Legend

ᖃᖅᓯᒍᐃᓐᓇᑦᑐᓄᑦ ᐊᕐᕋᑎᑎᕆᐅᓕᖅ
All-Season Road

ᐊᓂᖅᑎᓐᓇᖅᑐᑦ ᐅᑭᐅᓗᖅᑕᖅ ᐊᕐᕋᑎ
Meadowbank All-Season Road

ᐅᖅᑭᐅᑦ (ᐊᕐᕋᑎᑎᕆᐅᓕᒪᔪᖅᑐᖅ ᐊᑐᖅᑕᐅᔪᖅᑐᖅ)
Winter Road (Preferred Option)

ᑭᓚᐃᐅᑦ ᓄᖃᓇᓚᐅ
Kiggavik Site

Tehek Lake

Amarulik Lake

Schultz Lake
ᖃᒪᓂᖅ ᑐᓴᖅ
Qamaniq Tugliq

Qamanaarjuk Lake
ᖃᒪᓐᓇᕐᒃ

Thelon River
ᑲᖏᓐ ᔭᓐ ᑯᓘ
Kangirjuup Kuunga

Whitehills Lake
ᑕᓯᕐᔪᐊᖅ
Tasirjuaq

Itigulik Lake
ᐃᑎᒍᓪᓗ

Ajaktukvik Lake
ᐊᒃᑐᕐᕕᒃ

Kavisilik Lake
ᑲᐯᓯᓪᓗ

Aberdeen Lake
ᖃᒪᓂᖅᐅᖓᑦᓯᖅ
Qamaniq Ungalliq

Squiggly Lake

Skinny Lake
ᑲᐯᓯᓂᓪᓗ

ALL-SEASON ROAD
ᖃᖅᓯᒍᐃᓐᓇᑦᑐᓄᑦ ᐊᕐᕋᑎᑎᕆᐅᓕᖅ

MEADOWBANK ALL-SEASON ROAD (EXISTING)
ᐊᓂᖅᑎᓐᓇᖅᑐᑦ ᐅᑭᐅᓗᖅᑕᖅ ᐊᕐᕋᑎ

Siamese Lake
ᑕᕐᕋᐊᖅ ᓇᕐᖃᓚᖅ
Tasira'tuaq / Nurravik

Long Lake
ᓕᖅᓂᒍᖅ

Qatgiqtalik Lake
ᖃᓇᖅᑎᓕᒃᓪᓗ

Crossing Point Lake
ᓇᓐᓗᐊᖅᓱᖅ

Tunuhuk Lake
ᑐᓄᓚᕼᐅᖅ

Thom Lake
ᑕᕆᑐᐊᖅ
Tasi'tuaq

Tupik Lake

Baker Lake

Gerhard Lake

Lobster Lake

Judge Sissons Lake
ᖁᑭᖅᑕᖅ ᓴᐊᓕᓪᓗ
Qikiqtarjualik

Qamanaugaq Lake
ᖃᒪᓇᐅᒃᓪᓗ

WINTER ROAD (PREFERRED OPTION)
ᐅᖅᑭᐅᑦ (ᐊᕐᕋᑎᑎᕆᐅᓕᒪᔪᖅᑐᖅ ᐊᑐᖅᑕᐅᔪᖅᑐᖅ)

Qikiqtarjualuk River
ᖁᑭᖅᑕᔪᐊᓘᒃᓴᖅ ᑯᓘ
Qikiqtarjualuup Kuunga

Qinnguq Bay
ᖁᓂᖅᔪᖅ

Audra Lake
ᐊᐅᑐᖃ ᑕᓱᖅ
Anigguq

Aniggua River
ᐊᓂᓚ ᔭᓐ ᑯᓘ
Aniggiup Kuunga

Baker Lake
ᖃᒪᓂᑐᐊᖅ

Qamanaugakuluk Lake
ᖃᒪᓇᐅᒃᓵᓚᓪᓗ

Mihaluk Lake
ᒥᐻᐊᓚᓪᓗ

Marjorie Lake

Turtle Lake

Buzzard Lake

Murriittuq Lake
ᒧᕆᑎᑐᖅ

Quglungnil'naaq Lake
ᖁᓚᓪᓘᓐᓂᓕᓐᓇᖅ

Dragon Lake

Rocket Lake

Samarook Lake

Pistol Lake

Iqaluik Lake
ᐃᖃᓚᓪᓗ

Mallery Lake
ᑕᓯᔪᐊᖅᐊᓕᓪᓗ

Princess Mary Lake
ᑕᓯᔪᐊᖅᑐᓪᓗᐊᖅ
Tasirjuaq Tugliqpaaq

Pitz Lake
ᑕᓯᓗᓪᓘᐊᖅ
Tasilugjuaq

Gull Lake

Kazan River

Inuit Qaujimajatuqangit Legend

ᐱᑭᐅᐃᑦ ᐊᐠᕿᑕᓐᓂ ᖃᓄᓂᖏᓂ
Caching Area

ᑐᖅᑐᑦ ᒪᖃᐃᐱᖅ ᒪᖃᐃᑐᖃᖅ
Caribou Hunting Area

ᑎᓐᖏᒥᐊᖅ ᒥᕋᑎᑦ ᒪᖃᐃᐱᖅ ᒪᖃᐃᑐᖃᖅ
Goose Hunting Area

ᐅᓪᒥᖏᓪᒪᖅ ᒪᖃᐃᐱᖅ ᒪᖃᐃᑐᖃᖅ
Muskox Hunting Area

ᐊᓪᒪᑭᖅ ᑐᖅᑐᑦ ᒪᖃᐃᐱᖅ ᒪᖃᐃᑐᖃᖅ
Wolf/Caribou Hunting Area

N

Projection: NAD 1983 UTM Zone 14N
Compiled:TL
Date: 04/08/2014 Scale: 1:500,000
Data Sources: *Natural Resources Canada, Geobase®, Nation Topographic Database, Baker Lake Elders, AREVA Resources Canada Inc.*

FIGURE 9.1-3
HUNTING AND CACHING AREAS AROUND BAKER LAKE

ENVIRONMENTAL IMPACT STATEMENT
VOLUME 9

10 0 10
Kilometers

KIGGAVIK PROJECT

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File: Q:\SHEQ\GIS\KIGGAVIK\2014\EIS\Volume 9 - SocioEconomics and Community\Volume 9 - Tier 2\Part 1 - Socio-Economic\Maps\MXD\Figure 9.1-3 HUNTING AND CACHING AREAS AROUND BAKER LAKE.mxd

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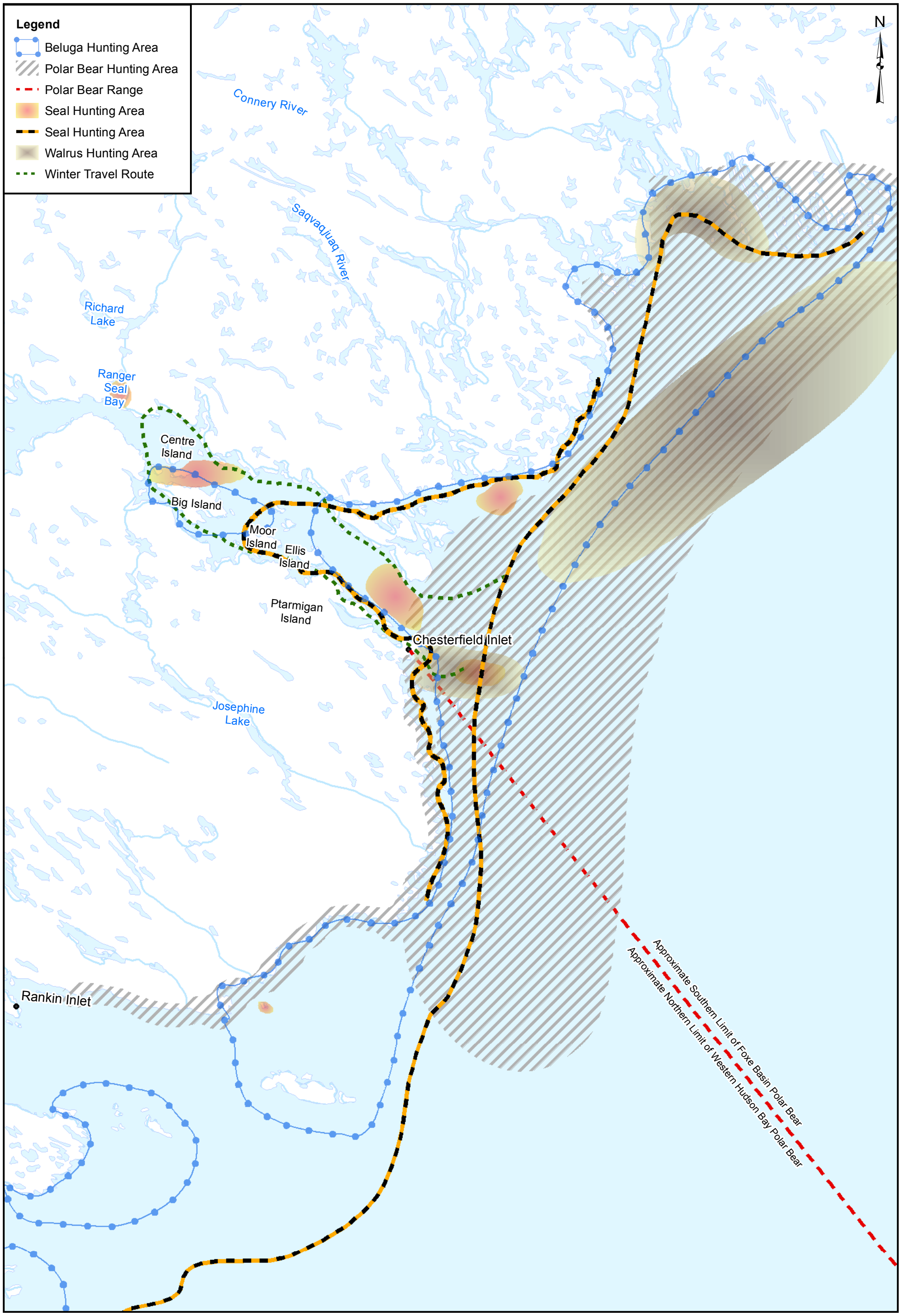

Projection: NAD 1983 UTM Zone 14N
Compiled: TL Drawn: TL
Date: 9/26/2014 Scale: 1:600,000
Data Sources: *Natural Resources Canada, Geobase®, Nation Topographic Database, AREVA Resources Canada Inc.*

FIGURE 9.1-4
PREFERRED MARINE-BASED HUNTING AREAS

ENVIRONMENTAL IMPACT STATEMENT
VOLUME 9

10 0 10
Kilometers

KIGGAVIK PROJECT

AREVA

File: Q:\SHEQ\GIS\KIGGAVIK\2014\EIS\Volume 9 - SocioEconomics and Community\Volume 9 - Tier 2\Part 1 - Socio-Economic\Maps\MXD\Figure 9.1-4 Preferred Marine-based Hunting Areas.mxd

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Hunters primarily harvest caribou, wolf, polar bear, beluga, fox, narwhal, and walrus (for people and dogs) in a sustainable manner to avoid waste and promote sharing of food (IQ RBHT 2009; RBYA 2009; ARVJ 2011). Interview respondents reported that polar bear is found generally at various locations around the Southampton and Coats Islands (IQ Riewe 1992; CHAH 2009). Polar bears are harvested around the end of May, with each community having a set quota. Coral Harbour receives 40 polar bear tags, while Chesterfield Inlet has an annual quota of eight to ten or twelve bears (IQ Riewe 1992; CHAH 2009; CI01 2009).

Hunters believe the best place to hunt beluga whale is close to Churchill in early July, when they are beginning to migrate (IQ RIHT 2009). However, people are restricted from going to Churchill to hunt beluga whale, as the government wants to protect tourism there (IQ ARHT 2009). In addition, they note that hunters will travel as far north as Whale Cove to hunt seals, and will go near the outlets of creeks (IQ RIJ 2011).

The assessment of effects on marine mammals notes that although significant effects are not expected, there could be movement away from ships and/or barges, which could in turn mean that animals might move away from suitable habitat, change behaviours and/or experience 'energetic stress'.

Fishing concerns related to harvesting focus on Baker Lake and Chesterfield Inlet rather than lakes in the mine site area, which does not overlap with any known fishing spot preferences. (There are however more general environmental protection concerns about fish at the mine site becoming contaminated.) Baseline results on fish indicate that spawning occurs outside Baker Lake, but people say that Arctic char migrate into Chesterfield Inlet to spawn. As for marine mammals, fish could have a behavioural response to noise, but no significant effects are expected – people will be able to fish as they always have. Fishing areas around Judge Sissons Lake are displayed in Figure 9.1-5, while those near Baker Lake are shown in Figure 9.1-6.

Results from consultations and socio-economic and IQ data collection suggest that with regard to land mammals, migratory patterns are in any case changeable and unpredictable (see Box 9.1-1). As the animals move, so do hunters as they share information on successful hunts. There is some feeling that caribou avoid hamlets because of noise and traffic, although in Baker Lake some people feel that caribou may be attracted to the hamlet as they are often seen drinking at the landfill. It has also been observed by hunters in Baker Lake that Meadowbank has changed caribou distribution and made access more difficult. One interviewee claimed that this may be the result of the increased amount of litter in the area (IQ BLHT 2011)

Legend

- ᖃᖏᒐᐃᓐᓇᑦ ᐊᕐᓂᑎᒋᔭᐅᔪᖅ
  All-Season Road
- ᐊᐅᖅᑎᓐᓇᖅᑐᑦ ᐅᑭᐅᓗᒃᑕᖅ ᐊᕐᓂᑎᑎ
  Meadowbank All-Season Road
- ᐅᖃᑭᐅᑦ (ᐊᕐᓂᑎᑎᕆᔭᐅᒪᔪᓕᖅᑐᖅ ᐊᑐᖅᑕᐅᔪᓕᖅ)
  Winter Road (Preferred Option)
- ᑭᒃᒪᔭᐅᑦ ᓄᖏᓇᖏᒃ
  Kiggavik Site

Species

- ᐃᖃᓗᒃᓗᐊᖅ
  Arctic Char
- ᓯᒡᓗᒃᐸᐅᒃᒪᖅ
  Arctic Grayling
- ᑎᒃᑕᒡᓕᖅ
  Burbot
- ᐊᓐᓇᒃᓂᖅ
  Lake Cisco
- ᐃᓗᕐᖅ
  Lake Trout
- ᒃᑭᖏᐃᔭᐊᖅᑐᖅ
  Lake Whitefish
- ᐊᓐᖏᕈᐊᖅ
  Longnose Sucker
- ᐅᓯᖏᓇᖅᒃᑭᐅᓂᐃᓇᖅ
  Round Whitefish

N

Squiggly Lake

Skinny Lake
ᑲᕕᓯᓕᒃ

Kavisilik Lake
ᑲᕕᓯᓕᒃ

Siamese Lake
Tasiraʼtuaq / Nurravik

ALL-SEASON ROAD
ᖃᖏᒐᐃᓐᓇᑦ ᐊᕐᓂᑎᒋᔭᐅᔪᖅ

Itigulik Lake
ᐃᑎᒍᓕᒃ

Ajaktukvik Lake
ᐊᔾᑐᖅᑐᕕᐃᒃ

Long Lake
ᐊᓐᓂᒍᖅ

Qatgiqtalik Lake
ᖃᑉᑭᖅᑕᓪᓕᒃ

Sleek Lake

Caribou Lake

Tunuhuk Lake
ᑐᓐᓄᕼᑦ

Thom Lake
ᑕᓯᐅᐊᖅ
Tasiʼtuaq

Qamanaugaq Lake
ᖃᒪᓇᐅᔪᖅ

WINTER ROAD (PREFERRED OPTION)
ᐅᖃᑭᐅᑦ (ᐊᕐᓂᑎᑎᕆᔭᐅᔪᓕᖅᑐᖅ ᐊᑐᖅᑕᐅᔪᓕᖅᑐᖅ)

Judge Sissons Lake
ᖁᑭᖅᑕᖅ ᓴᐊᓕᒃ
Qikiqtarjualik

Qikiqtarjuaq River
ᖁᑭᖅᑕᕐᔪᐊᓕᐅᓴ ᑯᓘ
Qikiqtarjualiup Kuunga

Buzzard Lake

Murriittuq Lake
ᒧᖏᓕᑐᖅ

Quglungnilʼnaaq Lake
ᖁᓘᓚᓐᓂᓕᓕᒃᓇᖅ

Audra Lake
ᐊᐅᑐᖃ ᑕᓯᖅ
Anigguq

Aniggug River
ᐊᓕᒃ ᔪᓴ ᑯᓘ
Aniggugup Kuunga

Inuit Qaujimajatuqangit Legend

- ᐃᖃᓗᒃᓗᓯᐅᖅᓱᒃ ᐃᖃᓗᓕᐊᖅᓱᑦ ᐊᕐᕌᒍᓐᓃᓂ ᖃᓄᐃᓕᖅᓯᓂ
  Fishing Area
- Fishing Site (Riewe 1992)

Projection: NAD 1983 UTM Zone 14N
Compiled:TL
Date: 04/08/2014 Scale: 1:200,000
Data Sources: *Rick Riewe (Editor). 1992. Nunavut Atlas. Canadian Circumpolar Institute and the Tungavik Federation of Nunavut. Edmonton, AB.Art Design Printing Inc. Baker Lake Elders, AREVA Resources Canada Inc. NRC*

