed concern that the Project would intersect critical calving habitats and movement corridors of the Bathurst herd (NIRB 2024).</li> <li>• Athabasca Denesųliné Né Né Land Corporation expressed concern that the Project would increase illegal harvest of caribou (NIRB 2024).</li> <li>• Athabasca Denesųliné Né Né Land Corporation expressed concern regarding the cumulative effects to caribou (NIRB 2024, 2025b).</li> </ul>	See above	See above

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Topic	Comment	WKR Response	Where Addressed
Caribou (cont'd)	<ul style="list-style-type: none"> <li>• Athabasca Denesųliné Né Né Land Corporation hunters predominately harvest caribou from the Qamanirjuaq herd that migrates from the east. Hides of these caribou are used for making drums (NIRB 2025b)</li> <li>• Athabasca Denesųliné Né Né Land Corporation commented that traditional teachings and language about caribou harvesting cannot be passed on to future generations without the presence of caribou to harvest (NIRB 2025b).</li> <li>• The Beverly and Qamanirjuaq Caribou Management Board (BQCMB) expressed concern regarding the Projects crossing of critical calving grounds for the Bathurst caribou herd (NIRB 2024).</li> <li>• BQCMB expressed concern regarding increased access that could lead to overharvesting (NIRB 2024).</li> <li>• BQCMB expressed concern that the decline in the Bathurst herd would directly affect the well-being of Indigenous peoples who rely on caribou for sustenance and cultural well-being (NIRB 2024).</li> <li>• BQCMB expressed concern regarding habitat fragmentation from industrial development and the cumulative effects on caribou (NIRB 2024).</li> <li>• The Caribou Guardians Coalition expressed concern regarding the vulnerability of the Bathurst herd and how Project activities may further affect the herds health (NIRB 2024).</li> <li>• The Caribou Guardians Coalition expressed concern regarding change in caribou migration patterns, increased predation, illegal harvest, and cumulative impacts from other mines (NIRB 2024).</li> <li>• Wek'èezhi Renewable Resources Board (WRRB) expressed concern regarding loss of sensitive habitat for Bathurst caribou (NIRB 2024).</li> <li>• WRRB expressed concern regarding direct impacts to caribou movement from the Project (NIRB 2024).</li> <li>• The Government of Northwest Territories (GNWT) expressed concern regarding Project effects on barren-ground caribou (NIRB 2024).</li> </ul>	See above	See above

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Topic	Comment	WKR Response	Where Addressed
Caribou (cont'd)	<ul style="list-style-type: none"> <li>The GNWT expressed concern that the Project would interact with the Bathurst caribou herd calving grounds (NIRB 2024).</li> <li>The GNWT expressed concern that the increase in shipping traffic through the Coronation Gulf would affect the Dolphin and Union herd migration. The GNWT shared that the increase in traffic and ice breaking could delay and potentially prevent the Dolphin and Union caribou herd to migrate safely (NIRB 2024).</li> </ul>	See above	See above
Wildlife	<ul style="list-style-type: none"> <li>Community members in Yellowknife expressed concern regarding potential effects on moose and moose harvesting (NIRB 2025a).</li> <li>Inuvialuit Game Council (IGC) expressed concern regarding disturbances to wildlife and wildlife habitat through increased traffic (NIRB 2024).</li> <li>Community members in Yellowknife expressed concern regarding potential effects on moose and moose harvesting (NIRB 2025a).</li> <li>Athabasca Denesųliné Né Né Land Corporation expressed concern regarding changes in predator-prey dynamics (NIRB 2024).</li> <li>WRRB expressed concern regarding increased human access causing unsustainable harvest on wildlife species (NIRB 2024).</li> </ul>	<p>WKR acknowledges these observations and concerns and has incorporated these into the assessment.</p> <p>WKR commits to continued engagement on transboundary effects during the advancement of project design, planning, and monitoring throughout the life of the Project.</p>	<p>See Sections 33.4.4, 33.4.5, 33.4.6, 33.4.7, 33.4.8 and 33.5.1 for an assessment of transboundary effects on wildlife and traditional land and marine resource use respectively.</p> <p>See also Volume 6, Sections 17, 18 and Volume 9 Section 24 for an assessment of Project residual effects on birds, wildlife and TLMRU.</p>
Vegetation	<ul style="list-style-type: none"> <li>Athabasca Denesųliné Né Né Land Corporation expressed concern regarding invasive species from the Project (NIRB 2024).</li> </ul>	<p>WKR acknowledges these observations and concerns from the Athabasca Denesųliné Né Né Land Corporation and has incorporated these into the assessment.</p> <p>WKR commits to continued engagement on transboundary effects during the advancement of project design, planning, and monitoring throughout the life of the Project.</p>	See Sections 33.3.1 and Volume 6 Sections 15.3.2, 15.3.3 for an assessment of potential effects of invasive species.

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Topic	Comment	WKR Response	Where Addressed
Terrain Landforms and Soil	<ul style="list-style-type: none"> <li>Athabasca Denesųliné Né Né Land Corporation expressed concern about disturbance to eskers as they may act as travel routes (NIRB 2025b)</li> </ul>	<p>WKR acknowledges these observations and concerns from the Athabasca Denesųliné Né Né Land Corporation and has incorporated these into the assessment.</p> <p>WKR commits to continued engagement on transboundary effects during the advancement of project design, planning, and monitoring throughout the life of the Project.</p>	<p>See Section 33.3.1, and Volume 6 Section 14.3.2, 14.3.4 and for an assessment of potential effects to landforms and terrain stability</p>
Fish and Fish Habitat	<ul style="list-style-type: none"> <li>Community members in Inuvik commented that arctic char go to Kugluktuk for spawning (NIRB 2025a).</li> <li>Community members in Inuvik expressed concern for potential impacts to fish and fish habitat from culverts and dredging (NIRB 2025a).</li> <li>Community members in Inuvik commented that Inuvialuit communities share wildlife species with Kugluktuk and Cambridge Bay (NIRB 2025a).</li> </ul>	<p>WKR acknowledges these observations and concerns and has incorporated these into the assessment.</p> <p>WKR commits to continued engagement on transboundary effects during the advancement of project design, planning, and monitoring throughout the life of the Project.</p>	<p>See Section 33.3.1 for an assessment of transboundary effects on fish and fish habitat</p> <p>See also Volume 7 Section 20 and Volume 8 Section 22 for an assessment of Project residual effects on fish and fish habitat.</p>
Marine Water	<ul style="list-style-type: none"> <li>IGC expressed concern regarding increased ocean noise and pollution from Project activities (NIRB 2024).</li> </ul>	<p>WKR acknowledges these concerns raised by the IGC and has incorporated these into the assessment.</p> <p>WKR commits to continued engagement on transboundary effects during the advancement of project design, planning, and monitoring throughout the life of the Project.</p>	<p>See Section 33.4.9 for an assessment of transboundary effects related to underwater noise.</p> <p>See also Volume 8 Section 21 for an assessment of Project residual effects on marine water quality.</p>
Marine Mammals	<ul style="list-style-type: none"> <li>Community members in Inuvik expressed concern about impacts to beluga whales and other marine mammals (NIRB 2025a).</li> <li>The GNWT expressed concern regarding the effects to marine mammals with the increase in shipping traffic through the Coronation Gulf (NIRB 2024).</li> <li>The GNWT shared that the harvesting of marine mammals is important to Indigenous people for transmission of language and cultural activities (NIRB 2024).</li> </ul>	<p>WKR acknowledges these observations and concerns and has incorporated these into the assessment.</p> <p>WKR commits to continued engagement on transboundary effects during the advancement of project design, planning, and monitoring throughout the life of the Project</p>	<p>See Section 33.4.9 and 33.5.1 for an assessment of transboundary effects related to marine mammals and traditional land and marine resource use respectively.</p> <p>See also Volume 8 Section 23 for an assessment of Project residual effects on marine mammals.</p>

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Topic	Comment	WKR Response	Where Addressed
Noise and Vibration	<ul style="list-style-type: none"> <li>Community members in Inuvik commented that underwater noise can travel (NIRB 2025a).</li> <li>Community members in Yellowknife expressed concern for noise generated by the road (NIRB 2025a).</li> </ul>	<p>WKR acknowledges these observations and concerns and has incorporated these into the assessment.</p> <p>WKR commits to continued engagement on transboundary effects during the advancement of project design, planning, and monitoring throughout the life of the Project</p>	<p>See Section 33.4.9 for an assessment of transboundary effects related to underwater noise</p> <p>See also Volume 6 Sections 16-18 for an assessment of Project residual effects of road noise.</p> <p>See also Volume 8 Section 23 for an assessment of Project residual effects of underwater noise.</p>
Water Resources	<ul style="list-style-type: none"> <li>Community members in Yellowknife expressed concern about the contamination of water resources and potential effects to wildlife (NIRB 2025a).</li> </ul>	<p>WKR acknowledges these observations and concerns and has incorporated these into the assessment.</p> <p>WKR commits to continued engagement on transboundary effects during the advancement of project design, planning, and monitoring throughout the life of the Project</p>	<p>See Section 33.3.1 for an assessment of transboundary effects to water resources and Sections 33.4.3 through 33.4.8 for wildlife.</p> <p>See also Volume 10, Section 34 for an assessment of accidents and malfunctions.</p>
Air Quality	<ul style="list-style-type: none"> <li>Community members in Inuvik and Yellowknife expressed concern for potential contaminants in the area and the migration of airborne dust that may affect fish, caribou, and other species (NIRB 2025a).</li> <li>Athabasca Denesųliné Né Né Land Corporation expressed concern regarding dust from Project activities (NIRB 2024)</li> </ul>	<p>WKR acknowledges these observations and concerns and has incorporated these into the assessment.</p> <p>WKR commits to continued engagement on transboundary effects during the advancement of project design, planning, and monitoring throughout the life of the Project</p>	<p>See Section 33.4.1 for an assessment of transboundary effects to air quality and Sections 33.4.3 through 33.4.8 for wildlife</p>

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Topic	Comment	WKR Response	Where Addressed
Community Health and Well-being	<ul style="list-style-type: none"> <li>Community members in Inuvik expressed concern about the Project’s potential effects to their mental well-being (NIRB 2025a).</li> <li>Community members in Yellowknife expressed concern about potential impacts to community well-being from a change in caribou herds and harvesting opportunities (NIRB 2025a).</li> <li>The Caribou Guardians Coalition expressed concern regarding the Projects effects on human health (NIRB 2024).</li> <li>The GNWT shared that changes to traditional land use may contribute to adverse effects on cultural well-being for Indigenous members in Northwest Territories (NIRB 2024).</li> </ul>	<p>WKR acknowledges these observations and concerns and has incorporated these into the assessment.</p> <p>WKR commits to continued engagement on transboundary effects during the advancement of project design, planning, and monitoring throughout the life of the Project</p>	<p>See Section 33.5.3 for an assessment of transboundary effects to community health and well being.</p> <p>See also Volume 9 Section 26 for an assessment of Project residual effects on community health and well-being</p>
Employment and Economy	<ul style="list-style-type: none"> <li>Community members in Inuvik expressed concern about induced development and potential effects to future business owners (NIRB 2025a).</li> </ul>	<p>WKR acknowledges these concerns expressed by Inuvik community members and has incorporated these into the assessment.</p> <p>WKR commits to continued engagement on transboundary effects during the advancement of project design, planning, and monitoring throughout the life of the Project</p>	<p>See Section 33.5.4 for an assessment of transboundary effects to employment and economy</p> <p>See also Volume 9 Section 27 for an assessment of Project residual effects on employment and economy</p>
Infrastructure and Services	<ul style="list-style-type: none"> <li>Community members in Inuvik commented that the Project would bring a lot of people into the Inuvialuit Settlement Region, which already lacks existing housing and infrastructure to meet current demands. They expressed concern about further pressure on Inuvialuit communities and resources (NIRB 2025a).</li> <li>Athabasca Denesųliné Né Né Land Corporation voiced concerns that the Project would increase access for hunters, tourists, and industry (NIRB 2025b).</li> </ul>	<p>WKR acknowledges these observations and concerns and has incorporated these into the assessment.</p> <p>WKR commits to continued engagement on transboundary effects during the advancement of project design, planning, and monitoring throughout the life of the Project</p>	<p>See Section 33.5.5 for an assessment of transboundary effects to infrastructure and services</p> <p>See also Volume 9 Section 28 for an assessment of Project residual effects on infrastructure and services</p>
Food Security and Sovereignty	<ul style="list-style-type: none"> <li>Community members in Yellowknife expressed concern for a change in the availability of caribou meat (NIRB 2025a).</li> </ul>	<p>WKR acknowledges this concern raised by community members and has incorporated this into the assessment.</p> <p>WKR commits to continued engagement on transboundary effects during the advancement of project design, planning, and monitoring throughout the life of the Project</p>	<p>See Section 33.5.2 for an assessment of transboundary effects to food security</p> <p>See also Volume 9 Section 25 for an assessment of Project residual effects on food security</p>

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Topic	Comment	WKR Response	Where Addressed
Climate Change	<ul style="list-style-type: none"> <li>Community members in Yellowknife commented that climate changes has affected the thickness of the ice, which is becoming thinner (NIRB 2025a).</li> <li>Athabasca Denesųliné Né Né Land Corporation expressed concern regarding the effects to caribou from climate change (NIRB 2024).</li> </ul>	<p>WKR acknowledges these observations and concerns and has incorporated these into the assessment.</p> <p>WKR commits to continued engagement on transboundary effects during the advancement of project design, planning, and monitoring throughout the life of the Project</p>	See Volume 5 Section 12 for an assessment of the potential effects of climate change.
Cumulative Effects	<ul style="list-style-type: none"> <li>Community members in Inuvik and Yellowknife expressed concerns for cumulative effects from induced development and reasonably foreseeable projects, including cumulative effects from shipping and climate change (NIRB 2025a).</li> </ul>	<p>WKR acknowledges these observations and concerns and has incorporated these into the assessment.</p> <p>WKR commits to continued engagement on transboundary effects during the advancement of project design, planning, and monitoring throughout the life of the Project</p>	See Volumes 5-9, Sections 11-30 for an assessment of cumulative effects and Volume 10, Section 32 for an overview of the cumulative effects assessment.
TLMRU	<ul style="list-style-type: none"> <li>Community members in Inuvik expressed concern that the marine hunting rights of Gwich'in communities would be affected by increased shipping along the coast (NIRB 2025a).</li> <li>Community members in Inuvik commented that Indigenous rights should be protected and respected (NIRB 2025a).</li> <li>Community members in Yellowknife commented that harvesting caribou is an important part of continuing their cultural traditions and identity, and recovering from the trauma of the residential school system (NIRB 2025a).</li> <li>Community members in Yellowknife identified that there was a burial site in the Jericho area (NIRB 2025a).</li> <li>Community members in Yellowknife commented that it is a tradition to make caribou hide slippers when someone is sick and passes. The tradition is still practices today. Caribou hides have also been used to make rope, strings, bags for food, coats, moccasins, and bunting bags for babies (NIRB 2025a).</li> <li>Community members in Yellowknife commented that they harvest in the Project area, especially around Contwoyto Lake (NIRB 2025a).</li> </ul>	<p>WKR acknowledges these observations and concerns and has incorporated these into the assessment.</p> <p>WKR commits to continued engagement on transboundary effects during the advancement of project design, planning, and monitoring throughout the life of the Project</p>	See Section 33.5.1 for an assessment of transboundary effects to traditional land and marine resource use See also Volume 9 Section 24 for an assessment of Project residual effects on TLMRU

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Volume 10: Additional Assessments and Conclusions**

Section 33: Transboundary Effects Assessment  
March 2026

Topic	Comment	WKR Response	Where Addressed
TLMRU (cont'd)	<ul style="list-style-type: none"> <li>• Athabasca Denesųliné Né Né Land Corporation expressed concerns regarding the continued use and practice of Indigenous Knowledge and TLMRU activities, including section 35 rights (NIRB 2025b)</li> <li>• Athabasca Denesųliné Né Né Land Corporation commented about the impacts of development, residential schools, and language and culture loss on intergenerational knowledge transfer (NIRB 2025b).</li> <li>• Athabasca Denesųliné Né Né Land Corporation expressed concerns about reduced Indigenous Knowledge about caribou due to declining caribou populations (NIRB 2025b).</li> <li>• Athabasca Denesųliné Né Né Land Corporation commented about effects to intergenerational knowledge transfer from the impacts of development, residential schools, and language and cultural loss (NIRB 2025b).</li> <li>• Athabasca Denesųliné Né Né Land Corporation commented that the Project would largely benefit industry, while communities would bear the environmental and cultural costs (NIRB 2025b).</li> <li>• Athabasca Denesųliné Né Né Land Corporation and the Tłıchų Government recommended the involvement of Indigenous groups in Project-related decisions and engagement (NIRB 2025b).</li> <li>• Athabasca Denesųliné Né Né Land Corporation expressed concern about disturbance to eskers as they may contain burials (NIRB 2025b).</li> <li>• Athabasca Denesųliné Né Né Land Corporation recommended frequent meetings and direct engagement with Athabasca Denesųliné leadership and communities and stressed the need for transparency, respect, and long-term planning for future generations (NIRB 2025b).</li> </ul>	See above	See above

## 33.3 Approach to Assessing Transboundary Effects

### 33.3.1 Identification of Valued Components Subject to Transboundary Effects

While Project infrastructure is located entirely within the Kitikmeot Region of the Nunavut Settlement Area (NSA), the Project does have the potential to result in transboundary effects related to the following:

1. **Physical activities associated with the Project that cross the NSA boundary.** Marine vessels accessing the Port during construction will transit either from the east (Quebec ports) or the west (via the Ports of Inuvik or Tuktoyaktuk in the Inuvialuit Settlement Region (ISR)). If Ports in the ISR are used, then trucks will pass through the ISR to supply the barges at the Ports. Additionally, some construction personnel and resupply will be via the Tibbitt to Contwoyto Winter Road (TCWR) during the winter months, which accesses the Northwest Territories (NT). During Operations and Maintenance marine vessels may transit to the Port from the west crossing the ISR or from the east (Quebec). During Operations and Maintenance vehicle traffic may cross back and forth from the NT during the winter using the TCWR.
2. **Migratory and wide-ranging wildlife species.** The Project is in an area known to be used by migratory species (e.g., caribou, marine mammals, and birds) and species with large home ranges (e.g., bears). Individual species may be exposed to the Project and then leave the NSA and/or vice-versa.
3. **Socioeconomic factors.** The Project will provide employment opportunities and require materials, equipment and services. These goods and services will be obtained from both within Nunavut and from other territories and provinces.

Based on the anticipated Project residual effects on VCs (as presented in Sections 11-30) and the Project factors detailed above, the following VCs have the potential to experience transboundary effects:

- Biophysical VCs – Caribou, Birds, Other Terrestrial Wildlife, and Marine Mammals.
- Human VCs – TLMRU, Food Security, Community Health and Wellbeing, Employment and Economy, and Infrastructure and Services.

An assessment of the transboundary effects for these VCs is provided in Sections 33.4 and 33.5. The assessment is focused on the potential for Project related transboundary effects. However, to address concerns raised during engagement related to potential effects of future induced projects, a discussion of the potential for transboundary effects from Reasonably Foreseeable Induced (RFI) projects has been included as appropriate.

The remaining VCs (air, noise and vibration, terrain soils and permafrost, vegetation, water resources, freshwater fish and fish habitat, marine water quality and sediment, marine fish and fish habitat, non-TLMRU and Heritage) are considered not to have the potential for transboundary effects. A justification for this conclusion for each VC is provided below.

### ***Terrain Soils and Landforms***

The Project is not expected to have any effects on terrain, soils, or landforms beyond the geographic extent of the LAA (Section 14). The LAA for terrain, soils, and landforms is a 1 km buffer around the PDA and, as such, is entirely within the NSA. Consequently, no effects are predicted outside the NSA and as such, no transboundary effects.

### ***Vegetation***

Project residual effects on vegetation are expected to remain within the RAA (Section 15). The RAA for vegetation is a 30 km buffer around the PDA and, as such, is entirely within the NSA. Consequently, no effects are predicted outside the NSA and as such, no transboundary effects.

### ***Water Resources***

Project residual effects on water resources are predicted to be limited to the LAA (Section 19). The LAA, located within the NSA, is defined by a 100m buffer around the PDA and an extension to the northwest side of the Kennarctic River, west of the Aerodrome. All five main watersheds within the LAA drain into the Arctic Ocean. Consequently, no effects are predicted outside the NSA and as such, no transboundary effects.

### ***Freshwater Fish and Fish Habitat***

Project residual effects on freshwater fish and fish habitat are limited to the LAA (Section 20). The LAA, which is located within the NSA, is defined by a 100m buffer around the PDA plus an extension to the northwest side of the Kennarctic River west of the Aerodrome. Consequently, no effects are predicted outside the NSA and as such, no transboundary effects.

### ***Marine Water Quality and Sediment***

The assessment concluded that Project residual effects on marine water and sediment quality are expected to remain localized within the RAA (Section 21). The RAA for marine water and sediment quality is defined as a 20 km buffer around the Port PDA. This is located within the NSA, and therefore, no transboundary effects on marine water quality and sediment are predicted.

### ***Marine Fish and Fish Habitat***

The assessment of effects on marine fish and fish habitat concluded that there are no population-level residual effects likely to result from project activities, and that any residual effects will be confined to the RAA (Section 22). The RAA for marine fish and fish habitat is defined as a 20 km buffer around the Port PDA. This is located within the NSA, and therefore, no transboundary effects on marine fish and fish habitat are predicted.

### *Non-TLMRU*

Project residual effects on non-traditional land, marine, and resource use are predicted to be limited to within the RAA (Section 29). The RAA for non-TLMRU corresponds to the western portion of the Kitikmeot Region and is entirely within the NSA. Consequently, no transboundary effects are predicted. Potential changes in wildlife distribution or animal travel patterns that may be of interest to outfitters or hunters are addressed in the appropriate wildlife VC sections (Sections 16-18).

### *Heritage*

The residual effects on heritage resources are limited to the PDA (Section 30). The PDA has been delineated to encompass the physical footprint of all Project components, including both permanent and temporary disturbances (e.g., the extent of Project infrastructure and planned clearing and laydown areas). The PDA is located entirely within the NSA. Therefore, no transboundary effects on heritage resources are predicted.

## **33.3.2 Assessment of Transboundary Effects**

As per the NIRB Impact Statement Guidelines (NIRB 2026), the transboundary assessment discusses the pathways, affected VCs, mitigation, and residual effects, and provides cross-references to the relevant sections of the Impact Statement where more information can be found.

## **33.4 Biophysical VCs**

### **33.4.1 Air Quality**

The Project residual effect identified for air quality is expected to remain within the air quality Local Assessment Area (LAA) (Section 11). The LAA for air quality is a 5 km buffer around the Project Development Area (PDA) and, as such, is located entirely within the NSA.

The Project will require ground traffic (i.e., trucks) to transport supplies across the Nunavut/NT border, which will generate air emissions. During Construction, approximately 1000 truckloads/year will utilize the TCWR, reducing to 30 truckloads/year during Operations and Maintenance. If materials are shipped by barge from Inuvik or Tuktoyaktuk during Construction, then it is estimated that approximately 135 trucks/year will travel through the ISR from the Yukon border.

Given current traffic volumes on the TCWR and the ISR highways, the addition of project-related vehicles is limited and transboundary effects from Project vehicles are considered negligible.

Vehicles associated with Reasonably Foreseeable Induced (RFI) activities may have the potential for transboundary effects. However, the purpose of the Project is to provide infrastructure to allow future RFI projects to develop. These RFI projects would use the Project Road and Port to transport supplies and product during operations and therefore there would be minimal, if any, traffic crossing the border to NT or using other jurisdictions. Early construction activities for the Izok Corridor Project may require some traffic on the TWCR, but when the Project is operational, Izok Corridor Project supplies and trucks would utilize the Project Road and Port and have minimal traffic on the TWCR.

WKR will implement mitigation and management measures identified in Section 11.3.2.3 to reduce the potential for adverse residual transboundary effects.

### **33.4.2 Noise and Vibration**

The Project residual effects identified for noise and vibration are expected to remain within the Regional Assessment Area (RAA) defined for this VC. The RAA for noise and vibration is a 3 km buffer around the PDA and, as such, is located entirely within the NSA.

As noted in Section 33.4.1, the Project will result in ground traffic (i.e., trucks) transporting supplies across the Nunavut/NT border and potentially within the ISR. Noise and vibration will be associated with these trucks. The potential effects of noise and vibration on wildlife from Project traffic have been assessed in the wildlife VC sections (Sections 16-18). Project traffic travelling outside Nunavut would present the same potential for sensory disturbance. Given current traffic volumes on the TCWR and the ISR highways, the addition of project-related vehicles is limited and transboundary effects from Project vehicles are considered negligible. As noted in Section 33.4.1, RFI activities would be anticipated to add minimal, if any, transboundary traffic and therefore transboundary sensory disturbance are also considered negligible.

Noise created by marine shipping is assessed in Section 33.4.9 and under the Marine Mammal VC assessment (Volume 8, Section 23).

WKR will implement mitigation and management measures identified in Sections 13.3.2.3 and 13.3.3.3 to reduce the potential for adverse residual transboundary effects.

### **33.4.3 Caribou**

Cumulative exposure to human disturbances in Nunavut (NU) (i.e., baseline, Project, and RFI physical activities) and NT (e.g., mines, roads, settlements) affects individuals in ways that extend beyond each territorial border. Effects experienced by caribou in NT may persist while caribou reside in NU, and vice versa. However, this continuity depends on the type of effect. Some effect pathways are likely to be persistent (and thus transboundary), while others are likely to be transient.

Community members in Inuvik noted that caribou can sometimes tolerate infrastructure, but at other times they do not (NIRB 2025a). Community members in Yellowknife reported that the Bluenose and Bathurst caribou herds used to migrate to the Yellowknife area. However, mining development and forest fires have redirected their migration to other areas. Caribou are now seen as skinny, whereas they used to be fat (NIRB 2025a). BQCMB expressed concern about habitat fragmentation from industrial development and the cumulative effects on caribou (NIRB 2024).

Mainland caribou, such as the BCH, cross the territorial boundary between NU and NT throughout their annual lifecycle. This broad geographic extent of use exposes caribou to human disturbances across seasons, which vary in their effects on an individual's sensitivity to sensory disturbance, forage availability and access, and mortality risk. In contrast, while island caribou, such as the DUH, cross territorial boundaries on Victoria Island, the herd is exposed to human disturbances only when occupying mainland NU. DUH exposure to human development on mainland NU is unlikely to cause effects that carry over to

NT (Victoria Island). The difference in transboundary effects between the BCH and DUH is a consequence of exposure timing. Changes to body condition depend on summer and early-fall foraging. The DUH complete summer and early-fall foraging on Victoria Island before arriving on the mainland NU. But the BCH interacts with human development during critical life stages (e.g., calving/post-calving) and key foraging windows (i.e., summer and early fall), which can hypothetically influence body condition.

Therefore, the assessment of transboundary effects focuses primarily on the BCH's interactions with human disturbances in NU and NT.

Community members in Yellowknife expressed concern about potential effects on the Bathurst and Bluenose caribou herds, including changes to herd size, calving grounds, and migration routes. They noted that measures were needed to protect the herds and conserve cultural practices for harvesting caribou (NIRB 2025a).

