Baffinland

# Memo

From: Baffinland Iron Mines Corporation

Title: **Type A Water Licence Renewal – Re Cumulative Effects (in Response to QIA IR-20)**

Date: September 16, 2024

In QIA IR-20, the Qikiqtani Inuit Association (QIA) has recommended the following:

- Baffinland should include an updated description of cumulative effects on water quality, quantity and flow in its Application, that shows that Baffinland has been properly tracking cumulative effects over the past decade or more.

This memo has been prepared to respond to this request.

Section 17 of the Water Licence Renewal Application Form asks the Applicant to answer the following questions: "*Are predicted environmental impacts of the undertaking and proposed mitigation measures the same as those considered in the existing water licence*? [Check yes or no] *Describe direct, indirect, and cumulative impacts related to water and waste*."

Per Baffinland's completion of the Water Licence Renewal Application Form, the predicted environmental impacts and proposed mitigation measures for this renewal application are the same as those considered in the existing water licence. This memo provides information on the cumulative impacts related to water and waste.

The Nunavut Water Board (NWB), while conducting a thorough technical review of the Renewal Application, is bound by the assessment of the ongoing Mary River Project activities, works and undertakings that was previously concluded by the Nunavut Impact Review Board (NIRB). The NIRB has carried out assessments previously and issued Project Certificate No. 005 and Project Certificate Amendments No. 1-5 based on its assessment (including its assessment of cumulative effects) of the following applications:

- Final Environmental Impact Statement, Mary River Project (2012)
- Final Environmental Impact Statement Addendum, Early Revenue Phase (ERP) (2014)
- Application for Amendment, Production Increase Proposal (PIP) (2018)
- Application for Amendment, Production Increase Proposal Extension (PIPE) (2020)
- Application for Amendment, Production Increase Proposal Renewal (PIPR) (2022)
- Final Environmental Impact Statement Addendum, Sustaining Operations Proposal (SOP) (2023)

The NIRB is currently carrying out an assessment of the Sustaining Operations Proposal 2 (2024) (SOP2), which reflects the approach committed to by Baffinland at the February 2024 NIRB Cumulative Effects Workshop. As indicated in Table 3, the SOP2 cumulative effects assessment has updated the list of Projects considered in previous assessments. As indicated in Table 4, the overall conclusion is that SOP2 will not result in any significant cumulative effects, taking into account mitigations. It is important to emphasize the following with respect to SOP2:

- SOP2 is a continuation of current approved activity and already part of the undertaking since 2018.

- There has never been any Type A Water Licence amendments to terms and conditions or Type A Water Licence modifications associated with the transportation of up to 1.8 mtpa of iron ore along the Northern Transportation Corridor (in addition to the 4.2 mtpa rates approved under the ERP).
- Likewise, no amendments or modifications of the Type A Water Licence are required as a result of SOP2.
- The renewal of the Type A Water Licence should not be linked to or delayed by the SOP2 Project Certificate amendment process. The Type A Water Licence expires in June 2025, and Baffinland requires a timely renewal of the Type A Water Licence to continue operations.
- In the unlikely event that amendments to the Type A Water Licence are required as an outcome of the SOP2 Project Certificate Amendment process, those would be sought by Baffinland in due course following issuance of the renewed Type A Water Licence.

## 1. NIRB Cumulative Effects Assessment

As part of the initial project proposal for the Mary River Project submitted to the NIRB in 2012, Baffinland prepared a FEIS, which included a cumulative effects assessment (CEA) that screened all VCs considered in the effects assessment. VCs with no predicted project-related residual effects were not carried forward in the CEA since in those cases there would be no mechanism for the Mary River Project to have a cumulative effect. Similarly, any positive residual effects were screened out for further assessment. Since 2012, Baffinland has proposed various amendments to the Mary River Project, which have required a reconsideration of the Project Certificate and submission of FEIS addenda by Baffinland. Only where potential changes in project residual effects were predicted to occur as a result of the amended project proposal, the original CEA conclusions were updated to reflect the outcomes from those updated VC assessments, while all other VC conclusions remained the same as and relied on in the approved 2012 FEIS CEA. Table 1 lists the CEAs presented as part of the FEIS and FEIS Addendums presented in relation to the Mary River Project to date.

**Table 1: References to Mary River Project Cumulative Effects Assessments**

| Document | Year | Cumulative Effects Assessment Reference |
|---|---|---|
| Mary River Project FEIS | 2012 | Volume 9, Section 1 |
| ERP FEIS Addendum | 2013 | Volume 9, Section 1 |
| Mary River Modification Application – Production Increase, Fuel Storage, and Milne Port Accommodations | 2018 | No change from ERP |
| Phase 2 Addendum to the FEIS (Note: The Phase 2 proposal was rejected and did not proceed) | 2018 – 2019 | Main Document, Section 6;<br>Technical Supporting Document 27, Section 1; Revised Addendum to TSD-27 |
| PIPE Request, Supporting Information Summary Report | 2020 | No change from ERP |
| PIPR Application Supplement | 2022 | No change from ERP |
| SOP FEIS Addendum | 2023 | Section 6.9 |

| | | |
|---|---|---|
| SOP2 FEIS Addendum | 2024 | Each VC section |

## 2. Baffinland Actions to Respond to Reports re Inuit Experience of Effects from the Mary River Project

Every CEA conducted for the Mary River Project to date have concluded that cumulative effects are not significant with reference to effects thresholds Baffinland has established for assessment, and the Minister and the NIRB has approved the Mary River Project and each subsequent amendment to the Mary River Project based on those assessments.

As noted by QIA, some Inuit and Inuit organizations have described effects they have experienced as a result of the ongoing operation of the Project, and that their experience does not always align with the results of Baffinland's scientific monitoring programs under the Project Certificate. Baffinland is taking significant action to directly address Inuit concerns.