FIGURE 9.1-5
FISHING AREAS NEAR JUDGE SISSONS LAKE

EVIRONMENTAL IMAPCT STATEMENT
VOLUME 9

4 0 4
Kilometers

KIGGAVIK PROJECT

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File: Q:\SHEQ\GIS\KIGGAVIK\2014\EIS\Volume 9 - SocioEconomics and Community\Volume 9 - Tier 2\Part 1 - Socio-Economic\Maps\MXD\Figure 9.1-5 Fishing Areas Near Judge Sissons Lake.mxd

Legend

- ᖃᖏᒐᐃᓐᓇᑦᑎᓂᒃ ᐊᕐᕋᑎᑎᖅᑐᕐᓴᖅ
  All-Season Road
- ᐊᐅᖅᑎᓇᓐᓇᖅᑐᒥᑦ ᐅᑭᐅᓗᑦᑕᖅ ᐊᕐᕋᑎᑎ
  Meadowbank All-Season Road
- ᐅᖅᑭᐅᓂᒃ (ᐊᕐᕋᑎᑎᖅᑐᐅᓚᐅᖅᑐᖅ ᐊᑐᖅᑕᐅᓕᖅᑐᖅ)
  Winter Road (Preferred Option)
- ᑭᒃᓱᐃᐅᑦ ᓄᖏᓇᖏᓐ
  Kiggavik Site

Species

- ᐃᖃᓗᓕᒫᒃ
  Arctic Char
- ᓯᓚᓗᒃᐊᐅᒡᒐᖅ
  Arctic Grayling
- ᑎᒃᑕᓚᓂᖅ
  Burbot
- ᐊᖏᓇᒃᓂᖅ
  Lake Cisco
- ᐃᓗᕐᖅ
  Lake Trout
- ᒪᒃᑭᖏᐃᐊᖅᑐᖅ
  Lake Whitefish
- ᐊᖏᖑᐊᖅ
  Longnose Sucker
- ᐅᓯᖏᓇᖅᓴᐅᐼᐅᖏᓇᖅ
  Round Whitefish

N

ALL-SEASON ROAD
ᖃᖏᒐᐃᓐᓇᑦᑎᓂᒃ ᐊᕐᕋᑎᑎᖅᑐᐅᓚᐅᖅᑐᖅ

MEADOWBANK ALL-SEASON ROAD (EXISTING)
ᐊᐅᖅᑎᓇᓐᓇᖅᑐᒥᑦ ᐅᑭᐅᓗᑦᑕᖅ ᐊᕐᕋᑎᑎ

WINTER ROAD (PREFERRED OPTION)
ᐅᒃᑭᐅᐅᑦ (ᐊᕐᕋᑎᑎᖅᑐᐅᓚᐅᖅᑐᖅ ᐊᑐᖅᑕᐅᓕᖅᑐᖅ)

Long Lake
ᐊᖓᓂᒍᖅ

Qatgiqtalik Lake
ᖃᐅᒋᖅᑕᓪᓕᒃ

Tunuhuk Lake
ᑐᓴᓂᕆᒃ

Thom Lake
ᑕᓱᑐᐊᖅ
Tasi'tuaq

Crossing Point Lake
ᓇᓪᓕᐊᖅᓯᒃ

Tupik Lake

Baker Lake

Qikiqtarjualik River
ᖁᑭᖅᑕᕐᓯᐊᓕᐅᓱᒃ ᑯᓘ
Qikiqtarjualiup Kuunga

Murriittuq Lake
ᒪᕐᕆᑐᖅ

Quglungnil'naaq Lake
ᖁᐊᓚᖓᓂᓕᓇᖅ

Audra Lake
ᐊᐅᐃᑐ ᑕᓱᖅ
Anigguq

Aniggua River
ᐃᓂᒋ ᒍᒃ ᑯᓘ
Aniggauup Kuunga

Qinnguq Bay
ᖁᓪᓕᒍᖅ

Qamanaugâkuluk Lake
ᖃᖓᓇᐅᑲᓗᓚᐅ

Mihaluk Lake
ᒥᐦᐊᓚᐅ

Baker Lake
ᖃᓘᓐᑐᐊᖅ

Inuit Qaujimajatuqangit Legend

- ᐃᖃᓗᓕᒫᓂᐅᔪᓐᓇᖅ ᐃᖃᓗᓕᓕᐊᖅᓇᖅ ᐊᐸᕈᑕᓐᓂ ᖃᓐᓂᓐᖃᓘᓂ
  Fishing Area
- Fishing Site (Riewe 1992)

Projection: NAD 1983 UTM Zone 14N
Compiled:TL
Date: 04/08/2014 Scale: 1:200,000
Data Sources: *Rick Riewe (Editor). 1992. Nunavut Atlas. Canadian Circumpolar Institute and the Tungavik Federation of Nunavut. Edmonton, AB.Art Design Printing Inc. Baker Lake Elders, AREVA Resources Canada Inc. NRC*

FIGURE 9.1-6
FISHING AREAS NEAR BAKER LAKE

EVIRONMENTAL IMPACT STATEMENT
VOLUME 9

4 0 4
Kilometers

KIGGAVIK PROJECT

AREVA

AREVA Resources Canada Inc - P.O. Box 9204 - 817 - 45th Street West - Saskatoon, SK - S7K 3X5

File: Q:\SHEQ\GIS\KIGGAVIK\2014\EIS\Volume 9 - SocioEconomics and Community\Volume 9 - Tier 2\Part 1 - Socio-Economic\Maps\MXD\Figure 9.1-6 Fishing Areas Near Baker Lake.mxd

Box 9.1-1 Animal Distribution and Movement

Caribou naturally change their migration patterns every few years.

Caribou herds don't take the same routes anymore.

Caribou no longer go to Rankin Inlet because there are too many people there, and there are too many people with snow machines on the south side of Chesterfield Inlet – this had made it difficult to determine the natural movement of caribou.

The Meadowbank gold mine has altered caribou distribution and made it more difficult to access caribou.

There are not a lot of caribou around the hamlet now, they don't like all the noise from the snow machines and all-terrain vehicles.

Wildlife moves so it is important to protect the environment everywhere, not just at specific places.

Predicting where animals are is important because they migrate and fuel is expensive.

Muskoxen are not close anymore so they are not hunted often.

Beluga whales used to come into the harbour at Chesterfield in August, but come only occasionally now as there is too much noise from boat motors.

Because of the increase of barge traffic in Chesterfield Inlet there are fewer seals in the inlet.

There were no seals last year and this is because of Meadowbank's [barge] traffic. Traffic vibrations drive seals away.

Unpredictability has not yet appeared to noticeably affect levels of harvesting activity – as the baseline notes, harvest levels continue to remain high. Unpredictability may, however, explain part of the high annual variability in catches as reported in NWMB's harvest study (2004). Hunter harvest studies concluded that between 2006 and 2011, 'there does appear to be an increased harvest along

the [Meadowbank] access road' but that as at the end of 2012 there was a decrease (AEM, 2012 and 2013).[89]

As Box 9.1-1 indicates however, there is more concern about marine mammals, particularly in Chesterfield Inlet where people feel increased barge traffic has in fact changed distribution. This implies increases costs in both time and money to hunt successfully, and in the case of whales, possible loss of access. During visits to Chesterfield Inlet, including during an IQ validation meeting, hunters communicated changes in the abundance and distribution of seals near Chesterfield Inlet. During a Kivalliq Wildlife Board meeting in April 2014 AREVA staff met with a Fisheries and Oceans biologist who agreed with these observations due to cyclical changes in seal populations[90]. A presentation of IQ and western science knowledge of seal populations, abundance, and distribution is presented in Volume 7. No access issues are expected as a result of changes to sea ice conditions attributable to the Project as there is no proposed ice breaking (i.e. shipping only to occur during open water season).

An additional factor, frequently spoken of, is related to the potential for contamination of harvest resources – land and marine mammals and fish. The understanding that any uranium contamination may not be observable in harvested resources has suggested to some people that harvesting is less attractive as a source of food.

Reference was made above to difficult access being a constraint on harvesting west of the Thelon. The winter road is not expected to result in an upsurge of hunting for the months that it operates. However, the all-season access road could potentially increase hunting pressure. Baker Lake hunters indicated support for infrastructure crossing the Thelon River in order to access the area if caribou were there. Technical Appendix 3B cites a study on Inuit lifetime hunting patterns, noting that younger hunters travel longer distances than older ones.[91]

However, at the same time, hunters in Baker Lake but also in most other Kivalliq communities also indicated that they do not go as far as they used to go but most often hunt close to their communities. In Baker Lake for example, hunters said that they didn't often need to travel further

[89] See Volume 6 for a more detailed discussion on the potential Project and cumulative effects on caribou distribution.

[90] Ferguson, S. 2014. Research Scientist. Fisheries and Oceans Canada. Presentation and Discussion at the Kivalliq Wildlife Board Meeting. Rankin Inlet. April 9, 2014.

[91] This however was thought to be related to increasingly available snow machines.

than about 40 km from the hamlet and most frequently hunted within 10 km because there are caribou close by.

From the point of view of traditional culture, increased access to harvested resources (caribou specifically, but potentially other land mammals) would be considered a benefit. It increases the options for following animals whose movements change regularly. The ease of travel, and safety, on the Meadowbank road has encouraged more hunting along this route[92]. But the Meadowbank road does not appear to have been an important cause of any changes to total harvests. Statistics Canada (2007b) reported rising harvest activity for all but two Kivalliq communities between 2001 and 2006 (that is, the number of people harvesting trended slightly upwards over this period at least everywhere except Chesterfield Inlet and Whale Cove). AREVA's investigation of harvesting in Baker Lake indicated some small increase between 2000 and 2010 as well, with the indication that this was associated with fewer constraints to harvesting, the major constraints being time and money.

What the above implies however is that there is a confounding factor in the case of the Project's all-season road. Wildlife managers are concerned about the viability of the caribou herds. At the time of DEIS the concern was largely with the Beverly caribou herd with differing views on potential herd declines or herd level landscape use changes. The most recent, available caribou information has been included in the revised Tier 2 Volume 6 caribou assessment. Regional caribou herd use of space is dynamic but IQ and government information supports the understanding that the Project is expected to have minimal interaction with the Beverly, Lorillard, and Wager Bay herds and some greater potential for interaction with the Ahiak and Qamanirjuaq herds. Project effects on all herds are assessed as not significant and not resulting in changes to caribou abundance or distribution that can further result in changes to harvest. The possibility of project infrastructure acting in combination with local harvest resulting in a possible increases in harvest for the Qamanirjuaq herd is possible and was assessed.

Increased harvest pressure on the Qamanirjuaq herd could have a negative effect on the hunting sustainability. While access roads are likely to have an effect on caribou harvest, it is not clear if that harvest will be additive or compensatory to what is already harvested by Baker Lake Hunters. To be conservative, the assessment considers both an increase in total harvest taken and a shift in preferred hunting locations. Given herd presence in the Regional Assessment Area and the

[92] It is unknown if there may be a bias due to higher participation rates from Baker Lake mine workers in the hunter harvest study lead by Agnico-Eagle Mines, these hunters may be more familiar with the access road and therefore preferentially use it and also more likely to participate in the study.

improved access that the all-season access would provide during the snow-free seasons, the potential effects on an increased harvest would be realized primarily on the Qamanirjuaq caribou herd. Tier 2 Volume 6 states that a small portion of the herd is found in the Regional Assessment Area when an all-season road would facilitate greater access in the snow free months and it is possible that tens of additional caribou could be harvested in the time they are in the area. Regardless of current harvest intensity, the effect of All-Season Road on hunter access and, consequently, caribou mortality, is expected to be undetectable at the scale of the Qamanirjuaq caribou herd's current population. The determination of this possible effect is based on broad estimates of both current harvest rates and current caribou population numbers. The certainty of this predication would be improved with greater knowledge of both.

It is noted in this regard that both the wildlife boards and HTOs share responsibility for ensuring the sustainability of harvesting levels including responsibilities related to the regional and community level harvesting practices and techniques. A full discussion of the cumulative effect on caribou mortality (Project infrastructure acting in combination with other human activities i.e. harvest) is presented in Tier 2 Volume 6 Section 13.3. Potential effects on future harvest due to current harvest patterns are contemplated in the Nunavut Land Claims Agreement and the decision making and responsibilities regarding potential harvest restrictions provided. Should responsible authorities (Nunavut Wildlife Management Board, Government of Nunavut, Regional Wildlife Organizations, and Hunter and Trapper Organizations) determine the desire for a harvest restriction, AREVA will operate in compliance and collaborate with responsible organizations to promote third party compliance and facilitate monitoring and management on a restriction that may be issued under the authority of the NLCA as appropriate and as related to the potential public use of an all-season access road (secondary project option, winter road is the preferred road option).

Aside from effects on harvested resources, the other major potential link between a large Project and harvesting is through the movement of large numbers of people into the wage based component of the economy and as a corollary out of the land based economy. As the socio-economic baseline notes, most people in Kivalliq express a preference to continue to be active in both wage and land based economic activity. Rotational work provides both the resources to go out on the land, and extended periods of time to do so. With regard to the latter point, a rotation of two weeks on and two weeks off provides non working weeks every month, and up to six weeks off when vacation leave is combined with off rotation periods.

Lessons from NWT suggest that traditional harvesting increased, rather than decreased as predicted, with more wage employment in the diamond mines taken up by people in smaller communities. Nor is there any evidence that there has been less harvesting in association with Meadowbank. As noted above, AREVA's investigations in 2010 indicate that harvesting is stable and may be on the increase, particularly among the more employed. With a single exception, every household interviewed reported harvesting activity in 2010. While it is true that more people report themselves as occasional harvesters only, people seem to catch as much as they did at the end of the 1990s and clearly have a preference for hunting from home or nearby cabins – family, health,

employment, and costs are all considerations. Cabins are most often found close to communities, where they can be easily accessed along an established travel path. Box 9.1-2 notes comments regarding the relationship between harvesting and employment.

Box 9.1-2 Harvesting and Employment

Being able to buy boats, cars and snow machines allows people to hunt and fish more than before.

I can go on the land and hunt more than before I had a job – I can afford to go hunting and rotational work gives me the time.

A schedule of two weeks working and two weeks off is good – two weeks off allows time to travel and hunt, and gives a lot of time with families and especially with children.

People are taking their kids out of school to go on the land during their weeks off.

9.1.3 Food Security

Food security refers to adequate safe, nutritious, culturally acceptable food, accessible to all in a dignified and affordable manner (Koc and MaCrae, 2001). Socio-economic and environmental factors have influenced food security in Nunavut and in Kivalliq. Settlement in hamlets, wage employment, rising costs of travel on the land, and real or perceived contaminants have brought about changes in food consumption patterns over the last decades. Traditional diets have been displaced by mixed diets which include some store bought foods with lower food value, it is thought to the detriment of health and to household resilience in face of economic challenges.

In the absence of harvesting, the ability of households to satisfy all the above criteria for food security is challenged by poverty in face of high food costs, particularly for fresh foods. While the previous section noted the cultural importance of harvesting as integral to Inuit identity and culture, harvesting also serves as a means to ensure good quality food not only for harvesters and their families, but also the people they share with. Section 4.3 notes that the value assigned to harvesting is much more likely to be articulated as a basic need value (food and secondarily clothing) than as a cultural value. This is also supported by socio-economic baseline data collection results (see Box 9.1-3).

Box 9.1-3 Country Food

Young people increasingly depend on older people for their country food, because the young cannot afford to go out and hunt *(IQ AR04 2009)*.

Store bought food is too expensive.

Variety is important partly because people like to have different food and also because people are not supposed to over-hunt.

This is not tradition, harvesting is for food.

People hunt for food and fish for food. No one says hunting and fishing are recreational activities.

Most people in Baker Lake still depend on caribou for food (IQ BLH 2009; BLHT 2011).

Results presented in the socio-economic baseline of both estimations of the market value of harvests in Kivalliq communities, and levels of harvesting of a variety of country foods in Baker Lake suggest high dependence on hunting and fishing for food. The baseline also notes that two thirds of households, and half of children in Nunavut, were found to be food insecure at some time in 2007/2008 in Nunavut – it is considered unlikely that food insecurity is not an important challenge in Kivalliq in 2011. Changes in harvesting thus would have important implications for food security, but as the previous section notes, it is not expected that harvesting levels will decrease overall as a result of the Project.

However, there are other linkages to consider. There are concerns that wage employment will undermine the value of sharing, a mechanism that has historically served to ensure that not only harvesters, but also the less fortunate members of Inuit society, have access to food. This could arise from either or both of a shift in values as a result of cross cultural contact (such as an increase in individualism) or increased commercialization of harvesting in response to people's ability to pay.

AREVA's investigations in Baker Lake indicated that sharing remains high in the hamlet. But there is also unmet demand for country food – just over a third of people said they are eating less country food than they would like – and there is a willingness to pay for country food. Desire for country food, especially seal meat has been expressed, (IQ CHW 2009). In a context where income inequalities develop between those with well-paying jobs and those without, commercialization of country food seems to be occurring to some small degree.