Transboundary effects are those that are likely to directly influence herd dynamics. Although the potential Project-related effects assessed for caribou (i.e., range disturbance, habitat, movement, and mortality risk) may have population-level consequences, the associations are either ambiguous or regionally constrained. By contrast, changes in body condition, reproduction, and survival can directly affect herd dynamics across space and time. Consequently, the assessment of transboundary effects relies on the Caribou Herd Vulnerability Model (CHVM) framework, which examines changes in body condition and subsequent herd dynamics based on assumptions about caribou space use, energy-protein allocation, and vital rates (see Appendix 16B). The CHVM simulates herd dynamics under different hypothetical scenarios of climate, human development, and mitigation. The CHVM is useful for evaluating *relative* potential changes in herd dynamics, including rates of decline, across different hypothetical scenarios. However, it is not a tool for accurate or precise predictions of herd dynamics due to substantial uncertainty in the outcomes (see Section 16.6.3.3 for a discussion of prediction confidence and uncertainty relating to the CHVM). As such, transboundary effects inform the Project assessment and mitigation but do not contribute to determinations of significance.

Results from the CHVM model scenarios show that climate change is projected to have a stronger influence on BCH population levels than the human-development scenarios. While human development also has the potential to produce measurable impacts on caribou energetics and population dynamics—particularly for the BCH—its effects are expected to be less than those driven by climate change. The model assessed future development scenarios with and without the implementation of mitigation measures (traffic control and hunting controls). Existing mitigation measures used at other Arctic developments sites i.e., temporary road closures and convoy strategies, and varying levels of hunting pressure were assessed. Results indicate that the consistent application of mitigation targeting traffic and hunting pressure measurably reduces the potential effects on caribou populations.

Detailed mitigation measures that the Project will be implement are provided in Sections 16.4.2.3, 16.4.3.3 and 16.4.4.3. Those specifically related to traffic and noise control are listed below.

- A caribou Trigger Action Response Plan (TARP) to manage road Construction and Operations and Maintenance activities. As part of the TARP framework, Mobile Caribou Conservation Measures (MCCMs) will inform adaptive road closures from the start of Bathurst caribou spring migration through to the end of post-calving, whereby lead caribou (cows or cows with calves) observed near the road and caribou collar movements on a trajectory to cross the road will result in suspension of vehicle traffic. Road closures will be removed once road monitoring, supported by collar data, indicates that cow and calf caribou have moved out of the road area. Additional traffic management measures include speed limits and providing wildlife the right-of-way.
- Road construction activities will be temporarily suspended when groups of caribou ( $\geq 25$  individuals) are identified within line of sight of the active work area (i.e., the front of the new road being built). Road construction can recommence when a wildlife monitor reports that the caribou have either habituated (i.e., tolerating the disturbance) or left the area and are  $> 100$  m from the construction zone.
- Wildlife will have the right-of-way when they occur on or immediately adjacent to the roadway. All vehicles and equipment must slow down to 30 kilometres per hour (km/h) when wildlife occur within line of sight of the driver, and must stop for 20 minutes when wildlife are within 100 m of the road and show intent to cross; vehicles may proceed after 20 minutes or wildlife no longer show intent to cross. When animals are on the road, drivers must stop and wait for them to leave the area. If wildlife do not leave the road after 20 minutes since stopping, vehicles are to move forward no faster than a walking pace until the individuals leave the road, and may resume the posted speed limit once the vehicle has driven past the animals.
- Speed limits shall be posted along the completed portions of the road during Construction, and Operations and Maintenance. Traffic speed will be limited to 60 km/h on Project Road surfaces, which may be decreased in certain areas, depending on terrain conditions and geometric constraints, and in areas and times of high potential for caribou or other wildlife occurrence (i.e., identified wildlife road-crossing locations). In instances where terrain conditions and geometric constraints allow, and in areas of low potential for caribou or other wildlife occurrence, speeds may be increased to 80 km/h.
- Dust will be actively suppressed from roads (with water and/or other dust suppressants) when necessary to prevent excessive dust from affecting the surrounding environment. Dust suppression will follow *Environmental Guideline for Dust Suppression on Unpaved Roads* (GN 2014).
- Reduced speed limits may be temporarily posted during drier conditions to reduce fugitive dust.
- Blasting at quarries will be suspended if wildlife are identified within 0.5 km of the blast site, or if a group of caribou (i.e.,  $\geq 25$  individuals) are identified within the line of sight (i.e.,  $> 500$  m) from the blast area. Blasting may continue once all wildlife move outside of the 0.5 km exclusion zone, and no caribou groups (i.e.,  $\geq 25$  individuals) occur within the line of sight from the blast area.
- Construction and quarry development activities will adhere to the recommended setbacks and timing restrictions outlined in the *Wildlife Mitigation and Monitoring Plan* (WMMP).

- All-terrain vehicle (ATV), utility task vehicle, and snow machine use will be limited to within the PDA boundaries during construction. Any deviation of use outside of the PDA must be pre-approved by the WKR representative on site.
- All aircraft will do an initial fly-by of the airstrip to confirm no wildlife located on or in proximity to it before landing. If wildlife are observed within 100 m, pilots will notify ground personnel and aversion techniques will be implemented to discourage wildlife so aircraft can land safely.
- Aircraft will maintain a minimum cruising altitude of 610 m above ground level except during landing and take-off at the airstrip, or for safety reasons due to inclement weather, or when operationally required.
- Drivers must call out on the radio for wildlife observed on or immediately adjacent to the road (i.e., the nearest kilometre marker).
- Wildlife signs will be displayed along the road in areas where wildlife are commonly observed to inform drivers.
- Snowbanks will be maintained so they are not an obstruction to movement for caribou and other wildlife. Creation of snowbanks will generally be avoided (for operational reasons to avoid snow drifts on the road on the lee side of the bank), except where not feasible; the height of snowbanks will be maintained at less than 1 m and snow plowing will be conducted in such a way as to limit the angle and vertical height of the snowbank edge.
- Speed limits shall be posted along the completed portions of the road during Construction, and Operations and Maintenance. Traffic speed will be limited to 60 km/h on Project Road surfaces, which may be decreased in certain areas, depending on terrain conditions and geometric constraints, and in areas and times of high potential for caribou or other wildlife occurrence (i.e., identified wildlife road-crossing locations). In instances where terrain conditions and geometric constraints allow, and in areas of low potential for caribou or other wildlife occurrence, speeds may be increased to 80 km/h.

The transboundary nature of effects on BCH dynamics requires effective co-management among the jurisdictions within the BCH annual range. The co-management system in place for the BCH brings together various Inuit, Indigenous, and government representatives. The Bathurst Caribou Range Plan, developed by the Bathurst Caribou Advisory Committee to support the co-management system, provides a (non-binding) framework to identify key management objectives, thresholds, and best management practices for the BCH's conservation and recovery. Expanded regional-level mitigation, management, and enhancement measures (see Section 16.8.4) and monitoring programs (see Section 16.9) will be important to better understand the factors affecting the BCH and, where possible, to mitigate those effects.

A more detailed assessment of the Project's potential transboundary effects on caribou is presented in Volume 6, Section 16.6. Given the complexity of the assessment and its interconnections with the assessment of residual and cumulative effects (Sections 16.4 and 16.5), it was considered that presenting the full assessment separately in this Volume would disrupt the flow of information and compromise understanding.

### 33.4.4 Birds

Most birds occurring within the RAA are migratory, arriving during spring migration between May and early June and then commencing fall migration southward in August and September. Most birds spend the winter in warmer climates in the United States, around the Gulf of Mexico, and in Central America (e.g., most waterbirds and passerines), with some species wintering in South America (e.g., American golden-plover, pectoral sandpiper [*Calidris melanotos*]) or even offshore in the Pacific Ocean (e.g., red-necked phalarope). Migratory birds will travel across many boundaries to complete their life cycle.

Exposure to human disturbance, i.e., habitat loss or change, can disrupt bird behaviour, communication, and overall reproductive success. Migratory birds may carry these effects across boundaries throughout their life cycle.

Given the low bird density and the lack of identified communal breeding areas for migratory birds during baseline studies within the RAA, Project residual effects experienced by birds (i.e., changes in habitat or mortality risk) are predicted to be low in magnitude, defined as “a detectable change from baseline conditions but within the range of natural variation and/or accepted standards”. Overall, the Project’s residual effects, combined with the RFI activities residual effects, will not substantially influence the amount or quality of bird habitat within the RAA. As such, transboundary effects from the Project are unlikely to be evident to migratory birds as they travel in and out of Nunavut.

WKR will implement mitigation and management measures identified in Sections 17.4.1.3, 17.4.2.3, 17.5.2.1 and 17.5.3.2 to reduce the potential for adverse residual transboundary effects.

### 33.4.5 Muskox

Given the Project’s design and its location entirely within NU, direct transboundary effects on muskox habitat, movement, and mortality risk in NT are unlikely. However, Inuit Knowledge indicates that muskox distribution can shift over time (Inuit Advisory Group 2025a). Muskox mean home-range size varies considerably by season, with a study in the Sahtu Region of NT reporting a mean home range of 112.8 km<sup>2</sup> in winter and 566 km<sup>2</sup> in summer (B. Tacz, unpublished data in Gunn et al. 2024). While daily movements tend to be relatively short (1.1 to 2.6 km/day; Douglas et al. 2002), seasonal movements of up to 85 km have been recorded (Gunn and Fournier 2000). Based on the size of muskox home ranges and because muskox will occasionally disperse long distances (Reynolds 1998), some individuals in the south-central portion of the RAA (e.g., near Contwoyto Lake) may naturally range across the NU/NT border.

The Project and RFI activities may cumulatively affect muskox movement in the RAA, primarily through sensory disturbance from roads, leading to avoidance of project activities and infrastructure. Because roads will not create impermeable filters and, any new topographical variance introduced by the road will likely be within the range of natural variation on the landscape, the cumulative effect will be low magnitude. In the context of minor shifts in the distribution and abundance of muskox along the NU/NT border, Project and RFI activities effects on muskox habitat, movement, and mortality risk could extend

into NT. However, given natural changes in muskox distribution over time, any potential transboundary effects are expected to be negligible.

If existing territorial wildlife monitoring programs detect a meaningful shift in muskox distribution away from the Project and into NT, those occurrences will be tracked through existing wildlife management processes with NT management partners.

WKR will implement mitigation and management measures identified in Sections 18.4.1.3, 18.4.2.3 and 18.4.3.3 to reduce the potential for adverse residual transboundary effects.

### **33.4.6 Moose**

Given the Project's design and its location entirely within NU, transboundary effects on moose are expected to be minimal. During engagement with community members in Yellowknife, concerns were raised about potential effects on moose and moose harvesting (NIRB 2025a). Moose have wide dispersal distances and home ranges. Dispersal rates have ranged from 2 to 24 km per year (Rolley and Keith 1980; Hundertmark 1998). Seasonal movements for non-migratory moose in Alaska ranged from 2 to 29 km, and for migratory moose from 1 to 57 km (Joly et al. 2015). Average home ranges of moose can vary from 10 to 125 km<sup>2</sup> (Stenhouse et al. 1995; BC Ministry of Environment, Lands and Parks 2000; Hammerson and Cannings 2004; Oehlers et al. 2011).

In this context, potential transboundary effects would be limited to localized influences on habitat use, movement, or mortality risk for moose whose home or seasonal ranges overlap the NU/NT boundary (potentially individuals near the southern limits of the Project). To adapt to changes in movement, moose are known to be tolerant and adaptable to human activity. While some individuals may initially change their movements due to the Project and the RFI activities, moose are predicted to habituate to human activity and continue to move through the landscape adjacent to these developments. The magnitude of the Project and RFIs to influence moose movement is predicted to be low.

A small number of moose that interact with the Project and RFI activities may cross territorial boundaries, thereby bringing residual effects from the Project into another jurisdiction. The overall influence of these transboundary effects is expected to be small relative to baseline conditions, and the residual effects are unlikely to be measurable in either the NT or NU moose populations.

WKR will implement mitigation and management measures identified in Sections 18.8.1.3, 18.8.2.3 and 18.8.3.3 to reduce the potential for adverse residual transboundary effects.

### **33.4.7 Grizzly Bear**

Given the Project's design and its location entirely within NU, transboundary effects on grizzly bears are expected to be minimal. However, because barren-ground grizzly bears in the central Arctic have extensive home ranges (McLoughlin et al. 2002a; COSEWIC 2012), some individuals using the southern portion of the RAA, where the Project road terminates, could range into the NT. For example, a male grizzly bear first detected in the 2012 Ekati Project was subsequently detected 60 km north in a 2022 DNA hair-snagging study (Awan et al. 2025). Home ranges for Arctic grizzly bears average 7,245 km<sup>2</sup> for males and 2,100 km<sup>2</sup> for females (McLoughlin et al. 2003). Movement studies from the

Arctic and sub-Arctic further show that daily movements can span several kilometres and that individuals may occasionally undertake long directional forays, suggesting likely cross-boundary use near the Project road terminus and along the RFI road alignments (Reynolds 1980; Gau et al. 2004; Northrup et al. 2012). Denning studies in the same region indicate that females exhibit strong site fidelity to denning slopes within their home ranges (McLoughlin et al. 2002b), limiting the likelihood of regular cross-boundary denning. Effects on grizzly bear movement, primarily due to sensory disturbance from RFI activities, are expected to be a low-magnitude.

In this context, the Project and RFI activities potential transboundary effects would be limited to minor, localized influences on habitat use, movement, or mortality risk for bears whose ranges straddle the NU/NT boundary, or for individuals that undertake occasional longer-distance forays or dispersal. Therefore, any transboundary effects of the Project on grizzly bears are expected to be small relative to baseline conditions and unlikely to measurably affect NT populations.

WKR will implement mitigation and management measures identified in Sections 18.12.1.3, 18.12.2.3 and 18.12.3.3 to reduce the potential for adverse residual transboundary effects.

### **33.4.8 Wolverine**

Given that the Project is entirely within NU, transboundary effects on wolverines are likely to be minimal. However, wolverines have relatively large home ranges and are known to disperse over long distances; therefore, the Project could influence wolverines to the south in NT. Such transboundary effects are most likely to occur along the southern portion of the project road, which ends near the NU/NT border. Given the size of male wolverine home ranges (1,000 km<sup>2</sup> to 1,400 km<sup>2</sup>), it is likely that some animals' ranges could overlap the Project and cross the territorial border (Krebs and Lewis 1999; Lofroth 2001). Wolverines are known to make daily movements of up to 65 km, and young wolverines have been recorded dispersing over distances greater than 300 km (Wilson 1982; Ruggiero et al. 1994; Lofroth et al. 2007). Wolverine movement often occurs in search of food resources, and if food resources become increasingly scarce within the RAA, such long-distance dispersal might become more likely (Krebs et al. 2007; Glass et al. 2022). Therefore, there is a possibility of wolverine cross-boundary use near the road terminus.

In this context, potential transboundary effects of the Project and RFI projects or activities would be limited to minor, localized influences on habitat use, movement, or mortality risk for wolverines whose ranges straddle the NU/NT boundary, or for individuals that undertake occasional longer-distance forays or dispersal. As such, any transboundary effects are anticipated to be small relative to baseline conditions and unlikely to measurably affect NT populations.

WKR will implement mitigation and management measures identified in Sections 18.16.1.3, 18.16.2.3 and 18.16.3.3 to reduce the potential for adverse residual transboundary effects.

### 33.4.9 Marine Mammals

As previously noted, Project infrastructure does not extend across territorial or international boundaries. However, marine traffic is a component of the Project, including both known Project vessels and vessels associated with RFI projects, i.e., mining developments, and the Project expansion. Vessels are anticipated to include concentrate ships, cargo ships, barges, fuel tankers, and other vessel traffic which may access the Port from different jurisdictions. Marine vessels from RFI projects would cross other jurisdictions to transit to and from the Port (the exact routes are unknown), and therefore could interact with marine mammals, which often migrate, forage, and breed beyond Canada's boundaries and into other jurisdictions. Many marine mammal species are transboundary in the Canadian Arctic, especially cetacean species (e.g., bowhead, narwhal, and beluga), which often move substantial distances throughout the Arctic during their life cycles and therefore are transboundary in nature. As such, there is a potential for transboundary effects on marine mammals as a result of marine shipping.

Transboundary effects do not include changes to marine habitat. Loss or alteration of marine habitat as a result of the Project and RFI activities is limited to the LAA and, as such, does not have the potential to result in transboundary effects. Potential effects to marine mammals that are likely to be transboundary relate to sensory disturbance and mortality/injury risk due to marine shipping.

During a public comment period for the NIRB, the Inuvialuit Game Council expressed concern for increased marine traffic and potential disturbances to marine mammals outside of the RAA, specifically in the Inuvialuit Settlement Region (ISR), from the residual cumulative effects of underwater noise (NIRB 2024 and NIRB 2025a). GNWT also expressed concern regarding the effects to marine mammals with the increase in shipping traffic through the Coronation Gulf (NIRB 2024). Community members in Inuvik expressed concern about impacts to beluga whales and other marine mammals and expressed concern that the marine hunting rights of Gwich'in communities would be affected by increased shipping along the coast (NIRB 2025a).

Materials and equipment for Construction Operations and Maintenance are planned to come from Quebec ports via sealift. This will be the primary marine transportation route for Project vessels to access Grays Bay Port. Barging from Hay River, Inuvik, or Tuktoyaktuk to Grays Bay could be utilized as an alternative option to supply certain equipment or materials that are more readily available in western Canada, or to reach Grays Bay in advance of the first sealift from Quebec.

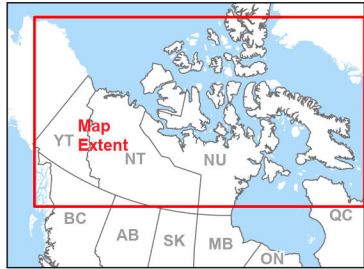
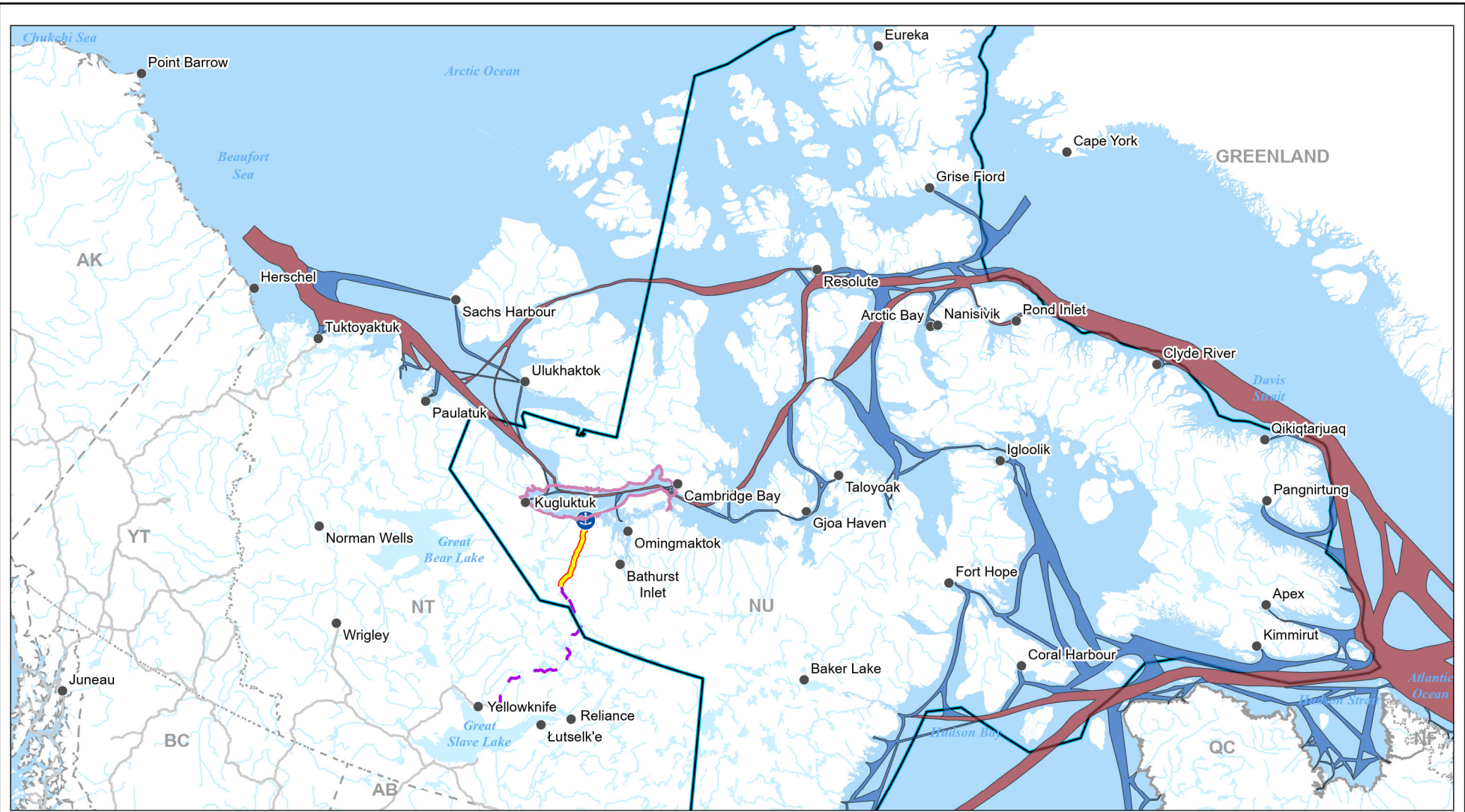
RFI vessel activity from the Operations case is anticipated to be an additional 40 transits annually in each direction (i.e., to and from the port) at its peak in 2040, see Section 23.4.3.3. This volume of traffic will not occur immediately once the Port is open, but would be expected to build up slowly as RFI projects become operational over the period of 2035-2055. It is estimated that 30 of these vessel transits will be from concentrate ships. The exact origin/destination of these concentrate ships is unknown; therefore, it has been conservatively assumed that half (15) will access the Coronation Gulf from the east, with the other half (15) originating from the west, between 2035 and 2055 (see Section 23, Table 23.16). Figure 33.1 illustrates known shipping routes throughout the NSA and neighbouring jurisdictions (CCG 2014). The shipping routes illustrated in Figure 33.1 were compiled by the Northern Marine Transportation Corridors (NMTC) initiative, an interdepartmental government initiative within the Department of Fisheries and Oceans (DFO), Canadian Coast Guard (CCG) and the

Canadian Hydrographic Service (CHS). The vessel routes data was categorized into Primary and Secondary routes. The primary routes represent “*The main traffic highways in the Arctic, which provide a means to enable secondary access to ports*”. The secondary routes represent “*Corridors characterized by medium-low density traffic levels, which can provide access to navigational ports to fulfill supply links and the movement of passengers.*” Although the exact routes of future vessels associated with the Project is unknown, third-party bulk ore carriers will take the most directly available route to the Port, based on weather (ice) conditions. Smaller vessels may take less direct routes, particularly when engaged in community resupply.

Project residual and cumulative effects related to sensory disturbance and mortality/injury risk within the RAA are presented in Sections 23.4.3 and 23.4.4, respectively. Based on the strong understanding of potential effects pathways, the anticipated effectiveness of mitigation measures, and the assessment of cumulative effects, any change in behaviour caused by sensory disturbance is anticipated to be transitory, relatively brief in duration, and characterized as not significant (Section 23.5.2.2). Any transboundary disturbance to marine mammals from underwater noise associated with vessel activity outside the RAA would be transitory and only occur within the open water season. Given the estimated source levels and infrequency of traffic, the disturbance is anticipated to be minor and relatively brief in duration, even with the variance in marine mammal species densities and distribution outside of the RAA.

The probability of collisions between vessels and marine mammals is very low, but on infrequent occasions, whales and vessels do collide, resulting in injury or death to the marine mammal (Laist et al. 2001; Moore and Clarke 2002). The cumulative effects assessment (Sections 23.4.4 and 23.5.2.3) concluded that, given the low marine mammal densities in the RAA and the implementation of mitigation measures, the potential for vessel strikes is low, and changes in mortality and/or injury risk due to vessel strikes are characterized as not significant. The probability of vessel strikes associated with transboundary vessel traffic outside the RAA would still be considered low, even in higher-use marine mammal areas, primarily attributable to the comparatively small amount of vessel traffic.

WKR will implement mitigation and management measures identified in Section 23.5.3 to reduce the potential for adverse residual transboundary effects.



**Shipping Corridor**

- Primary
- Secondary
- Grays Bay Port
- Grays Bay Road
- Marine Mammal Regional Assessment Area (RAA)
- Nunavut Settlement Area

- Community
- Major Road
- Tibbitt to Contwoyto Winter Road
- Watercourse
- Ocean
- Waterbody

0 100 200 Kilometres

(At original document size of 8.5x11) 1:16,000,000



Project Location: West Kitikmeot Region, Nunavut  
Prepared by SL on 2026-01-16, TR by CE on 2026-01-16

Client/Project: 123514868\_182

West Kitikmeot Resources Corp  
Grays Bay Road and Port

Figure No.

**33.1**

Title

**Recorded Shipping Routes**

**Notes**  
 1. Coordinate System: Canada Lambert Conformal Conic.  
 2. Data Sources: Governments of Nunavut and Canada, Canadian Coast Guard, "Northern Marine Transportation Corridors Initiative," Company of Master Mariners of Canada, April 29, 2014, © 2016 The Pew Charitable Trusts

## 33.5 Human VCs

### 33.5.1 Traditional Land, Marine, and Resource Use

As outlined in the NIRB guidelines for the IS, transboundary effects refer to Project-related effects in the Traditional Land, Marine, and Resource Use (TLMRU) RAA that may result in impacts beyond territorial or provincial borders. This includes potential adverse residual effects on the exercise of rights of Indigenous groups or changes to harvesting or other TLMRU outside of the TLMRU LAA and RAA (NIRB 2025a). For example, potential adverse residual effects on migrating species (e.g., caribou, marine mammals, and birds) may result in changes to the quality, quantity, or distribution of traditional resources outside of the territory of NU, thus signalling a change to TLMRU.

Because the BCH range extends beyond the NU border into the NT, and cumulative exposure to human disturbances in NU (i.e., baseline, Project, and RFI physical activities) and NT (e.g., mines, roads, settlements) affect individuals in ways that are not confined to each territorial border, transboundary effects are anticipated for the BCH (see Section 33.4.3 and Volume 6, Section 16). Potential transboundary effects to other animals that may be of interest to hunters are discussed in Sections 33.4.3 - 33.4.8. Transboundary effects on birds, muskox, moose, bear and wolverine are all considered either negligible or small and are not anticipated to measurably affect populations in the NT. This potential change in the quality, quantity, or distribution of harvested resources has the potential to affect TLMRU for other Indigenous groups outside of the Kitikmeot Region. Consequently, this change also poses a potential for transboundary effects on food security and food sovereignty (see Section 33.5.2). There is potential for transboundary effects associated with community health and well-being due to Project-related travel, health care requirements, working conditions, and Project-related employment and income. Some of these transboundary effects may be adverse; for example, out-of-region workers may transmit communicable diseases to other individuals and families within their home communities outside of Nunavut or contribute to adverse effects on community and personal safety through interactions with residents in Yellowknife and the potential for increased alcohol and drug use while in transit. In addition, rotational shiftwork may affect family and community dynamics and cohesion, and mental and emotional health for families of workers located outside of Nunavut. Conversely, Project-related employment and income may have positive effects on the health and well-being of workers, including improvements in mental health and family and community dynamics and cohesion (see Section 33.5.3). In both instances, positive and adverse effects on TLMRU may be experienced by transboundary Indigenous groups since community health and well-being is deeply connected with the ability to engage in cultural practices, language use, and knowledge transfer, as discussed in Section 24.3.6.1.