- To help address Inuit concerns relating to dust, Baffinland established the Dust Audit Committee which is an all-Inuit committee with participation from Arctic Bay, Clyde River, Igloolik, Pond Inlet and Sanirajak that is developing Inuit-led recommendations to reduce emissions from the Tote Road and other Project areas of interest identified by the group.
- Another ongoing initiative that will enhance the ability of communities to identify and propose responses to potential cumulative effects will occur through the QIA's Inuit Stewardship Plan, including completing a Culture, Resources and Land Use (CRLU) Assessment to establish the scope and contents of the CRLU Monitoring Program.
- Baffinland has funded the QIA-led Pond Inlet IQ Water Values Study.
- Baffinland also agreed to participate in regional government initiatives and programs including federal initiatives aimed at evaluating regional cumulative effects in the Eastern Canadian Arctic and a marine spatial planning exercise should an appropriate regional body lead the initiative. Baffinland continues to work with regulatory agencies and local communities to reduce residual effects from the Mary River Project and is committed to participating in collaborative initiatives aimed at managing regional cumulative effects in the Eastern Canadian Arctic.
- The NIRB is leading an exercise to develop a Cumulative Effects Assessment Framework for the Mary River Project, in collaboration with the Minister, QIA, Baffinland and other participants in the NIRB process.

## 2. Spatial Boundaries for Cumulative Effects

Other projects and activities within the NSA that were screened as potentially interacting with valued components (VCs) that could also experience residual effects of the approved Mary River Project are shown on Figure 2. These projects and activities were identified based on past CEAs conducted for the Mary River Project, with updates made based on review of the NIRB Project Registry, recommendations made as part of the CEA Framework Workshop (2024) and professional judgement. This list includes past projects that have been carried out, current and ongoing projects and activities, and certain and reasonably foreseeable future projects and activities. NIRB (2009) defines reasonably foreseeable projects as those that are currently under regulatory review, or that will be submitted for regulatory review in the near future, as determined by the existence of a proposed project description, of letter of intent, or any regulatory application filed with an authorizing agency. Baffinland has adopted a similar standard for the practical

purpose that without certain advancement and public disclosure of details relating to a future other project, it is difficult to understand its potential interactions with this Proposal. Baffinland has also included induced projects or activities which are more likely to occur as the Mary River Project develops.

Projects and activities presented in Table 2 include mining and mineral exploration; pits and quarries; military activities; transportation; tourism; protected areas; communities; monitoring and research; commercial fisheries; and natural events (e.g., climate change). Potential effects of these projects and activities, in recognition of spatial and temporal overlap with predicted effects of the Mary River Project will be considered as appropriate within the respective VC CEAs. In many cases, there is little to no spatial overlap of biophysical effects given the geographic separation of the Mary River Project from other projects and activities. However, these projects and activities may contribute to biophysical and/or socio-economic effects within the larger RSAs (which in some cases is the NSA itself).

Ongoing mineral exploration and future development plans (e.g., Deposits 2 and 3) being evaluated by Baffinland are considered in the CEA as Certain and Likely Foreseeable Future Projects and Activities with Deposits 4 to 9 considered as potential future induced projects.

As indicated in Table 2, many of these other projects and activities are well outside the defined Regional Study Areas defined for the Mary River Project and therefore potential for spatial overlap of effects, and potential cumulative effects, is limited. However, Baffinland also recognizes the migratory ranges of some VCs extends beyond the NSA where they may be exposed to other stressors not captured in Table 2. It is not feasible to compile an inventory of all projects and activities within the extent of all mobile species' ranges, therefore additional stressors beyond the NSA are considered, as applicable based on a generalized understanding of human activities in the Arctic archipelago.

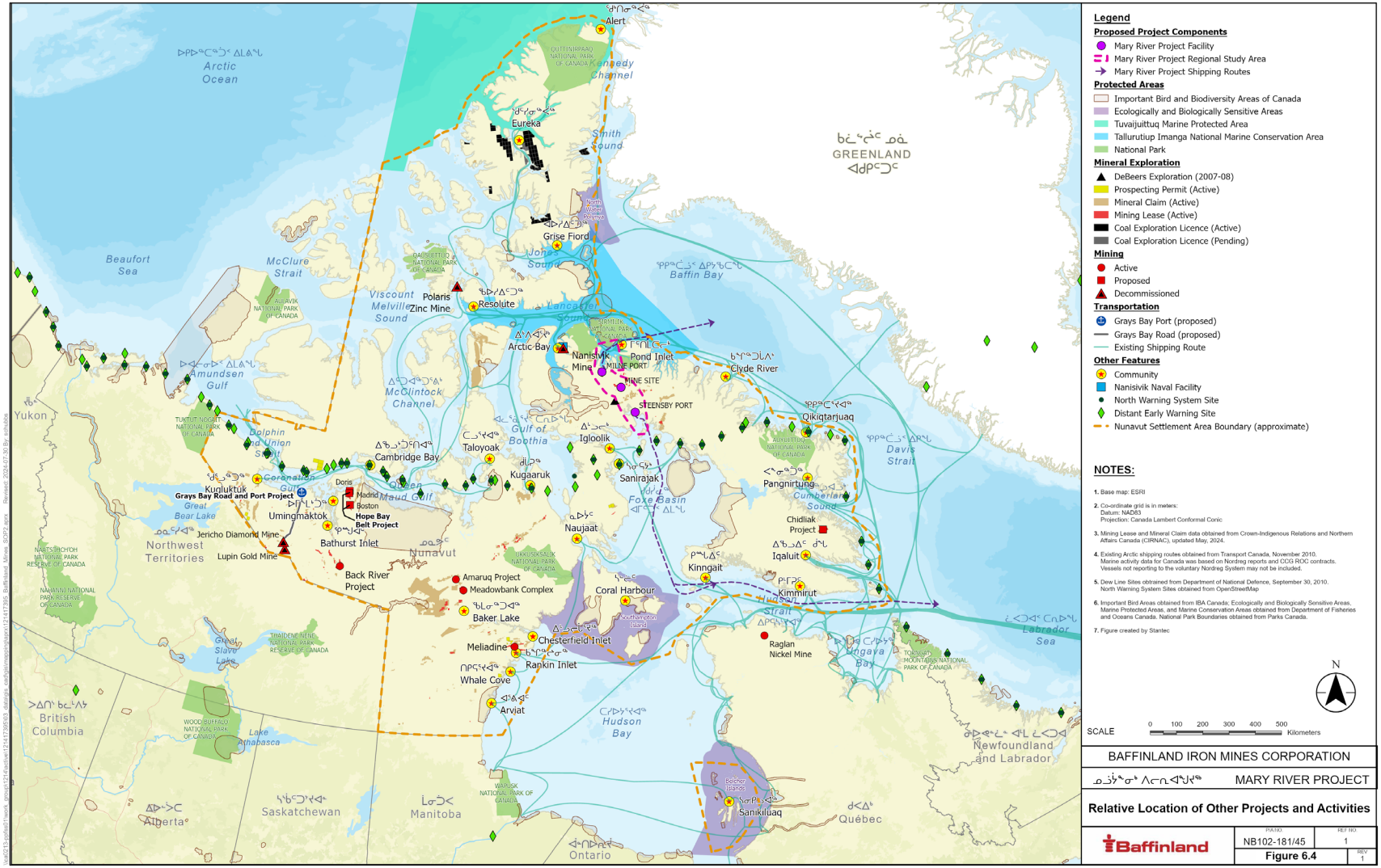


**Figure 2: Relative Location of Other Projects and Activities**

**Table 2: SOP2 Assessment - Other Projects and Activities with the Potential to Interact Cumulatively with the Mary River Project**