One upside is some potential for some people to fund capital and operating costs of harvesting in the expectation of some financial return. However such a process is likely to have negative effects on those who depend in some part on sharing for food security. A second upside is more diversity in traditional diets. Baker Lake hunters and Elders described themselves as inland people, very few of whom harvest marine mammals (IQ BLH 2009; BLE 2009). However, there is some evidence that people in Baker Lake are eating more foods from marine mammals than they had in the past for example. Variety in country food availability has some potential to replace some store bought food.

It is also noted that even the employed can struggle to keep up with the cost of living so there will still be motivation to harvest in order to conserve cash for other needs. People mention that with employment, rents for housing go up rapidly and family members have expectations of support. Increasing government initiatives to encourage traditional activity on the land and educate on its health benefits also motivate continuing to harvest. And people continue to want more country food.

9.1.4 Language

Issues of language and cultural preservation are central to economic and social development strategies in Nunavut – for example, debates on an appropriate education policy for Nunavut reflect a fundamental concern that the young acquire skills needed to work in the wage based component of the economy, but also retain Inuktitut. People in communities also worry that Inuktitut may be lost over the longer term, as the young are more immersed in English environments (see Box 9.1-4). People are worried about maintaining Inuktitut as a primary language or worse, that there will be a loss of bilingualism in favour of English. Loss of language is loss of identify, and makes the communication between generations, including the passing on of IQ, difficult.

Box 9.1-4 Language

People want to stay in the community, and people who leave try to come back because they feel their kids are losing their language.

Baker Lake and Rankin Inlet, where there are more white people, use Inuktitut less but people in other communities have stronger Inuktitut.

I was studying outside Nunavut but it seemed I was losing my language so I came back home for a while

Cultural differences at Meadowbank cause problems – people should try to translate if others are listening.

I speak to my own children in Inuktitut but see younger people and children not learning

Inuktitut at all and believe this to be wrong.

Parents consider it very important for children to speak Inuktitut because if not, they will not understand the elders.

Young people, even young adults, are now speaking a mix of Inuktitut and English.

There are fundamental questions about the extent to which southern Canadians are coming to exert economic influence in the north. In a cross cultural context, language can be viewed as a resource, used to extend power of one group over another – if one language has to be used in preference to another it gains status (Dorais, 1989). This is the real concern related to the retention and use of Inuktitut. Allen (2007) notes that particularly where people learn two languages from birth, but live much of their lives in an English environment, there can be a trajectory to higher proficiency in English.

English has taken hold in Kivalliq in two important domains, school and work. The non Inuit population represents less than 10% of Kivalliq's population. But the use of English is proportionately much more dominant than that. The use of Inuktitut at home and the teaching of Inuktitut to children before they enter the school system are still common in Kivalliq communities and this does help to forestall erosion of language, however success in high school and in most of the wage based component of the economy requires English. There are large differences between communities – in more traditional communities, over 80% of Inuit speak Inuktitut at home, while only about half or less do in Baker Lake and Rankin Inlet.

It is noted that these percentages are from the 2006 census, and therefore pre date any employment at Meadowbank – there have many drivers of language use operating that have no association with mining, including the English curriculum in high schools, entrance of English media (primarily the internet, television and music) and struggles to staff social service delivery with Inuktitut speakers. Nunavut passed the Inuit Language Protection Act in 2009 to address some of these issues, and there are a number of initiatives underway to implement the act. To the extent that people in Kivalliq are aware of the potential for language loss and have convictions about the need to retain Inuktitut, measures to advance the use of Inuktitut can be expected to have some success (Allen, 2007 and Tullock, 2004).

As noted in Section 6, Socio-Economic Management, the Project will facilitate the use of Inuktitut in the work place to the extent practicable, however English will be the work language for most Inuit employees and proficiency in English will be required on work place health and safety grounds. The Project will thus contribute to the expansion of the use of English. Countervailing measures, by

government and people, should result in strengthening bilingualism rather than loss of Inuktitut however.

9.1.5 Values and Knowledge

IQ encompasses a value system that rests on sharing, cooperation, group decision making and healing and counseling, resourcefulness and both knowledge and conservation of the land and its resources. IQ confirms the identity of people, and is critical to individual, family and community wellbeing (James and Irniq, 2008). Skills in applying IQ to livelihoods are the means by which values and knowledge are practiced, and therefore maintained. Participation in the land based component of the economy provides economic inclusion but it also provides social inclusion.

Changing values and knowledge (cultural change) has a great deal to do with changing patterns of subsistence, a process that has been going on for decades. IQ values reflect that people's relationships are defined by the reciprocity and exchange that ensure the wellbeing of the group, whether this involves an elder providing guidance and emotional support or a hunter sharing harvest (Myers and Powell, 2004). Some are concerned that there may be more individualism in the community and that the role of Elders is changing. Elders have expressed their desire to be asked questions, participate in gatherings, and tell their stories in the schools (IQ CHAH 2009; CHE 2009; CHW 2009). Additionally, elders have conveyed appreciation for their Elders who taught them traditional activities, believing that learning through traditional activities is better than learning at school (IQ WCE 2009). It is not clear to people that, as Kivalliq's economy becomes more wage based, IQ values will remain as strong as they have been in the past.[93] Box 9.1-5 gives some evidence that people continue to see IQ has critical to wellbeing, but at the same time are not quite sure how possible it is to function in a mixed economy without some loss of traditional culture.

[93] Although Myers and Powell also note that values do persist – they observed sharing practices extending to store bought foods.

Box 9.1-5 Values and Knowledge

When traditional activity reduces, so does knowledge.

It still is extremely important to people to keep a grip on tradition, and memory, which roots people and gives them identity.

Traditional activity can only be learned by working at it, not by playing at it.

We are not going back – that is not the intention of teaching traditions.

The south is moving in too fast.

If young people give up hunting to work in the mine, they will not be self-sufficient if it closes.

The young are no longer self-sufficient so they do not have that to be proud of.

It is hard to live both a traditional and more modern life. It is particularly hard for people to understand how to resolve problems in ways that combine the two very different lives.

There is some resentment that people feel they need a paycheck to live reasonably, that is, that the traditional economy has given way to a more modern economy that requires quite a bit of money to participate in.

Wood for making drums comes from the lumber store. Hides are not used for drum skins because they dry out – even elders use store bought drum skins now.

Elders used to run communities and told young people where to hunt. Now, their governance role is gone and their role as hunting advisors is diminished (*IQ RBYA 2009; RBE 2009)*.

Hunting skills are not being passed down in the younger generation, mostly because there is not enough time.

The traditional Inuit value of sharing is disappearing.

Not hunting on Sundays is IQ.

Socio-economic data collection results suggest people's concern that with increasing wage employment, workers will, over time, abandon the values particularly of sharing and make their decisions based on their own needs and desires, and those of their immediate families, rather than on the needs of the group. Some people worry that this increases vulnerability, and that the authority and wisdom of elders is giving way to the wage earner as the role model and advisor.

Values and knowledge cannot be maintained unless they are practiced. For example, the act of sharing food is considered to reproduce values of cooperation and equity (Kishigami, 2004). Thus there is a central role for harvesting as the primary means by which values and knowledge are practiced. It is expected that the Project will provide the income and time to continue land based activity. There perhaps is more concern that despite this, cultural change associated with more opportunities to transition into the wage based component of the economy will, over the longer term, demotivate traditional activity on the land and see values moving towards a more individualistic rather than group ethic. Hunters have expressed concern that an increase in individualism is contributing to the erosion of traditional ways. For example, caribou and musk ox carcasses have sometimes been left to rot on the land, a practice that is not part of the traditional Inuit way (IQ CHAH 2009). Although the socio-economic baseline concludes that high employment in Baker Lake in 2010 has not yet had an observable effect on values and knowledge, and their practice, this does not eliminate the potential for this kind of cultural change as a result in part of increasing wage employment in the future.

Cultural change has been ongoing for some time, and will continue irrespective of the Project. The Project will certainly be one driver of change, but how people respond will often be a choice. Widening economic opportunities, both with the Project and in the rest of the economy, are highly desired by many people, in the recognition that change is needed if wellbeing goals are to be achieved. It is arguable that not only employment, but unemployment and its consequent challenges are also a detriment to maintenance of traditional values and knowledge.

Wage employment, with all it may imply for some, is one avenue but not the only avenue for livelihood strategies and associated values and knowledge. As discussed above for language, validation and support for traditional culture on the part of the Project and government, as well as ongoing importance given to Inuit values and knowledge by people, should help people make the choices they want to make. It may be that there will be strengthening of people's abilities to successfully combine wage based and land based economy activity in the various ways they find most suitable. To the extent that some choose to maintain more traditional lifestyles, and are able to do this successfully, is the extent to which cultural change can be managed in ways that people themselves find appropriate to their needs.

9.1.6 Cultural Heritage Sites

Technical Appendix 9B, Archaeology Baseline and Technical Appendix 3B, IQ Documentation, include maps of cultural heritage sites identified in interviews with elders.

Technical Appendix 9B indicates that Dene groups lived in and travelled through parts of what is now Kivalliq until contact with Europeans, but then moved south into the forests where they hunted. At this time, Inuit moved in. Thus it is Inuit cultural sites that are primarily found, largely on the margins of the major rivers and lakes in the Kazan, Dubawnt and lower Thelon watersheds. Archaeology sites are mostly camps, characterized by stone features including inuksuit, tent rings, caches, hunting blinds and kayak stands. With settlement in communities, year round occupation of these areas no longer occurs but there has over time been some seasonal use. Elders in Baker Lake have identified grave sites, as well as areas and sites of spiritual and harvesting significance in these parts of Kivalliq.

With the exception of along the route of the all-weather access road, very few of the sites (and no grave sites) identified have any potential to be affected by the Project and fewer still were considered by Inuit to be culturally important. Although western Kivalliq is rich in sites, most of these are distant from the mine area. With the finalization of the Project layout, any site within 30 km of Project facilities will be rescued or protected as needed in full accordance with GN requirements. Although there has been little recent use of the area and sites have not often been visited, their preservation is important both culturally and emotionally to Inuit. Additionally, AREVA's homeland visit program is making it possible for elders to see parts of western Kivalliq they remember as being important to them when they were young and living on the land.

The bigger issue related to cultural heritage sites is any potential for the Project to affect the Thelon River Basin. The Thelon is culturally important not only to the people of Kivalliq, but to Dene and Métis groups in NWT who have opposed development in the upper Thelon on environmental but also on cultural grounds. The mine site is not in the Thelon River Basin, however the all-weather access road, if built, would traverse lower parts of the basin, including parts of the corridor along the Thelon River that is part of the Management Plan for the Thelon River (NWTEDT, 1990). Section 12, Assessment of Effects on Non Traditional Land Use and Land Use Planning, discusses the potential for the Project to encourage additional development, including in the Thelon Basin.

9.1.7 Residual Effects

Residual effects on traditional culture are summarized in Table 9.1-1. The practice of harvesting underpins much of the rest of traditional culture, and the expectation is that the Project will facilitate harvesting (a significant benefit) through increased income as a result of employment opportunities. However it also needs to recognized that there is potential for lifestyle changes and increased cross cultural contact to demotivate harvesting on the part of some workers (a significant negative effect).

There is also potential for increased access to resources in western Kivalliq as a result of the all-weather access road to result in what could be unsustainable harvesting levels of caribou, the Qamanirjuaq herd specifically. This would be a significant negative effect however it is considered that by the time the road, if built, would be open there will be sufficient information and understanding about this herd to determine any necessary access or hunting limit restrictions. Otherwise, increased access is a significant benefit.

Any decrease in harvesting on the part of workers will not necessarily affect their food security as they will have the income to buy the food they choose, although poor choices in this regard can affect nutritional status. However, any decline in harvesting, or commercialization of harvesting in response to wage earner demand for country food, would be a significant negative effect on the food security of more vulnerable people in communities, people who depend to some extent on shared harvest for good quality, cost free food.

Table 9.1-1 Summary Impact Matrix, Effects on Traditional Culture

Effect	Project Phase	Mitigation/ Enhancement	Direction	Magnitude	Geographic Extent	Duration	Significance	Likelihood	Prediction Confidence	Monitoring
Residual Project Effects, Individual, Family and Community Wellbeing										
Resource abundance	Construction and operations	Environmental mitigation	Negative	Negligible/ low	Communities	Long	No	Low	Medium	Environmental monitoring
Access to caribou in western Kivalliq	Operations -- all weather road	Management measures as may be agreed	Negative	Medium	Primarily Baker Lake	Long	Yes	Medium	Low	Operations, collaborative monitoring
Increased access to harvested resources in western Kivalliq	Construction, operations	Public use of roads	Positive	Medium	Primarily Baker Lake	Long	Yes	High	High	Operations, collaborative monitoring
Facilitation of harvesting	Construction and operations	Work force management	Positive	High	Communities	Long	Yes	Medium	Medium	
Demotivation for traditional harvesting and thus food security	Construction and operations	Work force management	Negative	Low	Communities	Long	Yes	Medium	Medium	
Reduction in shared harvest availability for the more vulnerable	Construction and operations	None practicable	Negative	High	Individuals	Long	Yes	Medium	Medium	
Reduced use of Inuktitut	Construction and operations	Work force management	Negative	Medium	Communities	Long	Yes	High	Medium	Collaborative monitoring
Loss of Inuktitut	Construction and operations	Work force management	Negative	Negligible	Communities	Long	No	Low	Medium	
Reduced traditional values and knowledge	Construction	None practicable	Negative	Medium	Communities	Medium	Yes	High	High	
Loss of traditional values and knowledge	Construction and operations	Work force management	Negative	Low	Communities	Long	No	Low	Medium	
Preservation and access to sites of cultural heritage	Construction and operations	Archaeological management, homeland visits	Positive	Low	Primarily Baker Lake	Long	Yes	High	Medium	Operations, collaborative monitoring

The Project will be a contributing factor to an ongoing process of cultural change that is expected to manifest in some reduced use of Inuktitut and some abandonment of some Inuit values and knowledge in at least in some part of the population. Cultural change is conventionally considered to be a significant negative effect of large mining projects and is so assessed in Table 9.1-1. However, it is noted that unemployment and poverty also are inducing negative cultural change, that some people choose change and others do not, and there is both public and government support (and there will be AREVA support) for people who wish to continue traditional ways. Thus outright loss of language, values and knowledge is not considered to be a significant negative effect of the Project.

No significant negative effects on cultural heritage sites are assessed. These are protected by laws and regulations, which AREVA will respect. There may be some small benefit however, insofar as the identification and study of such sites provides more knowledge of Inuit history and insofar as AREVA's homeland visit program will continue to facilitate people visiting sites of importance to them.

9.2 Cumulative Effects Analysis for Traditional Culture

As noted in Section 8, Assessment of Effects on Community Economies, there is important potential for cumulative effects insofar as there is potential for a total of nine large mining projects to be developed in Nunavut over the coming decade, and what is considered good potential for Kivalliq participation in many of these projects even where they are not located in Kivalliq Region. In addition, initiatives underway (or as may be developed in the future) to support traditional culture, and ongoing cultural change are factors in looking forward to assess potential cumulative effects.

The same processes discussed above for the Project specifically apply to the potential for cumulative effects. It will take many years before mines are not dependent for a large fraction of their work forces on southern Canada (bring about more cross cultural contact) and English is expected to continue to be the language of work. Although the socio-economic baseline presents some evidence of resurgence of traditional culture in Kivalliq, there is also some evidence of decline in Nunavut overall and people do feel that younger people are not as committed to traditional culture as older people.

How people are able to meet the challenges of combining wage based economic activity with traditional culture will determine cumulative effects. It is fully expected that different people will take different paths, including the path of abandonment of at least some traditional culture components on the part of some people. This has occurred in the past and will continue to occur. The issue then becomes one of how much abandonment is tolerable in the context of the strong desire to maintain traditional culture. Objectively, there are no good answers to such a question and it is clear that different people will subjectively have very different views. Loss of traditional culture would be the real threat, rather than abandonment on the part of some, because loss is irretrievable. Given the strength of traditional culture currently, loss is not considered to be an immediate threat. As noted

above, ongoing efforts to validate and support traditional culture are expected to at least forestall loss. Irrespective, any cumulative abandonment of traditional culture is considered a significant negative effect. There are also strong links between such effects and the VSECs listed under individual, family and community wellbeing. Table 9.2-1 details cumulative effects on traditional culture.

