APPENDIX 3-D

Cumulative Effects Study Area and Reasonably Foreseeable Future Development

June 2016
Report No. 1541520

AGNICO EAGLE

Golder Associates

3.D-1 CUMULATIVE EFFECTS

The Nunavut Impact Review Board (NIRB) defines a cumulative effects assessment as the assessment of impacts on the biophysical and socio-economic environment that results from the incremental effects of a development when added to other past, present, and Reasonable Foreseeable Future Developments (RFFDs), regardless of what agency or person undertakes such other developments. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (NIRB 2007).

Using this definition, the following approach was used to assess cumulative effects:

1) Select broad cumulative effect categories to describe key components of the biophysical and socio-economic environment, and select suitable study areas for each.

2) Identify past and present developments, and determine which occur in each study area.

3) Select and describe the suitable RFFD.

4) Identify possible pathways of effect to each cumulative effects category based on the number and type of developments in each study area.

These steps are detailed in the sections below. Cumulative effects were scoped at a broad level, with the intent on focussing on particular areas of concern, if required. Pathway validity indicates a possibility for cumulative effects, rather than actual cumulative effects. For example, two projects in the same water management area may not cause cumulative effects if the effluent from the two does not overlap. Thus, this screening process indicates cumulative effects potential only.

3.D-2 CUMULATIVE EFFECTS CATEGORIES AND STUDY AREAS

Broad cumulative effects categories were identified, grouping effects that operate through similar pathways and at similar spatial scales. As the pathways and spatial scales may differ for each of the cumulative effects categories, several unique cumulative effect study areas were established (Table 3-D-1).

Table 3-D-1: Cumulative Effects Categories and Cumulative Effects Study Areas

Cumulative Effects Category	Cumulative Effect Study Areas
Effects to Caribou	Ranges of the Lorrilard, Wager Bay, and Ahiak caribou herds
Effects to Terrestrial Environment	Terrestrial Regional Study Area
Effects to Marine Wildlife	Chesterfield Inlet, Hudson Bay, and Hudson Strait
Effects to Aquatic Resources (Water and Fish)	Thelon, Quoich, and Back River water management areas, and the Baker Lake water management area crossed by the Meadowbank Mine All-weather Access Road and Whale Tail Haul Road
Effects to Traditional Land Use	Kivalliq Region
Effects to Socio-Economics	Kivalliq Region

3.D-3 PAST AND PRESENT DEVELOPMENT

3.D-3.1 Methods

To quantify past and present development, a geospatial database containing the type and location of past and present development was compiled. The following sources were reviewed for information on development and other human activity:

- NIRB permitted and licensed activities within Nunavut;
- KIA Land Management Application (KIA 2015);
- Aboriginal Affairs and Northern Development Canada: permitted and licensed activities within Northwest Territories and Nunavut;
- Aboriginal Affairs and Northern Development Canada: Nunavut Mineral Exploration, Mining and GeoScience Overview (AANDC 2013);
- Federal Contaminated Sites Inventory (Treasury Board 2015);
- Kiggavik Project Final Environmental Impact Assessment (Areva 2014);
- location of hunting camps from operator websites;
- Amaruq Baseline Traditional Knowledge Report (Agnico Eagle 2014);
- websites of companies holding land use permits; and
- knowledge of the area and Project status.

The developments included were current to 31 December 2015. The Meliadine Gold Project, located near Rankin Inlet and also owned by Agnico Eagle, was included as a current development in the analysis though it was not active as of December 2015. It was included as a current development because it is nearing the end of the permitting stage, and including it as an existing project rather than a reasonably foreseeable project is the more conservative approach offering greater certainty that cumulative effects are not under-estimated.

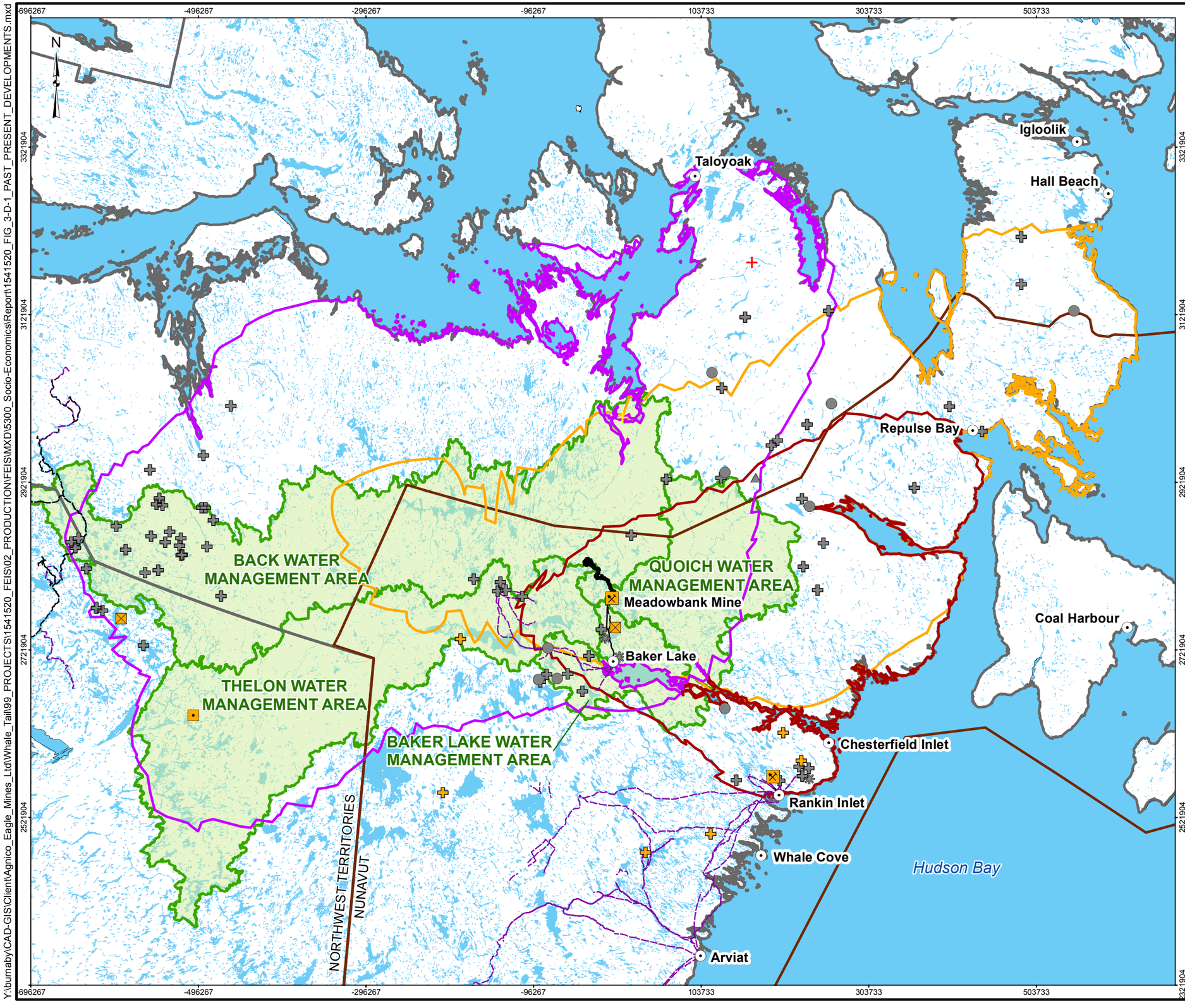
Data were divided into points and lines. The use and type of existing development was derived from land use permit applications. In cases where multiple land use permits issued for the same development, the information was merged into a single feature in the database, using the most relevant descriptions. The following limitations and assumptions guided the preparation of the database:

- The accuracy of the location of the developments is variable; in some cases it is precise, in other cases the exact site of the activities were not recorded, or the activities were dispersed in nature (such as exploration camps with drilling programs).
- Any developments within municipal boundaries were not included, as the community is assumed to be the greater source of disturbance.
- Contaminated sites of moderate or high priority (as defined by Treasury Board 2015) were included; sites of low or unassigned priority were not included. Low priority contaminated sites are typically point-source sites considered too small to be relevant at the spatial scales for cumulative effects assessment.

- Developments for which the land use permit was issued more than five years ago were considered to be inactive. Similarly, contaminated sites were considered to be inactive.
- All permitted developments and activities were assumed to be operating throughout the year, for the full duration of the land use permit. This is a conservative assumption, as many activities are seasonal and many are not active each year of the five year span of the land use permit.
- Activities that did not trigger land use permits were considered to have a negligible effect on the environment, and were not included. This included traditional outpost camps.
- Developments were described by their land use permit category, unless additional information was available. Land use permits for Research Projects and Territorial Campgrounds were not included as these likely have negligible effects on the biophysical environment. Land use permits for miscellaneous activities were included, and typically describe reclamation activities.
- Mineral exploration projects often include a camp and multiple drilling locations in the vicinity. For the purposes of this assessment, operations by a single proponent working from a single camp were consolidated into a single feature, although it may contain multiple drill camps or possibly satellite camps. Exact details of camp and drill locations are not typically recorded.

3.D-3.2 Results

Previous and existing developments in the various cumulative effect study areas include roads, communities (including airports), hunting or fishing camps, mines, mineral exploration camps, contaminated sites, fuel storage areas, and quarries (Figure 3-D-1).



LEGEND

- WHALE TAIL PIT STUDY AREA
- KIVALLIQ REGION BOUNDARY
- AHIAK CARIBOU RANGE
- LORILLARD CARIBOU RANGE
- WAGNER BAY CARIBOU RANGE
- KIVALLIQ REGION BOUNDARY
- PROVINCE / TERRITORY BOUNDARY
- WATER MANAGEMENT AREA
- WATERBODY

PAST AND PRESENT DEVELOPMENTS

- CAMP, INACTIVE
- COMMUNITY
- CONTAMINATED SITE, HIGH
- CONTAMINATED SITE, MEDIUM
- FUEL STORAGE, INACTIVE
- MINE, ACTIVE
- MINERAL EXPLORATION, ACTIVE
- MINERAL EXPLORATION, INACTIVE
- MISCELLANEOUS, INACTIVE
- QUARRYING, INACTIVE
- TOURISM/CARIBOU HUNTING & FISHING, ACTIVE
- TOURISM/FISHING, ACTIVE
- ALL-SEASON ROAD, ACTIVE
- WINTER ROAD, ACTIVE
- WINTER ROAD, INACTIVE

REFERENCE

1. CARIBOU RANGES - NAGY ET AL, 2011. OBTAINED FROM THE GOVERNMENT OF NUNAVUT AND NORTH WEST TERRITORIES .
2. PROVINCE DATA OBTAINED FROM ESRI.
3. WATERBODY AND WATERSHED DATA OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.

DATUM: NAD 83 PROJECTION: CANADA LAMBERT CONFORMAL CONIC

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PROJECT
AGNICO EAGLE

AGNICO EAGLE MINES LIMITED:
MEADOWBANK DIVISION
WHALE TAIL PIT PROJECT

TITLE

PAST AND PRESENT DEVELOPMENTS AND CUMULATIVE EFFECTS STUDY AREAS

Golder Associates

PROJECT		1541520	FILE No.	
DESIGN	EN	07 Apr. 2016	SCALE AS SHOWN	REV. 0
GIS	CDB	07 Apr. 2016		
CHECK	JR	04 MAY. 2016		
REVIEW	LY	04 MAY. 2016		

FIGURE 3-D-1

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Caribou and Terrestrial Environment

Active and inactive development was identified in each of the three caribou ranges that overlap the Whale Tail Project (Table 3-D-2). Mineral exploration was the most common type of development, followed by camps and miscellaneous activities. Of these, very few are currently active. For example, no more than three active mineral exploration operations were identified in any of the caribou ranges. However, one active mine, the existing Meadowbank Mine, overlaps with the caribou ranges of all three herds. Further, it was assumed that these camps were active throughout the year, while in fact exploration camps are more often seasonal. Communities likely have the largest effect on caribou (as a source of harvesters), followed by roads providing access from communities. There are three communities within the Lorrilard caribou range, and one each within the Ahiak and Wager Bay herd ranges. While there is caribou sport hunting occurring in the Kivalliq region, it primarily originates from communities. One hunting lodge was identified. Within the Terrestrial Regional Study Area, the only other development documented within the regional study area was the Meadowbank Mine and Meadowbank all-weather access road.