| Category | Project / Physical Activity | Description | Proponent / Organization | Approximate Distance from Project | Status / Timeline | Temporal Overlap | Spatial Overlap | Inclusion in Updated CEA |
|---|---|---|---|---|---|---|---|---|
| **Past Projects or Activities that Have Been Carried Out** | | | | | | | | |
| Mining and Mineral Exploration | Nanisivik Mine (Decommissioned) (NIRB Registry No. 04YN100) | Former Lead-Zinc Mine decommissioned in 2003 located in the Arctic Bay with ongoing research by the University of Saskatchewan for residual soil contaminants. Shipping and icebreaking operations occurred during spring, summer and fall seasons including icebreaking through landfast ice. | Breakwater Resources Inc. | ~ 180 km NW of Milne Port | Operated: 1976-2002<br>Decommissioned 2003-2008 | No | No spatial overlap between shipping operations and the Marine RSA | No<br>Mine decommissioning occurred outside CEA temporal boundaries; no residual effects remain in the Marine RSA to interact cumulatively with the Mary River Project |
| Mining and Exploration | Polaris Mine (Decommissioned) (NIRB Registry No. 01MD098; 03YN103) | Former Zinc and Lead Mine located on Little Cornwallis Island in Nunavut. Final reclamation of the site was completed in 2011. | Teck Cominco | ~ 650 km NW of Milne Port | Operated: 1981-2002<br>Decommissioned: 2003-2004 | No | No spatial overlap between shipping operations and the Marine RSA | No<br>Mine decommissioning occurred outside CEA temporal boundaries; no residual effects remain in the Marine RSA to interact cumulatively with the Mary River Project |
| Mining and Exploration | Diamond Exploration | Diamond exploration programs southwest of the Mine Site | DeBeers Canada Inc. | ~ 50 km SW of Mine Site | 2004 to 2008 | No | Spatial boundaries within terrestrial RSA | No<br>Previously assessed in the FEIS CEA; No residual effects remain in the terrestrial RSA to interact cumulatively with the Mary River Project |
| **Present and Ongoing Projects or Activities** | | | | | | | | |
| Communities | Land and Resource Use | Traditional and recreational hunting, fishing and foraging activities associated with the seven potentially affected communities | Arctic Bay, Clyde River, Sanirajak, Igloolik, Pond Inlet, Kimmirut, Kinngait | Various | Ongoing | Within CEA temporal boundaries | Within land use RSA | Yes<br>Activities overlap with the Project temporally and spatially and effects may interact cumulatively with the Mary River Project |
| Commercial Fisheries | Commercial fishing | Various inshore and inland (Arctic char, shrimp, whelks, clams) and offshore fisheries (turbot and shrimp). | Across Nunavut (incl. Qikiqtani Region) | Various | Ongoing | Within CEA temporal boundaries | Within marine RSA | Yes<br>Activities overlap with the Project temporally and spatially and effects may interact cumulatively with the Mary River Project |
| Military | Nanisivik Naval Facility (NIRB Registry No. 09DN018) and Training Operations | Royal Canadian Navy (RCN) docking and refueling facility at the former Nanisivik Zink Mine site near the community of Arctic Bay (~100 km southeast of Resolute). Facility to serve primarily as a deep-water refueling and resupply station for Arctic Offshore Patrol Ships, Canadian Coast Guard and other government ships transiting through the Northwest Passage during the navigable season. The period of operation is expected to be about 4 weeks per year. The lifespan of the facility is at least 40 years. In November 2022, the Auditor General of Canada reported that the facility would start to be used by the RCN regularly beginning in 2025. The RCN have agreed with the Government of Nunavut to not break ice near the facility in order to protect community access to frozen waters and protect wildlife, therefore access is restricted to the RCN's operational season, which is typically between four and six weeks (between August and October). As long as the waters are navigable and the facility is accessible, the Nanisivik Naval Facility will be open to RCN and CCG ships.<br>As of 2023 filings with NIRB, the facility is currently being constructed and commissioning was proposed for 2024. | Department of National Defence | ~ 180 km NW of Milne Port | Construction: 2014-2023<br>Operations: 2024-2064 | Within CEA temporal boundaries | Unknown; could support shipping that overlaps with Northern Shipping Route | Yes<br>Effects on marine environment may interact cumulatively with the Mary River Project |