Table 9.2-1 Summary Impact Matrix, Cumulative Effects on Traditional Culture

Effect	Related VSEC	Potential for Project Effects		Potential for Significant Cumulative Effects		Mitigation/ Enhancement		Criteria for More than Additive Cumulative Effects					
		Direction	Significance	Additive	More, or Less, than Additive	AREVA	Governments	Direction	Magnitude	Geographic Extent	Duration	Likelihood	Significance Prediction Confidence
Cumulative Project Effects, Traditional Culture													
Resource abundance	Harvesting, food security, values and knowledge	Negative	No	Yes	More negative, where a large number of projects starts to affect resource abundance	Mitigation for biological cumulative effects	Land use planning, mitigation for biological cumulative effects	Negative (more negative)	Not determined	Communities	Long	Not determined	High
Access to caribou in western Kivalliq	Harvesting, food security, values and knowledge	Negative	Yes	Yes	More negative, where increased access starts to affect caribou abundance								
Increased access to harvested resources in western Kivalliq	Harvesting, food security, values and knowledge	Positive	Yes	Yes	No	n/a							
Facilitation of harvesting	Harvesting, food security, values and knowledge	Positive	Yes	Yes	No	n/a							
Demotivation for traditional harvesting and thus food security	Harvesting, food security, values and knowledge	Negative	Yes	Yes	More negative, where there is movement away from traditional culture as a result of increased exposure to English language large mining project environments	Workforce management measures to accommodate traditional culture, support for community wellbeing initiatives	Programs in support of traditional culture	Negative (more negative)	Not determined	Communities	Long	Not determined	High
Reduction in shared harvest availability for the more vulnerable	Food security, values and knowledge	Negative	Yes	Yes									
Reduced use of Inuktitut	Language	Negative	Yes	Yes									
Loss of Inuktitut	Language	Negative	No	Yes									
Reduced traditional values and knowledge	Harvesting, food security, values and knowledge, language	Negative	Yes	Yes									
Loss of traditional values and knowledge	Harvesting, food security, values and knowledge, language	Negative	No	Yes									
Preservation and access to sites of cultural heritage	Values and knowledge, cultural heritage sites	Positive	Yes	No	No	n/a							

9.3 Summary of Effects on Traditional Culture

Maintaining the integrity of traditional culture can be somewhat challenging in the context of much of the non-Inuit world. Irrespective of the degree to which socio-economic management measures are successful in increasing Inuit participation in the Project in culturally appropriate ways, there will as a result of the Project be a shift towards more cross cultural contact and different lifestyles. Employees and businesses will necessarily operate within the context of AREVA's corporate culture, language and operational requirements. Economic growth in Baker Lake and Rankin Inlet may imply higher percentages of non Inuit in these two hamlets.

The extent to which traditional culture has and can be maintained over time is a result of a very large number of variables, few of which can be attributable to any given project specifically. Cultural change in Kivalliq has been occurring for decades, in large part a response to centralization of settlement, increased communications, economic transition generally into the formal wage based component of the economy and the cultural and social transition that has resulted. The Project, and other large projects expected in the future, will contribute.

Climate change will also affect the resource base that underlies culture. Finally, there is recognition that the land based economy cannot alone generate the resources needed to improve health, education and other socio-economic indicators, particularly in face of continuing rapid population growth. Movement into a more successful mixed economy is therefore government policy, and was clearly demonstrated to be a priority for Kivalliq people during consultations.

There are many government initiatives in support of traditional culture and people continue to give high importance to maintaining their culture. In this context, it may be that although change will continue, that change can be managed in ways that both provide people with real choices about how they want to conduct their lives and provide avenues for maintaining Inuit harvesting, food security, language, values and knowledge in ways that meet people's needs. This section has argued that despite some uncertainty, the Project is not expected to affect caribou herds that are also hunted in northern Saskatchewan and Manitoba by First Nations. Evidence from Lutselk'e in NWT, also concerned about the health of caribou herds, is that the cultural value accorded to the Thelon Basin

is centered on the upper Thelon and the Thelon Wildlife Sanctuary,[94] which will not be affected by the Project. Thus no transboundary effects are expected in this regard.

[94] See for example this community's interventions with the Mackenzie Valley Environmental Impact Review Board on proposed mining activity in NWT (MVRB, 2011).

10 Assessment of Effects on Individual, Family and Community Wellbeing

Potential effects on individual, family and community wellbeing are complex, far reaching, and unpredictable. Wellbeing is intimately associated with potential effects on community economies and traditional culture as discussed in Sections 8 and 9. In addition however, increased incomes, rotational work stresses, risks to public health and safety and changes to social capital are other drivers that have the potential to affect wellbeing. There are also numerous mutually reinforcing and counteracting linkages between both drivers and their effects. For example either of increased disposable income or job stress can lead to substance abuse, but the combination of the two may be the trigger for some people.

Most Project effects on wellbeing would be expected to be positive. However in the circumstances of Kivalliq, there are a number of confounding factors that raise concerns, including cultural change, negative social pathologies and challenges to accessing to Project benefits. Many, but not all, people in Kivalliq will benefit from either the employment offered by AREVA, employment by businesses supplying AREVA or induced economic opportunities. For some who do access economic opportunities, poor personal choices can be made. For those who do not, many of whom are likely to be the most vulnerable, whose educational achievement and/or personal challenges constrain their capacity for economic participation, there can also be negative effects.

10.1 Residual Project Effects Assessment on Individual, Family and Community Wellbeing

10.1.1 Analytical Methods

The assessment of residual effects is considered in terms of selected component parts of wellbeing – health, family function, savings, public security, public health and safety, and social cohesion and participation.[95] The assessment is necessarily qualitative. The results of consultations and of socio-economic and IQ data collection are essential to the discussion of effects on wellbeing. Again, the

[95] As noted for Section 9, Assessment of Effects on Traditional Culture, this is again an artificial breakdown and there are many inter linkages, both between each of these component parts, and between these components and other determinants of wellbeing such as income, education and culture.

range of experiences and aspirations of people across Kivalliq, both between and within communities, means that it is challenging to generalize. There is also sometimes a distinction to be made between wellbeing, and people's sense of wellbeing. It is of course AREVA's, and governments', intent to put in place opportunities for people to improve their quality of life in the ways they choose, and mechanisms to assist those who for whatever reason are unable to do so.

10.1.2 Health

The Project is not expected to have negative effects on infectious or chronic diseases, nor on the physical health of workers. There is some potential for positive effects, through worker health and safety training, income effects on overcrowded housing conditions that are considered a major contributor to the spread of infectious diseases, and what is generally believed to be a positive correlation between employment and improved physical and mental health. Increased incomes enable healthier lifestyles. However there are a number of potentially confounding factors. Concerns centre on the consequent health effects of increased substance abuse, changes to diet and inappropriate sexual behaviors.

Whereas there is evident concern that increased disposable income can lead to more drug and alcohol abuse, people in most communities generally see such abuse as an ongoing challenge, a challenge associated with not just employment but also unemployment and other factors (see Box 10.1-1). The box also provides some evidence of a range of views on what the groups of people are who abuse (although most people can identify individual abusers within their communities), why they abuse, what the consequences are and what the responses should be. This is of course is not unexpected given the complexities of substance abuse.

Box 10.1-1 Perspectives on Drug and Alcohol Abuse

The youth aren't the problem drinkers and they don't do a lot of drugs, probably because they don't have much money.

The young don't seem to obey any more, they just want to do what they want – sleep, play on the internet, watch TV and do drugs.

Tightening up on alcohol results does not result in more use of drugs.

When alcohol is controlled, people just replace alcohol with drugs. And there is always a new drug to try.

People need an identity to frame goals for themselves, which helps them stay away from

drugs and alcohol and suicide.

Alcohol and drug abuse is essentially ‘self-medication’ in face of lack of services to deal with problems.

White people have brought material possessions to Nunavut, including drugs and alcohol, and then are trying to bring jobs that will give people the money to buy these things. This in turn requires Inuit to have educations, papers, etc. (which is not the traditional way). The whole thing is a trap, resulting in people abandoning their identity.

Parents are not bringing their children up correctly and that is why they are doing more drugs and alcohol and spending time away from home.

Alcohol abuse is more a problem for the unemployed, but employed people do get drunk.

People who already have drug or alcohol problems when hired, will likely show escalation in problems. People without drug or alcohol problems when hired are not likely to start.

The drug and alcohol problem here is already bad and may become worse with lots of employment.

Mining projects can offer jobs that represent that new life, and jobs are certainly necessary, but with more disposable income there is more drug use.

Drugs contribute to poverty. Cannabis products are addictive, and people start not only using their money to buy drugs, but eventually start selling family property. This in turn leads to family conflicts.

Too much drug use means children aren’t cared for, food cannot be paid for and people are eventually unable to work.

Drugs are bad because they steal kids’ motivation.

The church’s message, taken from the bible, is that alcohol makes people lazy and that drugs make eyes red and makes people poor. The bible talks about what doing bad things does to people’s behaviours and lives, what people will be like if they do specific

things.

Mining companies need to take the advice of Inuit on who to hire and who not to hire. The Inuit know everybody and can advise on whether people are doing drugs, have criminal records, are able to work well.

Most people, including addiction counselors and police, note that currently drug use in Kivalliq is primarily of cannabis products. There is some consensus in Baker Lake and Rankin Inlet that, despite fears, harder drugs have not yet started to flow (although social service delivery staff are acutely aware of the dangers). Nor do people in Baker Lake believe that drug abuse has increased with Meadowbank, although people in all communities note that abuse is often hidden, not visible. To the extent that there is a relationship between mining and drug abuse, this was most often said by people in Kivalliq to be attributable to white mining employees importing drugs, rather than to increased abuse among the Inuit. This was said to be particularly egregious insofar as white supervisors of Inuit were believed to have used their relationships of power to induce Inuit into marketing transported drugs. In this regard, Agnico Eagle has since increased its security measures at southern points of hire which is believed to have addressed the problem.

Nor do people in Baker Lake believe that alcohol abuse has increased in association with Meadowbank. Police note that calls that involve alcohol abuse, often also involving domestic violence (see Section 10.1.3), are higher on the days that Meadowbank rotational shifts end, but are also higher on other days of 'moment', such as days of alcohol delivery. There are controls on the amounts of alcohol that can be accessed in all communities, even considering that there are ways around these. Thus it may be, as people observed, that the timing of abuse can be linked to Meadowbank activities, but there are limited opportunities to increase the amount of abuse. It may also be the case that the discipline required by an alcohol (and drug) free work place mitigates the potential to develop addictions.

There is evidence of an association between wage employment and increasing rates of substance abuse in the Canadian north, although this most often seen in environments where access to alcohol, particularly, is open (see Section 7, Comparable Experiences). And it is certainly the case that some individuals will choose to use new income and/or cope with job stress in ways that do not create benefit for themselves or their families. But there is also evidence of the opposite – that substance abuse is related to socio-economic and cultural challenges that can erode self-esteem, a process that employment can reverse. Gibson and Klinck (2005) and Sly et al (2001) in their reviews of the literature come to no conclusions about any necessary relationship between substance abuse and employment on the part of individuals, nor has monitoring in NWT suggested any community level effects.

The linkages between employment and substance abuse are therefore expected to vary from person to person.[96] To the extent that there are individuals who make poor choices, GN services and public health education programs, as well as AREVA's on site counseling, EFAP and health and safety training are intended to both prevent and manage poor choices. However, AREVA's programs will reach only its own employees and their families and there will be also increased employment in the expanding economy. Addiction counseling services are stretched, there is little capacity to manage associated mental health issues, and social service staff are wary that high drug prices in the north will attract more aggressive marketing.

The health benefits of traditional diets are well documented and well appreciated by Inuit. Some Inuit conveyed that *nutrition was the treatment of illness in the past, with a traditional diet that was calcium and nutrient rich (IQ CHE 2009).* Whereas reduced activity on the land can have implications for consumption of country food, this becomes a health concern where that consumption is replaced by poor quality bought food, or worse, where it cannot be replaced and people go hungry. Diabetes is a primary concern. Employment offers at least the possibility that for those people who consume less country food as a result of employment,[97] healthy alternatives are affordable. Again, the response will vary from person to person and to some extent can be mitigated with health education by both government and AREVA. However given the struggle in most developed economies to see that people eat well and control their weights, the danger of diet changes and consequent health effects is real.

It seems clear, from people's comments about Meadowbank and the frequency with which spousal jealously was spoken of during socio-economic baseline discussions, that what many would consider to be in appropriate sexual behaviors are an issue. The sensitivity of the subject makes it difficult to come to any concrete conclusions as to how different sexual behaviours are at Meadowbank, and might be at the Project, than they are when people are at home. However anecdotal evidence overall suggests that it is likely that consensual (but adulterous) sex, prostitution and sexual harassment (potentially extending to rape) do occur at Meadowbank and therefore are likely to occur at the Project. A report by Pauktuutit (Pautuutit, 2014) supported the anecdotal evidence available to AREVA at the time of DEIS preparation. The report documents experiences of women working at mine sites and the challenges of rotational work, whether women are workers or spouses of workers, but also documents negative effects of formal sector employment/income generally. Whereas work

[96] This would also apply to gambling, also said to be a problem in some communities but not generally noted as a problem of addiction by addiction counselors.

[97] This can be either because of a shortage of time for activity on the land, or as increasingly is feared, less interest and/or ability to harvest on the part of the young who may now have income to buy alternatives.

force management measures will discourage harassment and encourage people, women specifically, to come forward if it occurs, the control of other sexual activity is somewhat problematical.

People in communities have suggested mitigation measures, such as employing only men at mine sites and testing potential employees for STIs with a view to denying them employment. Such measures however contravene human rights and cannot be put in place. Aside from other negative effects of inappropriate sexual behaviours (see Section 10.1.3), the very high rates of STIs in Nunavut suggest cause for concern, particularly in regard to HIV which has not yet been a major health problem in the territory. As for substance abuse and diet, public health education by government and AREVA may go some way toward mitigating potential negative health effects.

Many suggestions in the 2014 Pauktuutit report are considered in section 6 of this volume and include i) cross cultural training, ii) financial (life skills) training for women, iii) elders on site, iv) enforcement of zero tolerance at site, v) informed and progressive human resources management, and vi) prominence of Inuktitut in the workplace. AREVA intends to meet with Pauktuutit to discuss and identify potential additional mitigation that could be implemented and included in future revisions of the Human Resources Development Plan (Technical Appendix 9C) including training for women on workers rights and the development of a module to accompany health and safety training that includes societal health issues that can include sexual health.

Specifics on health and safety are yet to be developed for the licensing stage. AREVA commits to liaise with community groups in Nunavut for their expertise in sexual health initiatives and will follow Canadian Human Rights legislation, Canada Labour Code and Canadian Labour Law professionals to ensure inappropriate sexual behaviours are defined and addressed appropriately and ensure harassment investigations proceed professionally where required and that any disciplinary action that may be required to be taken as a result of the investigation is taken immediately.

10.1.3 Family Function

As for the discussion on health above, normally there is a positive relationship between income and family function. However, again there are confounding factors. The integrity of families has potential to come under threat from various sources, including poor decisions on uses of new income,

stresses related to rotational work both for workers and families left at home, fears (however real) of infidelity during separations of spouses during rotational periods[98] and changing cultural roles.

The more serious consequences of poor family function include domestic violence – often alcohol related, divorce and resultant single parent households, and mental health challenges including suicides.[99] Incidences of all of these are already too high in Nunavut. With the exception of suicide perhaps, women are considered to be more vulnerable as they are more likely to not be working and more likely to have responsibility for young children. Their children of course are also very vulnerable.

Much has been written on the potential effects of rotational employment on the families of employees. Sly et al (2001) summarized these in 2001, and more recent studies of individual project cases converge on the same conclusions (Gibson, 2008; Intergroup, 2005). The positive effects can include reduced cross cultural contact within communities on the part of southern employees, time and resources available for harvesting and more workforce discipline while on the job, contributing to long term capacity building. Negative effects can include personal stress, discord within the family between generations and between spouses, breakdown of traditional values of sharing and mutual support, and increased substance abuse. What the literature generally finds is that what people find is good about rotational employment is essentially the reverse of what they find is bad (see Box 10.1-2). For example, rotation puts stress on families during times away, but allows more time with families when at home, and rotational work interferes with the timing of activity on the land, but provides the time and resources to spend more time on the land.

[98] This includes infidelity both by workers on rotation at the work site and by spouses left at home in communities.

[99] This is not to say that poor family function is the leading cause of suicide, but that in the absence of strong and supportive families, the threat of suicide is elevated.

Box 10.1-2 Perspectives on Rotational Work

Some men don't want their women to work in camps, they are afraid of harassment.

Rotational work allows people to live where they choose rather than close to projects.

A two week on/two week off rotational schedule is good, it gives people time to be with their children and take them out on the land.

Isolation at work camps can be hard to bear but enough phones and community radio would make this easier.

Spouse can find the house too quiet and the work too much when one is away but people can get used to this.

Stress and burn out are now behind some of the family violence, when it used to all be alcohol related.

Actual effects will depend on the success of work force management measures in accommodating individual needs, the effectiveness of counseling services, and the capacity on the part of individuals to manage the lifestyle, importantly through the personal choices they make. As noted elsewhere, rotational work is not for everybody. The danger lies in the possibility that in the case of someone for whom rotational work does not work very well, it is not given up quickly but is pursued until negative effects play out with serious consequences. As for substance abuse, stretched capacity to address mental health issues is the context within which such problems would occur.

It is also noted that failure to find employment, while many others are more successful, also creates individual stress. Sly et al (2001) notes that suicide rates are correlated with vulnerability created by being caught between the wage and land based components of the economy, which can be interpreted as an inability particularly in young males, the most suicide prone, to succeed at either. Hicks (2009) also notes the apparent relationship between suicide and cultural change.

Aside from rotational work, cultural change expected as a result of the Project but also of more wage employment more generally has implications for family function.

Traditionally, harvesting was strongly tied to gender and intergenerational roles and to the pattern of social relationships. Hunting was strongly linked to male identity, with women responsible for processing much of the harvest and for caring for children. Authority was vested in elders, with their vast knowledge of and experience on the land. Group decision making, reciprocity, sharing, teaching and learning (as well of course of environmental conservation) were essential to subsistence livelihoods.