Table 3-D-2: Past and Present Development in the Caribou Ranges

	Ahaik Caribou Range		Lorillard Caribou Range		Wager Bay Caribou Range	
Development Type	**Active**	**Inactive**	**Active**	**Inactive**	**Active**	**Inactive**
Camp		5		3		4
Community	2		3[a]		2	
Contaminated Site		1				1
Fuel Storage		1		1		1
Mine	1		2		1	
Mineral Exploration	1	47	2	14		23
Miscellaneous		2		3		2
Quarrying				1		
Research Projects	1					
Tourism/Caribou Hunting & Fishing	2		1		1	
Tourism/Fishing	1	2				

Note: There is overlap between the three caribou ranges, the number of developments within each range is not independent.

[a] The community of Rankin Inlet includes an inactive mine, considered here to be part of the community footprint.

Marine Wildlife

The study area for Marine Resources encompasses the proposed Project shipping corridor in Chesterfield Inlet, Hudson Bay, and Hudson Strait as shown in Figure 3.D-2 The proposed shipping corridor has been broken down into the following three shipping route segments: 1) eastern Hudson Strait to east entrance of Chesterfield Inlet (ocean-going vessel and/or tug-assisted barge); 2) east entrance of Chesterfield Inlet to Baker Lake (tug-assisted barge); and 3) east entrance of Chesterfield Inlet to the Port of Churchill (ocean-going vessel and/or tug-assisted barge).

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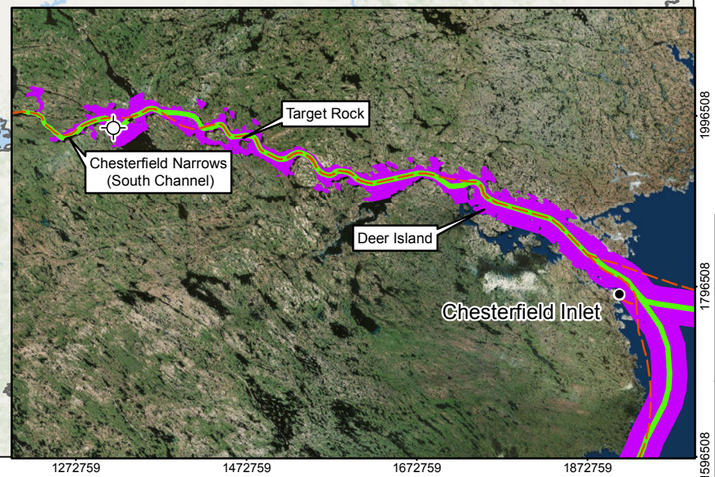
Taloyoak
Igloolik
Hall Beach
Pangnirtung
Repulse Bay
Iqaluit
Cape Dorset
Kimmirut
Coral Harbour
Baker Lake
Target Rock
Deer Island
Chesterfield Narrows (South Channel)
Chesterfield Inlet
Rankin Inlet
Whale Cove
Arviat
Churchill
Ivujivik
Killiniq
Inukjuak
Sanikiluaq
Winisk

FURY AND HECLA STRAIT
FOXE BASIN
FOXE CHANNEL
ROES WELCOME SOUND
HUDSON STRAIT
LABRADOR SEA
HUDSON BAY

Southampton Island
Salisbury Island
Nottingham Island
Resolution Island
Coats Island
Mansel Island
Akpatok Island

NUNAVUT
MANITOBA
ONTARIO
NEWFOUNDLAND



LEGEND

- POPULATED AREA
- LIGHTERING POINT (HELICOPTER ISLAND)
- SHIPPING ROUTE
- LOCAL STUDY AREA (LSA)
- REGIONAL STUDY AREA (RSA)
- PROVINCE / TERRITORY BOUNDARY

REFERENCE

1. BASE DATA ESRI, DELORME, GEBCO, NOAA NGDC, AND OTHER CONTRIBUTORS
2. SHIPPING ROUTE DATA OBTAINED FROM THE DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
3. PROVINCE AND POPULATED AREA DATA OBTAINED FROM ESRI.

DATUM: NAD 83 PROJECTION: CANADA ALBERS EQUAL AREA CONIC

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KILOMETRES

PROJECT
AGNICO EAGLE

AGNICO EAGLE MINES LIMITED:
MEADOWBANK DIVISION
WHALE TAIL PIT PROJECT

TITLE

MARINE RESOURCES STUDY AREA

Golder Associates

PROJECT		1541520	FILE No.	
DESIGN	KA	15 OCT. 2015	SCALE AS SHOWN	REV. 0
GIS	MH	24 MAR. 2016		
CHECK	JR	04 MAY. 2016		
REVIEW	LY	04 MAY. 2016		

FIGURE 3-D-2

Approximately 13 to 16 cargo vessels and 30 to 40 fuel tankers transit through Hudson Strait annually to service Arctic communities and to support regional mining developments (P. John 2013, pers. comm.; NEAS 2012; P. Paquette, NSSI, 2016, pers. comm.; D. White, WGC, 2016, pers. comm.). An additional 12 vessel shipments occur each year in Hudson Strait for grain export to overseas markets, departing from the Port of Churchill (AREVA 2014). From three to six dry cargo ships (P. Paquette, NSSI, 2016, pers. comm.) and up to 18 fuel tankers (D. White, WGC, 2016, pers. comm.) transit through Hudson Strait annually to service the Meadowbank Mine near Baker Lake. The region has become a tourist destination and is home to many Inuit communities who use the marine environment for local transport (WWF 2015). According to WWF (2015), an average of 60 commercial vessels entered Hudson Strait annually between 2007 and 2013, of which more than half were for domestic supply, (Table 3-D-3). During the period 2007-2013, the most common vessel types in the proposed shipping corridor were bulk carriers, general cargo ships and tankers (Table 3-D-4) (WWF 2015). Between 2008 and 2014, reported annual landings at Baker Lake ranged from 17 to 45 shipments per year (Agnico Eagle 2014a; Figure 3-D-3),of which only a portion were in direct support of the Meadowbank Mine Project. This included tug-assisted barges transporting both goods and fuel, as well as shuttle tankers transporting fuel. Aside from barge and shuttle tanker traffic, vessel activities in Chesterfield Inlet are mainly restricted to small fishing vessels and pleasure crafts, given there is only one small public dock in this area (Aarluk 2011).

