3-D: Addendum Cumulative Effects Study Area and Reasonably Foreseeable Future Development

Appendix 3-D - Cumulative Effects Overview Addendum

Whale Tail Pit - Expansion Project

Submitted to:

Nunavut Impact Review Board

Submitted by:

Agnico Eagle Mines Limited – Meadowbank Division

Prepared by:

Golder Associates Ltd.

Appendix 3-D - Cumulative Effects Overview

1896037

December 2018

Table of Contents

TABLES

FIGURES

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. 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 of the FEIS Addendum.

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 Lorillard, 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, Meadowbank and Back 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;
- Nunavut Mineral Exploration, Mining and GeoScience Overview (INAC 2017);
- Federal Contaminated Sites Inventory (Treasury Board 2015);
- location of hunting camps from operator websites;
- Amaruq Baseline Traditional Knowledge Report (Agnico Eagle 2014);
- websites or reports from developers and operators
- conversations with knowledgeable individuals; and
- knowledge of the area and Project status.

The developments included were current to August 1, 2018. To provide a precautionary approach, new mines which have either been approved by NIRB or are in construction were assumed to be operational. This included the Back River Project, the Hope Bay Project, and the Meliadine Project.

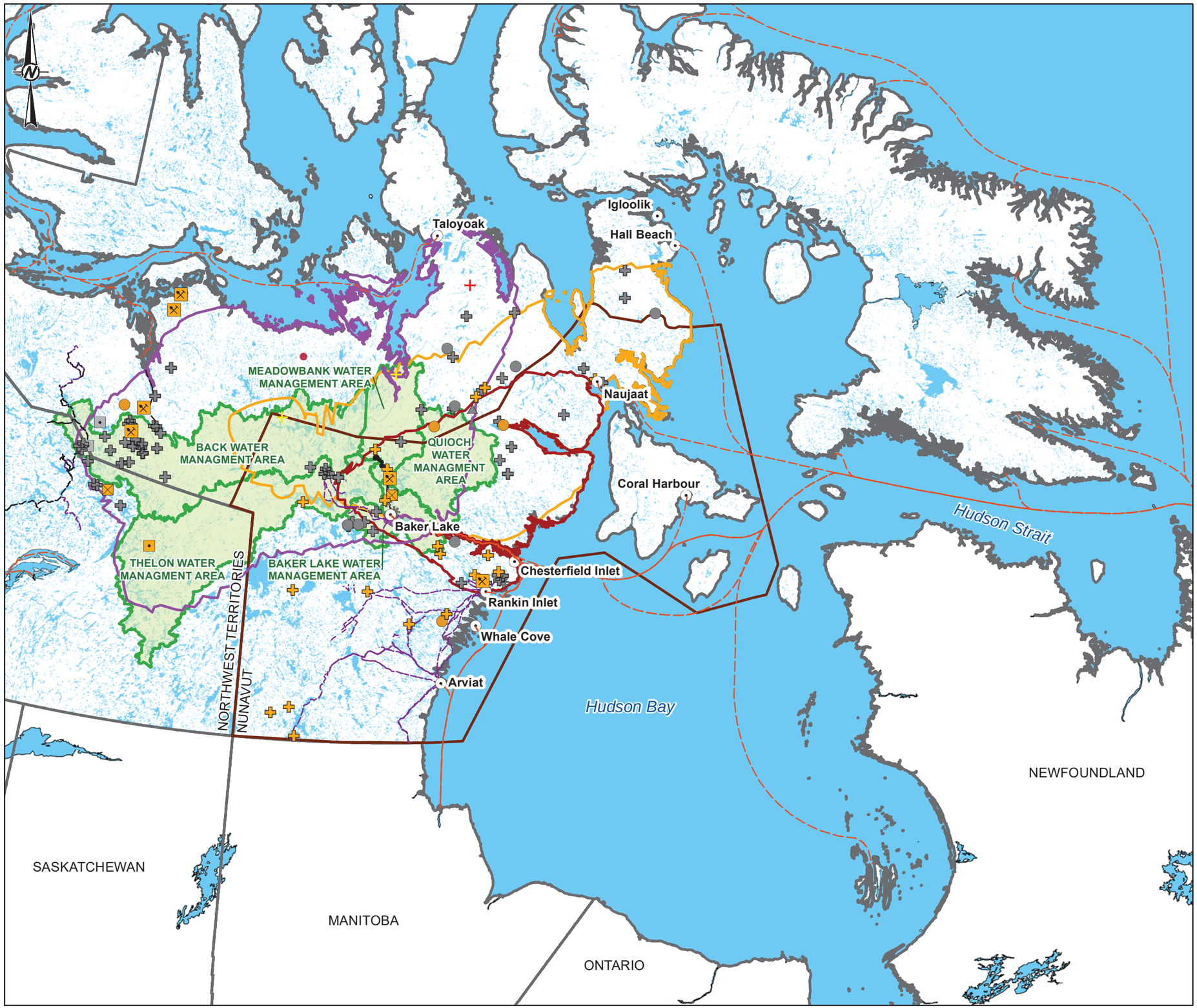
Data were divided into points and lines. The use and type of existing development was derived from land use permit applications. In cases where multiple land use permits issued for the same development, the information was merged into a single feature in the database, using the most relevant descriptions. 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. Reclamation of contaminated sites is captured as Camps or Miscellaneous activities if the reclamation triggers a land use permit.