Although the livelihood imperative is somewhat less now, and would become yet more so with increasing wage employment, expectations of roles and relationships persist and are integral to identity and wellbeing. At the same time, the 'south moving in' introduces new opportunities, expectations and requirements. In the wage based component of the economy there are opportunities for women in the work force, potentially as bread winners of their families. There is new income, coincident with access to a very large range of commercial goods. Workers are required to attend work regularly, and to have education and job experience. New technologies are not always understood by elders. These and other factors have implications for roles and social relations, some of which are manifested in substance abuse and suicides, but also poor family function – inter gender and inter generation misunderstanding, conflict and violence – that can culminate in family breakdown.

As for most other components of wellbeing, AREVA's capacity to respond is limited to culturally appropriate work force management measures that support people and their families in successful management of rotational work. There is also an important role for government in this regard.

10.1.4 Savings

At an aggregated level Nunavut has a savings rate that is higher than anywhere else in Canada, at over 30%, and is much higher than the rate for Canada as a whole, which is 4%. This however does not translate into a large amount of savings, nor are many of these savings benefiting Nunavut, as many are held in investment accounts outside the territory and as much of this is exported out when highly paid high savers leave the territory at the end of their contracts. The socio-economic baseline includes references to businesses in Kivalliq finding it difficult to access credit.

This high savings rate is projected to continue over the coming years. The Conference Board of Canada (2010a) has projected income, disposable income and savings rates for Nunavut to 2020. Incomes are expected to rise by almost 80% over the decade, but the savings rate is forecast to remain at 31% to 33% in all years. These forecasts take into account the construction and then operations of Meliadine. Thus the Project, with employment levels that are expected to be similar to Meliadine, is unlikely to affect the savings rate.

At the household level, it was frequently observed, by both Inuit and non Inuit, that in face of rising incomes, people will need assistance with personal financial management. Additionally however,

younger people spoke of cultural expectations making it challenging for them to save, to the extent that some expressed the notion employment would not bring any tangible benefits (increasing rents were also part of this equation).

AREVA will include personal financial management components in its training programs. It is expected that at least some people benefit from increased economic opportunities will be able, and choose, to save. Although not reflected in savings rate data, to the extent that people feel they are able to move into private housing (see Section 11.1.4) because they have secure employment, this also may be considered to represent savings.

Good personal financial management that permits savings is a contribution to household economic security which in turn has a beneficial effect on family function, personal feelings of self-esteem, resilience in the face of adversity and, at the limit, some potential to reduce dependence on government transfers.

10.1.5 Public Security

Project effects on public security would result if there were increases in crime and public nuisance behaviours, as a result of in migration (more people), increased drug trafficking, substance abuse and domestic violence, and/or developing inequities that encourage crime. Although increased incomes have potential to remove one of the motivations for some crime, police say that more income equates to more police activity simply because more people have more money to do more things. Crimes on this account however, unless involving violence as a result of alcohol abuse, are not always the most serious of crimes. It is noted that there are also other drivers of crime rates, most notably the percentage of the population that is young – as Kivalliq's population ages, some downward pressure on crime rates can be expected, although this may take some time to manifest.

Crime rates are already high in Kivalliq, although substantially lower than in Nunavut overall (Table 10.1-1; Figure 10.1-1). Violent crime rates had not changed much in the decade to 2009 but total crime rates show an upward trend with time. At the community level, crime rates are too variable to observe trends – for example, it is not possible to determine trends in Baker Lake in correlation with

Meadowbank. It may prove that violent crime rates, lower in Baker Lake in the period 2007 to 2009 than in the period 2002 to 2006, will show a clearer trend in future years.[100]

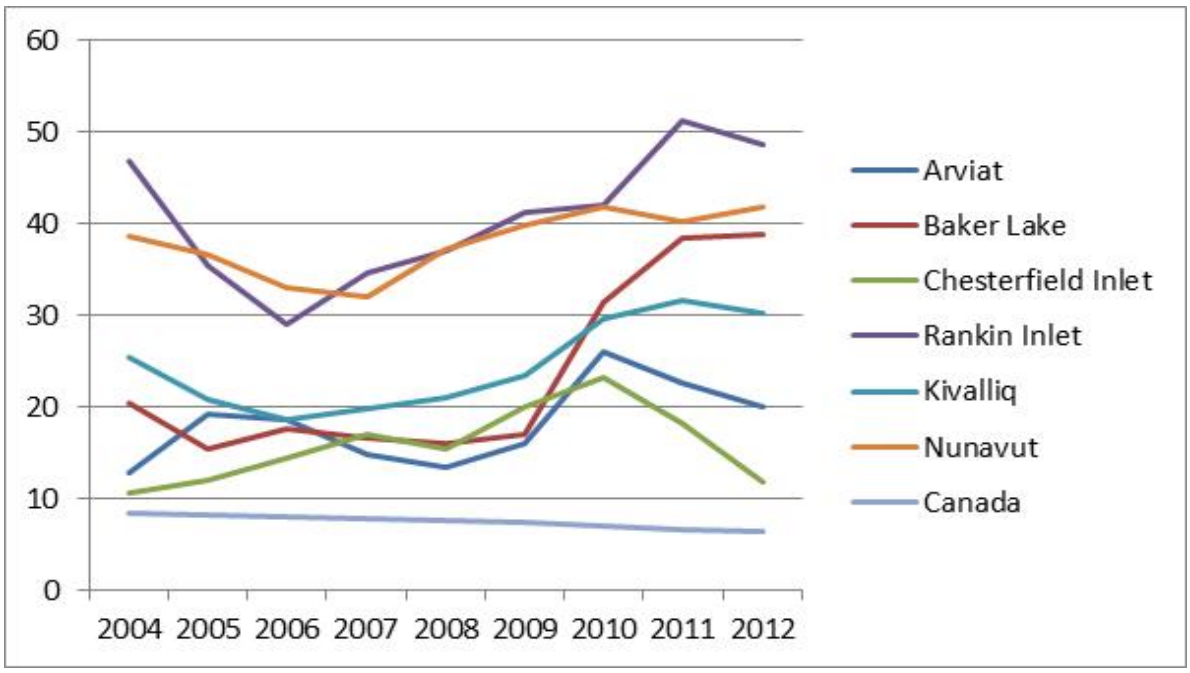
Table 10.1-1 Violent and non Violent Crime Rates

	Rate per 100,000 people			Change (%)		
	2004	2008	2012	2004 to 2012	2004 to 2008	2008 to 2012
Violent Crime Rate						
Arviat	2,961	5,073	5,424	83.2	71.4	6.9
Baker Lake	7,226	5,232	10,526	45.7	-27.6	101.2
Chesterfield Inlet	5,460	4,213	3,753	-31.3	-22.8	-10.9
Coral Harbour	7,801	5,476	7,727	-0.9	-29.8	41.1
Rankin Inlet	10,781	6,626	8,993	-16.6	-38.5	35.7
Repulse Bay	2,786	4,436	5,724	105.5	59.3	29.0
Whale Cove	6,799	7,254	8,665	27.4	6.7	19.5
Kivalliq	6,759	5,572	7,767	14.9	-17.6	39.4
Nunavut	9,999	9,733	10,004	0.1	-2.7	2.8
Canada	1,404	1,331	1,190	-15.2	-5.2	-10.6
Non violent Crime Rate						
Arviat	6,447	6,186	7,329	13.7	-4.0	18.5
Baker Lake	8,800	5,933	16,742	90.3	-32.6	182.2
Chesterfield Inlet	2,874	5,899	5,630	95.9	105.3	-4.6
Coral Harbour	14,578	4,881	7,727	-47.0	-66.5	58.3
Rankin Inlet	19,432	18,101	19,946	2.6	-6.8	10.2
Repulse Bay	4,735	8,513	2,916	-38.4	79.8	-65.8
Whale Cove	3,399	6,218	2,810	-17.3	82.9	-54.8
Kivalliq	10,959	9,497	12,034	9.8	-13.3	26.7
Nunavut	16,668	15,762	16,580	-0.5	-5.4	5.2
Canada	5,123	4,249	3,414	-33.4	-17.1	-19.7

Source: NBS, 2014d

[100] Very recent data provided by the RCMP to the Kivalliq SEMC suggests that particularly property crimes have spiked since 2010 but violent crimes have also increased. It is not yet clear how much of the increase in violent crime is associated with domestic violence, public behaviours and/or increased numbers of people in the hamlet.

Figure 10.1-1 Total Crimes (number per 1,000)[101]



Source: NBS, 2014d

Despite high crime levels, most people feel their communities are safe, and good places to raise children. This may be because the experience of crime at a community level is somewhat different than the statistics might indicate. Violent crimes are most often a result of domestic disputes rather than random aggression in public. Property crimes are often breaking and entering of community facilities (often to take food it is reported) rather than private homes.

As previous subsections have discussed, it is considered that Project effects on socio-economic parameters such as substance abuse and domestic violence are overall expected to be positive, albeit negative for some individuals. In turn, effects on crime and public nuisance behaviours at the community level are not foreseen on these accounts.

[101] Scale has been changed from the more standard number per 100,000 people to number per 1,000 as this may give a more accurate indication of the actual number of crimes in small communities.

It is however expected that increased incomes and in migration into Baker Lake and Rankin Inlet will result in more crime, if not necessarily an increase in crime rates, and if not necessarily an increase in violent crimes. Increased incomes in other communities, where there are proportionately a large number of newly employed, may also be expected. It is likely that people will hear about more incidences of crime as well, which can affect perceptions about public security.

It may also be that developing income inequities have consequences. Although an important benefit of the Project will be to increase incomes, both in aggregate at a community level and for many individuals, not everyone will benefit, and certainly not all will benefit equally. Even in societies that don't place strong value on equity, property crime can seem to some people an appropriate means of wealth redistribution (see for example Andrienko, 2003).

There is an association between out of area mining workers, largely men on single status and/or with good income, and such public security concerns as prostitution, harassment, and other negative social behaviours such as drunkenness. The Project will include the construction and operation of docking facilities in Baker Lake and there will be employees resident in the town. As at the mine site, AREVA expects enforcement of its worker code of conduct, and the openness to expression of any complaints on the part of Baker Lake residents about out of area workers, to address some of the potential for negative effect.

AREVA's responsibility for preventing and controlling crime and public nuisance behaviours is limited. The RCMP and community justice committees have responsibilities in this regard. Notionally an increase in police presence could prevent some crime although this is not a complete response as incidence of crime tends to generally correlate better with factors other than the number of police.

10.1.6 Public Health and Safety

10.1.6.1 Mining Safety

Health and safety of workers and of the broader population is subject to legislation and perhaps more importantly to best practice, as outlined throughout the EIS. AREVA's experience in northern Saskatchewan, and Technical Appendix 8A, Human Health Risk Assessment, suggest that while there will always be some risk, health and safety practice is expected to minimize this risk. AREVA will not only comply with legal requirements but also seek to continually improve its safety records through application of best practice.

The dissemination and enforcement of clear workplace health and safety regulations, health and safety training, provision of safety equipment, emergency response planning, availability of medical and evacuation services for work forces and other health and safety measures as are appropriate will be continually implemented, monitored and improved upon where possible. Health and safety training also has applications in personal life – workers often not only use new health and safety

training on the job but at home in the course of daily tasks. Risk cannot ever be entirely eliminated however.

Traffic

Rather than risks related to the mining, processing and transport by plane of uranium, it is expected that the primary risk to public health and safety will be related to the potential for traffic accidents, either involving Project vehicles, or of people using either the winter road or the all-weather road should this prove needed for the Project. Health and safety best practice briefly described above includes driver training, codes of conduct and safety equipping of course, and the larger transport movements of the Project will not pass through Baker Lake.[102] However, as noted in the socio-economic baseline, the driving of all-terrain vehicles and snow machines is more dangerous than the driving of cars and trucks and, probably on that account, Nunavut's accident rate has been fairy consistently higher than that of Canada on a per kilometer driven basis.

Built roads permit higher speeds than travel on the land and may contribute to accident rates and seriousness. In mitigation, checkpoints and the volumes of Project traffic will contribute to ensuring that in the event of an accident, assistance will be closer at hand than it would be away from either road and the Project will of course fully cooperate with search and rescue teams in any event of an accident. The Meadowbank experience with their all-weather road, in operation now for a number of years now, is illustrative. People are reported to be respectful of the rules of road use (speed and vehicle type restrictions for example) and there have been no injury causing accidents.

Perceptions of Harm

Public safety in relation to uranium mining has been uppermost in most people's minds through AREVA's consultations. Box 10.1-3 provides an indication of the kinds of questions that have been and continue to be asked of AREVA. There have been many environmental concerns, but more generally people are worried that they don't understand, and can't see, what may be happening to them, to their culture and to their children in the future. A detailed review of engagement results also suggests that whereas some people are in fact confident in the environmental stewardship of modern

[102] As presented in the Project description, AREVA is projecting that heavy transport for the Kiggavik Project could be as high as 3,300 trips (one way) per year, equivalent on the winter road to 36 trips per day, and on the all weather road to about half that. There will also be regular use of smaller vehicles, including in Baker Lake.

mining companies, others are supportive of the Project, in despite of fears, only on the grounds that will provide needed economic opportunities.

Box 10.1-3 Understanding of Uranium Mining and its Effects

Uranium gets into animals and people eat them, will we get sick?

Baker Lake flows to the sea. Uranium is going to impact all that water, and our sea mammals. Our water is pure and pristine today, but that's going to be damaged.

What about dust pollution coming from uranium mines, our air is different up here. How are we going to be able to maintain our wildlife, our caribou habitat and our people?

What about impacts to our wildlife, our pride, our traditional culture.

A lot of the Inuit today don't rely on caribou as part of their food group because of concerns they have been affected by mining.

After the mine closes, they will have to put away the waste in a safe manner.

They are saying it will create jobs, but what will happen when there's a leakage? Who will help us?

We understand that you cannot see with your eyes what contaminates our environment.

Because of my lack of understanding, I have fear in my heart.

We have heard from both sides, pros and cons. It is confusing for communities.

Some people are against and some people are for uranium mining. Sometimes we hear that there is not any danger from uranium mines, but some people say it is quite dangerous.

After we're gone, our children will be living. They will have to deal with uranium mines, which will damage future generations.

Our children's children will be hunting two headed caribou.

While not general, some people indicate that an expectation of (invisible) contamination could lead to a fear of country food. As discussed elsewhere, the maintenance of elements of traditional diets are important both to cultural integrity and to health. People have tales of observed differences in, as examples, the skins of polar bears and the meat of caribou, which they attribute to existing environmental contamination and note that where these things are noticed people choose to throw away rather than consume what they see to be contaminated harvest. People will need objective, and trusted, information on uranium mining to ensure that they are not basing harvesting decision of false fears.

AREVA has held, and will continue to hold, public information and education events on uranium mining and its risks. Presentation of environmental monitoring results, and visits to uranium mines in Saskatchewan and to the Project when it is operating, are other avenues to provide people with information and provide opportunities for questions[103]. Public discussion of the pros and cons of uranium development and policy decisions on the part of GN and NTI will also in the longer term bring to people more confidence in their knowledge, and consequently less fear should uranium mining proceed. This however will be a process that will take some time to take effect, a process that may not come to a conclusion quickly given ongoing struggles for public opinion, and some lack of confidence in parts of the population that government and AREVA necessarily have people's best interest at heart.

10.1.7 Social Cohesion and Participation

Social capital represents the ability of people to work together to identify, understand and manage the opportunities and challenges they face as they advance towards the goals that they themselves establish. It is a function of satisfaction of basic needs such as health and education, but equally of well-grounded social networks, mutual understanding and cooperative relationships (social cohesion). Experience in participatory mechanisms and the learning that comes with collaboratively producing results through these mechanisms are also important to strengthening social capital, as are institutional strength and political empowerment.

Construction and operations of the Project will be a force of change – movement into the wage based component of the economy with all that implies for traditional culture and wellbeing, likely in migration to Baker Lake and Rankin Inlet, and some developing inequities. Much of this change is

[103] A framework for a risk perception plan as part of community engagement is presented in Appendix 3C

highly desired, as some people clearly want to move into wage employment. However, it can be challenging to manage change effectively and change does have significant potential to undermine social relationships, to the disbenefit of some, particularly of the more vulnerable.

People give very high importance given to social cohesion in Kivalliq. The potential for the Project to contribute to some weakening of traditional culture may in turn generate a weakening of social cohesion, which has served people well over the years, in response to very challenging conditions for earning livelihoods (see Box 10.1-4). Reduced social cohesion can reduce a sense of wellbeing. There are also comments in the box however that indicates that some people feel that working for Meadowbank has contributed to social cohesion, and that in some communities there is some desire to see some social networks loosened.

Box 10.1-4 Perspectives on Social Relationships

A bad effect of employment is that some people also become greedy and may not share as much as they used to or should.

The traditional Inuit value of sharing is disappearing. People are less willing to share when they see what is happening to what they have to offer, how it is used and how people treat their families, especially their children.

People are getting stingy with their harvests, it is getting harder to find people who will give away caribou.

Equality is a traditional value and mining jobs mean that some people have a lot more than others.

Mixing of Inuit and non Inuit might affect culture.

Where people don't go out on the land as much, like the young and people who are busy working, people are starting to go into the business of providing country food.

Providing for the family now means making money, and wages are shared with parents, siblings and other family members.

The economy has already changed so much that people feel they must get a pay check to live reasonably; that they can't really participate the way they want to in community life unless they have money.