| Category | Project / Physical Activity | Description | Proponent / Organization | Approximate Distance from Project | Status / Timeline | Temporal Overlap | Spatial Overlap | Inclusion in Updated CEA |
|---|---|---|---|---|---|---|---|---|
| | | Operation Nanook is the Canadian Armed Forces' signature northern operation and takes place each year across Yukon, the Northwest Territories, Nunavut, and Labrador. It features up to 4 deployments throughout the year.<br>In 2023 Operation Nanook-Nunalivut took place from March 1 to 20, 2023 in and around the community of Rankin Inlet, Nunavut. Operational activities included long range patrols, ice diving, and an austere range. Operation Nanook-Tuugalik took place from August 8 to August 25, with portions of the operation continuing through September 29. As part of the operation, the USS San Juan, with members of the Royal Canadian Navy aboard, navigated the Northwest Passage.<br>Canadian Armed Forces are expected to undertake Operation Nanook annually, including up to four deployments by air, land and sea (Government of Canada 2023). | | | | | | |
| Military | Military Radar Stations (DEW Line Decommissioning) | DEW Line system remediation concluded in 2014. The current North Warning System (NWS) consists of unmanned stations (radar tower, building and airstrip) south of the RSA. In Canada, the NWS consists of 47 radar sites of 11 long-range and 36 short-range radar sites. These sites are operated remotely but do require periodic visits for inspection and maintenance. | Department of National Defence | Closest station is ~ 500 km SE of Mine Site | 1950s onwards | Within CEA temporal boundaries | Outside of terrestrial RSA | No<br>Zone of influence of effects does not overlap with predicted zone of influence of the Mary River Project |
| Mining and Mineral Exploration | Raglan Mine | Operating nickel mine in Deception Bay in the Nunavik region of Northern Quebec. The mine includes two new mining phases called the Sivumut Project (Glencore 2017). In 2022, Raglan mine produced 24,323 tonnes of nickel, 5,488 tonnes of copper, and 498 tonnes of cobalt. Nickel concentrate travels 100 kilometers by truck the mine site to the Deception Bay seaport before traveling 2,600 km by sea voyage to the Port of Québec aboard the MV Arvik, a 27,000 metric ton icebreak bulk carrier. The concentrate then travels by train to Sudbury, Ontario for smelting into matte. The product returns to Québec City by rail and is then shipped to Kristiansand, Norway where the raw nickel is processed. The Raglan Mine involves year round shipping and icebreaking during the ice-covered periods. There were 8 trips planned for the MV Arvik between June 2023 and March 2024 from Raglan Mine to the Port of Québec (Glencore n.d). | Glencore Canada Corporation | ~ 1000 km SSE from Steensby Port | Operations: 1997-2041 | Within CEA temporal boundaries | Shipping and icebreaking activities overlap with Southern Shipping Route/marine RSA | Yes<br>Activities overlap with the Project temporally and spatially and effects may interact cumulatively with the Mary River Project |
| Mining and Mineral Exploration | Nunavik Nickel Project | The Nunavik Nickel Project involves the construction and operation of an open-pit mine for primary nickel extraction and secondary copper extraction and the construction of port infrastructure at Deception Bay in the Nunavik region of Northern Quebec. The mine is located south of the Raglan Mine, between the communities of Salluit and Kangiqsujuaq.<br>The production phase started in February 2013 and continues to employ upwards of 1000 workers today. Due to the remote location of the Mine site, most all Canadian supplies are shipped into the Port of Deception Bay by sealift during the ice-free summer months between July and November inclusively. During the winter months between December and March, only ships with icebreaking capabilities can reach the Port. Between March 15 and June 15 is a black-out period where no ships are permitted in the Bay. This is so that the neighboring Inuit community residents can travel freely and safely on the iced over Bay. This leaves the Nunavik Nickel Project Mine with a narrow shipping window in which to receive supplies for a year-round operation. Under normal operations, this is managed through careful procurement, inventory, and storage plans.<br>The ore carriers that the proponent plans to use have a maximum capacity of 25,000 tonnes and are approximately 190 m long. An estimated nine trips are made each year between mid-June and mid-March. This is the shipping period that has been agreed upon with the Inuit and that is specified in the certificate of authorization issued by the Quebec Department of Sustainable Development, Environment and Parks (MDDEP) in 2008. The proponent has indicated that CRI's ships will follow the same route in Deception Bay as Glencore Xstrata's ships. With the three trips required to supply fuel and goods, CRI would make a total of 12 trips per year in Deception Bay, two of which would be in ice-covered waters. | Canadian Royalties Inc. (CRI) | ~ 1000 km SSE from Steensby Port | Operations: 2013-onwards | Within CEA temporal boundaries | Shipping and icebreaking activities overlap with Southern Shipping Route/marine RSA | Yes<br>Activities overlap with the Project temporally and spatially and effects may interact cumulatively with the Mary River Project |

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| Mining and Mineral Exploration | Meadowbank Mine (NIRB Registry No. 08CN076) (including Whale Tail [NIRB Registry No. 16MN056] and Amaruq extensions [NIRB Registry No. 15EN050]) | Operating gold mine 100 km from Baker Lake, Kivalliq, Nunavut (Agnico Eagle Mines Ltd. 2017). Meadowbank Complex includes processing facilities and infrastructure at the Meadowbank mine site and mining and infrastructure at the Amaruq site. Amaruq property (127,042 hectares) is located approximately 50 km northwest of the Meadowbank mine site, with a 64-kilometre road connecting the two sites. The final year of production at the Meadowbank mine was 2019.<br>The Amaruq mining operation uses the existing infrastructure at the Meadowbank mine, including mining equipment, mill, tailings facilities, camp and airstrip. Additional infrastructure has been built at the Amaruq site, including a truck shop/warehouse, fuel storage and a second camp facility. Amaruq ore is transported using long haul off-road type trucks to the mill at the Meadowbank facilities for processing. The mining rate at Amaruq underground is set to gradually ramp-up to approximately 2,300 tpd. Over the five-year mine life, the average mining rate is expected to be approximately 2,000 tpd.<br>The current mine life for the Amaruq mine is 2026.<br>The process design at the Meadowbank mill consists of two-stage crushing, grinding, gravity concentration, cyanide leaching and gold recovery in a CIP circuit with a current capacity of 3.6 million tonnes processed per year (9,840 tonnes per day).<br>At the Meadowbank Complex in 2023, 32,000 metres of expensed exploration drilling was proposed, focused on testing open-pit and depth extensions of mineralization and the potential for further underground deposits at the Amaruq satellite operation.<br>An additional 8,000 metres of drilling is proposed to investigate for new, near-surface satellite deposits close to the road and infrastructure around the Meliadine and Meadowbank/Amaruq operations (Agnico Eagle 2024a). | Agnico Eagle Mines Ltd. | ~ 1,000 km SW from the Mine Site | Operating since 2010; with Extension Proposal extending operations to 2025 and closure activities planned from 2026 to 2051<br>Ongoing exploration | Within CEA temporal boundaries | Shipping overlaps with Southern Shipping Route/marine RSA | Yes<br>Activities overlap with the Project temporally and spatially and effects may interact cumulatively with the Mary River Project |
| Mining and Mineral Exploration | Meliadine Project (NIRB Registry No. 11MN034) | Gold project, 25 km from Rankin Inlet. Updates proposed to allow extension of mine life to 2043. Includes seven gold deposits, six of which are part of the current mine plan. The 98,222-hectare property covers an 80-km-long greenstone belt. Operations proposed include 10 open pits and two underground mining operations. The mill employs a conventional gold circuit comprising crushing, grinding, gravity separation and cyanide leaching with a carbon-in-leach circuit, followed by cyanide destruction and filtration of the tailings for dry stacking. In 2022, milling rates averaged 4,814 tonnes per day. The Phase 2 mill expansion is expected to be completed in mid-2024 and the processing rate ramp-up is expected to increase throughput to achieve 6,000 tpd by year-end 2024.<br>An additional 8,000 metres of drilling is proposed to investigate for new, near-surface satellite deposits close to the road and infrastructure around the Meliadine and Meadowbank/Amaruq operations (Agnico Eagle 2024b).. | Agnico Eagle Mines Ltd. | ~ 1000 km SW from Steensby Port | Currently in operations, with proposed extension to 2043<br>Ongoing exploration | Within CEA temporal boundaries | Shipping overlaps with Southern Shipping Route/marine RSA | Yes<br>Activities overlap with the Project temporally and spatially and effects may interact cumulatively with the Mary River Project |
| Mining and Mineral Exploration | Back River Project (NIRB Registry No. 12MN036) | Gold project in the West Kitikmeot region with a 160 km winter ice road connecting the mine (Goose Property) to a marine laydown area port facility in Bathurst Inlet. Construction is underway with estimated 15 years of production starting in 2025. Recent proposed modifications include the addition of wind and solar energy facilities. Exploration at other properties is ongoing.<br>The processing plant mill at the Goose Property uses conventional gravity concentration and cyanidation techniques at approximately 6,000 tonnes of ore per day. The gold dore bars produced at the processing plant will be stored on-site and then transported off-site by aircraft on a semi-weekly basis. The marine laydown area consists of a single barge terminal, laydown areas, a camp facility, and associated storage and maintenance facilities. The project will be resupplied annually from southern Canada by barge during the open water season. Project materials would then be transported annually from the marine laydown area to the Goose Property using the winter ice road from mid-January to April. | B2Gold Corp. (formerly Sabina Gold and Silver Corporation) | ~ 1200 km WSW from the Mine Site | Construction: 2023-2025<br>Operations: 2025-2040<br>Ongoing exploration | Within CEA temporal boundaries | Limited supply shipments through Northwest Passage – does not overlap with Northern Shipping Route or marine RSA. | Yes<br>Activities overlap with the Project temporally and spatially and effects may interact cumulatively with the Mary River Project |