Regarding a change to infrastructure and services, there is potential for a limited, controllable transboundary effect on other affected Indigenous groups outside the Kitikmeot Region through increased ground transportation and travel on the nearby Tibbitt Contwoyto Winter Road (TCWR), which crosses the NT-NU border (see Section 33.5.5). There may be increased demand on the TCWR during Construction and Operations and Maintenance of the Project, which could affect users, including Indigenous peoples who reside in the NT. However, use of that winter road will be subject to the policies and restrictions of the TCWR Joint Venture and the Government of the NT (see Volume 9, Section 28).

Finally, transboundary effects are anticipated for employment and economy due to the Project's need to fill local employment gaps with an outside Project workforce from the NT and other parts of Canada (see Section 33.5.4). For other Indigenous groups, this may result in similar positive and adverse residual effects as described in Section 24.3.5, due to improvements in employment and economic opportunities, and potential drawbacks from the rotational shiftwork associated with the Project.

Taking this information into consideration, adverse transboundary effects on TLMRU may occur as the availability, accessibility, and stability of harvested resources and TLMRU activities may be affected by Project-related activities. If members of transboundary Indigenous groups join the Project's workforce or interact with those who do, positive transboundary effects are expected from increased financial stability, which could support the costs required for participating in TLMRU activities. Joining the project workforce could also result in adverse transboundary effects if members of by reducing time available to participate in TLMRU activities or through personal or community safety concerns that could interrupt their participation in TLMRU activities.

WKR will implement mitigation and management measures identified in Sections 24.3.3.2, 24.3.4.2, 24.3.5.2 and 24.3.6.2 to reduce the potential for adverse residual transboundary effects.

## **33.5.2 Food Security**

### **33.5.2.1 Traditional Food System**

Transboundary effects may occur as the availability, accessibility, and stability of country foods may be impacted by Project-related activities. For example, effects may occur on accessibility and utilization of the traditional food system for individuals in NT who either utilize the Kitikmeot Region for harvesting purposes, or harvest species that cross from NU into NT during their life cycles. During engagement community members in Yellowknife expressed concern for a change in the availability of caribou meat (NIRB 2025a).

There is potential for transboundary effects on the stability of the traditional food system as a result of changes to wildlife distribution and wildlife habitat, which could affect harvesting success for individuals in NT. Potential transboundary effects to animals that may be of interest to hunters are discussed in Sections 33.4.3 - 33.4.8. Transboundary effects to birds, muskox, moose, bear and wolverine are all considered either negligible or small and are not anticipated to measurably affect populations in the NT. Human development has the potential to affect BCH body condition and herd dynamics, the effects of which may be carried by the herd to NT. The transboundary nature of these effects on BCH dynamics requires effective co-management among the jurisdictions within the BCH annual range.

WKR will implement mitigation and management measures identified in Sections 25.3.3.2 to reduce potential adverse residual transboundary effects.

### **33.5.2.2 Market Food System**

Transboundary effects have the potential to affect the availability and stability of the food market system for individuals outside of the NSA. WKR will transport supplies sourced from Yellowknife to the Project site using charter aircraft. Transport of supplies using air freight is not anticipated to interfere with resupply to communities in NT, many of which also source supplies from Yellowknife.

Construction of marine-based infrastructure would increase the infrastructure available in the RAA for community resupply using sealift. This could increase the frequency and improve the timing and reliability of community resupply using sealift to the Kitikmeot Region. This may benefit communities outside of Nunavut that are on the same marine resupply routes as the Kitikmeot communities (ITK 2021).

Transboundary effects may occur on accessibility and utilization of the market food system for individuals in NT and other territories and provinces who obtain employment on the Project. Project-related employment would result in increased income for individuals and their families to purchase store-bought foods, including healthy and nutrient-dense foods. An increase in demand would likely lead to the expansion of businesses to meet said demand.

WKR will implement mitigation and management measures identified in Section 25.3.4.2 to reduce the potential for adverse residual transboundary effects.

### **33.5.3 Community Health and Well-being**

There is potential for transboundary effects associated with community health and well-being due to Project related travel, health care requirements, working conditions, and Project-related employment and income.

As described in Section 26.2.2.2, health infrastructure and services available in the Kitikmeot Region have limited capacity, and currently people seeking medical services are often required to travel to Yellowknife and, in some instances, to locations in southern Canada (e.g., Edmonton). WKR will develop and implement a Health and Medical Services Plan (HMSP) that outlines the provisions of on-site health and medical services available to workers. Measures in the HMSP are intended to reduce use of local and transboundary health and medical services. However, Project workers may require medical care in Yellowknife and/or southern Canada in the event of medical emergencies and non-emergency incidences that cannot be addressed on-site, which would increase demand on health infrastructure and services in these jurisdictions.

Workers may be sourced from NT, Yukon, and southern Canada. The incidence rate of communicable diseases may increase as a result of social interactions between out-of-region workers at camp accommodations and during transit to/from the Project Site. Out-of-region workers may transmit communicable diseases to other individuals and families within their home communities outside of Nunavut. The HMSP will include prevention, management, and outbreak response measures for injuries, infection, and disease to reduce the incidence of communicable diseases among the Project workforce.

Workers that are sourced from NT, Yukon, and southern Canada will transit through Yellowknife on their way to/from the Project site. Out-of-region workers may contribute to adverse effects on community and personal safety through interactions with residents in Yellowknife and the potential for increased alcohol and drug use while in transit. WKR will develop and implement a Drug and Alcohol Policy and Travel Policy to govern workers' conduct while in transit.

Project working conditions (i.e., rotational shiftwork, Fly-in-Fly-Out, and camp accommodations) may contribute to adverse effects on health and well-being for workers from NT, Yukon, and southern Canada. Section 26.3.6 describes the effects that rotational shiftwork can have on family and community dynamics and cohesion, and these effects may be felt by the families of workers located outside of Nunavut. Rotational shiftwork can also have adverse effects on mental health and emotional health and, in turn, coping mechanisms of affected workers. Adverse effects at the individual level may in turn affect families and communities. WKR will provide access to an Employee and Family Assistance Program and an Inuit Employee Assistance Program to workers and their families. WKR will provide on-site access to mental health services for workers and access to telecommunications for workers to remain in contact with their families during their shift. These measures are intended to reduce adverse transboundary effects on family and community dynamics and cohesion.

Project-related employment and income may have positive effects on health and well-being for workers from NT, Yukon, and southern Canada. Positive effects may improve mental health and family and community dynamics and cohesion.

WKR will implement mitigation and management measures identified in Sections 26.3.3.2, 26.3.4.2, 26.3.5.2, 26.3.6.2, 26.3.7.2 and 23.3.8.2 to reduce the potential for adverse residual transboundary effects.

### **33.5.4 Employment and Economy**

Project activities and expenditure on materials, equipment and services will result in increased economic activity in Nunavut and the rest of Canada. Economic activity outside Nunavut will provide contributions to territorial or provincial gross domestic product (GDP) as well as contributions to municipal, territorial or provincial, and federal government revenues. Over the five-year construction phase, total Project-related GDP effects in Nunavut are estimated to total \$375 million, equivalent to \$75 million each year, inclusive of direct and spin-off economic benefits. Annual GDP contributions in Nunavut from Project construction would amount to a 19% increase on the construction industry's contributions to territory GDP in 2024. Over the operations and maintenance phase, Project-related GDP effects in Nunavut are estimated to total \$21 million annually.

Mineral development, facilitated by the Project will generate substantial economic benefits for Nunavut and Canada overall. Capital spending during the construction of three RFI mining projects that could be induced by the Project, Izok Lake Mine, High Lake Mine, and the Hackett River project would collectively contribute approximately \$840 million to Nunavut's GDP through their direct and indirect activity over the duration of their construction. Induced economic activity would further add to Nunavut's GDP. Once operational, these mines would collectively contribute approximately \$610 million in GDP annually as a

result of direct and indirect economic activity, which would be a 15% increase in Nunavut's 2024 overall GDP.

Project construction, and operations and maintenance, will create employment opportunities and employment income for workers residing in the Kitikmeot Region, Nunavut and the rest of Canada. WKR expects 15% of the direct construction workforce to be Nunavut residents. For operations and maintenance, WKR targets 50% Nunavut residents initially, aspiring to transition to a fully Nunavut-resident workforce over time. The remaining direct workforce will come from outside the Kitikmeot Region and Nunavut. Further indirect and induced employment opportunities will be created through Project-related expenditure on goods and services in Nunavut and the rest of Canada.

Community members in Inuvik expressed concern about induced development and potential effects to future business owners (NIRB 2025a). Project expenditures on materials, equipment, and services will increase demand for local, territorial and Canadian contractors and businesses during construction and operations and maintenance. During construction, it is estimated that approximately 20% of Project expenditure in supply chains will occur in Nunavut, with 50% comprising interprovincial imports and 30% comprising international imports (Statistics Canada 2025). During operations and maintenance, it is estimated that approximately 50% of Project expenditure in supply chains will occur in Nunavut, with 40% comprising interprovincial imports and 10% comprising international imports (Statistics Canada 2025).

There are no transboundary effects anticipated with education and training and cost of living.

WKR will implement mitigation and management measures identified in Sections 27.3.3.2, 27.3.4.2, 27.3.5.2, 27.3.6.2 and 27.3.7 to reduce the potential for adverse residual transboundary effects.

### **33.5.5 Infrastructure and Services**

During Construction and Operations and Maintenance, the Project will generate hazardous and non-hazardous solid waste. Solid waste will be stored, incinerated and/or transferred to waste management facilities in Yellowknife and/or Quebec for disposal, which would increase demand on these facilities. In 2018, it was estimated that Yellowknife's landfill had the capacity to accept waste for 10 more years at the current disposal rate and the City of Yellowknife is currently expanding the facility to extend its lifespan to 2034 (Lamberink 2024). The Project may therefore increase demand on the Yellowknife landfill; however, it is not anticipated to exceed available capacity for waste disposal.

Project activities during Construction and Operations and Maintenance may increase demand on temporary accommodations (i.e., hotels, motels) in Yellowknife as out-of-region workers will transit through Yellowknife on their way to/from the Project and project work camps. Yellowknife has 14 hotels and motels and an estimated several dozen bed and breakfasts. Temporary accommodations in Yellowknife may see heightened demand during regularly scheduled shift rotations and if workers are weathered in in Yellowknife during mobilization/demobilization to/from the Project site. It is not anticipated that out-of-region workers will relocate to Yellowknife during Construction and Operations and Maintenance phases of the Project. Project-related population growth due to in-migration and associated increases in demand on permanent accommodation are therefore not anticipated to occur.

Community members in Inuvik commented that the Project would bring a lot of people into the Inuvialuit Settlement Region, which already lacks existing housing and infrastructure to meet current demands. They expressed concern about further pressure on Inuvialuit communities and resources (NIRB 2025a). As with Yellowknife, it is not anticipated that out-of-region workers will relocate to Inuvialuit Settlement Region the during Construction and Operations and Maintenance phases of the Project.

The Project could increase demand on emergency services such as police services. The Project could increase demand on police services in Yellowknife if employees purchase and consume drugs and alcohol and interact with residents improperly during transit. Out-of-region workers could also incrementally increase demand on community programs and recreation facilities in Yellowknife during transit; however, increased demand is anticipated to be negligible compared to current use.

The mobilization of equipment and materials from Yellowknife to Jericho Station via the TCWR and new winter road will increase demand on the TCWR during Construction and Operations and Maintenance of the Project. Increased traffic volumes on the TCWR could affect businesses, organizations, and other users, including Indigenous peoples who reside in NT. However, Project traffic on the TCWR during the Construction and Operations and Maintenance phases represents approximately 15% (1000 trucks) and 0.4% (28 trucks), respectively, of average annual traffic on the TCWR and is within the total number of trucks that the TCWR is approved to transport (see Section 28.2.2.3).

The mobilization of personnel and goods and materials to the Project will increase the number of aircraft that use air transportation infrastructure in Yellowknife beyond current conditions; however, increased demand is expected to be within the current capacity of the Yellowknife Airport as the airport previously operated at a higher volume in 2023 and based on aircraft movements and planned expansion of its infrastructure.

Project Construction will increase land- and marine-based infrastructure available for use by residents in NT and, potentially, Yukon and the provinces. Grays Bay Road would be connected to Yellowknife through annual construction of a winter road that connects Jericho Station to the TCWR. Access to Grays Bay Road from Yellowknife would be limited to the winter road season.

Construction of marine-based infrastructure would increase the infrastructure available in the RAA for community resupply using sea-lift. This could increase the frequency and improve the timing and reliability of community resupply using sea-lift to the Kitikmeot Region. This may benefit communities outside of Nunavut that are on the same marine resupply routes as the Kitikmeot communities (ITK 2021a).

Sea-lift to transport materials and equipment for Project Construction and Operations and Maintenance are primarily planned to come from Quebec. However, barge cargo may be transported from Hay River, Inuvik, or Tuktoyaktuk to Grays Bay during Construction. Each barge (up to 3 per year of construction) will require around 45 truckloads to travel through the ISR from the Yukon border to existing staging facilities at those ports. These trucks will arrive in Inuvik or Tuktoyaktuk from approximately April to July, and materials and equipment will be staged at existing facilities in Inuvik or Tuktoyaktuk. Barges and tugs will travel to Grays Bay and return to their home ports in the open water season, primarily in August and September.

WKR will implement mitigation and management measures identified in Sections 28.3.3.2, 28.3.4.2, 28.3.5.2, and 28.3.6.2 to reduce potential adverse residual transboundary effects.

## 33.6 Follow-up and Monitoring

The Project will implement follow-up programs and monitoring (see Sections 11-30) to evaluate the effectiveness of mitigation measures and compare the realized effects of Project activities with the conclusions in this assessment. The findings of these programs will constitute the basis of the adaptive management approach to address residual, cumulative, and transboundary effects as applicable.

WKR will continue to respond to questions and concerns from Kitikmiut, other Indigenous groups, and other potentially affected communities through its ongoing engagement efforts. WKR has endeavoured to review and integrate all information received, where applicable. Information provided following submission of the IS as well as any potential omissions will be reviewed in the context of the IS for incorporation into project planning, including adaptive management and monitoring, as appropriate.

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## 34 Accidents and Malfunctions

### 34.1 Introduction

Accidents and malfunctions resulting from the construction, operations and maintenance of the Grays Bay Road and Port (the Project) are events that are not part of any planned activity or normal operation of the Project but have a reasonable probability of occurrence and have the potential to result in adverse environmental effects. In consideration of the Project's spatial extent and long lifespan, accidents and malfunctions have the potential to occur due to acts of nature, abnormal operating conditions, wear and tear, human error, equipment failure, or other causes. Despite prevention and mitigative efforts, accidents and malfunctions may pose a risk to valued components (VCs).

During engagement activities for the Grays Bay Road and Port Project, Inuit, Nunavummiut, and Canadians emphasized the collective concern about accidents and malfunctions that may occur during all phases of the Project. It was understood that accidents and malfunctions may occur; however, the expectation is that West Kitikmeot Resources Corp. (WKR) ensures that all possible measures are taken to prevent these incidents.

In accordance with the Nunavut Impact Review Board's (NIRB) *Final Guidelines for the Preparation of an Impact Statement* (NIRB 2026; NIRB File No.: 24XN038; the IS Guidelines), the Impact Statement (IS) for the Project includes the assessment of accidents and malfunctions that have the potential to occur in relation to the Project. Through good planning and design, combined with the adoption of safety measures, the risks of accidents and malfunctions can be reduced or controlled. Numerous management plans including, but not limited to, Risk Management and Emergency Response Plan (RMERP), Spill Contingency Plan (SCP), Fuel Management Plan, and Waste Management Plan will be developed to help reduce the risk and mitigate the effects of accidents or malfunctions. Details regarding these management plans are provided in Section 34.6 and Volume 11.

After taking into consideration Project design and safety measures, this section will discuss the type and likelihood of credible accidents and malfunctions, describe proposed mitigations to reduce the likelihood and outcome of each identified event, and describe the residual effects on applicable VCs. This section is organized by the assessment approach, description of potential accidents or malfunctions, effects pathways, effects assessment, and a description of residual effects. The analysis presented in this section relies on the residual effects characterization and significance definitions of Project VCs.

The scope of this assessment does not include third-party (e.g., resource companies, federal and territorial governments, local communities, community members and defence agencies) accidents and malfunctions during the construction and operations and maintenance of the Project, nor construction and operations and maintenance of potential future third-party components. The third-party that caused the release is ultimately accountable to respond, report, and facilitate remediation, but WKR's Project infrastructure will serve as an important staging point for emergency response in the event of a third-party accident or malfunction. The infrastructure will also enhance the emergency response capacity for local communities and land users. Third-party users will also be able to utilize the Project facilities for the

storage of emergency response supplies, locating emergency response personnel and coordination of response activities to bolster their response capabilities.

## 34.2 Influence of Engagement and Inuit, Indigenous, and Community Knowledge on the Assessment

WKR continues to engage with Inuit of the Kitikmeot Region (hereafter referred to as Kitikmiut), other Indigenous groups, and other potentially affected communities about the Project. A summary of engagement activities conducted between 2016 and 2025 is presented in Volume 3, Section 6 (Public Engagement). In addition to these activities, WKR conducted community-based primary research with residents and organizations of the Kitikmeot communities of Cambridge Bay (*Ekaluktutiak*), Gjoa Haven (*Ursuqtuq*), Kugaaruk, Kugluktuk, and Taloyoak, along with organizations in Yellowknife, NT. Additionally, an Inuit Advisory Group (IAG) was established to advise WKR on potential environmental and socio-economic effects or concerns related to the Project, planned mitigation approaches, and aspects of the environmental assessment, including, but not limited to, baseline conditions, and consideration and integration of Inuit and Community Knowledge. Members were selected by the Kitikmeot Inuit Association and WKR based on their knowledge of many aspects of the natural and human environment, including but not limited to wildlife, fish, climate, land use and access, archaeology, and water in the project area.

To further inform the project design, a Project-specific Inuit Knowledge report titled *Kitikmeot Knowledge of the Proposed Kogloktokyoq (Grays Bay) Port and Road Project Final Report* (Banci and Spicker 2024) was commissioned by WKR. This report, based on Inuit Knowledge contained in the Naonaiyaotit Traditional Knowledge Project (NTKP), was made available to WKR through a licensing agreement with the Kitikmeot Inuit Association.

Through the Project-specific engagement program, Kitikmiut, other Indigenous groups, and other potentially affected communities shared comments, perspectives, concerns, and recommendations related to accidents and malfunctions. WKR commits to continued engagement with Kitikmiut, other Indigenous groups, and other potentially affected communities during the advancement of project design, planning, and monitoring, throughout the life of the Project.

### 34.2.1 Inuit, Indigenous, and Community Knowledge and Engagement Feedback

Through the Project-specific engagement program delivered between 2016 and 2025, including community meetings, workshops, community-based primary research, the Project-specific NTKP report, and through a review of publicly available information, Kitikmiut, other Indigenous groups, and other potentially affected communities shared information, expressed concerns, and provided recommendations related to accidents and malfunctions. This feedback has been considered and summarized in Table 34.1 and where applicable, has been integrated into the assessment that follows.

**Table 34.1 Summary of Inuit, Indigenous, and Community Knowledge and Engagement Feedback**

Comment	Source	WKR Response	Where Addressed
<p>During engagement on the Project, Gjoa Haven community members stated that in early fall, roads can be slushy and slippery, and vehicles are not able to stop immediately, causing skidding and potentially spills from vehicle accidents. Concern was raised about whether spills would be cleaned up right away. Concern was also expressed that the road may be used to transport toxic materials, which they reported could lead to a disaster.</p>	<p>GBRP 2025</p>	<p>WKR acknowledges these observations and concerns and has incorporated Inuit, Indigenous, and Community observations and concerns into this assessment (Accidents and Malfunctions and Effects).                      WKR commits to continued engagement on accidents and malfunctions during the advancement of project design, planning, and monitoring throughout the life of the Project.</p>	<p>See Sections 32.4.1 and 32.4.5 for a description of potential accidental events related to vehicle use, Sections 32.6.1 and 32.6.2 for mitigations and emergency response measures.</p>
<p>During engagement on the Project, the Taloyoak Hunters and Trappers Association (HTA) expressed concern about the increased marine traffic as a result of the Project and the effects on marine resources, especially country foods. The HTA wished to understand who would be responsible for reporting all spills. The HTA also requested that WKR investigate the need for monitors or lighthouses throughout the Kitikmeot Islands to support early spill detection and response.</p>	<p>GBRP 2025</p>	<p>WKR would be responsible for reporting spills associated with the Project that occur at Project infrastructure.                      Third-party users would be required to report spills that occur while using Project facilities i.e., the road.                      Marine vessels transiting to and from the Port would also be required to report any spills to the appropriate authorities.                      WKR commits to continued engagement on accidents and malfunctions during the advancement of project design, planning, and monitoring throughout the life of the Project.</p>	<p>See Sections 32.4.2 and 32.4.7 for a description of potential accidental events related to marine shipping use, Sections 32.6.1 and 32.6.2 for mitigations and emergency response measures.</p>
<p>During engagement on the Project, Hamlet of Kugluktuk attendees noted the Government of Nunavut’s support of the Project as well as the positive effect of improved spill response capability in the region, which could be located at the Port. Attendees asked whether the tank farm could be located in an area that does not drain directly into the ocean.</p>	<p>GBRP 2025</p>	<p>WKR acknowledges the request for tank farm placement which will be considered in detailed Project design.                      Wherever located fuel tanks will be stored within berms with secondary containment capable of containing 110% of the largest tank volume and 10% of all combined tank volumes.</p>	<p>See Section 32.6.2 for emergency response measures.</p>

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Comment	Source	WKR Response	Where Addressed
<p>During early engagement on the Project, Kugaaruk community members inquired about the effects of the road on water and animals, and whether clean-up training would be provided to Kitikmeot communities in the event of a spill.</p>	<p>GBRP 2017</p>	<p>WKR will ensure that all employees and 3<sup>rd</sup>-party contractors supporting the Project receive adequate spill response training. WKR will facilitate training as needed to ensure proper cleanup and spill response.</p> <p>As a condition of facility use, Community users are required to complete an orientation to ensure safe use of the facility (port, road and Jericho Station). That orientation will include how to report a concern (e.g., release) if it is identified.</p>	<p>See Sections 32.4.1 and 32.4.5 for a description of potential accidental events related to vehicle use, Sections 32.6.1 and 32.6.2 for mitigations and emergency response measures.</p>
<p>During engagement on the Project, Kugaaruk community members inquired about impacts of the road on water and animals, employment opportunities for Inuit communities, and if training would be provided to Inuit communities for cleanup efforts.</p>	<p>GBRP 2025</p>	<p>WKR will ensure that all employees and 3<sup>rd</sup>-party contractors supporting the Project receive adequate spill response training. WKR will facilitate training as needed to ensure proper cleanup and spill response.</p> <p>As a condition of facility use, Community users are required to complete an orientation to ensure safe use of the facility (port, road and Jericho Station). That orientation will include how to report a concern (e.g., release) if it is identified.</p>	<p>See Sections 32.4.1 and 32.4.5 for a description of potential accidental events related to vehicle use, Sections 32.6.1 and 32.6.2 for mitigations and emergency response measures.</p>
<p>During an IAG workshop, a member stated the following: <i>Teachings through the generations are to keep the land clean from spills and waste. If you keep it clean the animals will stay.</i></p>	<p>IAG 2025</p>	<p>WKR acknowledges these observations and has incorporated Inuit, Indigenous, and Community observations into this assessment (Accidents and Malfunctions and Effects).</p> <p>WKR commits to continued engagement on accidents and malfunctions during the advancement of project design, planning, and monitoring throughout the life of the Project</p>	<p>See Section 32.4 for a description of potential accidental events, Sections 32.6.1 and 32.6.2 for mitigations and emergency response measures. Section 32.7 for an assessment of residual effects.</p>

WKR will continue to respond to questions and concerns raised from Kitikmiut, and other Indigenous groups, and other potentially affected communities through its ongoing engagement efforts. Information provided following submission of the IS will be reviewed in the context of the IS and for incorporation into project planning, including adaptive management and monitoring, as appropriate.

### **34.3 Assessment Approach**

To assess accidents and malfunctions associated with the Project, the following approach was used:

- Identify potential credible accidents or malfunctions that could occur during the Construction or Operations and Maintenance phase
- Determine the likelihood of occurrence and potential consequence rating which when combined provide an overall risk ranking for the scenario
- Identify the interaction and description of potential effects on VCs (as applicable) for each potential accident and malfunction scenario; these are potential effects that occur with (and despite) the application of standard mitigation measures applied during normal Project activities
- Identify the additional safety and design measures and emergency response measures that will be implemented to reduce or control the potential for, and potential outcome of, each potential accident or malfunction
- Describe the potential residual effects (after additional mitigation measures have been applied) on VCs that could result from each potential accident or malfunction, taking into consideration any environmentally sensitive timing (e.g., migration periods, nesting periods) that may coincide with events
- Determine the significance of residual effects on VCs resulting from each potential accident or malfunction

The significance of residual effects on VCs is determined using the definitions presented in each individual VC section of this IS (Volume 5 through 9), as they relate to the assessment of Project environmental effects.

#### **34.3.1 Temporal and Spatial Boundaries**

##### **34.3.1.1 Temporal Boundaries**

The assessment of potential effects of accidents and malfunctions is assessed over the following temporal boundaries:

- Construction phase: Subject to receipt of all required regulatory approvals, construction of the Project is scheduled to commence in 2029. The construction phase is anticipated to span approximately five (5) years, with operations Projected to begin in 2035.
- Operations and maintenance phase: As the Project components are considered permanent infrastructure, the operations and maintenance phase is considered indeterminate following the construction phase.

### **34.3.1.2 Spatial Boundaries**

The majority of potential accidents and malfunctions and associated potential effects are likely to be limited to the immediate area of the incident (e.g., terrestrial spill, vehicle accident) and are therefore assumed to be within the Project Development Area (PDA). An accident or malfunction resulting in the release of contaminants to a watercourse or waterbody has the potential to affect resources beyond the PDA.

Potential accidents and malfunctions and associated potential effects involving Project marine vessels or other interfaces with the marine environment have the possibility to occur over a larger geographic area and are therefore considered to be within the Regional Assessment Area (RAA) for marine mammals.

While the focus of this assessment is on the terrestrial PDA and marine mammal RAA it is recognized that, by the nature of the Project activities, the potential for accidents does exist outside of these areas. Marine traffic during Construction and Operations and Maintenance phases will require to transit the Northwest Passage beyond the boundaries of the RAA. This transit is anticipated to be primarily from the east via the Franklin Strait but also potential west through the Dolphin and Union Strait. Transport Canada regulates navigation and shipping through the *Canada Shipping Act, 2001* and the Canadian Coast Guard and Pilotage Authorities have responsibilities for safe shipping. The *Canada Shipping Act, 2001* provides the legislative framework that governs shipping in Canada; it promotes marine safety and protection of the marine environment. Vessels registered in Canada or those that travel within Canadian waters are required to comply with this law. The *Canada Shipping Act 2001* includes regulations for navigational safety aids, collision-prevention devices, standards for hull construction, fire detection and extinguishing requirements, and standards for construction and inspection of vessels carrying pollutants. Vessels associated with the Project will be required to adhere to all regulations and established operational practices. In addition to complying with the *Canadian Shipping Act, 2001*, vessels are expected to follow Navigational Warnings (NAVWARNs), which provide information on changes to navigational aids and current marine activities or hazards, as well as Notices to Mariners (NOTMARs), which supply essential updates for charts and nautical publications, thereby further promoting marine safety and the protection of the marine environment.