I am working but I am a member of the community and can't let my fellows see me doing bad things so now I am able to stand up to my employers.

We are all friends now from working together on site. Working has brought people (who didn't previously know each other) together, which is a good thing.

If you have a problem and try to solve it, you will find that whoever you have the problem with has a relative or friend that will intervene with some sort of point of leverage to make the problem just go away and leave you with no recourse.

Traditional families here are all powerful.

One family here has all the jobs, which are 'inherited'.

With regard to in migration, different groups of Inuit do feel distinct from other groups. The most obvious example is that a major distinction is made between coastal people and the inland people who make up most of the Baker Lake population. People say that Rankin Inlet has already seen the arrival of different Inuit (and non Inuit), and that society there is more diverse so absorption of different people is not something to be overly feared. Baker Lake shows some evidence of lack of welcome to migrants, both at the family level (which seems more an issue of inconvenience, expense and crowding) but also at the community level. This is expected to change with time, as the hamlet becomes more varied in its population and more accepting of its diversity. It is also noted in this regard that there were no reports of any specific problems in Baker Lake with migrants that have arrived from other communities or from those migrants themselves.

Engagement, and indeed AREVA's experience with people to date, has indicated that some people are concerned about the distribution of the Project's (and other) economic benefits. Some communities see themselves as left out and some people feel that they will not experience significant benefit while others will. Developing inequities can undermine social cohesion. There is also some evidence of potential for social conflict related to strong opinions about uranium mining. Such divergences in interests have potential to create social conflict.

People also give very high importance to participation in decisions that affect them. Interaction by people (but also governments and other organizations and institutions at both the local and regional levels) with the Project, its workplace environment, its effects and the socio-economic management measures put in place have very broad positive implications for participation. Participation in turn relates back to social cohesion – through collaborative learning and problem solving.

The socio-economic baseline indicates that there are some ineffective interactions between hamlets and the outside organizations and agencies, including government, that materially affect quality of

life. Collaborative mechanisms, for monitoring for example, bring people together to achieve common goals and objectives. AREVA is currently providing and will continue to provide support and create opportunities for both people and their organizations – whether pre-existing organizations or those created in response to the Project such as Baker Lake's Community Liaison Committee – to enhance their capacity to engage with the Project, learn and participate in decision making that affects them.

It is also arguable that AREVA's engagement throughout the development of the Project to date, and responsiveness to concerns, including changing the project design (the road and the transportation of yellowcake being prime examples) represents empowerment – people can see that their input is valued and used.

10.1.8 Residual Effects

Table 10.1-2 summarizes what are expected to be the Project's effects on individual, family and community wellbeing. These are overall considered positive for most individuals and families, and thus contribute to community wellbeing. For most people in communities, health status will improve, families will function better (although roles will evolve) and households will have more opportunities to save, all considered significant benefits. Although there are concerns about further spread of STIs, solid health education programs of AREVA and government are expected to go a long way towards addressing these, but negative effects may still occur.

Table 10.1-2 Summary Impact Matrix, Effects on Individual, Family and Community Wellbeing

Effect	Project Phase	Mitigation/ Enhancement	Direction	Magnitude	Geographic Extent	Duration	Significance	Likelihood	Prediction Confidence	Monitoring
Residual Project Effects, Individual, Family and Community Wellbeing										
Overall health status	Construction and operations, positive effects are expected to grow with time while negative effects will largely be seen in early years	Economic opportunities, health and safety training	Positive	Medium	Communities	Long	Yes	Medium	Medium	Collaborative monitoring
Infectious and chronic disease rates		Economic opportunities, health and safety training	Positive	Low	Communities	Long	Yes	Medium	Medium	
Substance abuse and gambling)		Work force management, life skills training, counseling	Negative	High	Individuals	Medium /long	No	High	High	
Diet		Work force management, health and safety training	Positive /negative	Medium	Individuals and families	Long	No	Medium	Medium	
Inappropriate sexual behaviours		Work force management, codes of conduct	Negative	Low	Individuals	Long	No	Medium	Medium	
Increases in STI rates		Work force management, codes of conduct	Negative	Low	Communities	Long	Yes	Medium	Low	
Overall better functioning families in response to economic security and personal self esteem		Economic opportunities, work force management, counseling	Positive	Medium	Communities	Long	Yes	Medium	Medium	
Poor management of incomes and stressors, leading to domestic violence, divorce, children at risk, suicide etc.		Work force management, counseling	Negative	Medium	Individuals and families	Long	No	High	High	
Increased household economic security with savings		Economic opportunities, life skills training	Positive	Medium	Communities	Long	Yes	Medium	Medium	
Increased rates of crime and nuisance public behaviours		Work force management, codes of conduct	Negative	Low	Communities	Long	Yes	Low	Low	
Increased incidence of crime and nuisance public behaviours and consequent lower sense of wellbeing		Work force management, codes of conduct	Negative	Low	Communities	Long	Yes	Medium	Medium	
Worker and public health and safety related to mining		Health and safety training, public education	Positive	Low	Communities	Long	Yes	Medium	Medium	
Public health and safety related to traffic		Traffic management	Negative	Low	Individuals	Long	No	Medium	Medium	
Safety on the land		Public road access	Positive	Low	Communities	Long	Yes	Medium	Medium	
Perceptions of harm		Public education	Negative	Medium	Communities	Medium	Yes	Medium	Medium	
Social cohesion		Work force management, engagement, collaborative monitoring	Positive /negative	Low	Communities	Long	Yes	Medium	Medium	
Participation		Engagement, collaborative monitoring	Positive	Medium	Communities	Long	Yes	Medium	Medium	
Social conflict		Work force management, engagement, collaborative monitoring	Positive /negative	Low	Communities	Long	Yes	Medium	Low	

For some people, there will be negative effects in this context of overall benefit. It is again noted that there will be an adjustment period during which more negative effects may be expected until people learn to manage the income and stresses that new employment brings. As well, more negative effects can be expected earlier because construction work can be shorter term contract work and not provide as much a measure of security as would operations work. People are more likely to struggle as they transition into the wage based component of the economy than they will once they have been through the construction and/or early years of operation and determine the path forward that works for them and their families. Negative effects on individuals are not expected to occur with such frequency that overall community wellbeing suffers.

There is one exception. Project is expected to have a significant negative effect on public security, particularly in Baker Lake and Rankin Inlet. Again, there may be an adjustment period during which effects stabilize and/or can be better managed by police and government, and it is not certain that rates of crime, as opposed to incidences of crime, will increase over the longer term. However with more people and more activity in these two communities, people's perceptions that they are secure in public can be expected to lessen, a significant negative effect on a sense of wellbeing at a community level.

No significant negative effects are expected on public health and safety, although risk cannot be completely eliminated. Rather, worker health and safety training can result in improved public health and safety, a benefit. Use of the controlled access road, whether this is a winter or an all-weather road, is considered safer than travel elsewhere on the land and is therefore a significant benefit. There will continue to be for some people a perception that they are in harm's way, or could be. This is a significant negative effect on those individuals' sense of wellbeing. Again, this is expected to lessen over time.

Although there is potential for reduced social cohesion, the degree to which people are able to join together in empowering processes of participation in the Project will be a counteracting factor. How social cohesion and participation interrelate to produce an increase or decrease in social conflict is undetermined.

10.2 Cumulative Effects Analysis for Individual, Family and Community Wellbeing

As for other socio-economic effects, the expected rapid expansion of the mining sector could very well accelerate the various effects foreseen on individual, family and community wellbeing, as the same processes apply. Many of these effects are additive, similar to Project residual effects but more prevalent. Significance would also parallel that determined for Project residual effects.

However it is also arguable that at some undetermined point in time a critical mass of healthy and well-functioning individuals and families can provide a shift in the understanding of possibilities and aspirations of the balance of the population. This may for example have occurred already in Baker Lake. Role models are important, and more valuable insofar there are many of them who have not achieved their status on the basis of extraordinary talent, but more on the basis of more easily achievable personal goals such as regular attendance at school and work. This would a significant cumulative benefit.

It is also noted that as more economic opportunities open, as people have wider choices on how to earn their livelihoods and as people adapt to the results of those choices, fewer people are left out. This has potential, in the longer run, to limit the negative effects of inequities for example, on crime and social conflict, an additional cumulative benefit of significance. Effects are considered additive, however it is acknowledged that over time a larger number of healthier and better-functioning individuals and families could represent a paradigm shift in socio-economic conditions

There is however a link to potential for more negative cumulative effects on VSECs under traditional culture, with respect specifically to diet, but also too many other wellbeing indicators.

STI rates in general are already very high in Nunavut but HIV rates are not, according to the recently available statistics. It is arguable that there may be some potential for HIV to become more prevalent in the event of multiple mining projects and associated movement of people in and out of communities.

These effects are considered additive, however it is acknowledged that over time there is potential for a paradigm shift in socio-economic conditions.

As more economic opportunities open, as people have wider choices on how to earn their livelihoods and as people adapt to the results of those choices, fewer people are left out. This has potential, in the longer run, to limit the negative effects of inequities for example, on crime and social cohesion and conflict, an additional cumulative benefit of significance.

Table 10.2-1 summarizes cumulative effects on individual, family and community wellbeing.

Table 10.2-1 Summary Impact Matrix, Cumulative Effects on Individual, Family and Community Wellbeing

Effect	Related VSEC	Potential for Project Effects		Potential for Significant Cumulative Effects		Mitigation/ Enhancement		Criteria for More than Additive Cumulative Effects					
		Direction	Significance	Additive	More, or Less, than Additive	AREVA	Governments	Direction	Magnitude	Geographic Extent	Duration	Likelihood	Significance Prediction Confidence
Cumulative Project Effects, Individual, Family and Community Wellbeing													
Overall health status	Health	Positive	Yes	Yes	No	n/a							
Infectious and chronic disease rates	Health	Positive	Yes	Yes	No	n/a							
Substance abuse and gambling)	Health, family function	Negative	No	Yes	No	n/a							
Diet	Health	Positive/ negative	No	Yes	No	n/a							
Inappropriate sexual behaviours	Health, family function	Negative	No	Yes	No	n/a							
Increases in STI rates	Health	Negative	Yes	Yes	No	n/a							
Overall better functioning families in response to economic security and personal self esteem	Family function	Positive	Yes	Yes	No	n/a							
Poor management of incomes and stressors, leading to domestic violence, divorce, children at risk, suicide etc.	Health, family function	Negative	No	Yes	No	n/a							
Increased household economic security with savings	Savings, family function	Positive	Yes	Yes	No	n/a							
Increased rates of crime and nuisance public behaviours	Public security, public health and safety	Negative	Yes	Yes	No	n/a							
Increased incidence of crime and nuisance public behaviours and consequent lower sense of wellbeing	Public security, public health and safety	Negative	Yes	Yes	No	n/a							
Worker and public health and safety related to mining	Public health and safety	Positive	Yes	Yes	No	n/a							
Public health and safety related to traffic	Public health and safety	Negative	No	Yes	No	n/a							
Safety on the land	Public health and safety	Positive	Yes	Yes	No	n/a							
Perceptions of harm	Public health and safety	Negative	Yes	Yes	No	n/a							
Social cohesion	Social cohesion and participation	Positive/ negative	Yes	Yes	No	n/a							
Participation	Social cohesion and participation	Positive	Yes	Yes	No	n/a							
Social conflict	Social cohesion and participation	Positive/ negative	Yes	Yes	No	n/a							

10.3 Summary of Effects on Individual, Family and Community Wellbeing

The actual cause and effect relationships between employment, traditional culture and wellbeing have proved extremely difficult to capture in the context of the north. Wellbeing parameters in communities affected by the diamond mines in NWT have not evolved as negatively as might have been expected, given the conclusions of various project environmental assessments prepared for the diamond mine projects, but this does not definitively prove that they would have not been yet better in the absence of the mines.

There is ample evidence world-wide that employment and good incomes are overall associated with improved wellbeing. And it can only be expected that the same relationship would hold true in Nunavut. There will be individuals and families that disbenefit, there will be an adjustment period and there will be some community level manifestations of at least a reduced sense of wellbeing in some respects. It is important to recall that the potential negative effects on traditional culture are a very strong component of overall community wellbeing.

Because overall community level effects are expected to be positive, non Inuit will benefit as will the Inuit. The potential for most potential negative effect at the individual and family level is rooted in the challenges of transitioning to the wage based component of the economy and in existing socio-economic health and education conditions for Inuit. Neither of these apply, generally, to the non Inuit population and where they may apply, the non Inuit have more resources with which to cope.

Climate change is a potentially additional source of stress and as such has some potential to affect wellbeing as other stressors, such as rotational work and shifting social roles, do.

No transboundary effects are expected.

11 Assessment of Effects on Public Infrastructure and Services

11.1 Residual Project Effects Assessment on Public Infrastructure and Services

Effects on public infrastructure and services are essentially manifested as the balance between supply and demand. The Project will not affect supply (although it is noted that the RCMP is already contemplating what implications rapid expansion of the mining sector in Nunavut may have for policing needs), but could affect demand through multiple, complex and often mutually reinforcing linkages. Effects can result from:

- shifts in demand (there is potential for both reduced and increased demand) of already resident populations in face of increased incomes and/or wellbeing effects associated with economic, social and cultural change
- increased demands as a result of population growth associated with in migration, as well as the reverse as a result of any out migration
- any Project demands on infrastructure or services such as for example health services, roads, other transportation facilities, telecommunications and utilities.

With regard to the last bullet, meeting the operational needs of the Project and the needs of its large out of area workforces is part of AREVA's response to limiting pressures on public infrastructure and services. AREVA will ensure that its power, communications, transport and other operational needs do not depend on communities' facilities to the extent that this is possible,[104] and that where such facilities that are used, for example local roads and the airport, these are paid for and/or maintained as needed. Food and accommodation, recreation facilities, physical and mental health services and other goods and services as may be identified as necessary will be provided at the mine site independently of what is now available in Baker Lake or Rankin Inlet, barring exceptional emergency circumstances. Emergency circumstances are not expected to be frequent – for example Meadowbank, with a workforce of over 1,000 people in 2012, estimates that there were about 20 referral visits to GN health facilities in 2012 (AEM, 2014a), representing less than 0.02% of the over

[104] There will of course be limited use of municipal services in Baker Lake, associated with the maintenance of a Project office.

11,000 visits to the Baker Lake health facility in that year. Project demand on public infrastructure and services is therefore not considered further.

11.1.1 Analytical Methods

As noted earlier, quantification of many of the drivers of increased or decreased demand for public services and infrastructure is not really possible with any reasonable level of confidence. Further, most effects on public infrastructure and services are expected to gain momentum during the Project's operations phase, when household economic security is more assured and most migration decisions – affecting population growth rates – are made. It is not currently clear what capacity constraints on public infrastructure and services will be in 2021, or what this may imply relative to what government revenues may be in face of ongoing development of the mining sector. Therefore, the assessment of residual effects on public infrastructure and services is largely qualitative. The one partial exception is some quantitative scenario building specific to changing demand for social housing that could result from people eligible for social housing moving into Baker Lake and Rankin Inlet, whether from within or from outside Kivalliq.

11.1.2 Social Infrastructure and Services

For purposes of this subsection, social infrastructure and services include social assistance and health and education services.

Increased employment and contracting opportunities will result in increased incomes, in turn resulting in less demand for social assistance. This is probably the most straightforward relationship between a large project and a socio-economic indicator. Social assistance data in Kivalliq are in the table below and suggest a direct relationship with Meadowbank. Social assistance recipients as percentages of populations have fallen in most communities over the period since 2005, most particularly since 2009. Not all the decreases can be attributed to Meadowbank, however the percentage decrease by 2011 was the largest in Baker Lake (16% overall). In 2012, when Meadowbank began to reduce its workforce, the percentage of the population on social assistance in Baker Lake started to rise again. Still, in 2013 Nunavut was spending $400,000 (or over 25%) less on social assistance than in 2005 in Baker Lake, despite the fact that unit costs had risen and population had grown (thus the same percentage of the population would mean more recipients). Table 11.1-1 details social assistance in the LAA.