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| Mining and Mineral Exploration | Hope Bay Project (Doris North Gold Mine [NIRB Registry No. 05MN047) and the Phase 2 Hope Bay Belt Project [NIRB Registry No. 12MN001]) | Gold mine in the Kitikmeot region, Nunavut. Hope Bay Project Currently in care and maintenance mode. In 2022 and 2023, production activities remained suspended; the focus at Hope Bay is on exploration. | Agnico Eagle (previously TMAC Resources Inc.) | ~ 1200 km SW of the Mine Site | Doris North: 2017-2022<br>Hope Bay: Exploration | Within CEA temporal boundaries | Limited supply shipments may overlap with Northern Shipping Route | Yes<br>Activities overlap with the Project temporally and spatially and effects may interact cumulatively with the Mary River Project |
| Mining and Mineral Exploration | Baffinland Regional Exploration | Baffinland continues to conduct ongoing regional exploration | Baffinland Iron Mines Corporation | ~ 200 km SE of Mine Site; ~90 km ESE of Steensby Port | 2019 onwards | Within CEA temporal boundaries | Within terrestrial RSA | Yes<br>Activities overlap with the Project temporally and spatially and effects may interact cumulatively with the Mary River Project |
| Mining and Mineral Exploration | Various Mineral Exploration Programs | Various ongoing mineral exploration programs on Baffin Island | Various | Various | Ongoing | Within CEA temporal boundaries | May occur within the terrestrial RSA | Yes<br>Activities may overlap with the Project temporally and spatially and effects may interact cumulatively with the Mary River Project |
| Monitoring and Research | Regional Monitoring Programs | Marine mammal, marine environment, caribou, bird and freshwater environmental effects monitoring programs | DFO<br>Government of Nunavut, Baffinland | Within the Terrestrial and Marine RSAs | Ongoing | Within CEA temporal boundaries | Within terrestrial and marine RSAs | Yes<br>Activities overlap with the Project temporally and spatially and effects may interact cumulatively with the Mary River Project |
| Natural Events | Climate Change | There is documented evidence that climate change is occurring globally and in the region, and that these trends will continue into the future. See Section 4.4 and 7.1.1 for more information on climate change in the Arctic. | N/A | Global | N/A | Within CEA temporal boundaries | Within terrestrial and marine RSAs | Yes<br>Effects overlap with the Project temporally and spatially and effects may interact cumulatively with the Mary River Project |
| Pits and Quarries | Various | Various present and ongoing pits and quarries in Qikiqtani operated by the Government of Nunavut and private proponents for building materials, and Inuit art (e.g., soapstone and carving stone deposits) | Various | Various | Ongoing | Within CEA temporal boundaries | Potentially within the terrestrial RSA | Yes<br>Activities may overlap with the Project temporally and spatially and effects may interact cumulatively with the Mary River Project |
| Transportation | Marine Transport / Shipping | Marine transport and shipping in Hudson Strait, Foxe Basin, Baffin Bay, Eclipse Sounds | Various | ~ 100 km NE of Milne Port | Ongoing | Within CEA temporal boundaries | Shipping overlaps with Northern Shipping Route | Yes<br>Activities overlap with the Project temporally and spatially and effects may interact cumulatively with the Mary River Project |