Table 3-D-3: Summary of Vessel Traffic in Hudson Strait by Industry Sector Between 2007 and 2013

Sector	Volume of Traffic (%)	Traffic Assessment
Domestic Supply	54	Domestic resupply/sealift operations for communities in Eastern Arctic dependent on operations for consumer, commercial, and construction needs.
Shipping	15	Bulk carrier exports of grain to foreign destinations.
Mining and Mineral Extraction	14	Supply to and export from Ragland and Nunavik mines, supply to Baker Lake.
Government Activities	9	Coast Guard icebreakers perform research activities, navigational assistance and community visits.
Tourism	5	Passenger vessels access Hudson Bay and the Canadian Arctic Archipelago.
Oil and Gas Exploration	1	Currently no development occurring in Hudson Strait. Vessels use Strait to access Hudson Bay and enter/exit Arctic Archipelago and Northwest Passage.
Fishing	1	Small numbers of fishing vessels pass through Hudson Strait in transit.
Other	1	Scientific research and ocean survey vessels perform research, tugs assist with towage.

Source: Adapted from WWF (2015).

Table 3-D-4: Vessels in Hudson Strait Between 2007 and 2013

Vessel Type	Average Annual Vessels	Average Annual Transits for All Vessels
Bulk Carrier	17	27
General Cargo	13	71
Tanker	8	34
Tug	6	14
Government Icebreaker	6	11
Passenger Vessel	5	9
Fishing Vessel	3	5
Other	2	3

Source: Adapted from WWF (2015).

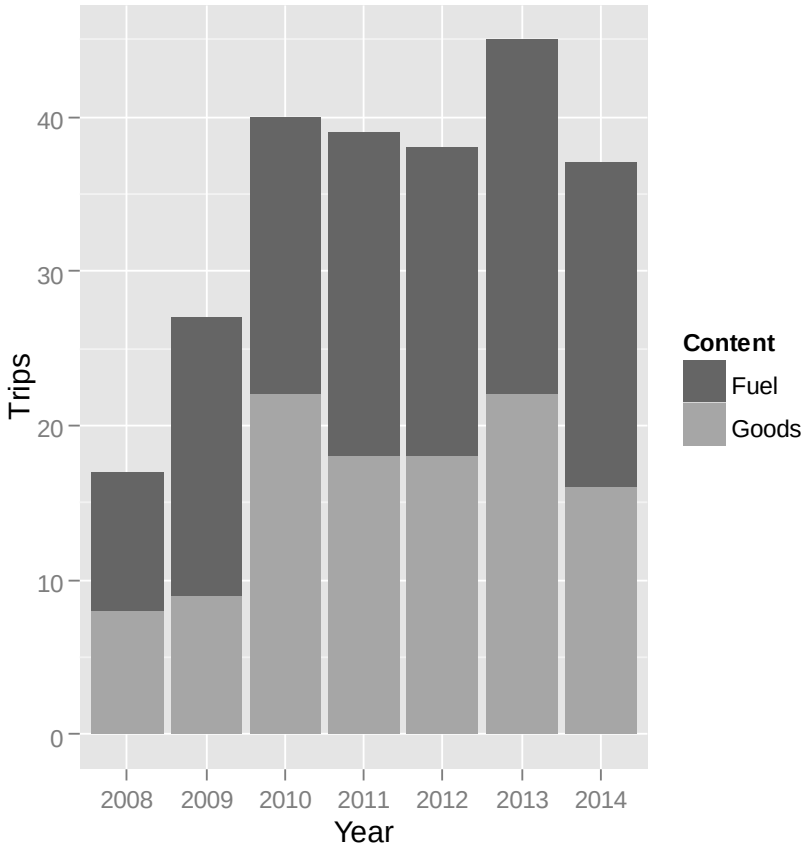

Figure 3-D-3: Barge Traffic (Number of trips/year) Arriving in Baker Lake From Chesterfield Inlet Since 2008

Source: Adapted from the Meadowbank 2014 Annual Report (Agnico Eagle 2015).

Aquatic Resources

The Whale Tail Pit Project (the Project) straddles three water management areas, the Back, Thelon, and Quioch (Figure 3-D-1). The Baker Lake water management area was also considered, as it is crossed by the Meadowbank all-weather access road. To assess potential for cumulative effects to aquatic ecosystems, active and inactive developments were identified in these water management areas (Table 3-D-5). None of the four water management areas contained more than two active developments. The active developments included the community of Baker Lake, the Meadowbank Mine, mineral exploration camps, and two outfitting lodges. The Back water management area has the highest number of historic developments at 24 mineral exploration camps (most of which are in the Kitikmeot region, Figure 3-D-1). Of these developments, communities and mines are of the greatest concern for their potential to contribute to cumulative effects, as they typically both have effluent streams triggering a Type A Water Licence. The other developments listed typically require a Type B Water Licence or do not require a water licence.

Table 3-D-5: Past and Present Development in the Water Management Areas

	Back Water Management Area		Baker Lake Water Management Area		Thelon Water Management Area		Quioch Water Management Area	
Development Type	**Active**	**Inactive**	**Active**	**Inactive**	**Active**	**Inactive**	**Active**	**Inactive**
Camp				2				
Community			1					
Contaminated Site		1						
Mine							1[a]	
Mineral Exploration		25		5	1	3		
Miscellaneous				2				
Tourism/Caribou Hunting & Fishing			1					
Tourism/Fishing		1			1			

[a] The one active mine in the Quioch Water Management Area is the Meadowbank Mine.

Traditional Land Use and Socio-Economics

Finally, to assess potential for cumulative effects to traditional land use and socio-economics, the number of past and present developments in the Kivalliq region were quantified (Table 3-D-6). According to this data, there are currently nine active and 26 inactive mineral exploration operations in the Kivalliq region, the most numerous type of development. Mineral exploration camps likely have little effect to traditional land use as they are remote and seasonal, but may affect regional socio-economics through employment and work rotations away from the community. There is only one major development, the Meadowbank Mine. All-season roads also have the potential to affect traditional land use patterns by facilitating access along their route. There is only one such road leading out of a community in the Kivalliq region, that to the Meadowbank Mine. Winter travel in the Kivalliq region is also facilitated by occasional winter roads, and there currently exists extensive travel routes in both summer and winter via boat, snowmachine, and all-terrain vehicle.