Table 11.1-1 Social Assistance Recipients and Expenditures

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Social Assistance Recipients (% of the population)									
Arviat	41.2	42.4	54.8	56.2	53.3	49.9	44.0	44.2	n/a
Baker Lake	41.5	39.1	42.9	41.6	31.6	28.1	23.7	25.9	n/a
Chesterfield Inlet	31.1	34.9	29.9	38.1	31.8	29.2	28.3	33.8	n/a
Coral Harbour	14.1	56.2	57.3	66.0	56.5	49.7	52.1	52.3	n/a
Rankin Inlet	31.1	22.9	31.0	34.2	25.6	23.9	20.5	19.6	n/a
Repulse Bay	62.7	69.7	67.9	70.6	63.8	62.6	56.9	52.4	n/a
Whale Cove	41.6	52.9	50.1	44.6	34.6	41.1	44.7	41.7	n/a
Kivalliq	37.4	40.1	45.7	47.9	40.4	37.9	34.3	34.8	n/a
Nunavut	40.9	44.1	47.4	49.1	43.6	41.8	39.6	39.8	n/a
Social Assistance Expenditures ($ million)									
Arviat	1.7	1.8	2.0	2.1	2.1	2.1	2.1	2.4	2.7
Baker Lake	1.5	1.7	1.7	1.3	1.0	0.9	0.8	1.0	1.1
Chesterfield Inlet	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2
Coral Harbour	0.7	0.8	0.9	0.9	0.8	0.9	0.8	1.2	1.2
Rankin Inlet	1.1	1.2	1.1	1.2	1.2	1.1	0.8	0.9	0.9
Repulse Bay	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.2	1.0
Whale Cove	0.4	0.4	0.4	0.3	0.2	0.3	0.3	0.3	0.4
Kivalliq	6.7	7.0	7.2	6.8	6.5	6.5	6.0	7.4	7.5
Nunavut	23.9	26.2	28.0	28.7	28.1	28.3	27.9	34.3	35.9

Source: NBS 2013xxxx

In Rankin Inlet, where fewer Meadowbank workers were employed but the business response to the project was broader, the initial decrease was not as pronounced but has been more sustained. There have also of course been other large economic stimuli in Rankin Inlet, including both other mining sector and infrastructure spending. Social assistance recipients in 2012 were at the lowest percentage of the population since 2005, and costs had fallen by about $200,000, or about 20%. In all other communities, in Kivalliq as a whole, and in Nunavut, although social assistance recipients as percentages of populations have fallen, costs have risen. As compared to 2005, costs in 2012 were 12% higher in Kivalliq (despite substantially lower costs in Rankin Inlet and Baker Lake) and 50% higher in Nunavut. In only half the differential in cost increases between Kivalliq and Nunavut were attributable to Meadowbank, that would represent a saving to GN of in the order of $2.5 million per year.

Increased incomes are normally associated with improvements in wellbeing. A measure of economic security, improved health status and improved self-esteem of the newly employed and their families should in turn translate into reduced demand for mental and physical health and counseling services.

Although there will be individuals who struggle, as there are now, the net effect might be expected to be some reduction in demand for health and counseling services.

The available data relevant to demand for health services are presented in Table 11.1-2 below. There is no firm evidence that Meadowbank, as at 2012, either has, or has not, had the expected effects in Baker Lake. The data are highly variable from year to year, and there are some unexplained anomalies in the data,[105] so establishing trends is challenging. It is the case that in Baker Lake there were slightly fewer visits in absolute terms in 2012 (11,435 visits) than there were in 2004 (11,716). This is despite the spike seen in health facility visits in 2012, and despite population growth of over 20% over the period. There is however no basis upon which to attribute this to Meadowbank alone.

Table 11.1-2 Demand for Health Education Services

	2004 to 2005	2005 to 2006	2006 to 2007	2007 to 2008	2008 to 2009	2009 to 2010	2010 to 2011	2011 to 2012
Health Facility Visits, % change on previous year								
Arviat	6.8	-29.7	21.3	-19.7	-13.3	21.4	-8.4	6.9
Baker Lake	-1.6	11.9	-12.7	-14.8	-15.1	20.8	-1.9	18.4
Chesterfield Inlet	19.4	-19.8	4.4	-21.1	-19.5	13.2	19.6	38.1
Coral Harbour	5.3	-4.5	9.6	2.7	-10.8	4.6	-11.1	15.4
Rankin Inlet	18.5	10.9	-7.6	7.1	-10.0	12.8	3.2	4.8
Repulse Bay	17.1	1.4	-7.9	-16.3	-31.1	91.1	6.3	-4.4
Whale Cove	17.0	35.7	-4.5	3.2	-17.1	16.0	0.8	11.4
Kivalliq	9.8	-2.6	-1.0	-8.2	-15.0	22.3	-0.5	9.5
Nunavut	6.0	0.9	-6.9	0.2	-11.2	24.7	1.5	9.7

Source: NBS 2014g

Thus the available data do not yet support the expectation that increased employment and incomes are necessarily associated with improvements in wellbeing, at least not immediately. But nor do they suggest the reverse, that increased employment and incomes are associated with negative impacts on wellbeing. That is, the data do not suggest that people are less healthy as economic opportunities

[105] There are for example precipitous decreases in visits in all Kivalliq communities, and in Nunavut as a whole, in 2008 to 2009 whereas in all other years, some places see decreases in visits while other see increases.

expand. In this context, it is to be recalled that Meadowbank employs only about 12% of Baker Lake working age adults and the figures in the table above are community wide. The extent to which there are negative socio-economic trends, of whatever origins, in the broader population may be the extent to which positive trends in mining work forces are masked.

With regard to education, demand would be expected to increase in response to employment opportunities. The available data are presented in Table 11.1-3 below. The case for education is similar to that for health – high year to year variability makes identifying trends challenging. As for demand for health services, 2012 also saw a spike in enrollment rates in Baker Lake, however the overall trend had been downward in the previous four years (while high school graduation rates in Baker Lake were consistently higher than they had been pre Meadowbank).

Table 11.1-3 Historical School Enrollment in LAA Communities

	2004 to 2005	2005 to 2006	2006 to 2007	2007 to 2008	2008 to 2009	2009 to 2010	2010 to 2011	2011 to 2012
School Enrollment, % change on previous year								
Arviat	5.8	2.2	3.9	2.8	2.3	-1.7	5.6	-0.9
Baker Lake	-7.9	2.5	7.5	-1.3	2.5	-6.3	-4.2	16.1
Chesterfield Inlet	-4.9	-2.8	-2.9	8.4	0.0	-12.3	3.6	-9.9
Coral Harbour	-12.6	20.1	-8.4	-2.1	9.9	-4.7	3.8	1.8
Rankin Inlet	1.7	3.7	-0.1	-3.3	-0.4	7.4	-2.6	-1.0
Repulse Bay	3.2	9.7	-0.4	2.5	5.0	4.4	7.4	1.8
Whale Cove	-6.4	9.6	-8.4	1.4	8.6	10.8	17.6	7.7
Kivalliq	-1.3	5.1	1.2	0.1	2.8	-0.2	2.1	4.2
Nunavut	-0.6	-0.5	-0.3	2.5	-2.5	-2.2	0.2	-2.5

The above addresses what can be learned from the Meadowbank experience. With regard to potential effects of Kiggavik on the demand for health and education services, and social assistance, there are two additional confounding factors. The first is population growth that may be attributable to the Project (as it appears not to have been for Meadowbank), as a result of in migration in Baker Lake and/or Rankin Inlet. As indicated in Section 8.7.1, given that Meadowbank did not result in abnormal population growth rates, the expectation is that Kiggavik will not, at least in the medium term until operations begins, when it is possible that a measure of economic security might encourage people to take the opportunity to move for personal reasons, the opportunity rotational employment provides.

Any migration is not expected to affect social assistance expenditures, insofar as these are expenditures that do not depend on infrastructure for their delivery.

With regard to health services, at the time of socio-economic baseline data collection, health workers were concerned about the implications on people's mental health of a lack of capacity to deliver mental health and addiction services. However, this was related to the unavailability of facilities and services in the territory, rather than to numbers of users. Health staff did not report any incapacity to respond to demand for services they were competent to deliver. As noted above, visits to the health centre in Baker Lake are still below levels seen in 2005. Rankin Inlet visits are up by 43% over 2005, but this in a context of the establishment of regional health facilities that are drawing visits from elsewhere in the region.

With regard to education, some capacity constraints had started to become evident in some schools, in Rankin Inlet and Arviat for example. This was being seen at both the primary and secondary levels. Table 11.1-4 below presents the Kindergarten to Grade 12 (K-12) educational institutions in the Kivalliq region, their capacity, use, attendance and graduation rates. Currently, most schools are near capacity, with the expectation of the school in Repulse Bay, which is significantly over capacity.

Table 11.1-4 K-12 Educational Institutions in Kivalliq, Capacity and Graduation Rates (2013 / 2014)

Community	Grade	School Name	Total Capacity	Utilization (% Capacity)	Attendance Rate (%)	Graduation Rate (% of Grade 12 Students)
Arviat	K-5	Levi Angmak Elementary School	390	83%	70.1%	n/a
Arviat	6-8	Qitiqliq Middle School	187	95%	55.4%	n/a
Arviat	7-12	John Arnalukjuak High School	422	89%	69.6%	59.6%
Baker Lake	K-5	Rachel Arngnammaktiq Elementary School	313	69%	81.4%	n/a
Baker Lake	6-12	Jonah Amitnaaq Secondary School	382	92%	68.7%	57.1%
Chesterfield Inlet	K-12	Victor Sammurtok School	157	68%	70.2%	55.6%
Coral Harbour	K-12	Sakku School	335	83%	69.8%	26.1%
Rankin Inlet	K-4	Leo Ussak Elementary School	346	75%	84.2%	n/a
Rankin Inlet	5-6	Simon Alaittuq School	176	51%	89.4%	n/a
Rankin Inlet	7-12	Maani Ulujuk Ilinniarvik	442	77%	74.1%	58.2%
Repulse Bay	K-12	Tusarvik School	263	141%	79.6%	41.7%
Whale Cove	K-12	Inuglak School	187	76%	89.2%	46.2%

Source: Nutara, C., 2014 pers. comm.; Cooper, B., 2014 pers. comm.

What the situation may be in 2017, and 2021, is harder to judge. Populations will continue to grow and capacity constraints will become evident, or more evident, in the absence of planning and implementation of both more infrastructure and more staffing on the part of the GN.

The second factor to consider is that increased demand for health and education services can be expected from people who are better off financially. Better health status does not necessarily reduce demand for health services – the socio-economic baseline notes that visits to doctors in Kivalliq do not seem to correlate well with health status. Increased health awareness typical of mining workers who are exposed to health and safety training may be associated with both higher demand for the services that are currently available, and for services that are not. The situation regarding demand for counseling is less clear – there is an association between rising incomes and demand for counseling but most of this is in contexts where private counseling is available. Also, AREVA will make available counseling services for workers and their families. Changing attitudes to education and changing aspirations can be expected to increase demand for high school and postsecondary training in Nunavut, and increase attendance rates.

As noted in earlier sections, most of any increased demand is expected to manifest earlier in the Project's operations phase, rather than continuously, as people settle in to lifestyle choices, including migration decisions and adaptations to wage employment and higher incomes. GN continues to respond to increasing demands, currently largely as a result of rapid population growth. However, there can be resource constraints and some stickiness in government response – it can take time to budget, design, approve, construct, staff and equip new infrastructure and even where new infrastructure is not needed, additional staff may need to be identified, recruited, housed and trained. Where increased demand cannot be immediately met on the part of government, there can be periods of stresses. For example, class size could need to be bigger and teachers and administrators busier until such time as new resources are can be in place.[106]

11.1.3 Policing

The demand for policing services increases with population growth, and with more public activity that is consequent on increased incomes. There is some evidence in some communities that timing of the need for police interventions can cluster at specific times, as a sort of peak load, which can stretch police forces on these occasions. There is also concern among the police that more serious drugs, and associated criminal activity, will become more common. Finally, specific to Baker Lake, policing is one area in which a large remote mine can have increased need for government services. Any emergency or crime at the mine site that requires police intervention can involve long travel times to address. The Project mine site is far away from the hamlet, weather can intervene and the RCMP requires that two police officers attend a call.

[106] Staff stresses have some potential to affect retention as well.

As for social services and infrastructure, any capacity constraints to policing in individual communities five years and more from now are not predicted in detail. A major determinant of police capacity is the incidence of crime and in Kivalliq communities total crimes are rising, which cannot be attributed to the Project. The largest increases in demand for policing, associated with the Project, would be expected in Baker Lake and Rankin Inlet, as a result of any additional population growth. There is thus potential for increased policing costs, and again there may be some stickiness in responsiveness to increased demand, although recent inquiries to AREVA regarding expectations of required policing is indicative of RCMP attempts to plan well.

11.1.4 Housing

A prominent concern regarding housing in Nunavut is increased demand for social housing and the capacity of GN to respond. Population growth has had particularly negative effects on the availability and quality of housing, with consequent negative effects on wellbeing. Increased demand for private housing however is an economic driver, creating employment and other economic activity. Table 11.1-5 provides housing characteristics in LAA communities.

Table 11.1-5 Housing Information in LAA Communities

	2009									2014
	Dwellings (no.)	Owners (%)	Renters (%)				Crowded and/or in Need of Major Repair (%)	Dwellings with Temporary Residents (%)	Demand for Housing (no.)	Waitlist for Housing (no.)
			Social Housing	Staff Housing	Private Housing	Other				
Arviat	490	27	59	12	0	2	64	20	310	181
Baker Lake	530	23	68	4	4	n/a	53	24	220	99
Chesterfield Inlet	100	20	70	0	0	0	54	31	50	18
Coral Harbour	180	22	67	0	6	6	60	34	70	48
Rankin Inlet	740	31	43	18	4	4	46	37	220	92
Repluse Bay	170	12	71	12	6	0	76	31	100	66
Whale Cove	90	22	67	11	0	0	61	43	50	30
Kivalliq	2,310	25	59	11	3	2	56	30	1,030	534

Source: NBS, nhs, NHC, 2014

Additional demand will occur as a result of population growth, but also from employment. Demand as a result of employment arises where people have some measure of economic security. This is particularly true with regard to demand for private housing insofar as mortgage payments, unlike social housing rents, are not adjusted over time on the basis of ability to pay and represent savings through growing equity in houses. Construction work is often temporary and shorter term and may

not provide the economic security, in a small economy, that allows people to choose to buy their own houses and most migration decisions are expected to be made at the time of operations.

Increased employment incomes have some potential to increase the demand for social housing, to the extent that newly employed workers feel more confident about their finances and wish to leave over crowded housing. In migration may also be expected to increase demand for social housing. Although Section 9 argues that most migrants are likely to be employed before making the decision to migrate, they will still need housing and most will at least initially likely seek out social housing. To the extent that demand increases, and cannot be met, overcrowding can result, although shortages of housing are in fact expected to be a constraint on migration.

In some alleviation of increased demand for social housing, some people are eventually expected to move into private housing. It is noted that this does not appear to have occurred in the NWT in response to the diamond mines. The cost of building in the north is very high and while mining incomes are generally higher than elsewhere in the economy, they are not extravagant. In Baker Lake however, smaller and therefore less expensive houses are being built and finding a market including among the Inuit. People find rent increases for social housing onerous, and many people do aspire – once they have secure employment – to owning their own homes. In the larger communities of Baker Lake, Rankin Inlet and Arviat, there are established contractors who can achieve some economies of scale in building houses where demand is sufficiently high.

To the extent that new demand for social housing can be met, workers moving out of over-crowded housing will not alleviate the housing shortage, but will improve housing for family members remaining. There is potential for this type of effect in all communities supplying workers to the Project. Workers moving out of social into private housing will result in a release of social housing to others. This is considered most likely to occur in Baker Lake and Rankin Inlet where not only the Project but also others in the expanding economy will provide a market of sufficient size to encourage a more active private housing response. This is also considered possible in Arviat, although perhaps not to the same degree. Arviat's larger population and its response to employment opportunities at Meadowbank has meant that more than only a few people from the hamlet have found secure well paid employment in the mining sector.

In looking at the potential changes in demand for social housing, three scenarios have been constructed. The low and high growth scenarios described below are considered to be limits to changes in demand for social housing – the assumptions used to construct these scenarios are outside recent experience, but are considered to be within the realm of possibility.

The scenarios consider migration in and out of Kivalliq communities, by Kivalliq Inuit workers only. They do not consider numbers of migrants who may come from elsewhere in Canada as it is expected that these would not represent increased demand for social housing, but be housed as possible through the private market. Nor do the scenarios consider Inuit migrants from outside

Kivalliq. For purposes of scenario building, it is assumed that any such workers would be hired in lieu of Kivalliq workers, that is that the total number of Inuit workers would not change, and that the effects on demand for social housing would be essentially the same in destination communities (Baker Lake and Rankin Inlet), irrespective of where Inuit workers come from. The difference would be that the net effects would be at the territorial, rather than the regional, level. While one of the larger Kivalliq communities, Arviat is not expected to be a destination for in-migration, given its location (i.e., not proximal to the Project or Meliadine).

The scenarios consider i) growth in demand in social housing as a result of population growth; ii) projections of new construction of social housing units; iii) projected Meliadine relation in migration into Rankin Inlet; iv) AREVA related in migration into Rankin Inlet and Baker Lake; v) number of in migrants from other Kivalliq communities; vi) numbers of in migrants who may seek social housing; and vii) numbers of in migrants who will vacate social housing or social housing waitlists in the communities they have left to migrate into Rankin Inlet and Baker Lake.

It is noted that demand for social housing is influenced by a number of other factors that are not considered in the scenarios. NHC rent policies, household income levels, household sizes, security of employment, opportunities and services offered in larger communities, availability of appropriate and affordable private housing alternatives, potential for out migration from Kivalliq by mining sector workers (made possible by fly in fly out rotational work), and household aspirations are just some of the considerations in any household's determination to opt (or to not opt) for social housing. The scenarios are therefore not predictions, but are simply indications of potential and of the relative contributions that population growth, new construction and in migration might make to numbers of people on wait lists for social housing.

In all three scenarios, distributions of out migrants from Kivalliq communities and of construction of new units are distributed across communities approximately proportionately to population.

11.1.4.1 Scenarios:

Low growth in demand:

Demand for social housing grows at the same rate as the population, using Nunavut Bureau of Statistics population growth rates for each community. These vary between communities, and the average for Kivalliq is 1.7% between 2014 and 2025 (NBS, 2009). The starting point for this growth is wait lists for social housing as at January 2014.