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|---|---|---|---|---|---|---|---|---|
| Transportation | Regional Air Traffic | Air transport servicing communities located across Nunavut. The impacts of regional air transport are expected to be confined to a relatively compact area surrounding each community or industrial project, since these aircraft generally fly at high altitudes outside of the approach to airstrips. | Various | ~ 150 to 400 km from the Mine Site | Ongoing | Within CEA temporal boundaries | Potentially within terrestrial and marine RSAs | Yes<br>Activities may overlap with the Project temporally and spatially and effects may interact cumulatively with the Mary River Project |
| Transportation | Small Craft Harbours | Coastal infrastructure improvements by DFO to provide safe and accessible small craft harbour facilities to allow communities to pursue marine fish and marine mammal harvesting | Fisheries and Oceans Canada | Various (incl. Clyde River, Arctic Bay Pond Inlet, Iqaluit) | Ongoing | Within CEA temporal boundaries | Potential overlap with Northern Shipping Route | Yes<br>Activities may overlap with the Project temporally and spatially and effects may interact cumulatively with the Mary River Project |
| Transportation | Community Roads | Operation and maintenance (including infrastructure upgrades and network expansion of various roads in Baffin Island communities | Various | Arctic Bay, Clyde River, Sanirajak, Igloolik, Pond Inlet, Kimmirut, Kinngait | Ongoing | Within CEA temporal boundaries | Potentially within terrestrial RSA for some communities | Yes<br>Activities may overlap with the Project temporally and spatially and effects may interact cumulatively with the Mary River Project |
| Transportation/ Tourism | Tourism (Arctic cruises) | Arctic cruise voyages in the Northwest Passage for tourism, wildlife viewing and landings (using zodiac boats) at local communities. Eight cruise ships conducted 23 voyages in Nunavut in 2018 and the Government of Nunavut estimates that 12 cruise ships conducted 21 separate voyages in Nunavut waters between July and September 2019 (Government of Nunavut nd(a). The expedition cruise season did not occur in 2020 due to the COVID-19 pandemic. Transport Canada subsequently canceled the season, which runs from July to October each year, through to February 2022. In 2023, the Association of Arctic Expedition Cruise Operators confirmed its members' ships would not travel through Eclipse Sound during the summer period (remaining in waters east of Pond Inlet) in response to MHTO's request to avoid this area given the number of summering narwhal in the Eclipse Sound summer stock area was shown to decrease in recent years, which they associated with increased shipping traffic. It is expected that Arctic cruise activity to return to pre-pandemic levels and increase in the future (Government of Nunavut nd(b). | Various (incl. F.K. Warren) | Various | Ongoing | Within CEA temporal boundaries | Potential overlap with Northern Shipping Route and Southern Shipping Route | Yes<br>Activities may overlap with the Project temporally and spatially and effects may interact cumulatively with the Mary River Project |
| Protected Areas | Bylot Island Migratory Bird Sanctuary | Federally designated as a Category IV Habitat Species Management Area by the International Union for the Conservation of Nature. Activities include harvesting and bird research. Located within Sirmilik National Park. | Environment and Climate Change Canada | ~ 175 km N of Milne Port | Ongoing | Within CEA temporal boundaries | Within marine RSA | No<br>Overlaps with the Project temporally and spatially but is not predicted to have any adverse residual effects and therefore is excluded from the CEA |
| Protected Areas | Sirmilik National Park | Tourist visits to experience the ecology and remoteness of the area, backcountry camping, ski touring, wildlife viewing and boating (May-September). | Parks Canada | ~ 175 km N of Milne Port | Ongoing | Within CEA temporal boundaries | Within marine RSA; the National Park is located north of Milne Port and overlaps with the RSA boundaries and shipping routes | Yes<br>Activities may overlap with the Project temporally and spatially and effects may interact cumulatively with the Mary River Project |

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|---|---|---|---|---|---|---|---|---|
| Protected Areas | Tuvaijuittuq Marine Protected Area (MPA) | MPA off the northwest coast of Ellesmere Island in the Arctic Ocean designated in August 2019 by Ministerial Order for interim protection until longer term protection for this area is established. Under the order no new or additional human activities are allowed for up to five years with the exception of the exercise of Inuit rights respecting wildlife harvesting; scientific research consistent with conservation objectives of the MPA; safety, security and emergency activities; and certain activities carried out by a foreign national, entity, ship or state | Government of Canada, Government of Nunavut, and QIA | Off the northwest coast of Ellesmere Island; >1,000 km from the Northern Shipping Corridor | Ongoing | Within CEA temporal boundaries | No | No<br>The protected area would not result in adverse residual effects that could overlap and interact cumulatively with the Mary River Project |
| **Certain and Reasonably Foreseeable Future Projects and Activities** | | | | | | | | |
| Mining and Mineral Exploration | Mary River Deposits 2 to 3 | Baffinland plans to expand the Mary River Project to include iron ore Deposits 2 and 3. Baffinland has expanded current monitoring programs to collect baseline conditions data for these areas and plans to start the permitting process in the next 2-3 years.<br><br>Deposits No. 2 and 3 are located within the Mary River watershed upstream of Deposit No. 1. Limited additional infrastructure would be required if these deposits were mined subsequent to mining Deposit No. 1, beyond a new haul road and/or conveyor to move ore from these deposits to the crusher and stockpiling area within the current Mine Site. The Mine Site PDA would expand to incorporate the footprint of the open pits and the associated waste rock stockpiles. These deposits could also be mined concurrent with Deposit No. 1 under an increased production rate scenario with modest additional infrastructure. Existing material handling and transportation infrastructure would need to be upsized to account for handling a larger quantity of ore. This would potentially include upsizing crushers, conveyors, stockpile areas, and increasing the number of rail cars transporting ore to one or both ports. Additional vessel traffic would be needed to ship the increased volume of ore to market. Refer to Section 2.4 for more information on Baffinland's long term development plan including Deposits 2 and 3. | Baffinland | Immediately adjacent to the Mine Site | 2030-2060 | Within CEA temporal boundaries | Within terrestrial RSA | Yes<br>Activities may overlap with the Project temporally and spatially and effects may interact cumulatively with the Mary River Project |
| Mining and Mineral Exploration | Chidliak Diamond Mine (NIRB Registry No. 22MN025) | Diamond mine at the Chidliak exploration site on the Hall Peninsula of Baffin Island, NU. De Beers is planning for a series of relatively small cylindrical pits or underground mines, likely mined in sequence. Each cluster would have an adjacent rock pile and processed kimberlite area with supporting infrastructure. The process plant is envisioned to be a mobile, modular facility which could be relocated to each cluster of kimberlites as required. The camp is anticipated to be small and modular, housing only those personnel that must be on site to perform their roles. Additional support personnel will be located off-site and may operate equipment remotely. De Beers is investigating low-carbon energy systems for use at the site, including synthetic diesel, micro-reactors, hydro-electricity, wind, and solar. | De Beers Canada Inc. | >700 km from Steensby Port; on Hall Peninsula (Southern Baffin Island) | 2028-2051 | Within CEA temporal boundaries | Within Land Use RSA (Iqaluit) | Yes<br>Activities may overlap with the Project temporally and spatially and effects may interact cumulatively with the Mary River Project |
| Protected Areas | Tallurutiup Imanga National Marine Conservation Area (NMCA) | Proposed National Marine Conservation Area, final boundary was agreed upon in August 2017, IIBA negotiations included federal programs, investment in infrastructure, harbours, and a training centre in support of five communities (Arctic Bay, Clyde River, Grise Fiord, Pond Inlet, and Resolute Bay). Tallurutiup Imanga is internationally recognized for its natural and cultural value providing essential habitat for narwhal, beluga, polar bears and several seabird species and traditional Inuit resource use. An interim management plan is currently being prepared for the proposed NMCA. | Government of Canada, Government of Nunavut, and QIA | ~ 270 km N of Milne Port | Proposed future | Expected to be within CEA temporal boundaries | Within marine RSA | Yes<br>Overlaps with the Project temporally and spatially and potential restrictions on activities represent a change in the environment which could potentially interact cumulative with the Mary River Project |
| Protected Areas | North Water Polynya (Pikialasorsuaq) | Remains ice-free in winter and provides important habitat for Arctic and migratory species. Plankton explosion in early spring provides food for numerous species. Pikialasorsuaq Commission recommended identifying a protected area that includes the polynya and a larger management zone with Inuit-led management. | Pikialasorsuaq Commission | North of Baffin Bay and Northern | Proposed future | Within CEA temporal boundaries | No | No<br>The proposed protected area would not result in adverse residual effects that could overlap and interact |