Table 3-D-6: Past and Present Development in the Kivalliq Region

Development Type	Active	Inactive
Camp		5
Community	7[a]	
Contaminated Site		1
Mine	2[b]	
Mineral Exploration	8	24
Miscellaneous		3
Quarrying		1
Tourism/Caribou Hunting & Fishing	1	

[a] The community of Rankin Inlet includes an inactive mine, considered here to be part of the community footprint.

[b] The active mines in the Kivalliq region are the Meadowbank Mine and the Meliadine Gold Project.

3.D-4 REASONABLY FORESEEABLE FUTURE DEVELOPMENTS

3.D-4.1 Methods

Reasonably foreseeable future developments are defined by the NIRB as projects or activities 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, letter of intent, or any regulatory application filed with an authorizing agency (NIRB 2007).

Further to the NIRB definition the following were also considered in the selection of RFFD:

- The RFFD should have a reasonable likelihood of initiating during the life of the Project.
- The RFFD should have the potential to change the Project impact predictions.

Each of the RFFDs was considered for overlap with the Project from the perspective of the cumulative effects categories (caribou, terrestrial, aquatic resources, traditional land use, and socio-economics. The pathway was determined to be either valid or invalid depending on whether the RFFDs occurred within the relevant study area.

From the definition and considerations above, the following proposed projects were selected as a suite of major developments that may occur in the cumulative effects study areas in the foreseeable future (Figure 3-D-4):

- Manitoba to Nunavut Road;
- Greyhound Lake Project;
- Kiggavik Uranium Project;
- Hope Bay Project;
- Hackett River Project;
- Back River Project; and
- Bathurst Inlet Port and Road.

Note that not all of the above projects meet the NIRB (2007) definition of having been proposed and scoped to a reasonable level of detail, or being under regulatory review. However, they were included to provide a range of development types and to avoid under-estimating cumulative effects from RFFDs, and to avoid underestimating the future development. The Meliadine Gold Project was not included as a RFFD for this analysis because it was considered a present development. Less than 1% exploration projects monitored in Canada between 1971 and 2009 advanced to production, and the proportion is thought to be less in the north (INAC 2010). A summary of each of these projects is provided below.

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Hope Bay Project

Bathurst Inlet Port and Road

Hackett River Project

Back River Project

BACK WATER MANAGEMENT AREA

THELON WATER MANAGMENT AREA

Whale Tail Exploration Site

QUOICH WATER MANAGEMENT AREA

Greyhound Lake Project

Kiggavik Uranium Project

BAKER LAKE WATER MANAGEMENT AREA

NORTHWEST TERRITORIES

NUNAVUT

Manitoba to Nunavut Road

Taloyoak

Igloolik

Hall Beach

Repulse Bay

Coal Harbour

Baker Lake

Chesterfield Inlet

Rankin Inlet

Whale Cove

Arviat

Hudson Bay

LEGEND

- COMMUNITY
- WHALE TAIL PIT STUDY AREA
- AHIAK CARIBOU RANGE
- LORILLARD CARIBOU RANGE
- WAGNER BAY CARIBOU RANGE
- KIVALLIQ REGION BOUNDARY
- PROVINCE / TERRITORY BOUNDARY
- WATER MANAGEMENT AREA
- WATERBODY

REASONABLE FORESEEABLE FUTURE DEVELOPMENT

- PROPOSED MINERAL EXPLORATION
- PROPOSED ALL-SEASON ROAD

REFERENCE

1. CARIBOU RANGES - NAGY ET AL, 2011. OBTAINED FROM THE GOVERNMENT OF NUNAVUT AND NORTH WEST TERRITORIES.
2. PROVINCE DATA OBTAINED FROM ESRI.
3. WATERBODY AND WATERSHED DATA OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.

DATUM: NAD 83 PROJECTION: CANADA LAMBERT CONFORMAL CONIC

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PROJECT

AGNICO EAGLE

AGNICO EAGLE MINES LIMITED:
MEADOWBANK DIVISION
WHALE TAIL PIT PROJECT

TITLE

REASONABLY FORESEEABLE FUTURE DEVELOPMENTS AND CUMULATIVE EFFECTS STUDY AREAS

Golder Associates

PROJECT		1541520	FILE No.	
DESIGN	EN	06 Mar. 2015	SCALE AS SHOWN	REV. 0
GIS	MH	10 Mar. 2016		
CHECK	JR	04 MAY. 2016		
REVIEW	LY	04 MAY. 2016		

FIGURE 3-D-4

Manitoba to Nunavut Road

The Manitoba to Nunavut Road is a proposed road route linking the community of Rankin Inlet to the Port of Churchill and the existing all-weather road transportation network in Manitoba, including the National Highway System. When or if it is built, the preferred road route would join the existing Manitoba Highway System at Sundance or Gillam, MB, with Churchill, MB, and Arviat, Whale Cove, and Rankin Inlet in Nunavut (Nunatsiaq News 2012). The development strategy for the new road is to develop a winter road, followed in time by possible construction of a single-lane, all-weather road, then finally, construction of a 2-lane, all-weather road.

While the route of the Manitoba to Nunavut Road is not determined by the location of potential mine sites (Nishi-Khon/SNC Lavalin 2007), the presence of the road may induce the development of deposits that are not currently economic. Proponents of the road assert that the road would pass by 20-plus mineral exploration projects, the viability of which, however, has not been conclusively demonstrated (Naylor 2013). The Manitoba to Nunavut Road will also include the construction of an electrical transmission line running parallel with the road to bring hydro electricity from Manitoba to Nunavut, and the further possible development of hydro-electric power along the road route. As none of the potential hydroelectric sites identified on the Manitoba to Nunavut Road are on the same water management area as the Project, none of these were considered as RFFD.

It is unclear yet what logistic arrangements will be required, but there is a possibility that some supplies for road development, including construction equipment, materials, non-perishable food and fuel will be delivered by marine transportation. It this case, shipping routes to both Churchill and Rankin Inlet would likely be used.