Some overland traffic associated with the Project will also occur out with the spatial boundaries assessed. For example, during Construction and Operations and Maintenance phases vehicles supporting and utilizing the Project will travel on the Tibbitt to Contwoyto Winter Road (TCWR) and potentially the Dempster and Inuvik to Tuktoyaktuk Highways in the Northwest Territories. Commercial vehicles using these roads will follow established operational procedures and practices.

## **34.3.2 Risk Assessment Methodology**

### **34.3.2.1 Introduction**

The risk assessment system serves as a structured approach to evaluate accident and malfunction scenarios, specifically focusing on their potential consequences to VCs. This system ensures that both the magnitude and duration of effects to VCs are taken into account when defining consequences.

### 34.3.2.2 Methodology

The risk assessment process is based on a semi-quantitative approach. Within this framework, the likelihood of an event is on the vertical axis, while the consequence to the VC(s) is on the horizontal axis. By mapping these two factors, the intersection determines the final risk ranking for each scenario.

This final risk ranking incorporates consideration of the mitigation measures that have been implemented for each identified effect. As such, the assessment reflects not only the inherent risks but also the effectiveness of controls in place.

### 34.3.2.3 Likelihood and Consequence Definitions

The definitions for both likelihood and consequence are designed to be generic, allowing them to be consistently applied across all scenarios evaluated in this assessment. Detailed likelihood and consequence ratings, along with their respective definitions, are presented in Table 34.2 and Table 34.3, respectively.

**Table 34.2 Likelihood Ratings for Accident or Malfunction Scenario**

Likelihood	Definition
Extremely Unlikely	Event practically impossible, requires multiple independent failures and exceptional conditions
Very Unlikely	Exceptional event, credible but not expected in the life of the Project
Unlikely	Event might occur during construction or operations and maintenance, and is anticipated to be rare (i.e., up to one event per decade)
Somewhat Likely	Event could occur during construction or operations and maintenance, and is anticipated to be infrequent (i.e., approximately one event per year)
Very Likely	Event is expected to occur during construction or operations and maintenance, and is anticipated to be common (i.e., more than one event per year)

**Table 34.3 Consequence Ratings for Valued Components**

Consequence	Health and Safety Definition	Environmental Definition
Insignificant	No Injury	<100 L contained spill with no water entry, no VC threshold exceedance, no external notification
Minor	First aid injury	100–1,000 L localized spill; short-term VC parameter exceedance within PDA; internal response only
Moderate	Recordable injury or Lost Time Injury (LTI)	>1,000 L spill with near-field water entry; localized fish/wildlife mortality; short advisory; limited community service draw
Major	Serious injury or single fatality	Large spill to water or open marine with shoreline interaction; temporary fishery/country food advisories; multi-day response; external resources engaged
Severe	Multiple serious injuries or fatalities	Major release/wildfire with regional VC effects; prolonged advisories/restrictions; sustained draw on external capacity

The likelihood and consequence ratings described above combine to create an overall risk ranking. A description of the risk rankings are provided below:

- Low - Risk managed by procedures, monitoring and assurance
- Moderate – Reduce risk where practicable via targeted controls and processes
- High – Reduce risk further via engineered/operational barriers or redesign as necessary
- Extreme – Reduce risk further via engineered/operational barriers or redesign.

**Table 34.4 Risk Ranking Matrix**

Likelihood	Consequence				
	Insignificant	Minor	Moderate	Major	Severe
Very Likely	Moderate	High	Extreme	Extreme	Extreme
Somewhat Likely	Moderate	Moderate	High	Extreme	Extreme
Unlikely	Low	Low	Moderate	High	Extreme
Very Unlikely	Low	Low	Moderate	Moderate	High
Extremely Unlikely	Low	Low	Low	Moderate	Moderate

## 34.4 Description of Potential Accidents or Malfunctions

Based on the design and proposed use of the Project, Inuit, Indigenous, and Community Knowledge and perspectives, professional judgment, and experience with comparable northern projects, potential accidents or malfunctions have been identified. These potential event scenarios are described in Table 34.5.

**Table 34.5 Potential Accidents or Malfunction Event Scenarios**

Potential Accident or Malfunction	General Description
Terrestrial & Aquatic Hazardous Materials Spill	<ul style="list-style-type: none"> <li>• Accidental spill of hazardous material (e.g., diesel fuel, lubricants, chemicals) during storage, handling or dispensing, resulting in the release of contaminants to the terrestrial or aquatic environment</li> <li>• Vehicle accident or mechanical malfunction involving equipment or transport trucks, resulting in the release of hazardous materials such as hydraulic fluid, diesel fuel, sewage, or oil to terrestrial or aquatic environment</li> <li>• Aircraft (fixed-wing or helicopter) accident or malfunction resulting in the release of contaminants (e.g., aviation fuel) to the terrestrial or aquatic environment</li> </ul>
Marine Hazardous Materials Spill	<ul style="list-style-type: none"> <li>• Accidental spill of hazardous material (e.g., diesel fuel, lubricants, chemicals) during storage, handling or dispensing, resulting in the release of contaminants to the marine environment</li> <li>• Marine vessel accident resulting in the release of hazardous materials such as marine diesel or bunker fuel to the marine environment</li> <li>• Aircraft (fixed-wing or helicopter) accident or malfunction resulting in the release of contaminants (e.g., aviation fuel) to the marine environment</li> </ul>

Potential Accident or Malfunction	General Description
Fire or Explosion	<ul style="list-style-type: none"> <li>• A fire or explosion within Project infrastructure (e.g., Grays Bay Port, accommodations / offices, Jericho Station, quarries or staging areas) resulting in the release of contaminants to the atmospheric, aquatic, marine, or terrestrial environments</li> <li>• A fire or explosion within Project infrastructure resulting in injury to people</li> </ul>
Handling, Storage and Use of Explosives	<ul style="list-style-type: none"> <li>• Accidental discharge of bulk explosive supplies (e.g., ammonium nitrate, emulsion) during handling or storage, resulting in the release of contaminants to the aquatic, marine, or terrestrial environment</li> <li>• Accidental detonation of explosives resulting in injury to people</li> </ul>
Vehicle or Mobile Equipment Accident	<ul style="list-style-type: none"> <li>• Vehicle(s) or mobile equipment(s) accident or malfunction (e.g., collision, roll over) resulting in injury to people</li> </ul>
Aircraft Accident	<ul style="list-style-type: none"> <li>• Aircraft(s) (fixed-wing or helicopter) accident or malfunction (e.g., crash) resulting in injury to people</li> </ul>
Marine Vessel Accident	<ul style="list-style-type: none"> <li>• Marine vessel(s) accident or malfunction (e.g., collision, grounding) resulting in injury to people</li> </ul>

### 34.4.1 Terrestrial or Aquatic Hazardous Materials Spill

During Project construction or operations and maintenance, an accidental discharge to the terrestrial or aquatic environment of hazardous material (e.g., diesel fuel, lubricants, chemicals) could occur during its storage, handling, or dispensing. Accidental discharge could be caused by improper storage, human error, or mechanical failure of equipment during filling of tanks or transfer from tanks to vehicles.

An accidental discharge of sewage could also occur during construction as a result of human error or mechanical failure during transfer of waste from camp infrastructure. It is assumed that spills hazardous materials would be relatively limited for each event (i.e., less than 100 litres [L]).

Approximately 10 million L of diesel fuel will be required annually to support construction of the Project. Fuel resupply will be brought via sealift to the Port and by trucks via the TCWR to Jericho Station throughout construction. Fuel will be stored in drums and tanks situated at the laydown areas, quarries, and camps during Year 1 of construction. Permanent fuel facilities will be built at both the Port and Jericho Station for Year 2 of construction. Fuels required during construction will include:

- Diesel for power generation, heating, heavy equipment and light vehicle operation
- Gasoline for light vehicles, utility vehicles, snowmobiles and boats
- Jet-A and Jet-B fuel for helicopter and aircraft support operations
- Propane for camp operations and heaters

During operations and maintenance, a permanent fuel storage and refuelling facility at the Port will include secondary containment berms, piping and pipelines, fuel storage tanks, and an industrial building to house dispensing equipment, all constructed with materials suitable for -45 degrees Celsius operations. Secondary containment berms will be constructed to allow winds to clear fuel vapor buildups and will be sized per applicable regulatory requirements. The facility's foundations and secondary containment berms will be constructed of quarried material with approved membrane material integrated

into the containment berm. The fuel storage tanks will be installed in a phased approach to meet demand, where initial bulk fuel tanks for capacity of around 10 million L will be placed. Space for additional bulk fuel tanks up to a capacity of 160 million L will be available for future third-party users. Where practical, required fuel piping and pipelines will be above ground rather than buried, as is standard practice for arctic environments.

During construction, facilities at Jericho Station are anticipated to store up to 180,000 L of diesel, 50,000 L of jet fuel, and 100 barrels of gasoline. Resupply will be delivered to Jericho Station by tanker truck either from the Port or via winter road from Yellowknife. During operations fuel storage at Jericho may increase to 10 million L dependent upon third-party use.

During the operations and maintenance phase, vehicles and heavy equipment will be travelling on the road for their operations (i.e., road maintenance, resupply, monitoring, etc.). Maintenance yards will be also used to store equipment and service vehicles. A vehicle accident or equipment malfunction could result in a release of hazardous materials (e.g., fuel, oil, hydraulic fluid) to the environment. It is anticipated that the volume of release would be limited (i.e., less than 100 L). The potential for a larger spill of fuel, 1,000 L or more, exists should an incident involving a fuel truck result in the loss of containment of the fuel tanks.

The highest potential for hazardous spills occurs is in the first year of construction as no/limited infrastructure will be in place. Additionally spills during the summer months have a higher potential to result in negative effects through direct interaction with flora and fauna. Spills in winter during frozen conditions are less likely to interact with flora and fauna due to snow and ice coverage, and spills to snow and ice are generally easier to contain and clean up.

A small spill during storage, handling, or dispensing of materials is considered very likely to occur during construction and somewhat likely to occur during operations and maintenance. With the implementation of mitigation and clean up, the consequences of a small spill would be insignificant/minor and as such the risk is considered moderate to high.

A large spill to the terrestrial or aquatic environment is considered unlikely to occur, however, the consequences of a large spill could be major and therefore the risk is considered high.

#### **34.4.2 Marine Hazardous Materials Spill**

A marine hazardous material spill may occur on shipping routes accessing the Port or at the port inclusive of the deep-water wharves, barge landing area, and small-craft harbour, as there will be regular project marine traffic to and from the port throughout the project phases. Vessels used for Project activities will transport/use various hazardous materials (e.g., fuels and lubricants) for storage and use throughout the Project phases. Vessel activity levels will be the greatest during the construction phase of the Project due to the transportation of materials, equipment, fuel, and personnel, and the construction of the in-water infrastructure. Improper handling, use or storage of hazardous materials could result in a minor spill or a more major release. A hazardous material spill may also be caused by environmental conditions and natural events (e.g., extreme weather). Spills may occur as a result of vessel accidents, equipment and Project infrastructure breakdowns, refuelling of small vessels, transfer of fuels from vessels to terrestrial storage facilities, or failure of terrestrial fuel storage and containment facilities.

The marine component of the port will only be operational during the open water season and therefore the potential for a hazardous materials spill to open water is limited to that time period. A spill to ice could occur during the winter season as a result of an accident close to the shoreline. A spill to ice may reach the marine environment through cracks in the ice.

A small spill during storage, handling, or dispensing of materials is considered very likely to occur during construction and somewhat likely to occur during operations and maintenance. With the implementation of mitigation and clean up, the consequences of a small spill would be insignificant/minor and as such the risk is considered moderate to high.

Large spills to the marine environment are considered unlikely to occur, however, the consequences of a large spill could be major and therefore the risk is considered high.

### **34.4.3 Fire or Explosion**

A fire or explosion at a Project facility during construction or operations and maintenance could be caused by equipment or machinery malfunction, combustion of flammable / explosive materials, improper storage or handling of hazardous materials, careless human activity (e.g., kitchen incidents), environmental conditions and natural events. A fire may result in injury to people and damage or destruction of facilities or equipment. Given mitigation measures, a fire or explosion is considered very unlikely to occur; however, the consequences of a fire or explosion could be minor to severe, depending on injuries or fatalities and therefore the risk is considered low to high.

### **34.4.4 Handling, Storage and Use of Explosives**

The use of explosives during construction (quarries and locations of rock cut) or operations and maintenance (quarries) presents the potential for an accidental release of materials used for explosive manufacture (e.g., ammonium nitrate) or prepared explosives (e.g., emulsion). A vehicle accident or improper storage could result in ammonium nitrate pellets (prill) or emulsion being spilled. The improper handling of explosives may also result in an unintended detonation. Given mitigation measures, these events are considered unlikely to occur. However, should an incident occur, the consequences could range from minor to major depending on injuries or fatalities and therefore the risk is considered low to high.

### **34.4.5 Vehicle or Mobile Equipment Accident**

During Project construction, Project vehicles will be used to transport workers to / from camps and between camps and worksites. Further, camps and worksites will be resupplied primarily using Project vehicles. A variety of mobile equipment (e.g., dozers, excavators, loaders, graders) will be used during Project construction and operations and maintenance phases. A vehicle or mobile equipment accident attributable to the Project can cause damage to facilities / equipment and result in injury to people. Potential effects to biophysical VCs as a result of a vehicle or mobile equipment accident are discussed under terrestrial hazardous materials spills and fires and explosions. Vehicle collisions with wildlife are addressed in the applicable VC sections (Volume 6, Section 16: Caribou and Section 18: Wildlife).

A vehicle or mobile equipment accident is considered very likely to occur during construction and somewhat likely to occur during operations and maintenance. The consequences could range from minor to severe, depending on injuries or fatalities and the extent of environmental damage. As such the risk is considered to range from high to extreme.

#### **34.4.6 Aircraft Accident**

The use of both fixed-wing and helicopters will occur as part of the Project's construction and operations and maintenance phases due to the isolated nature of the Project. There is the potential for aircraft accidents to occur primarily at the Aerodrome or at the Jericho Station airstrip as there will be regular air traffic to and from the Project. Aircraft activity levels will be greatest during the construction phase of the Project due to the transportation of materials, equipment, supplies, fuel, and personnel.

Accidents may be caused by aircraft and equipment malfunction, environmental conditions and natural events, human error, air traffic volumes, and periods of increased bird activity (e.g., migratory bird nesting periods).

An aircraft accident during construction or operations and maintenance resulting in injury to people is considered very unlikely to occur. However, depending on injuries or fatalities the consequences could range from minor to severe. As such the risk is considered to range from low to high.

#### **34.4.7 Marine Vessel Accident**

A variety of Project marine vessels will be operational at the Grays Bay Port site during construction and operations and maintenance of the Project. The marine component of the port will only be operational during the open water season and therefore the potential for a marine vessel accident resulting in injury to people (e.g., collision or grounding) is limited to that time period.

During construction, material and equipment will be delivered to the Port site by sealift, cargo freighters, bulk fuel carriers, barges, or semi-submersible vessels during the open water season. Material and equipment will be offloaded from vessels to shore at the port primarily using lightering barges. During operations and maintenance, the port will continue to receive materials and equipment and will also operate tugs to assist with large vessel berthing and general operations. Marine vessel volumes and variety related to the Project will be greatest during construction.

A marine vessel accident during construction or operation and maintenance resulting in injury to people is considered very unlikely to occur. However, should an incident occur, the consequences could range from minor to major depending on injuries or fatalities and therefore the risk is considered low to high.

### **34.5 Potential Effects Pathways**

Potential interactions between accidents and malfunctions and VCs are provided in Table 34.6.

**Table 34.6 Potential Interactions between Accidents and Malfunctions and Valued Components**

Accident or Malfunction	Atmospheric Environment	Climate	Noise and Vibration	Terrain, Soils and Permafrost	Vegetation	Caribou	Birds	Wildlife	Water Resources	Freshwater Fish and Fish Habitat	Marine Water and Sediment	Marine Fish and Fish Habitat	Marine Mammals	Traditional Land, Marine and Resource Use	Food Security and Sovereignty	Community Health and Well-being	Employment and Economy	Infrastructure and Services	Non Traditional Land, Marine, and Resource Use	Heritage Resources
Terrestrial & Aquatic Hazardous Materials Spill	-	-	-	✓	✓	✓	✓	✓	✓	✓	-	-	-	✓	✓	✓	-	-	✓	✓
Marine Hazardous Materials Spill	-	-	-	-	-	-	✓	-	-	-	✓	✓	✓	✓	✓	✓	-	-	✓	-
Fire or Explosion	✓	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	✓	✓
Handling, Storage and Use of Explosives	✓	-	✓	✓	✓	-	-	-	✓	✓	✓	✓	-	✓	-	✓	-	-	-	-
Vehicle or Mobile Equipment Accident	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	-	✓	-	-
Aircraft Accident	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	-	✓	-	-
Marine Vessel Accident	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	-	✓	-	-

Notes:

A check mark (✓) indicates a potential interaction between a valued component and an accident or malfunction.

A dash (-) indicates that no or limited interaction is anticipated between a valued component and an accident or malfunction

### **34.5.1 Justification for No or Limited Interactions**

Justification for those VCs where no or limited interaction with an accident or malfunction is identified is provided below.

#### **34.5.1.1 *Terrestrial or Marine Hazardous Materials Spill***

A terrestrial or marine hazardous materials spill is not expected to produce sufficient emissions that would affect the Atmospheric, Climate or Noise VCs.

A terrestrial or marine hazardous materials spill would not affect the number of workers employed by the Project and therefore interactions with the Employment and Economy VC are not anticipated. The Infrastructure and Services VC is not anticipated to be affected by a terrestrial or marine hazardous materials spill as the response would be primarily from on-site personnel.

Generally, a terrestrial hazardous materials spill would not be anticipated to affect the marine VCs (Marine Water and Sediment; Marine Fish and Fish Habitat and Marine Mammals). However, it is recognised that a terrestrial spill at the Port site or close to the coast has the potential to reach the marine environment. These spills are considered under the category of Marine Hazardous Materials Spill.

A marine hazardous materials spill would have no effects on terrestrial VCs, with the exception of the Birds VC which includes seabirds and shorebirds.

#### **34.5.1.2 *Fire or Explosion***

A fire or explosion has the potential to affect numerous VCs with the exception of Climate and Employment and Economy. While a fire or explosion would likely result in the release of criteria air contaminants (CAC), the volume of CACs is not anticipated to be such that climate would be affected and therefore the Climate VC is not assessed further. Fire or explosion would not affect the number of workers employed by the Project and therefore interactions with the Employment and Economy VC are not anticipated.

#### **34.5.1.3 *Transportation, Storage and Use of Explosives***

A spill during the transportation or storage of explosives (ammonium nitrate prill, and emulsion) can affect water and sediment quality and fish and fish habitat if it enters a water course (marine or freshwater). Generally, other terrestrial pathways are excluded since spills to land are expected to be readily cleaned up. An accidental explosion may temporarily affect air quality but would not be sufficient to affect the Climate VC. The residual effects on Traditional Land, Marine, and Resource Use (TLMRU) from an accidental release of ammonium nitrate prill or emulsion or an accidental detonation are expected to be not significant and not limit the supply of market foods therefore effects to Food Security and Sovereignty are not anticipated.

#### **34.5.1.4 Vehicle, Mobile Equipment, Aircraft or Marine Vessel Accident**

The assessment of vehicle, mobile equipment, aircraft or marine vessel accidents focuses on scenarios that have the potential to result in injury to people and as such the VCs assessed are Community Health and Well-Being and Infrastructure and Services. The potential effects to other biophysical VCs as a result of these accidents is considered under terrestrial hazardous materials spills, marine hazardous materials spills and, for vehicle/vessel collisions with wildlife, within the appropriate VC sections (Volume 6, Section 16: Caribou, Section 18: Wildlife, and Volume 8, Section 23: Marine Mammals).

### **34.6 Assessment of Residual Effects of Potential Accidents or Malfunctions**

This section is organized as follows:

- Mitigation applicable to all scenarios, describing plans and measures to mitigate effects on the environment from all seven accident or malfunction scenarios.
- Emergency measures and capacity, describing WKR's approach to responding to emergencies arising out of Project accidents or malfunctions.
- Discussion of seasonal risk considerations applicable to scenarios.
- Residual effects assessment, describing the effects on environmental VCs from each of the accident/malfunction scenarios remaining after mitigation.

#### **34.6.1 Mitigation Applicable to All Scenarios**

The following Management Plans (see Volume 11) will be developed to help reduce the risk, and mitigate the potential effects, of accidents or malfunctions should they occur. All management plans will be developed with input from Inuit and other Indigenous governments and organizations, users, and information obtained through consultation with regulators.

- **Explosives Management Plan:** will outline the management practices that aim to reduce the environmental and safety risks of manufacturing, transporting, storing, handling, and using these explosives. Contractors will be required to provide details relating to explosive storage facilities. The number and area of construction laydown areas, and their respective size, to be established at various locations along the right-of-way will list the material that will be stored, including construction vehicles, machinery, construction materials, geotextile rolls, explosives, erosion control supplies and other construction materials for the Project.
- **Fuel Management Plan:** will include procedures for safe handling, transportation, storage, and use of combustible substances.
- **Hazardous Materials Management Plan:** will be developed in accordance with the *Canadian Environmental Protection Act* and the Environmental Emergency Regulations. The Hazardous Materials Management Plan will identify terrestrial hazardous material spill prevention, protection and emergency response measures to be implemented.

- **Port Management Plan:** will include preventative measures for accidents, including vessel speed limits, size restrictions, tug assistance, and navigational aids, and requirements for calling at the Port, vessel operations, and maintenance of supporting infrastructure. It will also include procedures for communicating the presence of marine mammals in close proximity of the Grays Bay Port, weather, and operating conditions. The Port Management Plan will include provisions for aerodrome management, including protocols for specific air transportation operating procedures in accordance with Transport Canada and International Air Transport Association guidance and standards. In addition, the plan will identify air traffic management measures such as aircraft cruising altitudes and aerodrome wildlife aversion techniques.
- **Risk Management and Emergency Response Plan:** will include procedures to provide timely and effective emergency response, protocols that outline the responsibilities of Project personnel during an emergency, and a system for communicating and coordinating with first responders and local communities.
- **Road Management Plan:** will include preventative measures for accidents, including traffic speed limits, weight restrictions, signage, flag persons, road surface controls, beacon light and flagging requirements, and maintaining vehicles and mobile equipment. The Road Management Plan will also include procedures for communicating the presence of wildlife in proximity of the Grays Bay Road, weather, and road conditions.
- **Spill Contingency Plan:** will be developed in accordance with Government of Nunavut (GN) Spill Contingency Planning and Reporting Guidelines (GN 2023), and will include protocols for environmental emergency prevention, preparedness, response, and recovery in response to environmental emergencies caused by uncontrolled, unplanned, or accidental releases of toxic and hazardous substances listed in Schedule 1 of the Environmental Emergency Regulations (GOC 2019). The SCP will include direction for Project personnel for responding to a spill or unplanned release of a pollutant at the PDA. The direction provided will include immediate actions, corrective actions, and cleanup actions to be taken. The Spill Contingency Plan will also include a list of higher risk chemicals with information on the danger, safety data sheets that will be reviewed by Project personnel prior to handling the listed chemicals, methods of handling spills, precautions to be taken by Project personnel, and equipment required for handling and disposal. Contact information for emergency spill equipment contractors will be included in the Spill Contingency Plan.
- **Waste Management Plan:** will include procedures for the safe collection, handling, transportation, storage and disposal of wastewater (including sewage and greywater) and industrial and personnel-generated waste materials, including hazardous waste management.

In addition to the management plans already in place, the Grays Bay Port would serve as an important regional measure to improve marine safety and environmental protection. The port would support better charts, improved navigation aids, and upgraded marine infrastructure, helping to make travel through the Northwest Passage safer and more reliable. It would also allow faster and more effective responses to vessel accidents and hazardous material spills, strengthening emergency response capacity in a region that currently has marine traffic but limited response resources.

The mitigation measures detailed below are proposed to be implemented and are applicable to multiple accident and malfunction scenarios. Further mitigation measures specific to certain scenarios are discussed within each section.

The most likely accident to occur during the Project is a spill of hazardous materials to either the terrestrial, aquatic or marine environment. To prevent or reduce the severity of fuel and hazardous material spills during both the construction and operations and maintenance phases the Project design is proposed to include protective features to reduce the potential for vehicle and mobile equipment accidents. For example, watercourse crossings will be designed with posted speed limits and adequate signage for road curvatures or upcoming crossings. Bridges will have guardrails to reduce the risk of vehicles and equipment, which are likely hauling or containing fuel and hazardous materials from entering the water. Furthermore, a considerable amount of Project work is scheduled to occur during the winter; therefore, effects of spills to watercourses may be reduced because clean up would generally occur on frozen ground and ice.

Measures for spill prevention are included in the SCP, which consists of procedures to prevent and respond to spills, and includes the following based on regulatory requirements, guidelines, and industry best practices:

- Spill contingency measures will be implemented in accordance with the SCP.
- Fuel will be stored in tanks within berms with secondary containment capable of containing 110% of the largest tank volume and 10% of any aggregate containers.
- Fuel transport, handling and refuelling will be in accordance with an Operating Procedure to be included in the SCP.
- Areas and containers used to store Project wastes will be constructed, operated, and maintained in a manner to prevent waste from discharging to the surrounding environment.
- A landfarm may be constructed if required, at the Grays Bay Port site for onsite treatment of contaminated soil or snow that occurs as a result of accidents and malfunctions of mobile equipment. The facility would be constructed with an oil-water separator system. In the absence of the landfarm contaminated soils (small quantities) would be shipped offsite for treatment at a licensed treatment facility.
- Dedicated maintenance areas will have a liner or concrete installed under areas of vehicle storage and maintenance.
- Material Safety Data Sheets for hazardous substances are to be stored on site.
- Fuels and oils/lubricants will be stored more than 31 metres (m) from the ordinary high water mark of a watercourse or waterbody.
- Equipment such as generators and pumps will have secondary containment installed capable of containing fuel drips or leaks during operations and refuelling.
- Mobile equipment will be refueled more than 31 m away from the ordinary highwater mark of a watercourse or waterbody.
- Treated sewage and greywater are to be stored in approved holding tanks prior to removal from site or disposed of in accordance with the land use permit.

- All site personnel will receive SCP training and will have awareness of spill prevention.
- All construction workers will have sufficient safety training to reduce the potential for severe accidents.
- Machinery will be maintained as per the Operating Procedure and regularly inspected for fuel, oil, or other fluid leaks.
- Machinery found to be leaking will be withdrawn from service until repaired. Impacts to the environment resulting from the leaking equipment will be reported (if required) and remediated in accordance with the SCP
- Emergency spill response kits will be kept in vehicles and at fuel storage locations.
- Traffic speed will generally be 60 kilometres per hour (km/h), which may be increased up to 80 km/h, or decreased in certain areas, depending on wildlife considerations, terrain conditions, and geometric constraints.
- Speed limits will be posted on Project roads.
- Roadways within the port site and Jericho Station will be constructed to accommodate safe movement of traffic and equipment. Road design will include consideration of dark winter conditions and slow-moving traffic, as well as safe movement between vehicle types. Applicable roads will be designed and built to accommodate large vehicles and equipment. Adequate parking for staff and users will be provided.

If a spill at the Project sites occurs, the spill would be immediately contained and cleaned up using onsite spill kits and appropriate absorbent materials. Post clean up verification will ensure that all hazardous materials have been removed. In the event of a large spill, prioritization of site resources would be sent to the spill area for response. Larger spills may also require assessment by a qualified professional to confirm the extent of contamination and receptors and to develop a remedial plan as based on the site assessment.