- 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.
- 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. The seasonal use of the camps was not investigated, it was assumed that all camps were active throughout the year.

3.D-3.2 Results

Previous and existing developments in the various cumulative effect study areas include roads, communities (including airports), shipping corridors, hunting or fishing camps, mines, mineral exploration camps, contaminated sites, fuel storage areas, and quarries (Figure 3-D-1). The sections below describe the status and nature of previous and existing developments within the context of the cumulative effects study areas described in Table 3-D-1.



LEGEND

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

PAST AND PRESENT DEVELOPMENTS

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

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REFERENCE(S)
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

CLIENT
AGNICO EAGLE

AGNICO EAGLE MINES LIMITED:
MEADOWBANK DIVISION

PROJECT
WHALE TAIL PIT - EXPANSION PROJECT

TITLE
PAST AND PRESENT DEVELOPMENTS AND CUMULATIVE EFFECTS STUDY AREAS

CONSULTANT
GOLDER

YYYY-MM-DD	2018-11-11
DESIGNED	EN
PREPARED	CDB/CN
REVIEWED	JR
APPROVED	DF

PROJECT NO.	CONTROL	REV.	FIGURE
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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 active development, while there were no more than two instances of any other type of development within any range. During the operation of the expansion, there will be two active mines in the region (Meadowbank and Meliadine), which are within the range of both the Ahiak and Lorillard herds, and the Expansion Project is in the Lorillard and Wager Bay herds. There are no more than two permitted camps within the range of any of the herds, and 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, providing access to hunting and traditional land use. There are three communities within the Lorillard caribou range, and two within the Ahiak and Wager Bay herd ranges. While there is caribou sport hunting occurring in the Kivalliq region, it primarily originates from communities. Two hunting lodges were identified.

Within the Terrestrial Regional Study Area, the only other development documented within the regional study area was the Meadowbank Mine, the Meadowbank all-weather access road, and an active mineral exploration project.

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

	Ahiak Caribou Range		Lorillard Caribou Range		Wager Bay Caribou Range	
Development Type	**Active**	**Inactive**	**Active**	**Inactive**	**Active**	**Inactive**
Camp	1	4	2	1	2	3
Contaminated Site		3				2
Fuel Storage		1		1		1
Mine and Roads	2		2		1	
Mineral Exploration	4	46	7	13	5	21
Miscellaneous		2		3		2
Research Projects	1					
Quarrying				1		
Community	2		3 [a]		2	
Territorial Campground	1		2		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).