The Manitoba to Nunavut Road is anticipated to have large environmental, economic, and socio-economic effects to the region, relative to existing conditions. Construction of the road would take approximately 15 years after five years of preliminary planning and engineering, and cost approximately $1.2 billion (Nunatsiaq News 2012). The Manitoba to Nuanvut Road would likely also induce further exploration of mineral depostits along it's route through lower camp mobilization costs. While the road has only a small amount of overlap with the Lorrilard caribou herd, it could lead to increased caribou harvest from other herds through improved access. The Road is not within the cumulative effects study area for other cumulative effect categories.

Greyhound Project

The Greyhound Project owned by Aura Silver Resources Inc. (Aura Silver) is located 38 kilometres (km) north of Baker Lake, and about 32 km south of the Meadowbank Mine. An all-weather road to the Meadowbank Mine from Baker Lake crosses the Greyhound property. Aura Silver has undertaken surface collections, geophysical surveys, and drilling since 2006 (Aura 2014a). In 2014, Agnico Eagle conducted exploration programs including prospecting and rock assay results and an initial drill program on the property. Agnico Eagle staked additional claims enlarging the Greyhound Project area as a result of their assessment of the potential of this area. Access to the site offered by the Meadowbank road and the shared ownership agreement in the works between Aura Silver and Agnico Eagle may lead to induced development (Aura 2014b). Exploration or mining at this the Greyhould Project would likely be supported by dry-cargo ships, marine tankers or barges from outside Hudson Bay or from Churchill to Baker Lake using the existing shipping routes in Chesterfield Inlet, Hudson Bay and Hudson Starit.

Kiggavik Uranium Project

AREVA Resources Canada Inc. is proposing to construct, operate and decommission the Kiggavik Project, a uranium mine, in the Kivalliq Region of Nunavut. The Kiggavik Project is located approximately 80 km west of the community of Baker Lake. Four uranium ore deposits are proposed to be mined using open pit methods, and one

deposit will be mined using underground methods. All extracted ore will be processed through a mill. Some of the mined out pits will be used as tailings management facilities. The uranium product will be packaged in sealed barrels and transported south by aircraft. The Kiggavik Project will be serviced by an airstrip, ship, and barge, and a winter access road from Baker Lake. An all-season road between Baker Lake and the Project is a secondary option under consideration in case the proposed winter road cannot adequately support the Kiggavik Project. The shipping requirements to support the Kiggavik mine are substantial. The annual cargo requirement to support the Kiggavik Project is estimated to include approximately 55,300 tonnes (t) of diesel fuel and 91,000 tonnes of dry cargo during peak operations. The materials and equipment needed for the construction and operation of the mine are not available in the region; therefore they will be supplied through the sea-lift, with the shipping routes in Hudson Bay between Churchill and Chesterfield Inlet, and through Hudson Bay and Hudson Strait to the extent of Nunavut Territorial waters. A dock site and cargo storage facility are proposed to be built at Baker Lake to receive supplies.

Based on existing resources, mine life is estimated at 12 to 14 years of operation, with three to four additional years for construction, and five years for decommissioning. It is expected that additional resources will be found and the Project could operate for up to 25 years. Direct job estimates for the Kiggavik Project are up to 750 and 600 workers for the construction and operations stages, respectively. Indirect and induced jobs may be as high as 400 during construction, and 1300 during operations. On 29 September 2014 AREVA submitted the Final Environmental Impact Statement for the Kiggavik Project. On 8 May 2015, NIRB released a final hearing report that recommended that the Kiggavik Project should not proceed at this time. The NIRB stated that resubmission would be reconsidered when there is greater certainty regarding the start date. In July 2015, AREVA requested that the federal government reject NIRB's decision and allow the Project to move ahead, however the Kiggavik Project currently remains under active review by NIRB. While the future of this project is uncertain, for the purposes of this cumulative assessment it is assumed that this project will continue to move ahead.

Hope Bay Project

The Hope Bay Project is a gold and mineral resources deposit located in the Kitikmeot Region, about 90 km south of Cambridge Bay. The property is currently owned by TMAC Resources Inc. (TMAC) and includes three major target areas; Doris, Madrid, and Boston. In 2012, the nearly completed mine remained inactive for more than a year and was shut down just months after the Newmont Gold Corp. (Newmont) announced an expansion. In 2013, TMAC acquired the property, with Newmont as a principal shareholder.

When the project was acquired by TMAC, Doris already had an existing project certificate issued from NIRB for a two-year mining operation. The company now wishes to extend the Doris certificate for an additional four years (a total of six years of mining). The NIRB's public hearing on the Doris extension will start 12 April 2016. The plan is to build a mine that will be "multi-generational" with a lifespan of up to 10 years (Nunatsiaq News 2014a). Access to the Hope Bay Project is by air or by ship and a proposed all-season road from Roberts Bay, including shipping that may pass through Hudson Strait. The Hope Bay Project's Pre-feasibility Study was completed in April 2015, and TMAC intends to begin production in late 2016 (TMAC 2015).

Hackett River Project

The Hackett River Base Metals Mine (Hackett River Project) is in the Kitikmeot Region, near Bathurst Inlet. The Hackett River Project was previously owned by Sabina Gold & Silver Corp. (Sabina) and is near Sabina's Back River Project. The Hackett River Project is now owned by Glencore (formerly Xstrata Zinc Canada Ltd.). Resources from the Hackett River Project are estimated at 25 million tonnes (indicated) and include silver, zinc, lead, copper,

and gold (Sabina 2013). Capital costs have been estimated at $700 million, project life at 16 years, and operational employment at approximately 600 people. There is currently no road access to the Hackett River Project, but it is located 75 km south of Bathurst Inlet and 23 km from the proposed Bathurst Inlet Port site (Sabina 2008). The project may use sea-lift for supplies that may potentially be shipped through Hudson Strait. In response to a project proposal submitted in 2008, NIRB issued EIS guidelines in early 2009. If approved, Glencore had estimated a potential production date of 2018 (Xstrata 2012). Exploration in the Hackett River area continued in 2014 (Xstrata 2014). In late 2014, the submission of the Hackett River Project's Draft Environmental Impact Statement (DEIS) was delayed, and Glencore is uncertain when it will be submitted (Nunatsiaq News 2015a; Glencore 2014). Glencore has decided to put the project on hold and the future of the Hackett River Project is uncertain, it was assumed for this cumulative effects assessment that the Hackett River Project will re-open.