The Project will implement best management and industry practices as appropriate to prevent or reduce the occurrence of vehicle accidents and driver error that may lead to spills due to vehicle/equipment roll over or loss of control, such as:

- All onsite contractors will have industry-compliant and satisfactory Health, Safety and Environmental policies, programs, and manuals to be implemented throughout the Project.
- Project personnel will be trained in vehicle and mobile equipment safe operations, defensive driving, weather-related hazards, and wildlife migration periods, as required.
- The Project site during construction and operations will rely on traffic control speed limits, weight restrictions, and signage for safe driving conditions.
- Project vehicles and equipment will undergo inspection prior to use by an operator.
- Vehicle and equipment operators will follow established radio communication protocols.
- Access to construction areas will be limited to Project personnel only for safety reasons.
- All on-site contractors will have industry-compliant and satisfactory Health, Safety and Environmental policies, programs, and manuals to be implemented throughout the Project.

### 34.6.2 Emergency Preparedness and Response

WKR will require the Project contractor to demonstrate their ability to provide emergency response services at the Project site that are sufficient in capacity and capability to respond to emergency events in such a remote arctic operating environment. An RMERP will be developed to include detail pertaining to incident response, investigation, review, and corrective measures in accordance with the findings of the investigations. The measures in the RMERP will be combined with an SCP for events that require reaction to emergency spills. The RMERP will be developed in accordance with federal and territorial laws and regulations, in addition to the GN policies and procedures that are protective of the environment and human health. The RMERP will be enforced with subcontractors and workers for the duration of the Project construction and operations and maintenance.

The Project-specific RMERP will include:

- Scope of plan and types of emergencies covered by the plan (e.g., fire, medical, security)
- Responsibilities of the GN, contractor, and other responders
- Communications plan for alerting employees, communities and the GN during an emergency
- Evacuation and response plan
- Government agencies and communities to be notified
- Training, testing, and reporting

### 34.6.3 Seasonal Risk Considerations

The potential extent and risk of residual effects from accidents and malfunctions can be substantially influenced by seasonality. The geography and seasonality of the Project location provide unique considerations related to sensitive receptors, emergency response, and clean up ability.

In general accidents or malfunctions during summer months present a higher risk to wildlife and vegetation than an event during winter months. Wildlife has a relatively short summer season to take advantage of milder weather conditions and food availability for calving, feeding and breeding. Migratory species are also present in the area during the summer months. Arctic vegetation has a short growing season in the spring/summer months and due to lack of snow coverage is more likely to be directly impacted in the event of an accidental event. However, the long daylight hours of arctic summers and favourable weather conditions can be advantageous for emergency response and clean-up operations.

In contrast winter conditions may present a lower risk for an accident or malfunction to interact with vegetation in certain project areas. Vegetation is also likely to be afforded some protection from snow/ice coverage potentially preventing contaminants reaching the vegetation. Contaminant containment may also be aided by the presence of snow and ice. However, in contrast to summer conditions, poor winter weather conditions and short daylight hours can present challenges to emergency response and clean-up efforts.

Table 34.7 presents a summary of seasonal considerations when assessing the risk of accidents and malfunctions.

**Table 34.7 Seasonal Risk Considerations**

<b>Winter</b>	<b>Spring Break-up</b>	<b>Summer (open water)</b>	<b>Fall Freeze-up</b>
Lower potential for interaction with vegetation Containment and clean up may be aided by the presence of snow/ice Risk of hidden pathways via ice cracks and overflow Colder temperatures can slow biodegradation Poor weather conditions and limited daylight can present challenges to emergency response and clean up operations	High uncertainty for pathway of spread of contaminants due to runoff and freshet increasing spread to watercourses Migratory wildlife species may be moving through the area	Highest potential for interaction with wildlife and vegetation during sensitive life stages i.e., breeding, feeding migrating Faster spread of a spill in open water conditions (marine or freshwater) Good weather conditions and long daylight hours can be advantageous for emergency response and clean up operations	Wet soils increase mobility of contaminants Migratory wildlife species may be moving through the area Reducing daylight hours and increasingly poor weather conditions with early storms

### 34.7 Description of Residual Effects

The following sections describe the residual effects of each accident and malfunction scenario on applicable VCs. The determination of significance of effects is based upon the significance definition provided for each VC in Sections 11-30. The significance determinations for each VC sections incorporated the feedback provided at the September 2025 IAG workshop, where participants discussed significance, with the goal of identifying effects that are considered acceptable or unacceptable to members. Feedback received from IAG members identified the following priorities, when considering unacceptable changes as a result of the Project:

- That Inuit perspectives are considered and addressed in Project design,
- That the Project does not negatively affect peoples’ ability to put food on the table, and
- That water and wildlife are protected.

For reference, VC significance definitions are provided below in Table 34.8.

**Table 34.8 VC Residual Effects Significance Definitions**

VC	Significance Definition
Air Quality	For a change in ambient air quality, a significant adverse residual environmental effect is defined as a project-related environmental effect that degrades the quality of the ambient air such that the maximum ground-level concentrations of air contaminants of potential interest from the Project (in various phases) frequently exceeds the respective air quality standards, objects and guidelines.
Noise and Vibration	A significant residual effect is one where noise and vibration effects result in a high magnitude change (such as exceedance of applicable noise and vibration thresholds) in the LAA with medium-term or longer duration, and continuous frequency.
Terrain, Soils and Permafrost	A significant residual effect on terrain, soils, and permafrost is one that, following the application of avoidance and mitigation measures, threatens the stability of local terrain, soil development, and/or soil capability, as well as the ability of soils to support vegetation.
Vegetation	A significant adverse residual effect on vegetation is one that, following the application of avoidance and mitigation measures, threatens the long-term persistence or viability of plant communities or species, including those of plant resources of cultural importance to Kitikmiut, other Indigenous groups, and other potentially affected communities.
Wildlife	<p>A significant residual effect on Caribou is defined as: The Project's effect on a caribou herd causes or exceeds conservation-based thresholds or threatens the long-term persistence and viability of the population despite the application of mitigation, management, and enhancement measures.</p> <p>A significant adverse residual effect on other terrestrial wildlife is defined as one that is expected to alter the viability and persistence of populations of indicator species that interact with the RAA beyond an acceptable level (e.g., where it is not sustainable or is unavailable to contribute to biodiversity and ecosystem function or is not available for managed harvest).</p> <p>A significant adverse residual effect on birds is defined as a residual effect that is expected to result in an adverse change to bird population viability and persistence, of bird populations that interact with the RAA, beyond an acceptable level (e.g., where it is not sustainable or is unavailable to contribute to biodiversity and ecosystem function or is not available for managed harvest).</p>
Water	<p>A significant residual effect on surface water quantity is defined as a persistent, measurable change in surface water quantity attributable to the Project that remains after the application of avoidance and mitigation measures have been applied. The change must exceed natural variability to the extent that it could adversely affect the aquatic ecosystem or existing water users.</p> <p>A significant residual effect on surface water or sediment quality is defined as a persistent, measurable change in water or sediment parameters attributable to the Project that remains after the application of avoidance and mitigation measures have been applied. The change must exceed natural variability to the extent that could negatively impact ecological or human receptors defined in the assessment.</p> <p>A significant residual effect on groundwater quality is defined as a persistent, measurable change in groundwater quality attributable to the Project that remains after the application of avoidance and mitigation measures have been applied. The change must exceed natural variability and could adversely impact existing or future groundwater users and/or the environment.</p>
Freshwater Fish and Fish Habitat	A significant adverse residual effect on freshwater fish and fish habitat is defined as one that, following the application of avoidance and mitigation measures, results in an alteration, disruption, or destruction of fish habitat or a change in fish health, growth, or survival that is likely to cause a measurable change in the productivity of relevant fish populations, including those of cultural or traditional importance.

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VC	Significance Definition
Marine Water & Sediment	<p>A significant adverse residual effect on marine water quality is one which cannot be fully addressed through avoidance or mitigation measures and is likely to result in long-term or irreversible changes to water quality, with a moderate to high magnitude of impact as determined through available CCME marine water quality guidelines for the protection of aquatic life or contravenes the <i>Arctic Waters Pollution Prevention Act</i> or the <i>Fisheries Act</i>.</p> <p>A significant adverse residual effect on marine sediment quality is one which cannot be fully addressed through avoidance or mitigation measures and is likely to result in long-term or irreversible changes to sediment quality, with a moderate to high magnitude of impact as determined through available CCME marine sediment quality guidelines for the protection of aquatic life or screening criteria in the Disposal at Sea Regulations under the Canadian Environmental Protection Act, or under the Fisheries Act</p>
Marine Fish and Fish Habitat	<p>A significant residual effect on fish habitat is one which cannot be mitigated by avoidance and mitigation measures (including habitat offsets) and is likely to result in a permanent or long-term change to fish habitat, which may in turn threaten the long-term persistence or viability of a fish species or population.</p> <p>A significant residual effect on fish behaviour is one which cannot be mitigated by avoidance and mitigation measures and is likely to result in a permanent or long-term change in population-level fish behaviour and/or distribution with the potential to threaten the long-term persistence or viability of a fish species or population.</p> <p>A significant residual effect on risk of mortality or injury is one which cannot be mitigated following the application of avoidance and mitigation measures and is likely to result in a permanent or long-term increase in fish mortality and/or injury risk with the potential to threaten the long-term persistence or viability of a fish species or population.</p>
Marine Mammals	<p>A significant residual effect to marine mammal habitat is one which cannot be mitigated by avoidance and mitigation measures (including commitments) and is likely to result in a permanent or long-term change to marine mammals, which may in turn threaten the long-term persistence or viability of a marine mammal species or population</p> <p>A significant residual effect to marine mammal behavior is one which cannot be mitigated by avoidance and mitigation measures (including commitments) and is likely to result in a permanent or long-term change in population-level marine mammal behaviour and/or distribution.</p> <p>A significant residual effect on risk of mortality or injury is one which cannot be mitigated following the application of avoidance and mitigation measures (including commitments) and are likely to result in a permanent or long-term increase in marine mammal mortality and/or injury risk, which threatens the long-term persistence or viability of a marine mammal species or population.</p>
TLMRU	<p>Considering the above, for the purposes of this assessment, a significant adverse effect on TLMRU is one that, following the implementation of mitigation, management, and enhancement measures, will create a long-term permanent change or disruption to TLMRU to a point where the activities cannot continue at or near current levels within the TLMRU RAA.</p>
Food Security and Food Sovereignty	<p>A significant adverse residual effect on food security and food sovereignty is defined as one where:</p> <ul style="list-style-type: none"> <li>• There is a persistent and substantial decline in country foods availability or perceived quality</li> <li>• The Project will create a measurable adverse change from current conditions and trends with respect to food security or food sovereignty at the community level that are attributable to the Project and cannot be managed or mitigated through adjustments to programs, policies, plans, or through other mitigation.</li> </ul>

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VC	Significance Definition
Community Health and Wellbeing	<p>A significant adverse residual effect on community health and well-being is defined as one where:</p> <ul style="list-style-type: none"> <li>• There is an exceedance of available capacity of health infrastructure and services, or a substantial decrease in the quality of a service, provided on a persistent and ongoing basis, which cannot be mitigated with current or anticipated programs, policies, or mitigation measures.</li> <li>• The Project will create a measurable adverse change in physical or mental health outcomes or determinants of health from current conditions and trends at the community level; adverse changes are attributable to the Project and cannot be managed or mitigated through adjustments to programs, policies, plans, or through other mitigation.</li> <li>• Physical health from exposure to pollutants and hazards may be impaired compared to baseline conditions, even with the implementation of mitigation and management.</li> </ul>
Employment and Economy	<p>A significant adverse residual effect on employment and economy is defined as one where:</p> <ul style="list-style-type: none"> <li>• The project will create a measurable change from current conditions and trends at the community level that are attributable to the Project and cannot be managed or mitigated through adjustments to programs, policies, plans, or through other mitigation.</li> <li>• The project will result in a reduction in annual GDP growth at the territorial level.</li> </ul>
Infrastructure Services	<p>A significant adverse residual effect on infrastructure and services occurs when there is an exceedance of available capacity, or a substantial decrease in the quality of a service provided, on a persistent and ongoing basis, which cannot be mitigated with current or anticipated programs, policies, or mitigation measures.</p>
Non-TLMRU	<p>A significant adverse residual effect on non-traditional land, marine, and resource use is defined as one where:</p> <ul style="list-style-type: none"> <li>• The Project does not comply with established and approved land use plans, policies or by-laws, or</li> <li>• The Project will create a change or disruption that restricts or degrades present land use capability to a point where the activities cannot continue at or near baseline levels and where mitigation is not possible, or</li> <li>• The Project will affect marine navigation in a way that is unacceptable to the relevant regulatory authorities.</li> </ul>
Heritage Resources	<p>A significant adverse effect on heritage resources is defined as one that results in an unauthorized Project-related disturbance to, or destruction of, all or part of a heritage resource site considered by the territorial regulators to be important and that is not mitigated or compensated as required by regulators.</p>

### 34.7.1 Terrestrial and Aquatic Hazardous Materials Spill

The severity of environmental effects resulting from a spill of fuel or other hazardous material depends on the amount spilled, location, and the nature of the hazardous material spilled. Generally, a spill less than 100 L of fuel can be managed using best practices if it does not directly enter a waterway. Some hazardous materials are much more toxic in smaller quantities but may also be effectively managed if contained and cleaned up promptly and effectively. Effects of small spills < 100 L would not be considered significant.

If a large quantity of material is released to the environment it may result in deposition of the substance into the waterway (e.g., topography and soils conducive to flows). For example, a vehicle malfunction or collision could have a significant effect on surface water and fish and fish habitat should the associated spill enter a fish bearing waterbody.

Likewise, spills on land can still have adverse consequences if not cleaned up properly and in a timely manner. In contrast to spills in or near water, the effects are likely to be small on a local scale. With the WKR's commitments to prevention and effective response, these events will be contained and cleaned up before the spill can spread into sensitive areas.

The worst probable case for a hazardous material spill would likely be a large spill (> 1,000 L) of fuel into a major watercourse (e.g., Burnside River, Hood River, James River, and Kennarctic River) under unfrozen conditions. Due to the properties of the fuel (it is insoluble and lighter than water), fuel may be transported downstream into connecting waterbodies and to riparian areas. Some fuel constituents would likely move from the water to the sediment environment. Clean up efforts would remove accessible fuel, but the contamination may be widespread in the aquatic and terrestrial environment downstream of the discharge. Over time, the contamination will dissipate and be diluted. The severity of effects would depend on the use of the area by human and ecological receptors. Large volume fuel storage will only be in facilities that are well distanced as required from watercourses with safeguards and response capacity nearby (i.e., response personnel, equipment). The most likely spills near water would be from operating and transportation equipment and thus limited to the amount of fuel or hydraulic fluid contained in the equipment. Larger spills near water could occur during transport or transloading of fuel and will be limited to the volume of any tanker truck compartment that is damaged severely enough to spill. In the event of a spill, response measures would focus on containment of the spill to limit the effects, cleanup of the spill, and remediation of the affected areas as quickly as possible per the Emergency Response Plan and Spill Contingency Plan.

A hazardous materials spill to the terrestrial or aquatic environment generally presents the greatest risk during the spring and summer months when biota (wildlife and vegetation) is most abundant and exposure pathways are more direct i.e. no snow/ice coverage. However, as noted in Section 34.6.3, response and clean up may be aided by favourable summer weather conditions and long daylight hours.

### **34.7.1.1      *Terrain, Soils and Permafrost***

If a spill event occurred on land during the summer months, soil contamination would likely occur. The spill response procedures require the removal of contaminated soil material from the area, followed by storage or shipment for safe disposal. The effect from a large spill (> 1,000 L) on soil may affect long-term soil development, as the affected soil would need to be excavated and replaced with clean fill. A large spill is unlikely, but the residual effect on soil could be significant, if located in an area of productive soils.

### **34.7.1.2      *Vegetation***

In the unlikely event of a large spill of fuel or hazardous materials, there could be an effect on vegetation. The immediate road structure and right-of-way (ROW) will be cleared of vegetation; however, depending on the location of the spill and the time elapsed until clean up, spills may reach vegetated areas and/or wetlands adjacent to the ROW. Spills may also occur within reach of vegetated areas at the Port, Aerodrome, or Jericho Station. Effects may include direct loss or alteration of native vegetation communities and loss of traditional plant use.

There is also potential for vegetation loss due to soil removal as a result of cleanup activities. In the case of a large spill into a wetland, local effects may persist into the long-term but would not be expected to affect wetlands on a regional scale.

As the residual effect would have limited effect on plants and/or wetlands outside of the immediate vicinity of Project infrastructure (Port, Aerodrome, cleared road ROW, or Jericho Station) the residual effect of a spill on vegetation and wetlands is considered not significant.

### **34.7.1.3      *Wildlife (including Caribou and Birds)***

In the unlikely event of a large spill of fuel or hazardous materials, there could be an effect on wildlife. There are circumstances where wildlife could interact directly with spilled material if spill intervention and clean up was not rapid enough or the spill volume was large. Removal of contaminated soils and vegetation would reduce habitat in the immediate area and wildlife may avoid the area even after it is cleaned up. Small spills are more likely than large spills and the clean up of small spills would result in less soil removal and habitat loss.

Due to the limited local extent of a spill as a result of applying mitigation measures, the Project would not be expected to threaten long-term persistence or viability of wildlife species, including species at risk, species of conservation concern, or those that are of cultural or traditional importance. Residual effects on wildlife and wildlife habitat from a spill are considered not significant.

### **34.7.1.4      *Water Resources***

If a large spill event (> 1,000 L) entered a waterbody, there would likely be effects on surface water quality and sediment quality. In the event of a spill, response measures would focus on containment of the spill to limit the effects, cleanup of the spill, and remediation of the affected areas as quickly as possible; however, it is likely that water quality parameters may be exceeded in the local area.

A large spill is unlikely. The significance of the effect of a large spill on water and sediment quality will depend on whether ecological receptors such as wildlife and people have access to the area before the spill can be mitigated. The residual effects on water and sediment quality of a large spill, though unlikely, could be significant.

#### **34.7.1.5      *Freshwater Fish and Fish Habitat***

Localized fish mortality may result from an accident or malfunction that results in a spill of fuel or hazardous material in or near fish habitat. Depending on the location of the event, the size of the spill, and the toxicity of the materials being transported, fish mortality could range from a few fish (not affecting the sustainability and productivity of a fishery) to larger scale levels of fish mortality (which could have a temporary effect on localized fish populations). Changes in fish health, growth, or survival (e.g., number of fish mortalities, fish tissue metal content, fish community composition) can occur as a result of chronic or acute toxicity to fish populations.

By applying mitigation to limit the extent of the spill and cleaning up the spill promptly, the residual effects of a spill (large or small) on fish and fish habitat are considered not significant because they are not expected to affect the productivity or sustainability of the fish species or population. Large spills are also unlikely to occur.

#### **34.7.1.6      *Traditional Land, Marine and Resource Use/Food Security and Sovereignty***

A large spill of hazardous materials could affect several VCs contributing to traditional land, marine and resource use (as defined in Volume 9, Sections 24 and 25), including pathways to traditionally harvested wildlife, plants and fish, and use of land for cultural practices. The effects on TLMRU will, to some extent, be tied to the actual effects on those VCs based on measurable parameters and the cultural value of the area affected. TLMRU is closely tied with the Food Security and Sovereignty VC and as such they are combined in this assessment.

In the unlikely event of a large spill, the ability to access areas surrounding the incident location for cultural or traditional use (fishing, trapping, hunting) may be affected. The extent of the effects will be dependant upon the location i.e., whether the incident occurs in an important harvesting or cultural use area and the timing i.e., an incident occurring during key harvesting periods. Even in the event of a large spill effects to the supply of market food would not be anticipated or would be short term.

Given the likely limited geographic area of any spill and the effectiveness of mitigation measures at restoring lands and resources in the area affected by a spill, the effect on TLMRU and Food Security and Sovereignty are not anticipated to be significant; however, a large spill may change the way individual traditional land users use an area or resources, based on the perceived effects or changes to the value of the affected area or resource. If individual traditional land users select to no longer use an area due to the perceived effects of a spill then the effect to those users may be significant.

### **34.7.1.7      *Community Health and Well-being***

In the case of a hazardous materials spill, contaminants could be present in soil and water for a short time before the spill is cleaned up. The purpose of spill response and remediation would be to address residual contamination to levels that are below criteria for human and ecological health. During the short period of exposure, however, there could be ecological uptake by vegetation, wildlife, and fish.

Changes in water and country food quality would be unlikely and limited due to the short period of exposure. However, any changes could influence the well-being of local people who take part in hunting, trapping, traditional, and recreational activities, who may be required or choose to avoid harvesting of potentially affected resources.

The short-term nature and reversibility of the effect of spills would result in the residual effect on community health and well-being being considered not significant. In addition, as discussed in Section 34.7.1, large spills are considered unlikely.

### **34.7.1.8      *Non-Traditional Land, Marine, and Resource Use***

The potential effects of a terrestrial or aquatic hazardous materials spill on non-traditional land, marine, and resource use (Non-TLMRU) are similar to those discussed previously under TLMRU. The extent of the effects will be dependent upon the location i.e., whether the incident occurs in an area used for non-traditional activities i.e., outfitting, and the timing i.e., an incident occurring during key activity periods.

Given the likely limited geographic area of any spill and the effectiveness of mitigation measures at restoring lands and resources in the area affected by a spill, the effect on Non-TLMRU are not anticipated to be significant; however, a large spill may change the way land users use an area or resources, based on the perceived effects or changes to the value of the affected area or resource. If individual land users or tourism companies select to no longer use an area due to the perceived effects of a spill then the effect to those users may be significant.

### **34.7.1.9      *Heritage Resources***

In the unlikely event of a large spill of fuel or hazardous materials, heritage resources could be affected, primarily through disturbance during clean up and remediation. Any heritage resources encountered during clean up activities would be documented. Significant effects to heritage resources are not anticipated.

## **34.7.2      *Marine Hazardous Materials Spill***

During construction, the variety of Project vessels are anticipated to include: 3 barges/tugs, 1 fuel tanker, and 2 cargo freighters. For each year of construction there will be an annual sea lift of supplies via cargo freighter(s) with associated barge offloading, as well as fuel resupply via tanker. It is estimated that initial mobilization will require approximately two freighter (sealift) sailings and around 60 to 100 offload barge trips to stage materials required for the first season of construction at the port site. An ice-reinforced fuel barge may be mobilised concurrently with the first sea lift with the intent of freezing in over the winter months to support the first year of construction.

During operations and maintenance, the variety of Project vessels are anticipated to include approximately: 3 barges/tugs, 1 fuel tanker and 1 cargo freighter. Project vessels will provide annual resupply of the port facility and vessel docking assistance via harbour tugs. Construction and operations and maintenance vessels will operate during ice-free conditions, which is generally forecasted from late June through October, with annual variation depending on weather conditions. During operations, the Grays Bay Port will be made available during the shoulder season (i.e., early June and into November) to the Canadian Coast Guard. Operations of the marine-based infrastructure of the Grays Bay Port will not be available for use between December to May.

The marine component of the port will only be operational during the open water season and therefore the potential for a marine hazardous materials spill to open water is limited to that time period. A spill to ice could occur during the winter season as a result of an accident close to the shoreline. Spills to ice will have a lower potential to result in negative effects than a spill to open water if, containment and clean up can occur prior to the spill contacting the water. The highest risk of incident is considered to be during first year of construction when infrastructure (i.e., permanent fuel containment areas) is not yet in place

Potential scenarios for the spill of hazardous materials to the marine environment include:

- Fuel transfer to/from vessel to shore
- Vessel incident resulting in loss of containment
- Leaks from equipment working on/near the ocean
- Loss of materials during vessel onloading/offloading
- Terrestrial spill close to the coastline that is not contained and accesses the marine environment

An accidental release of fuel while refuelling or leaks from equipment are the most likely small-scale (i.e., several litres of less) hazardous material spill. During ship-to-shore fuel transfer, minor accidental releases may occur occasionally in water and/or on land. Other oily discharges may also occur from bilge tanks, engines, mechanical parts and other equipment on board the vessel. The accumulation of these minor spills may become a cause for concern if they are not quickly contained. Spills on land and ice are more readily contained than those in open water, since water can spread the spill quicker and cause immediate impacts to water quality and aquatic life. Snow and ice, on the other hand, will act to help contain the spill while clean-up action is implemented. Spill response equipment will be available at all times during construction and operations and maintenance at Grays Bay Port. An emergency and clean-up response team will implement the spill contingency plan as soon as possible. Appropriate loading and off-loading procedures using the *Arctic Waters Pollution Prevention Act*, Arctic Shipping Pollution Prevention Regulation and the Regulation for the Prevention of Pollution from Ships and Dangerous Chemicals, will be implemented to prevent or quickly contain any spills or releases of fuel during ship-to-land transfers.

For the first winter of construction, an ice class fuel barge may be used for fuel storage at the Project site to provide the diesel fuel required to support early construction. This is a common practice used for Projects undertaken in remote Arctic locations with limited infrastructure.

The operation of the fuel barge is regulated under the *Canada Shipping Act*. The barge will have its own Shipboard Oil Pollution Emergency Plan (SOPEP). The barge will be positioned during the open water season. Once immobilized in the ice, there will be little movement except for tidal upswell. The only scenario that could result in a large spill are related to on-board operations of the barge; the SOPEP will take this into consideration and will have detailed response procedures. The most likely spill scenario is thus from the ship-to-shore transfer of fuel as described above.

A large-scale spill could occur as a result of a vessel accident and breach of containment. Major spills due to vessel accidents in Canadian waters have been infrequent. A review of oil spills that reached shorelines in Canada found that, from 1970 to 2020, 9% occurred in Arctic waters, the majority (52%) of spills occurred on the Pacific Coast, and the remainder (39%) on the Atlantic Coast. Across Canada, the majority (55%) of spills were less than 100 cubic metres (m<sup>3</sup>), 30% spilled 100 to 1,000 m<sup>3</sup>, and 15% spilled more than 1,000 m<sup>3</sup>. Bunker fuel and diesel accounted for 33% of the spills (Feng et al. 2021).

A large-scale spill is also possible from the terrestrial bulk fuel storage facility, which, if uncontained could reach the marine environment. However, this is considered unlikely as the facility will be located approximately 300m from the coast and will include secondary containment and berms. The foundation and secondary containment berms will be constructed of quarried material with approved membrane material integrated into the containment berm.

The magnitude, duration and extent of effects from a spill to the marine environment will vary, depending on several factors including:

- Volume of material spilled
- Location of the spill
- Type of material spilled, including its chemical and physical properties
- Weather conditions at the time of the spill
- Season at the time of the spill (e.g., ice conditions, wildlife presence)
- Sensitive environmental receptors near the spill (e.g., spawning areas)
- The time it takes for the spill to be identified and response started
- Effectiveness of spill response efforts in consideration of weather at the time of the spill response efforts

A hazardous materials spill to the marine environment generally presents the greatest risk during the summer months when marine wildlife is most abundant and exposure pathways are more direct i.e. open water. However, as noted in Section 34.6.3, response and clean up may be aided by favourable summer weather conditions and long daylight hours.

When oil is spilled in the environment, a process called weathering begins to occur. Weathering is the process where the environment affects the oil products and chemical and physical changes occur. These changes can affect the viscosity and density of the oil, changing how it moves through the environment (Ryan et al. 2019). The volatile components in the oil will evaporate; the rate will depend on air temperature and any wind. Some compounds in the oil will dissolve in water, while others will disperse through the water column. Some oil or compounds in the oil will biodegrade (Ryan et al. 2019).