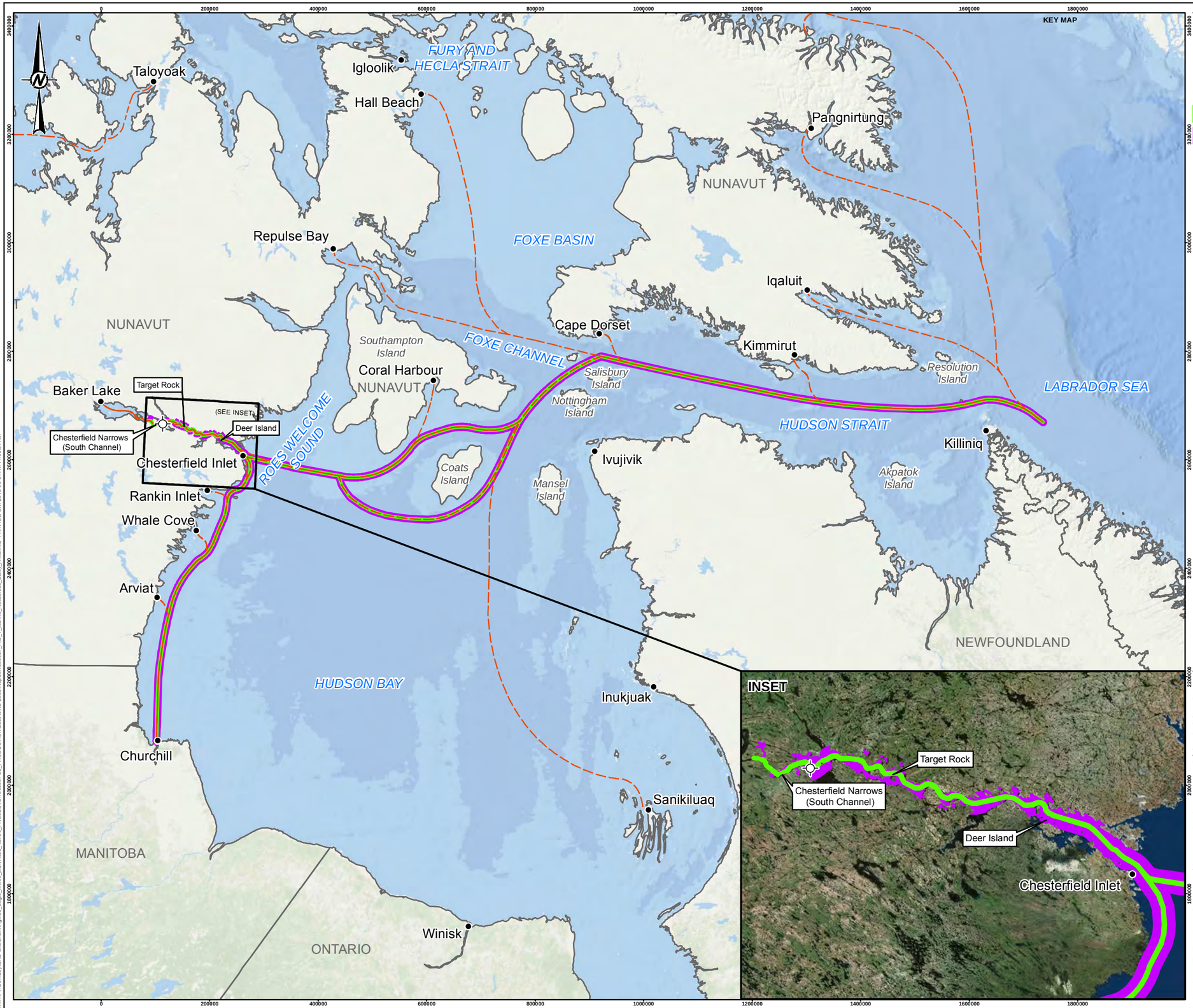
The Hudson Bay / Hudson Strait area is a critical corridor for marine transport into and out of Nunavut (LOOKNorth 2014). Vessel traffic occurs mostly during the open-water season extending from July to early October (WWF 2015). Table 3.D-3 provides the average annual number of vessels in the Hudson Strait from 2007 to 2013. In previous years, an additional 12 vessel shipments occurred each year in Hudson Strait for grain export to overseas markets, departing from the Port of Churchill (AREVA 2014).