| Category | Project / Physical Activity | Description | Proponent / Organization | Approximate Distance from Project | Status / Timeline | Temporal Overlap | Spatial Overlap | Inclusion in Updated CEA |
|---|---|---|---|---|---|---|---|---|
| | | | | Shipping Route | | | | cumulatively with the Mary River Project |
| Protected Areas | Southampton Island Area of Interest | AOI (candidate Marine Protected Area) under the *Oceans Act* within the Hudson Bay Complex Marine Bioregion. Represents important migration pathway for marine mammals (narwhal, beluga whales and bowhead whales), contains walrus haul-out sites, polar bear dens, and habitat for numerous seabird colonies. | DFO | Adjacent to Southern Shipping Route; near confluence of Hudson Bay and Fox Basin waters | Proposed future | Within CEA temporal boundaries | Yes | No<br>The proposed protected area would not result in adverse residual effects that could overlap and interact cumulatively with the Mary River Project |
| Protected Areas | Qikiqtait Protected Area Development (Belcher Islands Archipelago) | Inuit-led research and conservation project supporting the future protection of the Belcher Islands Archipelago | Hamlet of Sanikiluaq, Sanikiluaq Hunters and Trappers Association, Arctic Eider Society, QIA | In Hudson Bay; >1,000 km from Southern Shipping Route | Ongoing research with future objective of establishing a protected area | Within CEA temporal boundaries | No | No<br>The proposed protected area would not result in adverse residual effects that could overlap and interact cumulatively with the Mary River Project |
| Transportation (Infrastructure) | Grays Bay Road and Port Project (GBRP) (NIRB Registry No. 17XN011) | Proposed 230 km all-season road linking the northern terminus of the Tibbitt- Contwoyto Winter Road to a deep-water port at Grays Bay. Intended to improve regional resupply and induce mining in the Slave Geological Province. Project assessment under previous proponent was terminated in March 2023. New proponent signed novation and assignment agreement with landowner and shareholder (previous proponent) in November 2023. A port for cargo ships to dock, a small craft harbour, and supporting infrastructure at Grays Bay are proposed. | West Kitikmeot Gold Corp.<br>(formerly Kitikmeot Inuit Association) | ~ 1,200 km from Milne Port | Planned proposal submission to NIRB in 2024 | Within CEA temporal boundaries | Does not overlap with Marine RSA or Terrestrial RSA but within NSA | Yes<br>Activities may overlap with the Project temporally and some effects may interact cumulatively with the Mary River Project |
| **Potential Future Development** | | | | | | | | |
| Mining and Mineral Exploration | Mary River Deposits 4 to 9 | Baffinland may potentially develop deposits 4 to 9 in the future which could potentially extend the life of the Mary River Project. Unlike potential future development of Deposits 2 and 3, these deposits are further removed from existing facilities and would likely require dedicated ore stockpiling, crushing and loading facilities as well as separate camps. Development of these future deposits could extend the useful life of infrastructure constructed for Deposit No. 1. Upsizing of material handling facilities would also be required for transport (e.g., more rail cars) and at Steensby Port. | Baffinland | Less than 30 km from the Mine Site | Potential future induced project | Within CEA temporal boundaries | Within terrestrial RSA | Yes<br>Activities may overlap with the Project temporally and spatially and effects may interact cumulatively with the Mary River Project |

## 4. Summary of Cumulative Effects for a 6 Mtpa Operation

There are only two potential developments or activities that have the potential to overlap spatially with the Mary River Project, including:

- Activities associated with Baffinland, including other mineral exploration programs, Mary River Deposits No. 2 and 3, and the Mary River Deposits 4 to 9
- Climate change

With the application of appropriate mitigation, monitoring, and management commitments, residual effects from the approved Mary River Project are not significant and are unlikely to persist beyond the temporal boundaries of the combined projects. It is assumed that future projects and activities associated with the Mary River Project will also apply appropriate mitigation, monitoring, and management measures and therefore will not significantly contribute to cumulative effects. A summary of cumulative effects for a 6 Mtpa operation as they relate to surface water quantity and water and sediment quality is provided below.

### 4.1 Surface Water Quantity

Residual surface water quantity effects identified for the Project include water quantity reductions in certain lakes resulting from withdrawals, and from diversions of small watercourses, the main diversion being the collection of runoff around the waste rock stockpile at the Mine Site. Some of the key water quantity considerations include:

- Development of Deposits No. 2 and 3 will require an increase in the use of water at the Mary River Mine Site.
- Development of Deposits No. 4 and 5, or 6 and 7, if mined as satellite operations based from the Mary River Mine Site, could also result in an increase (assumed to be a doubling) of water requirements.
- A doubling in the production rate, from any or all of the additional deposits, is considered a credible expansion scenario.
- Development of Deposits No. 2 and 3 could also involve additional diversions of runoff around mining and stockpiling areas, although it is expected that these diversions would occur around these deposits, where runoff reports to the Mary River, rather than in the catchments that drain to tributaries of Camp and Sheardown lakes, as is the case with the current Project. Therefore, a cumulative effect on local watercourses due to water diversions around mining areas from development of Deposits No. 2 and 3 are not expected.
- Development of other deposits involving the establishment of camps and other mine site infrastructure at another location outside of the freshwater LSAs.