Marine diesel is considered non-persistent and will evaporate quickly (Environment Canada n.d.).  
Marine diesel is toxic to aquatic species and could harm marine birds if they interact with a spill.  
Marine diesel degrades naturally within days to months (Environment Canada n.d.).

In the event of a spill, response measures would focus on containment of the spill to limit the effects, cleanup of the spill, and remediation of the affected areas as quickly as possible per the Emergency Response Plan and Spill Contingency Plan.

Mitigation measures to reduce the potential for hazardous materials spills to the marine environment include:

- The Project will be designed with consideration of the potential for marine hazardous material spills and in accordance with Project-specific detailed bathymetric surveys, design safety considerations, industry best practices, guidelines and regulations.
- Controlled marine access to the port will be facilitated by communications and marine navigation aids to be located at on the headland at the port site and offshore islands, as needed. The placement and type of navigational infrastructure and navigational aids will meet Transport Canada and Canadian Coast Guard requirements for marine safety and navigation.
- The port will have Transport Canada-approved Oil Pollution Emergency Plans as required under the Oil Handling Facilities Regulations of the *Canada Shipping Act*; this Act also requires that every vessel have a Transport Canada-approved Shipboard Oil Pollution Emergency Plan to address accidental releases of fuel.
- The operations and response structure at the port will be designed for rapid response to a spill. All equipment and resources will be strategically placed directly at the port operation site.
- All refuelling and fuel transfer activities will be monitored.
- Materials will be available at all physical work locations to support containment and recovery of spills.
- Contractors will be responsible for having spill response equipment and materials onsite and readily available.
- Project personnel will be trained in fuel handling and equipment maintenance.
- Project personnel will be trained in spill prevention, response and spill contingency planning.
- All equipment will arrive to the Project free of leaks and in good working condition. Any equipment which does not arrive free of leaks and in good working condition will not be utilized unless repaired or replaced.
- Equipment used during Project activities will be maintained in proper working condition to reduce the potential for leaks.
- All hazardous materials will be stored using adequate secondary containment.
- No fuel, oil or other hazardous material will be stored within 31 m of the ordinary highwater mark of a marine waterbody.
- Equipment maintenance and servicing will not occur within 31 m of the highwater mark of any water feature.

- Project-related vessels will be equipped with spill containment and cleanup materials.
- Project-related vessels will undergo inspection prior to use.
- Project-related vessels will be equipped with radio communication controls, and anti-collision devices such as alarms and radars.
- Project-related vessels will comply with all applicable maritime laws, NOTMAR, NAVWARNs, regulations, and policies.
- Project-related vessels will adhere to speed limits and weight restrictions within the marine areas of the Project.
- WKR will keep the Project website, dedicated toll-free phone line and email address up to date with educational messages and emergency response guidance to support community awareness.

#### **34.7.2.1 *Marine Resources (Birds, Water & Sediment, Fish and Fish Habitat, Mammals)***

A large-scale spill of a hazardous material that originates on or enters the marine environment may affect marine resources, including species of cultural importance. The toxicity and size of a spill would depend on the volume and characteristics of the material, sensitivity of organisms to the material, spill response timelines, and characteristics of the ocean at the time of the spill. The most likely spill scenario would be of marine diesel or lubricants from vessels/equipment working at the Port. Marine diesel is considered a non-persistent oil (compared to a heavier Bunker or crude oil product) as in calm sea conditions it will lose approximately 40% of its volume due to evaporation in cold weather. In open rough seas most of the volume released would be expected to be dispersed or evaporated within five days (Environment Canada n.d.). However, even though marine diesel is considered non-persistent, it is toxic to aquatic life that come into direct contact (NOAA 2006). Some littoral and sublittoral marine vegetation, fish, invertebrates, and marine mammals may experience acute toxicity if they are directly exposed to a hazardous material. Individuals would be primarily affected, rather than populations. A spill of a hazardous material that affects the shoreline could affect intertidal vegetation and marine resources that use shallow habitats. The impacts of spills may be heightened seasonally for some species whose populations become concentrated during breeding seasons or in specific foraging areas or as they move along historic migration corridors.

Given the likely small size of a potential spill, species sensitivity and known toxicity of some materials (e.g., diesel fuel), and the speed and effectiveness of response measures, the effect on marine resources is not anticipated to be significant. However, in the unlikely event of a large uncontained spill to the marine environment, the effect could be significant.

#### **34.7.2.2 *Traditional Land, Marine and Resource Use/Food Security and Sovereignty***

A large spill of hazardous materials could affect several VCs contributing to TLMRU (as defined in Volume 9, Section 24 and 25), including pathways to traditionally harvested fish, marine/coastal birds, marine mammals, and use of coastal land for cultural practices. The effects on TLMRU use will, to some extent, be tied to the actual effects on those VCs based on measurable parameters and the cultural value of the area affected. TLMRU is closely tied with the Food Security and Sovereignty VC and as such they are combined in this assessment.

In the unlikely event of a large spill, the ability to access areas surrounding the incident location for cultural or traditional use (fishing and hunting) may be affected. The extent of the effects will be dependant upon the location (i.e., whether the incident occurs in an important harvesting or cultural use area) and the timing (i.e., an incident occurring during key harvesting periods). Even in the event of a large spill effects to the supply of market food would not be anticipated or would be short term

Given the likely small size of a spill and the effectiveness of response measures, the effect on TLMRU and Food Security and Sovereignty are not anticipated to be significant. However, in the event of a large spill to the marine environment which changes the way individual traditional users use an area or resources, based on changes to or perceived changes to the value of the affected area or resource, the effect could be significant.

### **34.7.2.3      *Community Health and Well-being***

Community health and well-being may be affected by a marine spill of a hazardous material through effects on the marine environment and organisms that are harvested for human consumption. If the spilled material bioaccumulates, there may be health effects to individuals who eat the contaminated food. Perception associated with ecological change and the quality of country foods could lead to decisions by individuals to forego consumption of country foods from locations around a spill.

The short-term nature and reversibility of the effects of small spills would likely not result in a significant effect on community health and well-being. However, in the unlikely event of a large spill residual effects could be significant.

### **34.7.2.4      *Non-Traditional Land, Marine, and Resource Use***

The potential effects of a marine hazardous materials spill on Non-TLMRU are similar to those discussed previously under TLMRU. The extent of the effects will be dependent upon the location i.e., whether the incident occurs in an area used for non-traditional activities i.e., tourism, outfitting, etc.

Given the likely small size of a spill and the effectiveness of response measures, the effect on Non-TLMRU is not anticipated to be significant. However, in the event of a large spill to the marine environment which changes the way individual users use an area or resources, based on changes to or perceived changes to the value of the affected area or resource, the effect could be significant.

### **34.7.3      *Fire or Explosion***

A fire or explosion could be caused by several failures, including equipment or machinery malfunction, combustion of inflammable materials, building fires, or human error occurring at the Project site. The Project design and safety measures aim to control human influences on fire ignitions. In cases where small, localized building or equipment fires occur, onsite fire suppression systems, fire response, and firefighting equipment are anticipated to be effective.

Explosions are possible when fires are in proximity to ignite pressurized vessels, such as propane tanks, or tanks that hold flammable materials, such as fuel tanks. Should fire suppression efforts not extinguish a fire immediately, a small fire or resultant explosion is not likely to reach surrounding tundra due to gravel clearings around buildings and road embankment setbacks from vegetation, which create a buffer to prevent spread of fire.

The worst-case scenario would be for a Project-related fire to expand into the nearby vegetation or expand outside of the Project area, becoming a wildfire. Wildfires are rare in Nunavut due to the cold climate, permafrost conditions, and limited biomass, with the territory primarily being affected by smoke from fires in neighbouring jurisdictions. The Project is situated in the Takijuj Lake Upland ecoregion of the southern arctic ecozone, and the ecoregion is composed mainly of unvegetated rock. The four most dominant landcover classes by percentage of area are Heath Bedrock/Boulder, Boulder/Bedrock, Water, and Heath Tundra. Although rare, wildfires do occur; in 2023 the Government of Nunavut declared a local State of Emergency in Bathurst Inlet due to a wildfire. Increasing trends in fire weather and fire activity are Projected under continued climate change. An overall increase in fire activity in the Arctic is Projected, driven by increasing air temperature, lightning activity, fuel load and availability (including woody shrubs and thawed permafrost), and fire season length (McCarty et al. 2021; Hethcoat et al. 2024). The maximum Projected number of days with “very high” fire danger in the Project region is 6-10 days per season, increasing from the baseline of 2 – 4 days per season (CanLEAD-FWI (Van Vliet et al. 2024)). The potential for adverse environmental effects is dependent on the size of fire/explosion, location, duration, weather conditions (i.e., wind, rain, temperature), and intensity of the burn.

The Emergency Response Plan (ERP) procedures related to fire prevention and management will reduce the likelihood of accidents and potential fires. As part of this plan, fire prevention and suppression systems will be located at work sites during construction, including water trucks, water hoses, pumps, fire extinguishers, and other firefighting equipment. Water for firefighting will be drawn from raw local sources (i.e., nearby ponds, rivers) for emergency use. A cleared buffer will be maintained around Project infrastructure and staging areas to limit the spread of fire from a facility fire to the surrounding forest and to protect the facilities from a non-Project-related wildfire.

The Project will depend on a network of strategically placed water tanks and pump/hose assemblies designed to deliver water in the event of an emergency. Fire extinguishers will be located indoors in accessible locations. Fire detection, fire alert, and fire protection systems will be installed in various facility areas. First response firefighting activities will be conducted by the Project workers trained to use water trucks and emergency response equipment.

Employees will be trained in fuel handling, equipment maintenance, and fire prevention and response measures, and fire prevention and suppression systems will be maintained on-site. Furthermore, emergency response procedures will be in place to provide timely and effective response to fires and containment within the Project area. Protocols for communication with local authorities will also be included in these emergency response procedures.

Design features and mitigation measures to reduce the potential for fires and explosions include:

- The Grays Bay Road will use signage to raise awareness of wildfire risks and to remind road users of fire prevention actions i.e., no fires allowed while utilizing the road.
- During operations and maintenance both the port and the Jericho Station will have a fire suppression system which will be capable of supplying water at a minimum rate of 1000 litres per minute for one hour. Water system infrastructure will include insulated, freeze protection, as well as thaw recovery systems.
- Fire extinguishers will be located indoors in tactical locations (buildings, vehicles, equipment), with sprinklers used in buildings. Fire detection and fire protection systems will be installed in various facility areas.
- Emergency exits will have appropriately illuminated exit signs.
- During construction, fire severity ratings and fire bans will be communicated to workers to raise awareness of fire sensitive periods. During operations and maintenance, fire severity ratings and fire ban signage will be posted in public areas for local awareness. Signage will also promote correct disposal of cigarettes.

In addition to design features, several safety measures will be implemented to reduce the potential for fire and explosion malfunctions or accidents because of the Project. These include the following:

- The Project will implement and enforce an ERP and procedures that cover protocols and responsibilities of site workers during a fire or explosion emergency.
- The Project will implement engineered controls and safe design of holding and storage tanks containing flammable and pressurized substances.
- Explosives will be handled, stored, and used by certified blasters in accordance with an Explosives Management Plan.
- A licensed contractor will be hired to handle explosives sourcing and handling.

A Project-induced fire may cause a wildfire to spread, altering vegetation communities, burning away the organic soil layer, and thawing permafrost. Widespread loss of vegetative communities may affect wildlife, and associated habitat that would in turn affect cultural use of the area. While a large fire is possible, it is considered unlikely due to the natural climatic conditions and terrain, and mitigation measures that will be implemented.

A fire or explosion would generally present the greatest risk to biota (wildlife and vegetation) during the summer months when biota (wildlife and vegetation) is most abundant and exposure pathways are more direct. During the summer months vegetation would be exposed and may provide a fuel source for the spread of a fire as opposed to winter conditions of snow/ice coverage. However, as noted in Section 34.6.3, emergency response may be aided by favourable summer weather conditions and long daylight hours. During winter conditions there would be less risk of a fire spreading however poor weather conditions may adversely affect emergency response capabilities thus increasing the risk for human receptors.

### **34.7.3.1      *Atmospheric Environment***

During a fire or explosion, releases and dispersions of CACs and other pollutants will occur. A large fire or explosion could result in temporary exceedances of ambient air quality standards and could affect human health through changes in air quality and immediate threats to safety and infrastructure. It could also affect wildlife, native vegetation, wildlife habitat, and land and resource use in the downwind area of the fire. Fire response measures will be in place to manage the spread and severity of fire to reduce potential spread. As such, fire would be most likely restricted to a small area.

Although a Project fire may result in a short-term localized exceedance of ambient air quality objectives widespread exceedances are not anticipated. Based on this, residual effects of fire on air quality are expected to be not significant.

### **34.7.3.2      *Noise and Vibration***

An explosion may cause a temporary increase in the sound levels in the immediate vicinity of the explosion. Based on the unlikely and short-term nature of a fire or explosion, the consequence of a terrestrial or aquatic fire or explosion on the acoustic environment is expected to be not significant.

### **34.7.3.3      *Terrain, Soils and Permafrost***

Fire can affect permafrost by removing the insulating layer of organic soil and vegetation. Without this layer of protection, the upper layers of permafrost can thaw, and the mineral soils can become exposed, leading to erosion. Firefighting measures may use water, leading to localized erosion. The severity of the effect on permafrost from a fire will depend on the geographic extent of the fire, season of occurrence, the sensitivity of the terrain and soils, and whether permafrost is present.

As the Project, and particularly camps and maintenance yards, will be sited to avoid sensitive terrain where practical and will already apply effective fire response and permafrost protection measures, some of this risk is mitigated. In the unlikely event of a fire or explosion residual effect on soils, terrain, and permafrost is expected to be not significant.

### **34.7.3.4      *Vegetation***

Should a fire or explosion occur, loss or alteration of vegetation would be limited to the immediate vicinity of the fire. Effects may include direct loss or alteration of native vegetation communities and loss of traditional plant use. A fire or explosion during the summer months would have a higher risk of affecting vegetation than during the winter months when snow and ice cover provides a level of protection to vegetation.

Due to the anticipated limited extent of a Project fire or explosion, the residual effect on vegetation is considered not significant. Fires or explosions large enough to cause effects outside the PDA are unlikely.

### **34.7.3.5 Wildlife (including Caribou and Birds)**

The effects of an explosion or fire on wildlife and wildlife habitat will depend on the size of the explosion or fire (primarily whether it spreads to adjacent areas) and timing of occurrence (e.g., during wildlife migratory periods or nesting periods for birds). The sensory disturbance associated with an explosion may cause a change in wildlife movement dependent on the size and location of the incident. A large explosion may temporarily cause wildlife and birds to leave the area due to noise, light, and smell, but they would be anticipated to return following the event. Most fires are expected to be contained within the PDA by applying fire response measures. In the unlikely case of a fire that spreads to the surrounding tundra becoming a large fire, availability of habitat and food for wildlife over the burned area could be affected over the long term.

For animals in the vicinity of a wildfire, there is potential for injury, entrapment, exhaustion, and mortality if the animal is unable to leave with sufficient time. Burned areas may be avoided by some species due to a lack of functional habitat and food sources; however, early successional vegetation species will return. A fire or explosion would not be expected to threaten the long-term viability of a species. Applying the definition of significance (Table 34.8), the residual effects on wildlife and wildlife habitat and birds and bird habitat associated with wildfire is considered not significant. Given the mitigation in place, geographic factors (e.g., terrain, weather etc.) a large wildfire caused by the Project is unlikely, however if a large wildfire did occur the effects may be significant.

### **34.7.3.6 Water Resources**

In the event of a fire or an explosion, the RMERP requires that site personnel extinguish the fire, if possible. Fire response will rely on the emergency usage of raw water from proximal sources. The volume of water taken could exceed permitted thresholds if this water is needed in winter or requires a sustained fire-fighting response. These changes would not be considered permanent. Water quality could be affected by temporary increase in water temperature, deposition of ash or burnt material, fire retardants or chemicals used to fight fires and sedimentation caused by erosion from firefighting response.

Because of the unlikely potential of large fires or explosions and the local geographic extent, the potential effects are predicted to be not significant. However, in the unlikely event of a large fire or explosion effects to water resources have the potential to be significant.

### **34.7.3.7 Freshwater Fish and Fish Habitat**

Localized fish mortality may result from an accident or malfunction that results in a fire or explosion near fish habitat. Depending on the location of the event, the size of the fire or explosion, and water depth, fish mortality could range from a few fish (not affecting the sustainability and productivity of a fishery) to larger scale levels of fish mortality (which could have a temporary effect on localized fish populations). For shallow waterbodies, adjacent fires could affect water temperature, which could result in harm to fish or mortality of spawn. Ash deposition, fire retardants or chemicals used to fight fires, run-off water, and water temperature changes can contribute to changes in water chemistry and turbidity, creating fish

migrations or die off. Changes in fish health, growth, or survival can occur from changes to fish habitat. In the event of an explosion near a waterbody, vibrations and pressure changes may harm fish.

Fish populations that have been affected by fire or explosion are expected to recover and not affect the long-term viability of fish populations. Given that large explosions or fires are unlikely and the localized effects of smaller events, residual effects on fish and fish habitat are considered not significant.

#### **34.7.3.8 Marine Water and Sediment**

In the event of a large fire or explosion at the Port, the potential effects on marine water and sediment are considered to be the same as those discussed for water resources and are characterized as not significant.

#### **34.7.3.9 Marine Fish and Fish Habitat**

In the event of a large fire or explosion at the Port, the potential effects on marine fish and fish habitat are considered to be the same as those discussed for freshwater fish and fish habitat and are characterized as not significant.

#### **34.7.3.10 Marine Mammals**

In the event of a large fire or explosion at the Port, potential effects to marine mammals are considered limited. Marine mammals would need to be in close proximity to the port to be affected by a fire or explosion at the Port. The risk of direct mortality as the result of an explosion or fire is considered low. Marine mammals may temporarily avoid the area as a result of sensory disturbance due to an explosion but they would be anticipated to return following the event. Ringed seal are anticipated to be the most abundant marine mammal in the Local Assessment Area.

Given that large explosions or fires are unlikely and the effects would be localized, residual effects on marine mammals are considered not significant.

#### **34.7.3.11 Traditional Land, Marine and Resource Use and Heritage**

Traditional land, marine and resource use and heritage resources could be affected by a Project-related fire or explosion event that spreads beyond the PDA into areas that may be important for cultural use, by affecting heritage sites, displacing harvested species, or causing wildlife or fish mortality. The effects on TLMRU and heritage resources will depend on the location, extent, and severity of the event. Mitigation measures will be effective at limiting the risk of spread of fire beyond the PDA. The value of a cultural use area or heritage resources may be affected in the years following a fire.

As the residual effects from fires and explosions are unlikely, and described as small extent, they will not result in a long-term loss or an elimination of traditional use and are, therefore, considered not significant. A fire or explosion caused by the Project may change the way individual traditional land users use an area or resources, based on the perceived effects or changes to the value of the affected area or resource. If individual traditional land users select to no longer use an area due to perceived effects of a fire or explosion then the effect to those users may be significant.

### **34.7.3.12      *Community Health and Well-Being***

Community health and well-being may be affected through changes to the availability of wildlife, fish, and plants that are harvested for country foods or the perceived quality of country foods.

Community health and well-being may also be affected by Project accidents such as a fire or explosion due to the potential for injury and changes to local air quality. Evacuations of Project infrastructure (construction camps, port buildings, accommodation) may be needed in the event of a serious explosion nearby or an approaching fire. Fires can also damage or destroy non Project related camps such as camps of those involved in traditional land use activities if they are in the vicinity of the Project. Well-being can also be affected by the inability to practice cultural traditions and on-land activities. Community members who are active in the vicinity of the Port (i.e., hunting, travelling) may be displaced from the area of an incident for a period while the risk of injury is addressed. A fire or explosion at the Port would not be expected to affect community members within their communities given the significant distance from the Port. Mitigation measures such as fire prevention and response will reduce the risk of a fire/explosion, which adversely affects community health and well-being.

Fires and explosions are singular events that can affect individuals and may contribute, exacerbate, or cause overall trends in community wellness. While explosions or a fire at Project infrastructure could affect individuals in a significant way, such events are very unlikely. The effects of fires and explosions on community wellness are, on a conservative basis, considered significant but unlikely.

### **34.7.3.13      *Infrastructure and Services***

In the event of a fire or an explosion, it is anticipated that emergency response capabilities at the Project site (e.g., firefighting, medical services, emergency evacuation) will be sufficient for most accidents during construction; however, an accident involving multiple injuries or widespread effect may require support from the surrounding communities or service providers, such as if there is a need for evacuations or additional emergency services. As this type of event is considered unlikely, community services should not experience regular disruption. Effects on community services and infrastructure would be short-term in duration and reversible. The residual effect on community infrastructure and services from a fire or explosion is considered not significant given the expectation of adequacy of available response primarily sources from the Project.

### **34.7.3.14      *Non-Traditional Land, Marine and Resource Use***

Non-traditional land, marine and resource use comprises land use planning, mineral and oil/gas resources, parks and protected areas, marine navigation, tourism and recreation and commercial fisheries. In the event of a fire or explosion, effects would likely be limited to the PDA or the close vicinity and be of short duration.

A fire or explosion may temporarily restrict land use activities in the affected area but would be of short duration and therefore considered not significant.

However, a fire or explosion caused by the Project may change the way individual land users use an area or resources, based on the perceived effects or changes to the value of the affected area or resource.

### 34.7.4 Handling, Storage and Use of Explosives

The handling, storage, and use of explosive materials are regulated by Natural resources Canada under the *Explosives Act and Explosives Regulations 2013*. Drilling and blasting of rock will be required at quarries and at locations of rock cut. While embankment construction and blasting will take place year-round, blasting size and timing will take into consideration applicable sensitive periods for wildlife, fish and migratory birds.

Accidents or malfunctions associated with the handling, storage, and use of explosives could be caused by equipment or machinery malfunction, improper use or storage of bulk explosive materials, accidental detonation, vehicle accidents involving transport of emulsion or bulk materials, and migration of blast residue contaminants.

The primary explosive that will be used on the Project is ammonium nitrate and diesel fuel oil (ANFO). Other explosives such as packaged explosives, and detonators may also be used. ANFO is only explosive when correct proportions of stable ammonium nitrate prill and fuel oil are mixed, confined appropriately, and detonated with an external device. The components of ANFO in isolation are not explosive. Prilled ammonium nitrate will be stored at designated rock quarries and at the Port in a designated, secured location and in accordance with the appropriate legislation and permits.

To avoid or reduce accidents and malfunctions associated with explosives, the Project's Explosives Management Plan will include measures such as pad locations to manufacture explosives that are separated from work and camp sites, secure storage of bulk materials and detonators, and cleared vegetation around isolated storage locations to limit the spread of fire. Bulk explosive materials, emulsion, and detonators will be stored separately. Routine inspection and monitoring of storage and manufacture areas will be performed so that bulk materials and emulsion are not entering the receiving environment.

Ammonium nitrate is classified as a hazardous substance and will be transported in bulk initially via sealift and then by truckload to site for manufacture of blasting emulsion. Ammonium nitrate is shipped in a solid prill form. Should an accident or malfunction occur releasing ammonium nitrate onto land, immediate clean up would result in negligible effects on the environment. The use, manufacture, and handling of explosives during the winter months poses lower environmental risk. Spills during winter will have less likelihood to mix directly with aquatic environments due to many waterbodies being frozen. Spill response procedures would be applied immediately following a spill incident.

Small batch manufacture of blasting emulsion will be conducted to reduce the potential for accidents. Safe transportation of emulsion at low speeds with traffic control protocols is common practice to reduce collisions, or accidental release of emulsion material. The emulsion plant will be operated and maintained in accordance with environmental protection measures, territorial and federal legislation, and guidelines.

Mixing of emulsion will not occur within 31 m of waterbodies or watercourses, preventing migration of contaminants. Furthermore, drainage from quarries and the Project site will be managed via the Quarry Management Plan so that blast residue water is not flowing into surrounding waterbodies or watercourses.

In addition to design features, safety measures will be implemented to reduce the potential for accidents and malfunctions as a result of the transportation, storage and use of explosives. These include the following:

- The management of explosives will be in accordance with environmental protection measures, territorial and federal legislation, and guidelines. All blasting activities will be performed by qualified contractors with strong safety track records. The Explosives Management Plan will include measures for the safe transportation, storage, manufacture, and use of explosives.
- A qualified contractor will be hired to handle explosives sourcing and handling.
- All Project blasting will be conducted as per standard safety procedures and regulations, which includes blast timing and communications, blast radius sweep, road signage, warning alerts, and radio announcement.
- Explosives manufacturing and storage facilities will be located using regulation setbacks from other Project-specific facility components. Explosive storage and manufacturing areas will be restricted to authorized employees only and the access road signed per regulations.
- Storage of ammonium nitrate will be kept in a dry location away from rain and runoff to prevent migration of contaminants.
- The qualified explosives contractor will provide measures to address potential effects and health and safety considerations.

An accidental event during the handling, storage and use of explosives generally presents the greatest risk during the summer months when biota (wildlife and vegetation) is most abundant and exposure pathways are more direct i.e. no snow/ice coverage. However, as noted in Section 34.6.3, response and clean up may be aided by favorable summer weather conditions and long daylight hours.

#### **34.7.4.1      *Atmospheric Environment and Noise and Vibration***

The effects on air quality and noise and vibration from an accidental detonation are the same as those for fire and explosion and are characterized as not significant.

#### **34.7.4.2      *Vegetation***

The effects on vegetation from an accidental detonation are the same as those for fire and explosion and are characterized as not significant.

#### **34.7.4.3      *Terrain, Soils and Permafrost***

The effects on terrain, soils, and permafrost from a spill of Prill are expected to be not significant. As prill is transported as a solid material it would not readily mix with soil and would be quickly cleaned up in the event of a spill. A spill of emulsion to the ground in the summer months may affect soil but would not be expected to affect terrain or permafrost. During frozen conditions potential effects to soil would be limited. A spill would be immediately cleaned up and any contaminated soils disposed or appropriately. Given the mitigation measures in place potential effects to soils because of an emulsion spill are expected to be not significant.

An accidental detonation has the potential to affect terrain, soils and permafrost. As previously detailed the components of the explosives are only explosive when combined appropriately and detonated with an external detonator. This process to make the explosives “active” will occur at the location where the explosives are needed i.e. quarry, borrow pit or Port. As such should an accidental detonation occur it would most likely occur close to or at the area intended for blasting. In the unlikely event of accidental detonation, dependent upon the size of the blast from effects to terrain, soils and permafrost may be significant.

#### **34.7.4.4      *Water Resources (Freshwater and Marine)***

In the rare event of a transportation accident or equipment malfunction involving bulk explosive materials or manufactured explosives near a waterbody (freshwater or marine), ammonium nitrate, fuel, or manufactured emulsion could spill or dissolve in water and enter the ecosystem. Accidents and malfunctions on dry land allow for cleanup; however, aqueous environments do not provide the same option. In winter, where waterbodies will be frozen, cleanup will be effective per the Spill Contingency Plan. If prill enters water, there may be limited opportunity to clean up the spill except to limit how much enters the water. Prill will be transported in small quantities to reduce the risk of large quantities of prill entering a waterbody. Small batch manufacture of blasting emulsion will be conducted to reduce the potential for accidents, and emulsion will not be mixed within 31m of a water course or water body.

The severity of effects on water and sediment quality of a spill (prill or emulsion) into water will depend on the location and amount spilled. A spill into an interconnected waterbody may change water quality over a greater area, but this may be mitigated by dispersion. A spill contained in a waterbody may affect sediment and water quality in the waterbody but may limit the effect on this area.