Between 2008 and 2017, reported annual landings at Baker Lake ranged from 17 to 45. In recent years, reported annual landings appear to have stabilized to approximately 34 to 37 (Agnico Eagle 2017; Figure 3-D-3). This included tug-assisted barges transporting of 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: 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).



REFERENCE(S)

1. BASE DATA ESRI, GARMIN, GEBCO, NOAA NGDC, AND OTHER CONTRIBUTORS SOURCE: ESRI, DIGITALGLOBE, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY
2. SHIPPING ROUTE DATA OBTAINED FROM THE DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
3. PROVINCE AND POPULATED AREA DATA OBTAINED FROM ESRI.

COORDINATE SYSTEM: CANADA ALBERS EQUAL AREA CONIC

CLIENT

AGNICO EAGLE MINES LIMITED: MEADOWBANK DIVISION

AGNICO EAGLE

PROJECT

WHALE TAIL PIT – EXPANSION PROJECT

TITLE

MARINE RESOURCES STUDY AREA

CONSULTANT

GOLDER

YYYY-MM-DD	2018-08-31
DESIGNED	KA
PREPARED	MH
REVIEWED	AO
APPROVED	PR

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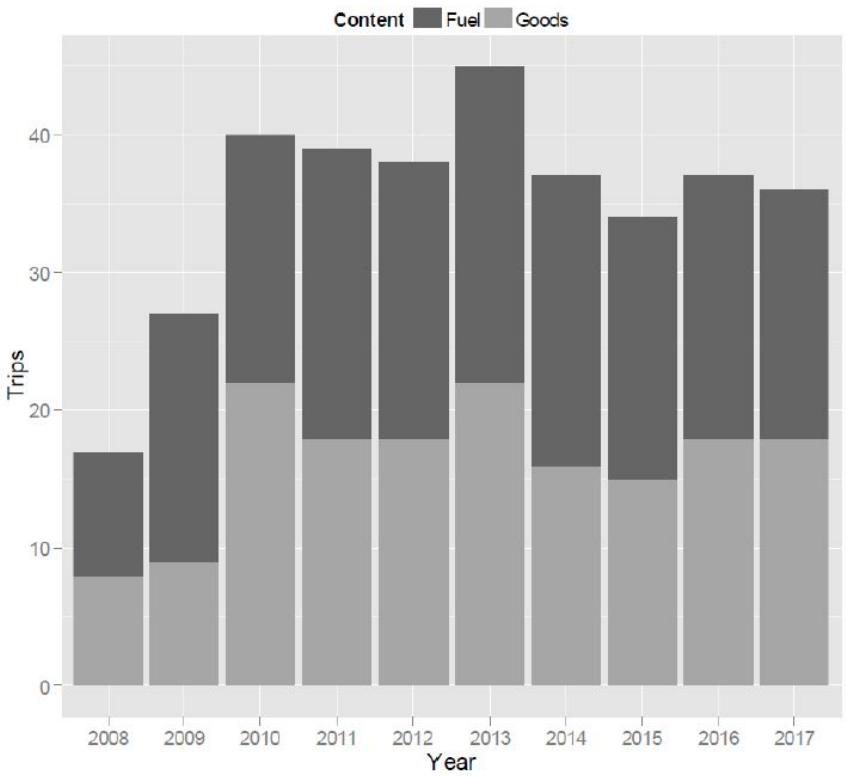


Figure 3-D-3: Barge Traffic (Number of trips/year) Arriving in Baker Lake from Chesterfield Inlet Since 2008

Source: Adapted from the Meadowbank 2016 Annual Report (Agnico Eagle 2017).