Based on the above considerations, cumulative effects to water quantity could occur with respect to water withdrawals for potable and other uses to supply larger accommodation facilities at the Mary River Mine Site, Milne Port and Steensby Port.

Under the assumption that development of additional resources in Deposits No. 2 and 3 would require a doubling of the Project's proposed water consumption, the resulting under-ice volume reductions in Camp Lake (Mine Site), 10-km lake (Steensby Port) and km-32 lake (Milne Port water supply) would all be less than 1 %, well below the recommended withdrawal threshold of 10 % identified by DFO, and does not represent a significant adverse cumulative effect.

Arctic land surface temperatures have increased substantially since the mid-20th century, and the future rate of warming is expected to exceed the global rate. Sea ice extent at summer minimum has decreased in the past decades, and the Arctic Ocean is projected to become nearly ice free in summer within this century (IPCC, 2014a; IPCC, 2014b).

Key water quantity related considerations:

- Increased temperatures may result in a longer open-water season and an increased proportion of precipitation falling as rain;
- Increased precipitation may result in greater volumes of runoff; and
- Increased extreme precipitation may result in larger flood events.

Since potential effects of the Project (and cumulatively, from expansion scenarios) are water withdrawals, it is expected that climate change effect of increased runoff will not result in a cumulative effect. Increased flows have been accounted for by designing to higher return periods and this would also be carried out for expansion development scenarios.

Application of appropriate mitigation measures to the Mary River Project is expected to limit their interaction with the potential effects of climate change. Based on residual effects of the Mary River Project that are not significant, as well as limited spatial and temporal overlap of the Project with other developments and activities, cumulative effects on Freshwater Quantity are predicted to be not significant.

**4.2 Water and Sediment Quality**

Cumulative effects to water quality could occur as the result of potential future developments associated with the Mary River Project if additional non-point source, point source, and/or airborne dust emissions result in water and/or sediment quality effects in waterbodies within the RSA. For example, additional effluents discharged to existing receiving waters such as the Mary River (e.g., from larger or additional waste rock facilities, pit water from mining of additional deposits, Mine Site camp expansions generating larger volumes of treated sewage effluent) and/or ongoing dust generation and deposition in the freshwater waterbodies of the RSA have the potential to result in additive cumulative effects to water quality. However, water treatment, management of discharge locations, dust suppression efforts, and other mitigation and adaptive management that are currently applied to the approved Mary River Project and that would be developed for new activities in the future would be expected to reduce or eliminate effects such that significant cumulative effects on water quality would not occur.

Cumulative effects to water quality and/or freshwater biota/Arctic char health and habitat could also occur as the result of climate change. As described in Section 4.1, climate change is expected to influence water quantity by generally resulting in increased precipitation and evaporation, and a net increase in runoff at high latitudes (i.e., a 4 to 5% median increase in precipitation is projected by 2035 and a 6 to 12% median increase in precipitation is predicted by 2065; Baffinland 2018a). Increases in net and peak runoff may increase erosion of soils resulting in higher concentrations of total suspended solids (TSS) and nutrients in freshwater environments under future climate conditions (Baffinland 2018a). Consideration of these climate change effects in the design of current and future Mary River Project infrastructure (e.g., culvert sizing, surface water treatment system capacity, etc.) mean that significant cumulative effects to freshwater/Arctic char habitat as a result of climate change effects on water quantity would not occur. Mitigation measures

to control TSS and nutrient inputs from runoff can be identified and applied through monitoring and adaptive management to reduce this cumulative effect of climate change.

### 4.3 Freshwater Biota and Habitats

While freshwater biota and habitats are vulnerable to the effects of climate change through changes to water quantity, quality, and temperature, the magnitude and temporal scale of changes are difficult to predict. Cumulative effects to freshwater biota/Arctic char health and habitat may occur as the result of climate change (Baffinland 2018b). Freshwater fishes are potentially vulnerable to climate change. Water temperature is a critical factor that influences the global distribution and ecological niche of Arctic char. Water temperature in streams, in the absence of other extreme modifying factors, is significantly correlated with both air temperature and with stream bed temperature (Docherty et al. 2019). Air temperatures due to climate change at high latitude are projected to increase by 1.2 to 1.5 °C (medians) by 2035 and 1.8 to 3.6 °C (medians) by 2065 (Baffinland 2018a). Modelling by Gross et al. (2011) suggests that air temperature and permafrost warming for the Mary River Project region are very similar (Baffinland 2018), indicating the potential for similar increases in permafrost temperatures. The optimal water temperature for growth with unlimited food supply of Arctic char lies between 14.4 and 17.2°C (Elliott and Elliott 2010), however, under natural conditions the optimum is likely much lower (Elliott 1982). Projected changes in air and permafrost temperatures due to climate change to 2065 (exceeding the temporal range of the Approved Project's post-closure phase in 2055 to 2059), are potentially of sufficient magnitude for water temperatures currently within this optimal range to increase outside of it but there is substantial uncertainty in this prediction. One modelled scenario has predicted that Arctic char will potentially lose more than half of their current southern distribution range in Canada by 2050 given projected temperature and precipitation patterns (Chu et al. 2005). Arctic char occur further north than all other freshwater fish species with limited opportunity to expand their range northward in response to climate change.

Cumulative effects to freshwater biota, Arctic char and their habitats may also occur as the result of the potential future developments associated with the Mary River Project, but it can be assumed that through application of appropriate mitigation measures, design changes and offsetting, the effects to freshwater fish habitat will be not significant.

## 4. Conclusion

Baffinland has conducted several cumulative effects assessments for the Mary River Project through the NIRB environmental assessment process. Every CEA conducted for the Mary River Project to date for the original project, ERP, PIP, PIPE, PIPR and SOP have concluded that cumulative effects are not significant with reference to effects thresholds Baffinland has established for assessment, and the Minister and the NIRB has approved the Mary River Project and each subsequent amendment to the Mary River Project based on those assessments. For the purposes of the Water Licence Renewal, the NWB, while conducting a thorough technical review of the Renewal Application, is bound by the assessment of the ongoing Mary River Project activities, works and undertakings that was previously concluded by the NIRB. Furthermore, Baffinland is taking action to directly address cumulative effects concerns expressed in relation to the Mary River Project through various pathways, such as establishment of the Dust Audit Committee, the Inuit Stewardship Plan and participation in the NIRB CEA Framework.

## 5. References

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