Due to the anticipated small amounts of prill and emulsion to be transported, and the low risk of incident, the residual effect on water and sediment quality is expected to be not significant.

#### **34.7.4.5      *Fish and Fish Habitat (Freshwater and Marine)***

An uncontrolled detonation that occurs in proximity to fish and fish habitat (within 100 m) would create noise, vibration, and pressures change, which is likely to affect fish depending on the size of blast, size of waterbody, and depth of water. Accidental release of ammonium nitrate or manufactured emulsion has potential to harm waterbodies, fish, and aquatic organisms, as discussed in the section on water quality. It is unlikely that an uncontrolled detonation would occur in a location other than one of the quarries or the port due to these locations being expected to contain temporary storage of manufactured explosives. Explosives will be stored more than 100 m from fish-bearing waterbodies. Due to the short-term nature and anticipated distance of an accidental detonation from fish and fish habitat, and its isolated incidence, potential residual effects on fish and fish habitat are considered not significant.

#### **34.7.4.6      *Traditional Land, Marine and Resource Use***

If an accident or malfunction results in an accidental release of ammonium nitrate prill or emulsion the ability to access areas for recreation or traditional use (fishing, trapping) may be temporarily affected in the vicinity surrounding the incident location. Mitigation measures to clean up a spill on land are expected to be effective and the spill will be limited to the PDA which may have limited TLMRU. An unintended

detonation would most likely occur within a quarry or the Port, which would not incrementally contribute additional effects on TLMRU from those of Project construction and operations and maintenance activities. The residual effects on TLMRU from an accidental release of ammonium nitrate prill, emulsion or an accidental detonation are expected to be not significant.

#### **34.7.4.7      *Community Health and Well Being***

In the event of an accidental release of emulsion or ammonium nitrate, contaminants could migrate to waterbodies and affect water quality and fish. Changes in water and country food quality are considered unlikely and limited but could influence the well-being of local people who take part in hunting, trapping, traditional, and recreational activities in proximity of the Project site.

While fish populations would ultimately return, there is potential for contamination of fish tissue and health due to long-term contamination of bottom sediments where constituents of the blast emulsion may settle. A considerable amount of construction work is scheduled during the winter, making for easier containment and cleanup of spills.

In the unlikely event of an accidental release of ammonium nitrate or emulsion, effects would not be anticipated to result in a long term or permanent change or disruption to the current use of land and marine resources and therefore is considered not significant.

In situations where an uncontrolled blast occurred as an aspect of explosive usage, while very unlikely, there is potential for human injury or death. In circumstances where there is injury due to an uncontrolled blast, the event would be considered significant.

#### **34.7.5      *Vehicle or Mobile Equipment Accident***

Despite best efforts in operator training, vehicle and mobile equipment accidents are likely to occur during the construction phase, and to a lesser extent during the operations and maintenance of the Project. Accidents may be caused by human error, mechanical failure and/or extreme weather events. The consequences can range from minor to severe, depending on injuries or fatalities. During all phases of the Project there is potential for vehicles and mobile equipment to collide with other vehicles, mobile equipment, and Project infrastructure. The port will have a medical facility and medical staff to deal with injured personnel. In case of severe injuries, the worker will be stabilized at the facility and evacuated off-site for medical treatment. All construction camps will include a medical support team.

During construction, operations and maintenance, Project employees and contractors will receive environmental awareness training to allow all drivers to operate their vehicles in a defensive manner with greater reaction time should wildlife intercept traffic. An accident involving animals may induce injury or death to vehicle operators. The presence of wildlife will be monitored and communicated to site personnel via radio when wildlife is observed in the area. When wildlife is present on the road or Road PDA, or within the port site or Aerodrome, site staff will be required to stop or idle their vehicle or equipment to allow for safe passage. The most substantial animal interaction will be with large-bodied mammals such as moose and caribou, and large avian species.

Mitigation measures to reduce the potential for and severity of vehicle and mobile equipment accidents include:

- Project personnel will be trained in vehicle and mobile equipment safe operations, defensive driving, weather-related hazards, and wildlife migration periods.
- Work shift protocols will be implemented to ensure personnel are fit for duty.
- Project vehicles and mobile equipment will undergo regular inspection, including prior to use
- Signage pertaining to speed limits, active construction areas, and emergency shelters will be posted on the Project roads, including the Grays Bay Road.
- All Project roads, including the Grays Bay Road, will undergo regular maintenance to provide safer driving conditions.
- Signage pertaining to known wildlife crossings and key wildlife habitat areas will be posted on the Grays Bay Road.
- Project -related vehicles and mobile equipment will be equipped with radio communication controls and a safety kit inclusive of supplies pertaining to extreme weather conditions.
- Project vehicles will adhere to posted speed limits and weight restrictions.
- Project-related vehicle operators will exercise caution in areas frequented by wildlife.
- Project-related traffic will be limited to the right-of-way and approved workspace when completing construction activities.

A vehicle or mobile equipment accident would generally present the greatest risk to biota (wildlife and vegetation) during the summer months when biota (wildlife and vegetation) is most abundant and exposure pathways are more direct. However, as noted in Section 34.6.3, emergency response may be aided by favourable summer weather conditions and long daylight hours. In contrast the risk to human life/injury from a vehicle or mobile equipment accident would generally be higher during the winter months as poor winter conditions increase the risk of incidents occurring and may adversely affect emergency response capabilities thus increasing the risk for human receptors.

#### **34.7.5.1      *Community Health and Well-being***

Transportation accidents have the potential to result in injury or loss of human life. In the event of human fatality or injury in the context of small communities where it is common to see interconnected relationships and large families, fatality can have a widespread effect on community wellness due to widespread grief. In the unlikely event of a vehicle collision resulting in serious injury or loss of life of a community member, the outcome would be considered significant.

#### **34.7.5.2      *Infrastructure and Services***

In the event of a Project vehicle or mobile equipment accident, it is anticipated that emergency response capabilities at the Project site (e.g., firefighting, medical services, emergency evacuation) will be sufficient for most accidents during construction; however, an accident involving multiple injuries may require support from the surrounding communities or service providers, such as the need for evacuations or additional emergency services. As this type of event is considered unlikely, community services should

not experience regular disruption. Effects on community services and infrastructure would be short-term and reversible. The residual effect on community infrastructure and services from a vehicle or mobile equipment accident is considered not significant given the expectation that emergency response resources directly from the Project will be adequate and services from local communities will not be required.

### **34.7.6 Aircraft Accident**

The use of both fixed-wing and helicopters is an important part of the Project and will continue through construction and operation and maintenance phases due to the isolated nature of the Project. There is the potential for aircraft accidents to occur at the Aerodrome or at the Jericho Station airstrip as there will be regular air traffic to and from the Project. Aircraft activity levels will be greatest during the construction phase of the Project due to the transportation of materials, equipment, supplies, fuel, and personnel.

Accidents may be caused by aircraft and equipment malfunction, environmental conditions and natural events, human error and pilot behaviour, air traffic volumes, and periods of increased bird activity (e.g., migratory bird nesting periods).

The likelihood of an aircraft accident resulting in loss of life is considered unlikely, given preventative measures. There are extensive safety and preventative maintenance programs which follow federal aviation requirements to ensure the safe operation of aircraft.

Mitigation measures to reduce the potential for and severity of aircraft accidents include:

- The Aerodrome and Jericho Station airstrip will be well-maintained with appropriate marking, lighting, electronic beacons, and weather reporting services.
- Visual, electronic, and procedural approach aids will be installed as part of the Project to support aircraft navigation.
- Project-related aircraft will undergo regular inspection, including prior to use.
- Project-related aircraft will be equipped with radio communication controls and a safety kit.
- Project-related aircraft will comply with all applicable aviation laws, regulations, permits, licenses, and policies.
- Project-related aircraft operators will exercise caution during bird migration periods.

An aircraft incident would generally present the greatest risk human life during the winter months. Poor winter conditions increase the risk of incidents occurring and may adversely affect emergency response capabilities thus increasing the risk for human receptors.

#### **34.7.6.1 Community Health and Well-being**

Aviation accidents have the potential to result in injury or loss of human life. In the unlikely event of a fatality or injury in the context of small communities where it is common to see interconnected relationships and large families, fatality can have a widespread effect on community wellness due to widespread grief. In the unlikely event of an aviation accident resulting in serious injury or loss of life of a community member, the outcome would be considered significant.

### **34.7.6.2      *Infrastructure and Services***

In the event of a Project aviation accident, it is anticipated that emergency response capabilities at the Aerodrome and port (e.g., firefighting, medical services, emergency evacuation) will be sufficient for most accidents during construction and operations and maintenance; however, an accident involving multiple injuries may require support from the surrounding communities or service providers, such as the need for multiple evacuations or additional emergency services. As this type of event is considered unlikely, community services should not experience regular disruption. Effects on community services and infrastructure would be short-term in duration and reversible. The residual effect on community infrastructure and services from an aviation accident is considered not significant, given the expectation that emergency response resources directly from the Project will be adequate and services from local communities will not be required.

### **34.7.7      *Marine Vessel Accident***

There is potential for marine vessel accidents (collisions and grounding) resulting in human injury during the construction and operations and maintenance phases of the Project. During the construction phase of the Project vessels are anticipated to be approximately: 3 barges/tugs, 1 fuel tanker, and 2 cargo freighters. For each year of construction, there will be an annual sea lift of supplies via the cargo freighter with associated barge offloading. Construction vessels will operate during ice-free conditions, with annual variation depending on weather conditions.

During operations and maintenance phase of the Project vessels will include approximately: 3 barges/tugs, 1 fuel tanker and 1 cargo freighter. Project vessels will provide annual resupply of the port facility and vessel docking assistance via harbour tugs for third-party users of the port. The port is expected to receive vessel traffic during times when no ice-breaking is required and will be operated during ice-free conditions, which is generally forecasted from late June through October, with annual variation depending on weather conditions. During operations Grays Bay Port will be made available during the shoulder season (i.e., early June and into November) to the Canadian Coast Guard, which carries out icebreaking services from June to November for search and rescue, environmental response, community resupply, breakouts, ship escorts and marine communications and traffic services and other approved vessels during this time, as necessary. Operations of the marine-based infrastructure of the Grays Bay Port will not be available for use between December and May as the sea ice is expected to be frozen in at this time. As noted in Section 34.1, the activity of third-party vessels (e.g., Canadian Coast Guard vessels, Post Panamax Ore-Bulk-Oil vessels, cargo vessels and private small craft) are not included within this assessment.

Accidents may be caused by vessel and equipment malfunction (failure of navigation systems, loss of engine power), human error, deviation from established shipping lanes, port congestion, environmental conditions and natural events.

Transport Canada regulates navigation and shipping through the *Canada Shipping Act, 2001* and the Canadian Coast Guard and Pilotage Authorities have responsibilities for safe shipping. The *Canada Shipping Act, 2001* provides the legislative framework that governs shipping in Canada; it promotes marine safety and protection of the marine environment. Vessels registered in Canada or those that travel

within Canadian waters are required to comply with this law. The *Canada Shipping Act 2001* includes regulations for navigational safety aids, collision-prevention devices, standards for hull construction, fire detection and extinguishing requirements, and standards for construction and inspection of vessels carrying pollutants. In addition to complying with the *Canadian Shipping Act, 2001*, vessels are expected to follow NAVWARNs, which provide information on changes to navigational aids and current marine activities or hazards, as well as NOTMARs, which supply essential updates for charts and nautical publications, thereby further promoting marine safety and the protection of the marine environment. The intended shipping approach for the Project is south of the existing shipping lane within the Northwest Passage. Shipping along this approach would support both Project phases.

The Transportation Safety Board of Canada (TSB) collates information on marine accidents and incidents in Canadian waters. In 2024, 182 shipping accidents were reported to the TSB and 12 marine fatalities. Fishing vessels were involved in 29% of all shipping accidents, which is the highest proportion among vessel types, followed by solid cargo vessels, involved in 18% of shipping accidents.

TSB reports information by three regions; Pacific Region, Central Region and Atlantic Region. The Project is located in the Central Region - Central Region's covers the provinces of Ontario and Quebec, the territory of Nunavut, and the Northwest Territories north of the 70<sup>th</sup> parallel, as well as James Bay, Hudson Bay, the St. Lawrence Seaway, and the Great Lakes waterways up to the Canada–U.S. border. In 2024, 51 shipping accidents were reported in the Central Region. Of those 51 accidents 6 involved barge/tugs and 22 involved cargo/tanker vessels. No fatalities resulted from barge/tug or cargo/tanker accidents in 2024 (TSB 2025).

The likelihood of a marine vessel accident resulting in injury to people is considered unlikely, given preventative measures.

Project mitigation measures including adherence to the Project-specific Management Plans will reduce the risk of vessel accidents. Additional mitigation measures that will be implemented to reduce the risk and likelihood of vessel accidents include:

- The Project will be designed with consideration of the potential for vessel accidents and in accordance with Project-specific detailed bathymetric surveys, design safety considerations, industry best practices, guidelines and regulations.
- Visual, electronic, and procedural approach aids will be installed as part of the Project to support vessel navigation and avoid accidents.
- Project-related vessels will undergo regular inspection and maintenance.
- Project-related vessels will be equipped with radio communication controls, a safety kit, and anti-collision devices such as alarms and radars.
- Project-related vessels will comply with all applicable maritime laws, regulations, permits, licenses, and policies.
- Project-related vessels will adhere to speed limits and weight restrictions within the marine areas of the Project.

Marine vessel activity will only occur during the open water season and will therefore only present a risk at this time. As noted in Section 34.6.3, emergency response may be aided by favourable summer weather conditions and long daylight hours.

#### **34.7.7.1      *Community Health and Well-being***

Marine vessel accidents have the potential to result in injury or loss of human life. In the unlikely event of a fatality or injury in the context of small communities where it is common to see interconnected relationships and large families, fatality can have a widespread effect on community wellness due to widespread grief. In the unlikely event of an aviation accident resulting in serious injury or loss of life of a community member, the outcome would be considered significant.

#### **34.7.7.2      *Infrastructure and Services***

In the event of a Project vessel accident, it is anticipated that emergency response capabilities at the port (e.g., firefighting, medical services, emergency evacuation) will be sufficient for most accidents during construction and operations and maintenance; however, an accident involving multiple injuries may require support from the surrounding communities or service providers, such as the need for multiple evacuations or additional emergency services. As this type of event is considered unlikely, community services should not experience regular disruption. Effects on community services and infrastructure would be short-term in duration and reversible. The residual effect on community infrastructure and services from a vessel accident is considered not significant given the expectation that emergency response resources directly from the Project will be adequate and services from local communities will not be required.

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## 35 Effects of the Environment on the Project

### 35.1 Introduction

This section considers how local conditions and natural hazards could adversely affect the Project and provides details of mitigation strategies that aim to reduce the potential for adverse environmental effects of the environment on the Grays Bay Road and Port Project (Project). A key concern is that severe weather events or natural hazards (e.g., ground instability) could affect or damage Project infrastructure, resulting in failures, malfunctions, or accidental events, which in turn could result in adverse effects to the environment. Accidents and Malfunctions are assessed in Volume 10, Section 32. Through the Project-specific *Naonaiyaotit* Traditional Knowledge Project (NTKP) study report (see Section 35.2), NTKP consultants reported that the weather in the Kitikmeot Region has become less predictable (Banci and Spicker 2024).

Section 7.4.2 of the Nunavut Impact Review Board's (NIRB) *Guidelines for the Preparation of an Impact Statement* (NIRB 2026; NIRB File No.: 24XN038; the Guidelines) request consideration of the following environmental factors that could affect the Project:

- Geotechnical Hazards
- Unfavourable Geological Conditions
- Permafrost
- Severe Weather Events; and
- Sea Conditions (ice, sea level, subsidence and local and global climate change)

A comprehensive Climate Change Risk Assessment (CCRA) was completed for the Project and is provided in Appendix 12B and summarised in Volume 5, Section 12.3. The intent of the CCRA was to identify the current and anticipated climate impacts on the planned infrastructure and assets of the Project and identify associated risks. The CCRA included adaptive strategy recommendations to address the high-risk climate hazard-asset interactions identified in the CCRA and improve the resilience of the Project. The CCRA considered the following climate hazards:

- Extreme cold
- Extreme heat
- Extreme rainfall – short-duration high-intensity rainfall
- Extreme rainfall – sustained rainfall
- Heavy snowfall
- Freeze-thaw cycles
- Dry spells
- Tundra fire
- High winds

- Icing (due to freezing rain, freezing fog)
- Permafrost thaw
- Spring melt (including aufeis) and spring freshet/riverine flooding
- Fog
- Whiteout conditions (due to blowing snow)
- Sea level change
- Wave activity
- Sea ice

Given that the CCRA provides an assessment of Permafrost, Severe Weather Events and Sea Conditions, the scope of this section focuses on Geotechnical Hazards (Terrain Instability; Seismic Activity) and Unfavourable Geological Conditions (Weak Zones/Faults).

## **35.2 Influence of Engagement and Inuit, Indigenous, and Community Knowledge on the Assessment**

West Kitikmeot Resources Corp. (WKR) continues to engage with Inuit of the Kitikmeot Region (hereafter referred to as Kitikmiut), other Indigenous groups, and other potentially affected communities about the Project. A summary of engagement activities conducted between 2016 and 2025 is presented in Volume 3, Section 6 (Public Engagement). In addition to these activities, WKR conducted community-based primary research with residents and organizations of the Kitikmeot communities of Cambridge Bay (*Ekaluktutiak*), Gjoa Haven (*Ursuqtuq*), Kugaaruk, Kugluktuk, and Taloyoak, along with organizations in Yellowknife, NT. Additionally, an Inuit Advisory Group (IAG) was established to advise WKR on potential environmental and socio-economic effects or concerns related to the Project, planned mitigation approaches, and aspects of the environmental assessment, including, but not limited to, baseline conditions, and consideration and integration of Inuit and Community Knowledge. Members were selected by the Kitikmeot Inuit Association and WKR based on their knowledge of many aspects of the natural and human environment, including but not limited to wildlife, fish, climate, land use and access, archaeology, and water in the project area.

To further inform the project design, a Project-specific Inuit Knowledge report titled *Kitikmeot Knowledge of the Proposed Kogloktokyoak (Grays Bay) Port and Road Project Final Report* (Banci and Spicker 2024) was commissioned by WKR. This report, based on Inuit Knowledge contained in the NTKP, was made available to WKR through a licensing agreement with the Kitikmeot Inuit Association.

Through the Project-specific engagement program, Kitikmiut, other Indigenous groups, and other potentially affected communities shared comments, perspectives, concerns, and recommendations related to weather events and natural hazards that may pose a risk to the Project. This includes insight into baseline climate conditions and observed changes being experienced by Kitikmiut and other Indigenous groups. WKR commits to continued engagement with Kitikmiut, other Indigenous groups, and other potentially affected communities during the advancement of project design, planning, and monitoring, throughout the life of the Project.

### 35.2.1 Inuit, Indigenous, and Community Knowledge and Engagement Feedback

Through the Project-specific engagement program delivered between 2016 and 2025, including community meetings, workshops, community-based primary research, the Project-specific NTKP report, and through a review of publicly available information, Kitikmiut, other Indigenous groups, and other potentially affected communities shared information, expressed concerns, and provided recommendations related to weather events and natural hazards. This feedback has been considered and summarized in Table 35.1 and where applicable, has been integrated into the assessment that follows.

**Table 35.1 Summary of Inuit, Indigenous, and Community Knowledge and Engagement Feedback**

Comment	Source	WKR Response	Where Addressed
<p>NTKP consultants shared that the weather and climate are changing and temperatures are increasing.</p> <p><i>It used to get really cold. Now it's getting warmer. The ocean doesn't freeze anymore; it's like slush.</i></p>	<p>Banci and Spicker 2024; GBRP 2017</p>	<p>WKR acknowledges these observations and concerns and has incorporated Inuit, Indigenous, and Community observations of the weather and climate in the baseline climate discussion and concerns into the relevant sections of the IS (e.g., VC assessments, Accidents and Malfunctions and Effects of the Environment on the Project ).</p> <p>Inuit, Indigenous, and Community Knowledge and engagement feedback and climate-related concerns provided insight and guidance into relevant climate parameters for consideration in the Project, including the Climate Profile and Climate Change Risk Assessment. The Climate Change Risk Assessment also includes adaptive measures and long-term resilience strategy recommendations.</p> <p>WKR commits to continued engagement on weather and climate and the influence on the Project as applicable during the advancement of project design, planning, and monitoring throughout the life of the Project.</p>	<p>See Volume 5, Sections 12.3 and 12.3.1 for a discussion of baseline climate in the West Kitikmeot Region.</p> <p>See Volume 5, Appendix 12A for the Climate Profile.</p> <p>See Volume 5, Appendix 12B for the Climate Change Risk Assessment. A summary of the assessment is also provided in Volume 5, Section 12.5.</p>

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<b>Comment</b>	<b>Source</b>	<b>WKR Response</b>	<b>Where Addressed</b>
NTKP consultants stated that sea levels are changing, with some stating that, the levels are going down. Consultants have also observed the freshwater levels going down as well, including in the Bathurst Inlet area.	Banci and Spicker 2024	See above.	See Volume 5, Sections 12.3 and 12.3.1 for a discussion of baseline climate in the West Kitikmeot Region.
NTKP consultants identified dangerous places for marine travel in the Grays Bay Project area. These include shallow areas, shoals, upwellings, whirlpools, marine currents and rough and steep terrain. NTKP consultants identified the Grays Bay marine environment as dynamic with strong currents upwellings, open water and thin ice during winter, travelers had to be mindful when travelling the area.	Banci and Spicker 2024	See above.	See Volume 8, Section 23.4.4.3, Figure 23.11 for an illustration of the dangerous areas identified. See Volume 5, Appendix 12B for the Climate Change Risk Assessment. A summary of the assessment is also provided in Volume 5, Section 12.5. Hydrographic surveys will be required if the Project is approved to ensure safe marine access to the Port.
NTKP consultants reported changes in lake and sea ice, including that the ice is thinner, slushy, arriving later, and melting earlier. They stated that the decreased ice quality poses a safety concern to people. These changes have been observed in several locations in the vicinity of the Project, including Bay Chimo, Cambridge Bay, and Bathurst Inlet. During early engagement on the Project, participants from Kuugaruk expressed concern about the thickness of ice as a result of climate change.	Banci and Spicker 2024; GBRP 2017	See above.	See Volume 5, Sections 12.3 and 12.3.1 for a discussion of baseline climate in the West Kitikmeot Region. See Volume 5, Appendix 12B for the Climate Change Risk Assessment. A summary of the assessment is also provided in Volume 5, Section 12.5.
NTKP consultants reported that the winds are increasing and while the amount of precipitation from rain is declining, they sometimes experience rain at unpredictable times, such as during winter.	Banci and Spicker 2024	See above.	See Volume 5, Sections 12.3 and 12.3.1 for a discussion of baseline climate in the West Kitikmeot Region. See Volume 5, Appendix 12B for the Climate Change Risk Assessment. A summary of the assessment is also provided in Volume 5, Section 12.5.

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Comment	Source	WKR Response	Where Addressed
<p>NTKP consultants reported that there is less snowfall than there used to be, which makes travel in winter more difficult.</p>	<p>Banci and Spicker 2024</p>	<p>See above.</p>	<p>See Volume 5, Sections 12.3 and 12.3.1 for a discussion of baseline climate in the West Kitikmeot Region. See Volume 5, Appendix 12B for the Climate Change Risk Assessment. A summary of the assessment is also provided in Volume 5, Section 12.5.</p>
<p>NTKP consultants noted that water quality and quantity are declining, including in lakes, rivers, and freshwater springs. They attributed these changes to less precipitation, climate change, increased contaminants from development, melting permafrost, airborne pollutants, increased tourism and waste, and an increasing goose population. These effects are being experienced more in coastal areas, although there are changes inland as well.</p> <p>Kitikmeot Inuit Association also expressed concern about climate change and the effects melting permafrost has on the environment and on traditional land, marine, and resource use (TLMRU).</p>	<p>Banci and Spicker 2024; MVRB 2016</p>	<p>See above.</p>	<p>See Volume 5, Sections 12.3 and 12.3.1 for a discussion of baseline climate in the West Kitikmeot Region. See Section 35.3 for a discussion of effects of terrain instability on the Project. See Volume 5, Appendix 12B for the Climate Change Risk Assessment. A summary of the assessment is also provided in Volume 5, Section 12.5. See Volume 7, Section 19.3 for a discussion on the effects of climate change on freshwater resources. See Volume 6, Section 14.3.6 for a discussion on the effects of climate change on terrain, soils, and permafrost. See Volume 9, Section 24.3.8 for a discussion on the effects of climate change on TLMRU. See also the Permafrost Protection Plan.</p>

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<b>Comment</b>	<b>Source</b>	<b>WKR Response</b>	<b>Where Addressed</b>
During engagement on the Project, Kugluktuk Hunters and Trappers Organization (HTO) representatives provided road construction suggestions to manage issues associated with building on permafrost and clearing snow. Specific to road construction, the HTO suggested using sand as a base to retain insulation. Specific to clearing snow on the road, the HTO suggested that snowblowers, instead of graders, be used to clear since snowblowers feather out the snow, while graders cause windrows that act as barriers for caribou travel. They reported that this method is being used in Rankin Inlet and Baker Lake.	GBRP 2025	See above	See Volume 5, Appendix 12B for the Climate Change Risk Assessment. A summary of the assessment is also provided in Volume 5, Section 12.5.  See Section 35.3 for a discussion of effects of terrain instability on the Project.
During engagement on the Project, participants from Gjoa Haven reported concerns about wildfires.	GBRP 2025	See above.	See Volume 5, Sections 12.3 and 12.3.1 for a discussion of baseline climate in the West Kitikmeot Region.  See Section 34.4 and 34.7 for a discussion of the effects of wildfires on the Project.
During project engagement, Kitikmeot Inuit Association commented that the Arctic is becoming more accessible due to the effects of climate change. The Kugaaruk HTO added that climate change was affecting the west Kitikmeot Region more than the east.	GBRP 2025	See above.	See Sections 12.3 and 12.3.1 for a discussion of baseline climate in the West Kitikmeot Region.  See Volume 5, Appendix 12B for the Climate Change Risk Assessment. A summary of the assessment is also provided in Volume 5, Section 12.5
During the public comment period for the NIRB, Kitikmeot Inuit Association commented that the construction and operation of the road would alter permafrost, snow accumulation and distribution, and surface drainage and water flow. In particular, Kitikmeot Inuit Association noted that culverts could alter hydrology, microclimate, and soil moisture, which may lead to localized flooding that could affect vegetation and the availability of permafrost.	NIRB 2024	See above	See Volume 5, Appendix 12B for the Climate Change Risk Assessment. A summary of the assessment is also provided in Volume 5, Section 12.5.  See Section 35.3 for a discussion of effects of terrain instability on the Project.