Aquatic Resources

The Project straddles four water management areas, the Back, Thelon, Meadowbank, 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-4). None of the four water management areas contained more than one active mining developments. The active developments included the community of Baker Lake, the Meadowbank Mine, the Back River Project, mineral exploration camps, and two outfitting lodges. The Back water management area has the highest number of historic developments at 23 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-4: Past and Present Development in the Water Management Areas

	Baker Lake Water Management Area		Back Water Management Area		Thelon Water Management Area		Quioch Water Management Area		Meadowbank Water Management Area	
Development Type	**Active**	**Inactive**	**Active**	**Inactive**	**Active**	**Inactive**	**Active**	**Inactive**	**Active**	**Inactive**
Mine and Roads			1				1			
Camp		1					1			
Mineral Exploration	2	4		23	1	3			1	2
Miscellaneous		2								
Community	1									
Territorial Campground	1									
Tourism/Caribou Hunting & Fishing	1									
Tourism/Fishing				1	1					
Contaminated Site				1						1

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-5). According to this data, there are currently 16 active and 23 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 are two major developments, the Meadowbank Mine and Meliadine 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-5: Past and Present Development in the Kivalliq Region

Development Type	Active	Inactive
Camp	2	3
Contaminated Site		1
Mine and Roads	2	
Mineral Exploration	16	23
Miscellaneous		3
Quarrying		1
Community	7	
Territorial Campground	2	
Tourism/Caribou Hunting & Fishing	1	

Note: The community of Rankin Inlet includes an inactive mine, considered here to be part of the community footprint. 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.

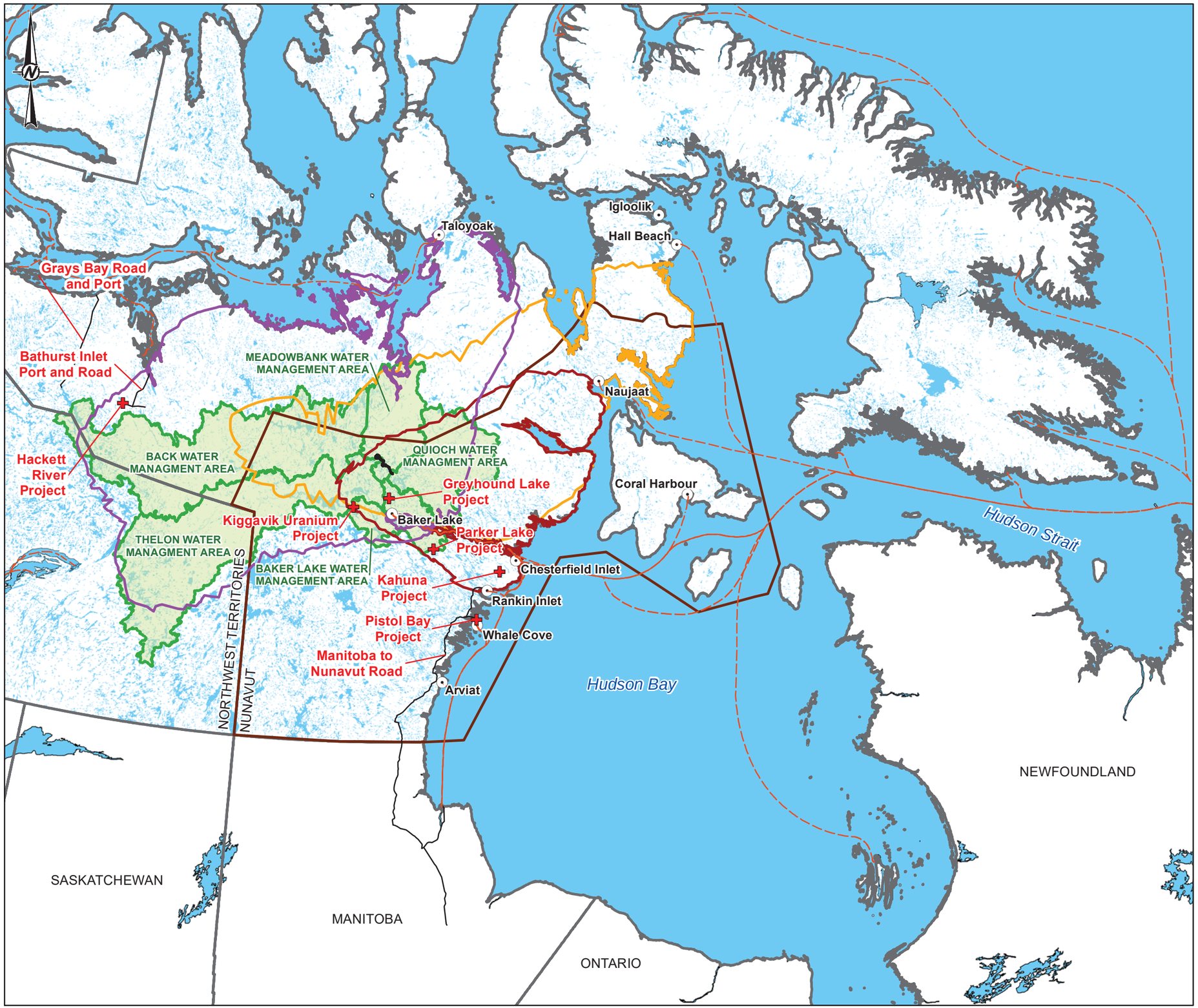
Each of the RFFDs was considered for overlap with the Project from the perspective of the cumulative effect categories (caribou, terrestrial, aquatic resources, traditional land use, and socio-economics). The pathway was determined to be either valid or invalid depending on whether the RFFDs occurred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