Back River Project

Sabina's100%-owned Back River Project is located in southwestern Nunavut, Canada, approximately 520 km northeast of Yellowknife, Northwest Territories, 50 km southeast of Glencore's Hackett River Project, and 75 km southwest of Bathurst Inlet. It consists of seven properties hosting known or observed gold mineralization in banded iron formations. Only two of these properties, Goose and George, have been the focus of exploration and resource development to date, but there are up to eight mining areas associated with the properties. Currently, Sabina only has plans to develop the Goose site (Nunatsiaq News 2015b).

A Preliminary Feasibility Study was released by Sabina in late 2013. A technical report for the Initial Project Feasibility study was released in September 2015 (Sabina 2015). The project is also in the permitting process and filed a DEIS in January of 2014 (Sabina 2014). The company filed the Back River Project FEIS to NIRB in November 2015. Final hearings on the project are expected to occur in April, 2016.

The mine is projected to operate for at least 11 years, produce 200,000 ounce of gold per year and employ up to 900 people. Sabina plans to build all season roads and a winter road from the Goose site to a marine laydown area at Bathurst Inlet (Nunatsiaq News 2015b). The project may use sea-lift for supplies that may potentially be shipped through Hudson Strait.

Bathurst Inlet Port and Road

Although there have been different owners since the proposal was first made to NIRB in 2004, the Bathurst Inlet Port and Road (BIPR) project is currently a joint venture between of Glencore and Sabina. In its current iteration, the BIPR consists of a deep water port and airstrip in Bathurst Inlet, and an 83 km all-weather road to the Back River Project and Hackett River Project properties (Phase I), with the possibility of an additional 134 km of all-season road to Contwoyto Lake (Rescan 2013). The proponent for the BIPR has recently decided to put further work on hold for an indeterminate amount of time. As of February 2015, submission of a DEIS has continued to be postponed with updates expected in December 2015 (Nunatsiaq News 2015a; Glencore and Sabina 2015). The construction of the BIPR use sea-lift for supplies that may potentially be shipped through Hudson Strait.

3.D-4.2 Results

Pathway validity was determined for each of the RFFDs by confirming which were within a cumulative effects category (Table 3-D-7). The threshold for validity was simply whether the RFFD was within the relevant study area.

Table 3-D-7: Pathway Validity to Cumulative Effects Categories from Reasonably Foreseeable Future Developments

Project	Effects to Caribou	Effects to Terrestrial Environment	Effects to Marine Wildlife	Effects to Aquatic Resources (Water and Fish)	Effects to Traditional Land Use	Effects to Socio-Economics
Study Area	Lorrilard, Wager Bay, and Ahiak caribou ranges	RSA	Chesterfield Inlet, Hudson Bay and Hudson Strait	Baker Lake, Thelon, Back River, or Quoich water management areas	Kivalliq Region	Kivalliq Region
Pathway Threshold	Valid if located within the same caribou herd range as the project	Valid if also located in the RSA	Valid if involves marine shipping or other activities in Chesterfield Inlet, Hudson Bay and Hudson Strait	Valid if also located within the Baker Lake, Thelon, Quoich, or Back water management area	Valid if there may be effects in the Kivalliq Region	Valid if there may be effects in the Kivalliq Region
Effects from the Whale Tail Project	Located within the Lorrilard, Wager Bay, and Ahiak caribou ranges	The Project will affect wildlife, vegetation, terrain, soils, and air quality in the RSA	The Project's marine shipping corridor overlaps with marine wildlife habitats	The Project will cross fish-bearing streams	Development and access may reduce traditional land use, but there will not be public access to the haul road	The Project will provide employment to the Kivalliq region
Manitoba to Nunavut Road	**Valid pathway** Located within the Lorrilard range	**Invalid pathway** Not located in the RSA	**Valid pathway** The road may use marine shipping for supplies	**Invalid pathway** Located in a different water management area	**Valid pathway** The road would improve access and change land use in the Kivalliq region	**Valid pathway** The road would change socio-economics in the Kivalliq region
Greyhound Project	**Valid pathway** Located within the Lorrilard, Wager Bay and Ahiak caribou ranges	**Valid pathway** Also located in the RSA	**Valid Pathway** Uses the same shipping corridor	**Valid pathway** Also located in the Baker Lake water management area	**Valid pathway** May lead to spur roads from the Meadowbank Road	**Valid pathway** Would affect the socio-economics of the Kivalliq region
Kiggavik Uranium Project	**Valid Pathway** Located within the range of the Lorrilard, Wager Bay and Ahiak herds	**Invalid pathway** Not located in the RSA	**Valid Pathway** Uses the same shipping corridors	**Valid pathway** Also located in the Baker Lake water management area	**Valid pathway** Would require a winter road and possibly an all-season road to Baker Lake	**Valid Pathway** Would affect the socio-economics of the Kivalliq region

Project	Effects to Caribou	Effects to Terrestrial Environment	Effects to Marine Wildlife	Effects to Aquatic Resources (Water and Fish)	Effects to Traditional Land Use	Effects to Socio-Economics
Hope Bay Project	**Invalid Pathway** Not within the range of relevant caribou herds	**Invalid pathway** Not located in the RSA	**Valid pathway** Would likely use shipping routes in Hudson Strait, not Hudson Bay or Chesterfield Inlet	**Invalid pathway** Located in a different water management area	**Invalid pathway** Would not affect land use or access in the Kivalliq region	**Invalid Pathway** Would not affect the socio-economics of the Kivalliq region
Hackett River Project	**Valid Pathway** Located within the range of the Ahiak herd	**Invalid pathway** Not located in the RSA	**Valid pathway** Would likely use shipping routes in Hudson Strait, not Hudson Bay or Chesterfield Inlet	**Invalid pathway** Located in a different water management area	**Invalid pathway** Would not affect land use or access in the Kivalliq region	**Invalid Pathway** Would not affect the socio-economics of the Kivalliq region
Back River Project	**Valid Pathway** Located within the range of the Ahiak herd	**Invalid pathway** Not located in the RSA	**Valid pathway** Would likely use shipping routes in Hudson Strait, not Hudson Bay or Chesterfield Inlet	**Invalid pathway** Located in a different water management area	**Invalid pathway** Would not affect land use or access in the Kivalliq region	**Invalid Pathway** Would not affect the socio-economics of the Kivalliq region
Bathurst Inlet Port and Road	**Valid Pathway** Located within the range of the Ahiak herd	**Invalid pathway** Not located in the RSA	**Valid pathway** Would likely use shipping routes in Hudson Strait, not Hudson Bay or Chesterfield Inlet	**Invalid pathway** Located in a different water management area	**Invalid pathway** Would not affect land use or access in the Kivalliq region	**Invalid Pathway** Would not affect the socio-economics of the Kivalliq region

RSA = regional study area.