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<b>Comment</b>	<b>Source</b>	<b>WKR Response</b>	<b>Where Addressed</b>
During the public comment period for the NIRB, the Kitikmeot Inuit Association stated that in order to mitigate adverse effects that the construction of the Project in combination with future environmental changes may cause, it is critical that sufficient geotechnical site investigations, terrain mapping and geohazard assessments are completed prior to detailed design and the initiation of construction. A solid understanding of the current subsurface and climatic conditions and how those may change during the proposed design life is required for understanding risks to the environment, the project and its users, which forms the basis for developing appropriate infrastructure design and hazard mitigation measures.	NIRB 2024	See above	See Volume 5, Appendix 12B for the Climate Change Risk Assessment. A summary of the assessment is also provided in Volume 5, Section 12.5.  See Section 35.3 for a discussion of effects of terrain instability on the Project.  See Section 35.4 for a discussion of effects of seismic events on the Project.
During project engagement, community members in Kugluktuk expressed concern regarding potential effects from ground disturbance.	GBRP 2025	See above	See Volume 5, Appendix 12B for the Climate Change Risk Assessment. A summary of the assessment is also provided in Volume 5, Section 12.5.  See Section 35.3 for a discussion of effects of terrain instability on the Project.
IAG members reported concerns about disturbance of surface water drainage patterns (and interaction with vegetation, permafrost and terrain stability). IAG members stated that the Project will require regular maintenance and monitoring for culvert management (in addition to other aspects of the Project design).	GBEEC 2018; IAG 2025	See above	See Section 35.3 for a discussion of effects of terrain instability on the Project.
Knowledge Holders from Gjoa Haven, Inuvik, and Clyde River reported recent changes in terrain condition due to permafrost thaw (e.g., thaw slump, ground subsidence, change in vegetation)	McLennan et al. 2022	See above	See Volume 5, Appendix 12B for the Climate Change Risk Assessment. A summary of the assessment is also provided in Volume 5, Section 12.5.  See Section 35.3 for a discussion of effects of terrain instability on the Project.

<b>Comment</b>	<b>Source</b>	<b>WKR Response</b>	<b>Where Addressed</b>
The Tłı̄chǫ Research and Training Institute described the summer of 2023 as “hot and too dry” (Dedats’eetsaa 2024:15). In July that year, there were tundra fires at Contwoyto Lake. Dry weather and reduced water levels in lakes, muskeg and ponds, led to a shorter growing season. These conditions were not consistent with the summer weather reported for previous years, which since 2016, has been a mix of wet and windy, cool and windy, and warm and dry summers.	Dedats’eetsaa 2024	See above.	See Volume 5, Sections 12.3 and 12.3.1 for a discussion of baseline climate in the West Kitikmeot Region. See Volume 5, Appendix 12B for the Climate Change Risk Assessment. A summary of the assessment is also provided in Section 12.5.
Yellowknives Dene First Nation reported that climate change and other project developments have put increased pressure on caribou.	YKDFN 2016	See above.	See Volume 6, Section 16 for a discussion on the effects of climate change on caribou.

### **35.3 Terrain Instability**

The Project area lies within the Canadian Shield and is characterized by undulating bedrock and glacial deposits. Surficial deposits are composed of till, glaciofluvial, glaciolacustrine, and marine deposits, as well as organic soils and bedrock. The topography is variable, ranging from planar, gently undulating, and hummocky. Some steep slopes are present; however generally short in length. Permafrost is continuous in the entire Regional Assessment Area (i.e., below 90 to 100 % of the land), and in some areas, is expected to be ice-rich, making it thaw sensitive. Although permafrost has been assessed in the CCRA, it is connected to and often integral to terrain instability and, therefore is included in this discussion as appropriate. Further details on terrain and permafrost in the Project area can be found in Volume 6, Section 14: Assessment of Potential Effects on Terrain, Soils and Permafrost.

#### **35.3.1 Potential Effects of Terrain Instability**

Geohazards such as terrain (slope and ground) instability, including those related to differential thaw settlement and frost heave, can pose challenges to the design, construction, and/or operation and maintenance of Project infrastructure. These processes can result in the occurrence of unstable ground conditions, potentially damaging infrastructure like roads and building foundations.

Thaw settlement or subsidence induced by changes to permafrost thermal regimes could result in damage to Project infrastructure (e.g., roads, airstrip, culverts and building pads) and temporarily impact construction and operations and maintenance activities. Kitikmeot Inuit Association expressed concern about climate change and the effects melting permafrost has on the environment and on traditional land, marine, and resource use (Banci and Spicker 2024; MVRB 2016). Knowledge Holders from Gjoa Haven, Inuvik, and Clyde River also reported that permafrost thaw is causing terrain stability issues, including

observed thaw slump and ground subsidence (McLennan et al. 2022). There is also potential for surface runoff and pooling water to affect the thermal regime, which could lead to thaw settlement or weakening of infrastructure foundations.

The effects of thaw settlement and subsidence on Project components can include differential settlement, structural failures, creep settlement, thermokarst development under infrastructure, and general embankment instability. These risks will be mitigated through geotechnical investigations to site Project components on bedrock where feasible, and through engineering design and construction that will maintain the current thermal conditions; this could include foundation design, interception berms, and culvert capacity. Active monitoring and maintenance of infrastructure during construction and operations and maintenance phases will also be employed.

### **35.3.2 Mitigation and Management Measures**

During engagement on the Project, Kugluktuk Hunters and Trappers Organization (HTO) representatives provided road construction suggestions to manage issues associated with building on permafrost and clearing snow. Specific to road construction, the HTO suggested using sand as a base to retain insulation. Specific to clearing snow on the road, the HTO suggested that snowblowers, instead of graders, be used to clear, since snowblowers feather out the snow, while graders cause windrows that act as barriers for caribou travel. During the public comment period for the NIRB, the Kitikmeot Inuit Association stated that in order to mitigate adverse effects that the construction of the Project in combination with future environmental changes may cause, it is critical that sufficient geotechnical site investigations, terrain mapping and geohazard assessments are completed prior to detailed design and the initiation of construction (NIRB 2024).

The following mitigation and management measures will be implemented to manage the risk to the Project as a result of terrain instability:

- Geotechnical investigations will be conducted to inform design and minimize potential effects of geohazards on the Project.
- As much as possible, the road alignment, as well as roads to quarries and borrow sources will be built over bedrock to lessen the potential for terrain subsidence.
- Drainage culverts will be constructed along the road to facilitate water movement and maintain drainage patterns where required. Follow-up investigations and design activities will determine the number of culverts, as well as their respective size and location. Follow-up maintenance of culverts will be conducted as required so that they maintain their drainage capacity.
- A “fill-only” construction approach will be in place where possible, with minimal disruption to the subgrade rather than a “cut and fill” approach, except at specific locations of road cuts, where grades at steep valley approach can be reduced by cutting into hill slope.
- To favor the stability of cuts and fills on slopes, fill material will be compacted, and the tops of cut slopes will be rounded where required.
- The slope of the cut or fill will have a horizontal to vertical ratio accounting for the geotechnical properties of the materials where required.

- Ice-rich terrain in thick material deposits will be avoided whenever possible, which includes, but is not limited to, ice-wedge polygons terrain, wetlands, fine-grained deposits such as marine or glaciolacustrine deposits.
- When sensitive terrain is not avoidable, mitigation measures and design will include ground thermal regime management and limit heat transfer to the ground as follows:
  - Road embankment will be thicker and made of coarse materials, with sand and gravel to provide insulation, to limit heat transfer to the ground and to limit ice formation in the embankment.
  - Building foundations will follow general guidelines for construction in permafrost terrain (CSA Group 2019).
  - If ice-rich permafrost is identified during excavation activities, suitable measures will be taken to protect permafrost and ground ice.
  - Steep grades where subsidence may occur as a result of permafrost thaw will be avoided, where possible.
- The Project will develop and implement an Erosion and Sediment Control Plan (ESCP) to target standards, mitigations, and procedures that will be used to lessen erosion and the potential for unstable slopes and terrain.
- Snowblowers will be considered for snow clearance where appropriate.

### **35.3.3 Conclusion**

The Project is being designed and engineered with consideration of environmental conditions, including terrain instability and permafrost. Industry standards and best management practices are being applied, along with appropriate operational procedures and mitigation measures. General considerations for engineering design to manage terrain instability and permafrost include avoidance measures, elimination and reduction measures, and accommodation and management of the effects. Specific effects management measures will be determined during the detailed design phase and will remain adaptable to the spatial and temporal variation of terrain conditions.

With the application of mitigation and management measures, terrain instability is not considered to have the potential to damage Project infrastructure, resulting in an increased safety risk or repairs which could not be technically or economically implemented or result in a substantial change to the Project construction or operations and maintenance schedule.

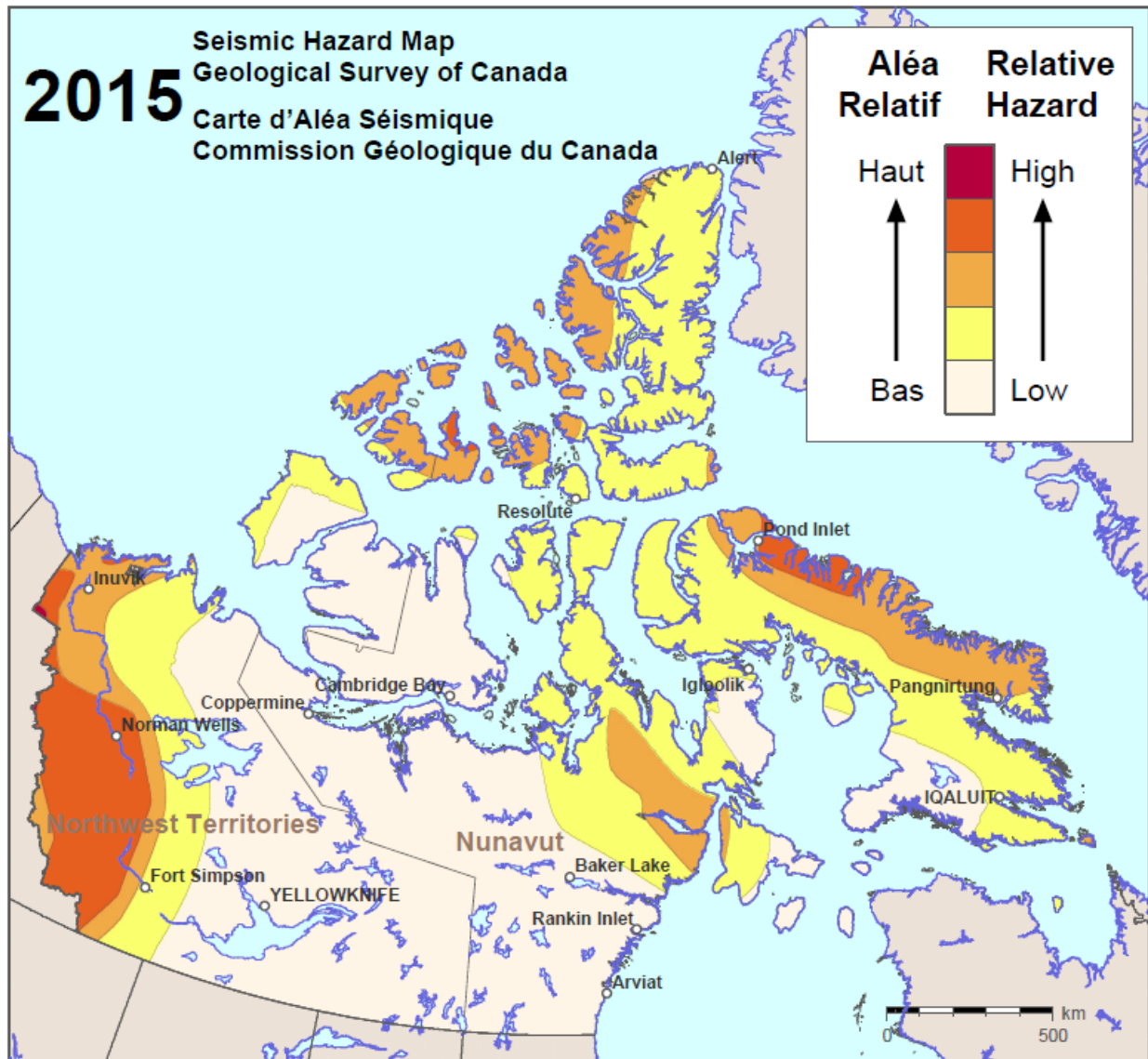
WKR will continue to respond to questions and concerns from Kitikmiut, other Indigenous groups, and other potentially affected communities through its ongoing engagement efforts. Information provided following submission of the IS will be reviewed in the context of the IS and for incorporation into project planning, including adaptive management and monitoring, as appropriate.

## 35.4 Seismic Activity

Seismic activity is characterized by the local geography of an area and the movement and/or fracture of rocks within the Earth's surface (e.g., the movement of tectonic plates). These movements release seismic waves that radiate and cause vibration of the ground (known as earthquakes) (NRCan 2025a).

The seismic hazard map of the Northwest Territories and Nunavut produced by Natural Resources Canada describes five hazard categories (NRCan 2015) that indicate the relative seismic hazard across Canada. The Project area falls within the lowest hazard category, indicating a low potential for seismic activity in the region, see Figure 35.1 (NRCan 2015).

Figure 35.1 Seismic Hazard Map



### **35.4.1 Potential Effects of Seismic Activity**

Seismicity has the potential to adversely affect the Project during both Construction and Operations and Maintenance phases. A seismic event could result in damage to infrastructure, such as structure foundations (e.g., accommodations, administrative and maintenance buildings, supply storage), roadways and airstrip, and to utility infrastructure (e.g., power generation and water pipelines), leading to temporary interruptions in power or water service.

If the magnitude is large enough, a seismic event could temporarily suspend project activities or result in damage to Project infrastructure, which may increase the safety risk or result in the requirement for repairs. Infrastructure damage could result in a delay to the Project schedule or interruption to Project operations.

The effects of a seismic event would depend on the magnitude of the event and the distance from the Project infrastructure. A low magnitude (i.e., less than M3.5) earthquake may not be felt, while earthquakes with a magnitude of M3.5 to M5.4 may be felt but do not cause damage often. A well-designed building may have minor damage from an earthquake under magnitude M6 and major damage from an earthquake over magnitude M6, depending on the location and proximity to the Project (NRCan 2025b). No casualties or building collapses have been directly related to an earthquake in Canada. Injuries have been reported caused by the fall of objects (NRCan 2025c).

### **35.4.2 Mitigation and Management Measures**

The following mitigation and management measures will be implemented to manage the risk to the Project as a result of seismic activity:

- The Project will be designed and constructed to meet applicable engineering codes, standards, and best management practices. Appropriate design earthquakes and the corresponding seismic design parameters will be selected.
- Regular maintenance and safety inspections will be conducted on project infrastructure and equipment.
- A Risk Management and Emergency Response Plan (as described in more detail in Section 32 – Accidents and Malfunctions) and Spill Prevention and Contingency Plan will be implemented including measures prescribed for the provision of emergency response planning, training, responsibilities, clean-up equipment and materials, and contact and reporting procedures.
- The Project will include backup emergency generators in case there is an interruption to power.
- The proponent will monitor observed effects of the environment on the Project, and will act as required to maintain, repair, and upgrade infrastructure/equipment as required.
- Muster points will be established to provide safety of personnel during a seismic event.

### **35.4.3 Conclusion**

The Project is being designed and engineered in consideration of environmental conditions, including seismic activity by applying industry standards and best management practices, and implementing appropriate operational procedures and mitigation measures. The potential for seismic events has been and will continue to be considered and incorporated into the planning, design, construction, and operation of the Project to reduce the potential for damage to infrastructure and equipment, and changes to construction or operations and maintenance of the Project.

With the application of mitigation and management measures, seismicity is not considered to have the potential to damage project infrastructure resulting in an increased safety risk or repairs which could not be technically or economically implemented or result in a substantial change to the project construction or operations and maintenance schedule. Infrastructure will be regularly inspected for damage and repaired as required to reduce the potential for safety risks.

In the unlikely event of a seismic event project activities, either during construction or operations may be suspended in order to allow personnel to gather at designated muster stations and project infrastructure to be inspected post-event to identify the need for repairs. These shutdowns are anticipated to be short-term and temporary in nature.

WKR will continue to respond to questions and concerns from Kitikmiut, other Indigenous groups, and other potentially affected communities through its ongoing engagement efforts. Information provided following submission of the IS will be reviewed in the context of the IS and for incorporation into project planning, including adaptive management and monitoring, as appropriate.

## **35.5 Unfavourable Geological Conditions**

Weakness zones and faults are important features in relation to rock excavation and can present problems and collapses, particularly in rock tunnelling activities. Effects from unfavorable geological conditions (such as weak zones or faults) are not considered a significant issue based on the design and nature of the Project (e.g., above ground roads and infrastructure). Weakness zones and faults may be encountered in project quarries and borrow pits, however, effects on project infrastructure are not anticipated.

## 35.6 Knowledge and Literature Cited

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## 36 Conclusion

### 36.1 Project Assessment Conclusions

Each VC within the IS was evaluated using the knowledge and perspectives of individuals and groups who have the potential to be affected by the Project. Inuit, Indigenous, and Community Knowledge, alongside western science, were identified as the key sources of understanding in evaluating the Project's potential effects.

Measures will be in place to reduce or manage potential adverse effects of the Project, with residual effects not anticipated to have significant residual effects to the atmospheric, terrestrial, freshwater, marine, or human environment. The Project is also anticipated to result in many positive effects, particularly for training, employment, and the economy. Having considered this, the assessment of the effects of the Project is predicted to be not significant.

### 36.2 Cumulative Effects Assessment Conclusions

Cumulative effects are the combined effects of the Project and other past, present, and future activities, as well as natural changes like climate change. A Project Inclusion List identified 129 physical activities (e.g., mines, exploration, roads, communities, marine traffic) that may interact with the residual effects of the Project. Remote conditions, long distances from the project to existing activities, and relatively low activity levels mean cumulative effects are currently rare today, though they could emerge depending on future development choices.

One of the goals of the Project is to spur economic development to benefit the Kitikmeot. With Reasonably Foreseeable mine development, increased traffic, or new infrastructure in the region, cumulative effects may emerge. That said, the overall effects are expected to remain generally low to moderate and not significant.

More meaningful cumulative effects emerge only in under Reasonably Foreseeable Induced scenarios where the Project supports additional mine development, increased transportation, or new regional infrastructure. Even then, effects are expected to remain generally low to moderate and not significant. With this increased economic development, the total positive effects, particularly for training, employment, and the economy, are also expected to increase.

## **36.3 Acknowledgements**

On behalf of the West Kitikmeot Resources Corp. (WKR) Project team, we extend our sincere appreciation to all individuals, organizations, communities, and agencies who contributed their time, knowledge, and feedback in preparing the Grays Bay Road and Port Project Impact Statement. Your participation was essential in ensuring that this Impact Statement reflects local priorities, Inuit, Indigenous, and Community knowledge, technical expertise, and regulatory requirements.

### **Kitikmeot Inuit Association**

WKR respectfully acknowledges the Kitikmeot Inuit Association (KIA) for its partnership, guidance, leadership, and ongoing support. Without KIA's involvement, this Project would not be where it is today. We extend our sincere thanks to James Eetoolook, Lawrence Otokiak, Cory Barker, Michelle Buchan, Skye Lacroix, Derek Elias, John Roesch, Jennifer Amagoalik, Katrina Hatogina, Tannis Bolt, and the Community Liaison Officers: Junna Ehaloak (Cambridge Bay), Susie Ikkutisluuk (Gjoa Haven), Jayko Neeveacheak (Taloyoak), Vincent Ningark (Kugaaruk), and Morgan Evaglok (Kugluktuk).

We also acknowledge Vivian Banci and Rose Spicker for their management of the NTKP database and preparation of the Kitikmiut Knowledge of the Proposed Koglokoakyoak (Grays Bay) Port and Road Project – Final Report, which was instrumental in informing the Project.

WKR further thanks Cambridge Bay MLA Fred Pedersen, former Executive Director of the Kitikmeot Inuit Association, Wynter Kuliktana and Geoff Clark, former Director of Lands, Stanley Anablak, former KIA president for their continued support of the Project and regional development.

WKR respectfully acknowledges the late Bobby Greenly, whose leadership was instrumental in transitioning the Grays Bay Project from the Kitikmeot Inuit Association to WKR. His vision and dedication to developing Grays Bay continue to influence the Project today. We are grateful for his lasting contributions and will miss him dearly.

### **Inuit Advisory Group**

WKR sincerely thanks the Inuit Advisory Group (IAG) for sharing their extensive knowledge of wildlife, fisheries, land use, archaeology, and water in the Grays Bay Road and Port area. Their contributions were critical in strengthening and completing the Impact Statement.

We gratefully acknowledge the past and present IAG members: Alice Ayalik, Allen Niptanatiak (Acting as a topic-specific advisor), Bobby Algona, Bobby Anavilok, Felix Tologanak-Labrie, George Hakongak, Jayko Palongayak, John Franklin Kaodloak, John Himiak, Jorgen Bolt, Kevin Ongahak, Larry Adjun, Martina Kapolak, Mercie Kaodloak, Ryan Nivingalok, and Tony Akoluk. Their insights greatly enhanced the quality of this submission.

## **Hunters and Trappers Organizations**

WKR thanks the Kitikmeot Regional Wildlife Board and the following Hunters and Trappers Organizations for their continued engagement and feedback: Kugluktuk Angoniatit Association, Ekaluktutiak Hunters & Trappers Organization, Taloyoak Umarulirigut Association, Kurtairujuark Hunters & Trappers Association, Gjoa Haven Hunters and Trappers Association, and Burnside Hunters and Trappers Organization.

Special thanks are extended to Allen Niptanatiak (Kugluktuk), Amanda Dumond (Kugluktuk), Peter Evalik (Cambridge Bay), Beverly Maksagak (Cambridge Bay), Rosemary Maksagak (Cambridge Bay), Jimmy Ullikatalik (Taloyoak), Barnaby Immingark (Kugaaruk), Anthony Anguttitauruq (Gjoa Haven), and Anthony Roche, Connie Kapolak (Burnside) for their time, openness, and willingness to share concerns and feedback.

## **Kitikmeot Region Residents and Organizations**

WKR thanks community members from Cambridge Bay, Gjoa Haven, Kugaaruk, Kugluktuk, Taloyoak, and local hamlets, municipalities, and high schools for their participation and engagement throughout the process.

We extend our appreciation to Mayors Ryan Nivingalok (Kugluktuk), Wayne Gregory (Cambridge Bay), Raymond Quqshuun (Gjoa Haven), Lenny Panigayak (Taloyoak), and Teddy Apsaktaun (Kugaaruk), along with their Senior Administrative Officers, Assistant Senior Administrative Officers, and support staff, for welcoming WKR into their communities and facilitating engagement opportunities.

WKR also thanks community members who supported baseline programs in 2024 and 2025 as assistants, wildlife monitors, or through equipment and boat rentals, including Jimmy Evalik, Nigel Allupik, Jeff Niptanatiak, Doyle Algona, Thomas Hanak, Luc Paul Uvilluk, and Matthew Ohokannoak.

We gratefully acknowledge the Kitikmeot Corporation and the Kitikmeot Chamber of Commerce for their ongoing support of the Grays Bay Road and Port Project and regional development initiatives.

Special thanks are extended to Peter and Helen Laube for their exceptional hospitality and generosity during WKR's work in Cambridge Bay.

## **Community Service Providers**

WKR thanks the interpreters, accommodations, caterers, and event hosts who supported meetings, workshops, and open houses, including:

### ***Accommodations:***

Enokhok Inns (Kugluktuk and Cambridge Bay), Green Row Executive Suites (Cambridge Bay), Boothia Inn (Taloyoak), Jeannie Ugyuk (Taloyoak), Amundsen Inns North (Gjoa Haven), and Inukshuk Inn (Kugaaruk).

***Interpreters:***

Mona Tiktalek, Mercie Kaodloak (Kugluktuk), Christopher Amautinuak, Danny Amautinuak (Kugaaruk), Joseph Quqqiaq Sr. (Taloyoak), Simon Okpakok, and Jacob Keanik (Gjoa Haven).

***Caterers:***

Kugluktuk High School, Delma Niptanatiak, Ida Hala (Kugluktuk), Qillaq Lodge (Cambridge Bay), Elizabeth and Caroline Anavilok (Gjoa Haven), Inukshuk Inns North Hotel (Kugaaruk), Maria Totalik, and the Ladies Auxiliary (Taloyoak).

**Other Indigenous Organizations**

WKR thanks the following Indigenous governments and organizations for their engagement and feedback: Tłı̨ch̨ Government, Yellowknives Dene First Nation, Inuvialuit Regional Corporation, Inuvialuit Game Council, Inuvik, Tuktoyaktuk, Aklavik, Paulatuk, Sachs Harbour, and Olokhtomiut Hunters and Trappers Organizations, North Slave Métis Alliance, Athabasca Denesų́liné NeNe Land Corporation, Ghotelnene K'odtineh Dene, Gwich'in Tribal Council, Łutsel K'e Dene First Nation, Northwest Territory Métis Nation, Pauktuutit Inuit Women of Canada, Sahtu Secretariat Incorporated, Wek'èezhì Renewable Resources Board, Beverly and Qamanirjuaq Caribou Management Board, Fort Smith Métis Alliance, and the Caribou Guardian Coalition.

**Government Agencies**

WKR acknowledges the Government of Canada, Government of Nunavut, Government of the Northwest Territories, Nunavut Water Board, Nunavut Impact Review Board, Mackenzie Valley Review Board, Environmental Impact Screening Committee, Environmental Impact Review Board, Transport Canada, Canadian Northern Economic Development Agency, Crown-Indigenous Relations and Northern Affairs Canada, Fisheries and Oceans Canada, and Environment and Climate Change Canada for their guidance, oversight, and support throughout the process.

Special thanks are extended to Transport Canada, Canadian Northern Economic Development Agency, and the Government of Nunavut for their continued financial support while WKR navigates the Nunavut Impact Review Board's regulatory process. WKR would also like to thank Crown-Indigenous Relations and Northern Affairs Canada for providing financial support to Indigenous peoples and other Northerners, allowing them to participate meaningfully in the Grays Bay Road and Port Project's Impact Assessment and Regulatory Processes.

**Technical Teams, Industry Partners, and Mining Users**

WKR thanks its technical, operational, and advisory teams, consultants, industry partners, and contractors for their expertise and collaboration. Special thanks to WKR advisors Matthew Pickard, Jason Prno, Jim Stevens, and Sharleen Hamm for their invaluable northern experience and guidance.

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March 2025

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We also acknowledge Scott Trusler, Dave Brescia, Elaine Little, Arlen Foster, and Glenn McIntyre of Nunami Stantec for leading Impact Statement data collection, integration, and drafting; Darren Lindsay of Blue Star Gold Corp. for access to exploration camp facilities to support our field programs; Peter Cullinane of Akokli Construction & Exploration for overseeing those programs; Acasta HeliFlight Inc.; Arctic Research Foundation; EDI Environmental Dynamics Inc.; Campbell Scientific Inc.; JASCO Applied Sciences (Canada) Ltd.; Geotech Ekutac; Tetra Tech Inc.; and Pido Production Ltd.

WKR also thanks the Mining User Steering Committee—MMG Resources Inc., Blue Star Gold Corp., Glencore Canada, Agnico Eagle Mines Limited, B2Gold Corp., and White Cliff Minerals Ltd.—for their technical input and guidance. We further acknowledge the Northwest Territories & Nunavut Chamber of Mines, Kitikmeot Corporation, and the Kitikmeot Chamber of Commerce for its continued support and advocacy.

We are grateful to all contributors for sharing their knowledge, perspectives, and recommendations, which strengthened this Impact Statement. Inuit, Indigenous, Community, government, and industry input informed baseline studies, mitigation measures, Project design, seasonal use considerations, and regulatory submissions.

Thank you to everyone who participated in meetings, provided written comments, shared Inuit, Indigenous, and Community knowledge, and reviewed draft materials. Your contributions helped ensure the Grays Bay Road and Port Project Impact Statement reflects community priorities and regulatory expectations.