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 and Power Line;
- Bathurst Inlet Port and Road;
- Greys Bay Road;
- Greyhound Lake Project;
- Kiggavik Uranium Project;

- Hackett River Project;
- Kahuna Project;
- Pistol Bay Project; and
- Parker Lake Project.

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, 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. The number of mines presented here is likely high considering that 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.



LEGEND

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

REASONABLE FORESEEABLE FUTURE DEVELOPMENT

- MINE
- ALL-SEASON ROAD

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REFERENCE(S)

1. CARIBOU RANGES - NAGY ET AL, 2011. OBTAINED FROM THE GOVERNMENT OF NUNAVUT AND NORTH WEST TERRITORIES.
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DATUM: NAD 83 PROJECTION: CANADA LAMBERT CONFORMAL CONIC

CLIENT

AGNICO EAGLE

AGNICO EAGLE MINES LIMITED: MEADOWBANK DIVISION

PROJECT

WHALE TAIL PIT - EXPANSION PROJECT

TITLE

REASONABLY FORESEEABLE FUTURE DEVELOPMENTS AND CUMULATIVE EFFECTS STUDY AREAS

CONSULTANT

GOLDER

YYYY-MM-DD	2018-11-11
DESIGNED	EN
PREPARED	CDB/CN
REVIEWED	JR
APPROVED	DF

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Manitoba to Nunavut Road and Power Line

No change from the Approved Project; however, the Road and potential power line is not within the cumulative effects study area for other cumulative effect categories but could decrease the amount of marine shipping in Hudson Bay.

Bathurst Inlet Port and Road

The viability of the Bathurst Inlet Port and Road is unknown, but was included here. Further details on this project were provided in the Approved Project FEIS (Agnico Eagle 2016).

Grays Bay Road and Port Project

The viability of the Grays Bay Road and Port (GBRP) is unknown, but was included here. The GBRP is a transportation system that, once completed, will connect the rich mineral resources of Canada's Slave Geological Province, which straddles Nunavut and the Northwest Territories, to arctic shipping routes. The GBRP consists of a 227 km all-season road linking the northern terminus of the Tibbitt-Contwoyto Winter Road to a deep-water port at Grays Bay on the Northwest Passage (GN 2018).

Greyhound Project

No change from the Approved Project; refer to the Approved Project FEIS (Agnico Eagle 2016) for details.

Kiggavik Uranium Project

No change from the Approved Project; refer to the Approved Project FEIS (Agnico Eagle 2016) for details.