3.D-5 CUMULATIVE EFFECTS SUMMARY

A cumulative effects assessment is the assessment of impacts on the biophysical and socio-economic environment that results from the incremental effects of a development when added to other past, present, and RFFDs. Cumulative effects can result from individually minor but collectively significant actions taking place over a given area over a period of time NIRB (2007).

Based on the summary of past, present, (Section 3.D-3), and RFFDs (Section 3.D-4) provided above, a screening of potential cumulative effects to caribou, terrestrial and marine wildlife, aquatic resources, traditional land use, and socio-economics are provided below. Cumulative effects to each Project VC were also considered as part of the residual effects assessment for each VC, provided in Volume 5.0.

3.D-5.1 Past and Present Developments

Cumulative effects from past and present development on caribou were considered within the Ahiak, Lorrilard, and Wager Bay herd ranges. Communities and hunting camps are the largest sources of direct mortality to caribou, while the other developments likely lead to negligible caribou mortality. Considering habitat loss (direct and indirect), communities, and mineral exploration camps are likely the largest sources of anthropogenic disturbance to caribou. However, the level of disturbance within the range of the three herds considered remains very low. While there may be local effects to abundance and distribution of caribou near communities and the single operating mine, anthropogenic disturbance is unlikely to be affecting the abundance and distribution of caribou at the population level.

Considering other components of the terrestrial environment (such as other wildlife, vegetation, soils, and landscape features), the Meadowbank Mine and access road was the only other development identified within the terrestrial study area. Environmental monitoring and mitigation at the Meadowbank Mine will help to reduce impacts from this development, reducing cumulative effects between the Meadowbank Mine and the Project.

The cumulative effects on marine wildlife from the past, present, and reasonably foreseeable future developments within the study are (Chesterfield Inlet, Hudson Bay, and Hudson Strait) were considered for marine wildlife. Currently, most marine shipping is for domestic supply to existing communities. Shipping specifically for mining and mineral extraction (including mines in Quebec) accounts for approximately 15% of shipping traffic, and approximately 10% of all shipping traffic is for the Meadowbank Mine. The Project will utilize existing shipping arrangements for the Meadowbank Mine and Agnico Eagle does not expect the Project to cause an increase in shipping volume within Hudson Bay and Hudson Strait or a change in shipping procedures. Considering the seasonality and low volume of shipping, the proposed mitigation and the limited impact of marine transportation to marine wildlife to date, the Project is not anticipated to led to significant cumulative effects to marine wildlife.

Cumulative effects to aquatic resources (including water and fish) were considered by estimating the number of past and present projects in the water management area crossed by the Baker Lake, Thelon, Quoich, or Back water management areas. Currently, the number of developments within these water management areas is low and the regional effect of any effluent emissions remains negligible. Few of the developments identified trigger a Type A Water Licence. A possible exception is the Baker Lake water management area, which includes the Meadowbank Mine and the community of Baker Lake. Water treatment and aquatic monitoring at the Meadowbank Mine are anticipated to prevent regional effects of the mine to the aquatic environment.

Effects to traditional land use were also considered. These were measured by the number of developments within the Kivalliq region. Very few Kivalliq residents still hunt full time or almost full time anymore but most people continue to go out on the land. Traditional land use has likely been augmented around the exiting Meadowbank Mine and road. For example, while the road facilitates caribou hunting and fishing, the area may be used less for other activities such as camping or berry picking. Considering that the level of development within the Kivalliq region remains very low, that caribou and other wildlife continue to follow traditional movements and natural population cycles, development does not significantly hinder resident's ability to use and enjoy the landscape continues in the Kivalliq region.

Effects to socio-economics were also measured by the number of developments within the Kivalliq region. Currently, there is one operating mine in the region, and a likelihood that the Meliadine Mine may soon open. Mineral exploration and tourism is also a source of employment, although seasonal. The Project is anticipated to contribute to regional employment through permanent and seasonal jobs and contracts to local business. It is expected that the Project will contribute to the local wage economy and have minimal effect on the traditional economy, although there may be social impacts of the shift work often associated with remote camps.

3.D-5.2 Future Developments

There is potential for cumulative effects from RFFD to all of the cumulative effects categories considered, as valid pathways were identified for each. However, the likelihood of significant cumulative effects from RFFD remains low, for several reasons. First, less than 1% of exploration projects in Canada advanced to production, so it is unlikely that many of the exploration camps identified will proceed to full development, or that there will be any temporal overlap in those that do (INAC 2010). Also, many of the RFFD identified are far from the Project and have limited potential for overlap (i.e., the Hope Bay Project, the Hackett River Project, the Back River Project, and the Bathurst Inlet Port and Road). Also, it is expected that each of the RFFD will undergo environmental assessment, and will implement mitigation and monitoring (subject to regulatory requirements and societal expectations) to reduce their potential effects. Finally, valid pathways do not necessarily mean that cumulative effects will occur.

Thus, cumulative effects from the RFFD may occur if most or all of the future projects proceed simultaneously. However, the likelihood of this occurring is low. This conclusion notwithstanding, there may soon be three operating mines in the Kivalliq, two of which are in the Baker Lake water management area, and environmental monitoring should be diligently continued to minimize the cumulative effects between them. Cumulative effects for each VC are also considered in the residual effects assessment for each VC, in the relevant chapters of Volumes 5, 6, and 7.

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