Hackett River Project

While Hacket River Project regulatory applications were initiated in 2008, it is currently on hold and the future of the Hackett River Project is uncertain (Sandstorm 2018). Regardless, it was assumed for this cumulative effects assessment that the Hackett River Project will be developed in response to new roads in the area.

Kahuna Project

The Kahuna diamond project is located between the communities of Rankin Inlet and Chesterfield Inlet. Bulk sampling was completed in 2006 to 2008. Diamondiferous kimberlites, including Kahuna, PST, and Notch, were identified through geophysical surveying, bulk sampling and drilling. There are over 100 kimberlites identified on the Kahuna property that occur as both pipes and dykes. In 2014, Dunnedin Ventures Inc. signed an option agreement to acquire a 100 per cent interest in the Kahuna project. Since the initial option agreement, Dunnedin has significantly expanded the property. Dunnedin initiated its summer field season in June 2017 with geological mapping and bedrock and till sampling (INAC 2017). For the purposes of this assessment, it is assumed that the Kahuna Project proceeds to operation.

Pistol Bay Project

The Pistol Bay Project is located near Whale Cove and currently operated by Nord Gold SE. The summer 2016 field season involved an extensive work program at the Pistol Bay Project, including drilling, till sampling, and geological mapping. The till sampling program focused on following up the anomalous gold results from the 2015 program around the Gill South prospect. In 2017, Northquest focused on detailed geological mapping, prospecting, and rock chip sampling conducted over all known targets in the claim block (INAC 2017). For the purposes of this assessment, it is assumed that the Pistol Bay Project proceeds to operation.

Parker Lake Project

Agnico Eagle owns several gold exploration properties between the company's Meliadine Gold Project and Meadowbank Gold Mine. The major properties include Cone Hill, Parker Lake, Fox Lake, and Peter Lake. The properties are on Crown land and IOL from the western extent of the Pyke Fault in the Rankin Inlet greenstone belt west of Meliadine, to the southwest side of Baker Lake in the Gibson MacQuoid greenstone belt. These claims are underlain by geological units similar to those found at the Meadowbank, Meliadine, and Amaruq properties that are all associated with greenstone belts and regional structures (INAC 2017). For the purposes of this assessment, it is assumed that the Parker Lake Project proceeds to operation.

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-6**). The threshold for validity was simply whether the RFFD was within the relevant study area.

Table 3-D-6: 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 and Pathway Threshold	Lorillard, Wager Bay, and Ahiak caribou ranges Valid if located within the same caribou herd range as the project	RSA Valid if also located in the RSA	Marine RSA - Chesterfield Inlet, Hudson Bay and Hudson Strait Valid if marine shipping activities overlap with Expansion Project shipping routes in Chesterfield Inlet, Hudson Bay and/or Hudson Strait.	Baker Lake, Thelon, Back, Meadowbank, or Quoich water management areas Valid if also located in the Baker Lake, Thelon, Back, Meadowbank, or Quoich water management areas	Kivalliq region Valid if there may be effects in the Kivalliq Region	Kivalliq region Valid if there may be effects in the Kivalliq Region
Effects from the Whale Tail Project	Located within the Lorillard, Wager Bay, and Ahiak caribou ranges	The Project will affect wildlife, vegetation, terrain, soils, and air quality in the RSA	The Expansion 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 and Power Line	**Valid pathway** Located within the Lorillard range	**Invalid pathway** Not located in the RSA	**Valid pathway** The road may use marine shipping for supplies, but may also reduce the need for shipping to the Kivalliq Region	**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
Bathurst Inlet Port and Road	**Valid Pathway** Located within the Ahiak range	**Invalid pathway** Not located in the RSA	**Valid pathway** Would likely use shipping routes in Hudson Strait, but 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
Grays Bay Road and Port Project	**Invalid pathway** Not within the range of an overlapping caribou herd	**Invalid pathway** Not located in the RSA	**Valid pathway** Would likely use shipping routes in Hudson Strait, but 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
Greyhound Project	**Valid pathway** Located within the Lorillard, Wager Bay and Ahiak caribou ranges	**Valid pathway** Also located in the RSA	**Valid Pathway** Would likely use shipping routes in Hudson Strait, Hudson Bay and Chesterfield Inlet.	**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 Lorillard, Wager Bay and Ahiak herds	**Invalid pathway** Not located in the RSA	**Valid Pathway** Would likely use shipping routes in Hudson Strait, Hudson Bay and Chesterfield Inlet.	**Valid pathway** Also located in the Baker Lake water management area	**Valid pathway** Would require a winter road and possibly an	**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
					all-season road to Baker Lake	
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
Kahuna Project	**Valid pathway** Located within the Lorillard caribou range	**Invalid pathway** Not located in the RSA	**Valid Pathway** Would likely use shipping routes in Hudson Strait, and Hudson Bay, but not Chesterfield Inlet.	**Invalid pathway** Located in a different water management area	**Valid pathway** Would lead to further development in the Kivalliq Region	**Valid pathway** Would lead to further development in the Kivalliq region
Pistol Bay Project	**Invalid pathway** Not within the range of an overlapping caribou herd	**Invalid pathway** Not located in the RSA	**Valid Pathway** Would likely use shipping routes in Hudson Strait, and Hudson Bay, and Chesterfield Inlet.	**Valid pathway** Also located in the Baker Lake water management area	**Valid pathway** Would lead to further development in the Kivalliq Region	**Valid pathway** Would lead to further development in the Kivalliq region
Parker Lake Project	**Valid pathway** Located within the Lorillard caribou range	**Invalid pathway** Not located in the RSA	**Valid Pathway** Would likely use shipping routes in Hudson Strait, and Hudson Bay, and Chesterfield Inlet.	**Valid pathway** Also located in the Baker Lake water management area	**Valid pathway** Would lead to further development in the Kivalliq Region	**Valid pathway** Would lead to further development in 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 Volumes 5, 6 and 7 of the FEIS Addendum.

No instances were identified where the potential for cumulative effects changed as a result of the expansion to Whale Tail Project. For Past and Present Developments, the changes identified where a result of either new developments or the expiration of permits. For Future Developments, the changes identified where a result of revisions to the suite of RFFDs.

3.D-5.1 Past and Present Developments

Cumulative effects from past and present development on caribou were considered within the Ahiak, Lorillard, 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.

As the shipping route, shipping volumes, volume of fuel being transported, lightering activities, and anchorage locations will remain consistent with those identified for the Approved Project, the Expansion Project activities represent a negligible change from the Approved Project activities. Consistent with the methodology applied for the Approved Project FEIS, the assessment of Expansion Project activities yielded no changes to the conclusions of the marine wildlife cumulative effects assessment made in the Approved Project FEIS (see Table 3.A-4 in Appendix 3-A of the FEIS Addendum). The Expansion Project will utilize existing shipping arrangements and procedures identified for the Meadowbank Mine and Agnico Eagle.

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 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 in the Kivalliq region.

Effects to socio-economics were also measured by the number of developments within the Kivalliq region. Currently, there are two operating mines in the region (Meliadine is considered operational for the purposes of this assessment). 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.

No instances were identified where the potential for cumulative effects changed as a result of the expansion to Whale Tail Project. The changes identified where a result of either new developments or the expiration of permits.

3.D-5.2 Future Developments

There is potential for cumulative effects from RFFD to all of the cumulative effect 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, some of the RFFD identified are far from the Project and have limited potential for overlap (i.e., the Hackett River Project, the Bathurst Inlet Port and Road and the Grays Bay Road). Also, it is expected that most or all 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.

No instances were identified where the potential for cumulative effects changed as a result of the expansion to Whale Tail Project. The changes identified where a result of revisions to the suite of RFFDs.

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, 7, and Appendix 3-A (Table 3.A-2 and Table 3.A-4) of the FEIS Addendum.

3.D-6 REFERENCES

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