In migration into Rankin Inlet is the average of the two scenarios in the Meliadine FEIS (AEM, 2014b), which considers in migration not only by people who may work directly for Agnico Eagle, but also people who would take up jobs created by indirect and induced economic effects of that project. The average of the two scenarios is 450 individuals, or 113 households at 4 people per household

over the period 2015 to 2025, with about 85% of these arriving in 2015 and 2016. Projected demand for social housing by these in migrants assumes that 25% come from Kivalliq communities (about 28 households in total) and that 50% will seek social housing (14 households). All those seeking social housing are assumed to either have left social housing or left wait lists for social housing in their home communities, for no net increase in demand at the regional level.

Nunavut Housing Corporation expects to build 115 housing units in Kivalliq to end 2016 (NHC, 2013). All of this housing is assigned to 2015 (55 units) and 2016 (60 units). This represents over 50% of funding being made available to the territory as a whole, more than proportional to Kivalliq's population – Kivalliq communities rank comparatively high on demand lists and have received some priority in the allocation. From 2017 forward, it is assumed that 40 units are constructed per year in Kivalliq. Forty units represent either i) about 40% of average annual building levels in Nunavut as a whole over the period 2001 to 2016 (about 100 units per year, although numbers vary enormously from year to year due to uneven funding availability); or alternatively ii) about 30% of an increase in building to about 130 units per year (that is, a 30% increase in funding over the annual average of 100 units per year).

Related to Kiggavik, in migration into each of Rankin Inlet and Baker Lake from elsewhere in Kivalliq is assumed to be 5% of AREVA's construction and operations Inuit work forces (that is, a total of 10% for both communities), a comparatively high figure to account for not only direct, but also indirect and induced employment effects. This is equivalent to a total of 15 workers (and households) over the four year period 2018 to 2021 and 25 workers (and households) over the four year period 2022 to 2025. As for Meliadine in migration, projected demand for social housing by these in migrants assumes that 50% will seek social housing (20 households) and that all those seeking social housing either have left social housing or left wait lists for housing in their home communities, for no net increase in demand at the regional level.

Medium demand scenario:

Demand for social housing grows at the same rate as the population, using Nunavut Bureau of Statistics growth rates for each community plus 0.4%, bringing the average for Kivalliq to 2.1%. Average population growth in Kivalliq has in fact been 2.4% between 2007 and 2013, and 2.6% between 2011 and 2013 (NBS, 2014a) but still is expected to slow at least somewhat in the future.

In migration into Rankin Inlet is as for the low growth scenario. However in this case, the assumptions are that 50% of migrants come from Kivalliq communities (56 households), that 75% will seek social housing (42 households), and that 75% of those seeking social housing have either left social housing or left wait lists for housing in their home communities (31 households). There is therefore a net increase to demand for social housing at the regional level.

Housing unit construction for 2015 and 2016 is as for the low growth scenario. However in this case, from 2017 forward, the assumption is that 30 units are constructed per year. This is 30% of annual average annual building over the period 2001 to 2016, proportional to Kivalliq's population.

Related to Kiggavik, in migration into each of Rankin Inlet and Baker Lake is assumed to be 10% of AREVA's construction and operations Inuit work force (for a total of 20% for both communities). This is equivalent to a total of 30 workers (and households) over the four year period 2018 to 2021 and 50 workers (and households) over the four year period 2022 to 2025. Again, the assumptions are that 75% will seek social housing (60 households), and that 75% of those seeking social housing have either left social housing or left wait lists for housing in their home communities (45 households). The implication of this scenario is that at least some in migrants will have left shared homes that cannot be released to the stock of social housing because they will still occupied.

High demand scenario:

Demand for social housing grows at the same rate as the population has grown recently, using Nunavut Bureau of Statistics growth rates for each community plus 0.8%, bringing the average for Kivalliq to 2.5%. Average annual population growth in Kivalliq has in fact been 2.4% between 2007 and 2013, and 2.6% between 2011 and 2013. As well, NHC data on waitlists indicate that the increase in demand for social housing from January 2013 to January 2014 was 3.7%.

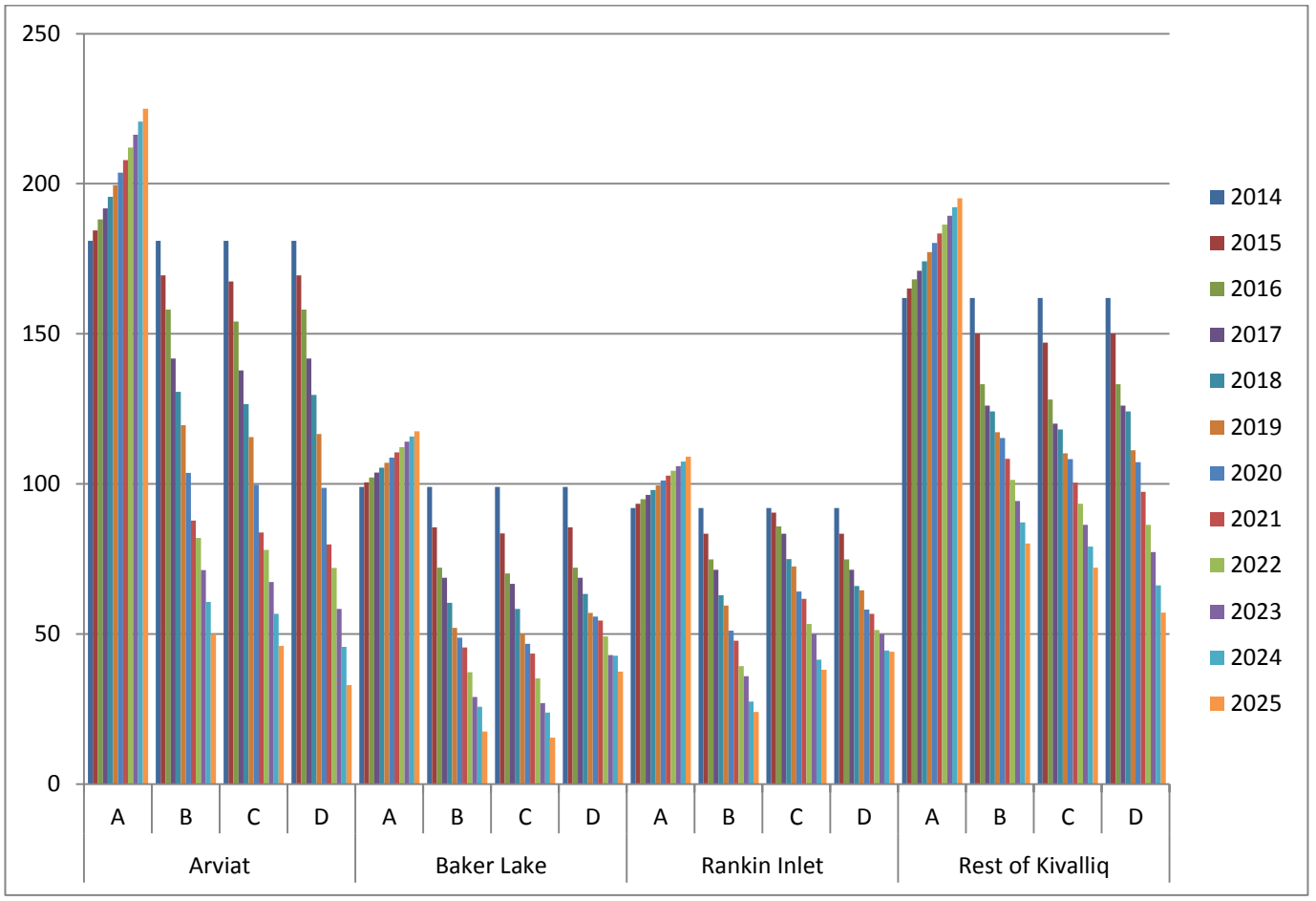
In migration into Rankin Inlet is as for the low growth scenario. However in this case, the assumptions are that 75% come from Kivalliq communities (84 households), that 100% will seek social housing (84 households), and that only 50% of those seeking social housing have either left social housing or left wait lists for housing in their home communities (42 households).

Housing unit construction for 2015 and 2016 is as for the low growth scenario. However in this case, from 2017 forward, the assumption is that 20 units are constructed per year. This is 20% of average annual building rates over the period 2001 to 2016, or 30% (more proportional to Kivalliq's population) of units that could be built annually in the event of reduced funding, sufficient to build only 65 units annually.

Related to Kiggavik, in migration into each of Rankin Inlet and Baker Lake is assumed to be 15% of AREVA's construction and operations work force (for a total of 30% for both communities). This is equivalent to a total of 45 workers (and households) over the four year period 2018 to 2021 and 75 workers (and households) over the four year period 2022 to 2025. Again, the assumptions are that 100% will seek social housing (120 households), and that 50% of those seeking social housing have either left social housing or left wait lists for housing in their home communities (60 households).

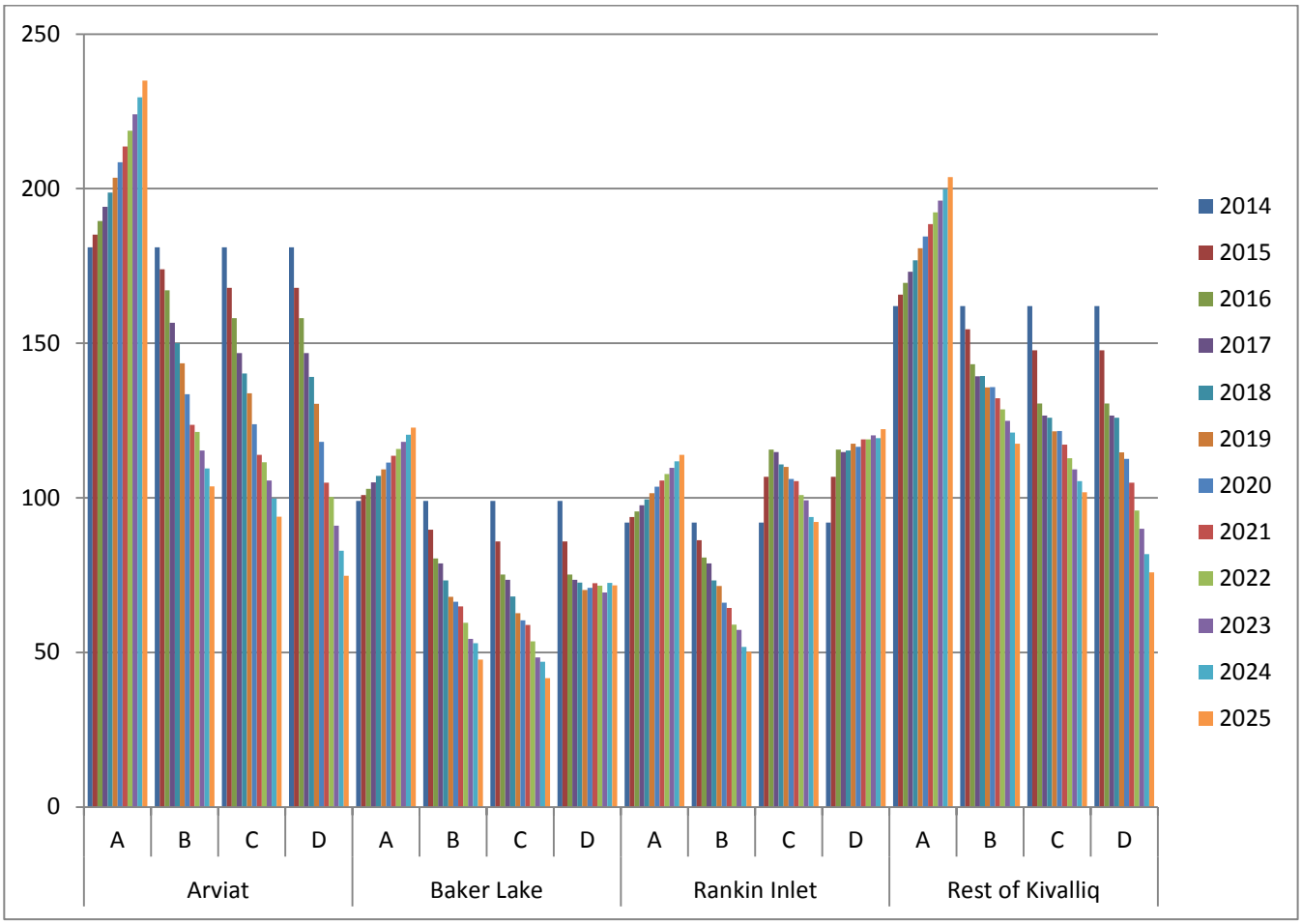
Annual wait list scenarios are shown in Table 11.1-6. Figure 11.1-1, Figure 11.1-2 and Figure 11.1-3 depict wait lists under low, medium and high growth scenarios (respectively).

Figure 11.1-1 Annual Wait Lists, Low Growth Scenarios



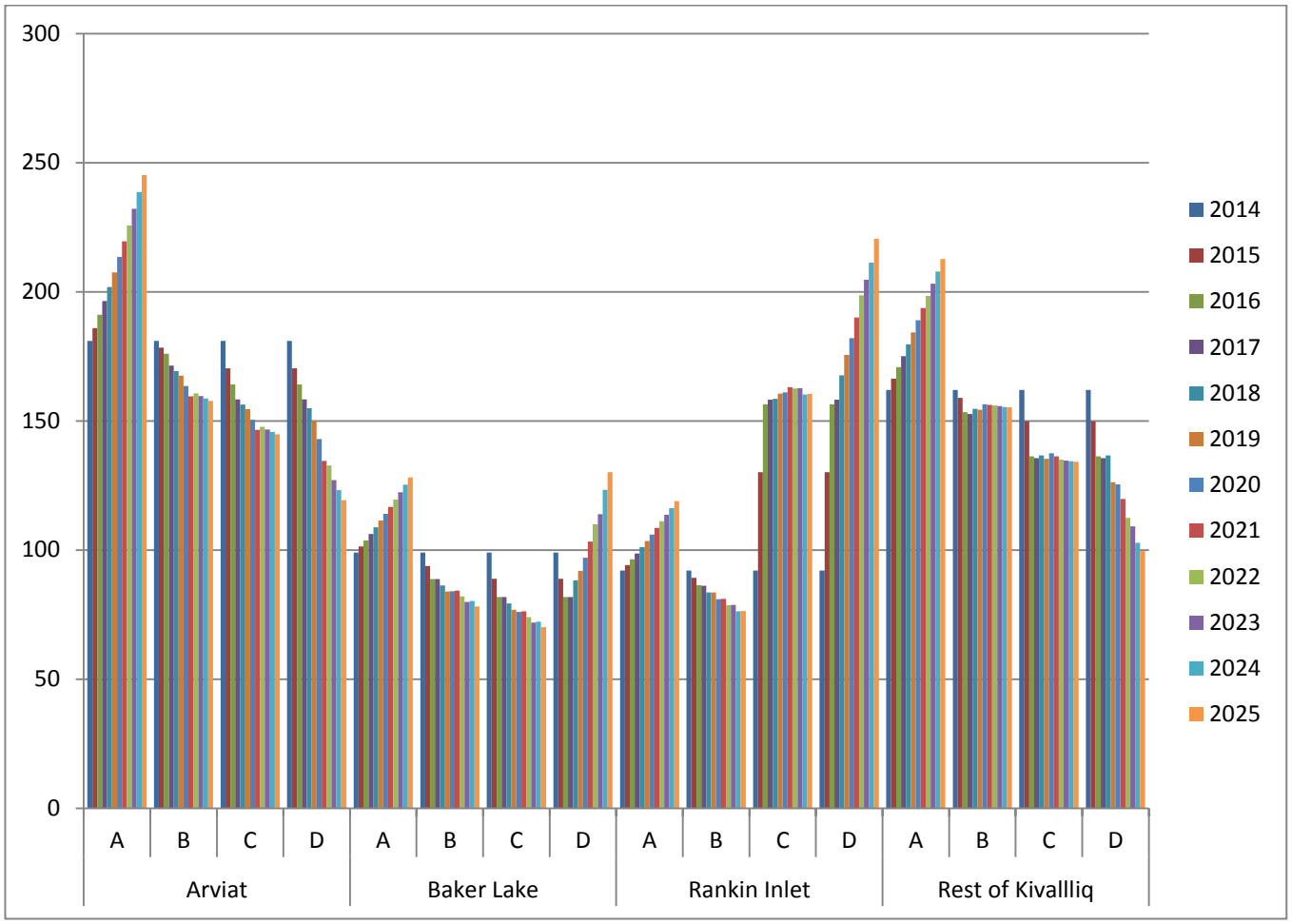
Notes:
A = Growth in wait list on the basis of 1.7% per year population growth
B = A, less house construction at annual rate of 40 units per year
C = B, plus effects of Meliadine related in migration into Rankin Inlet
D = C, plus effects of Kiggavik related in migration into Rankin Inlet and Baker Lake

Figure 11.1-2 Annual Wait Lists, Medium Growth Scenarios



Notes:
A = Growth in wait list on the basis of 1.7% per year population growth
B = A, less house construction at annual rate of 40 units per year
C = B, plus effects of Meliadine related in migration into Rankin Inlet
D = C, plus effects of Kiggavik related in migration into Rankin Inlet and Baker Lake

Figure 11.1-3 Annual Wait Lists, High Growth Scenarios



Notes:
A = Growth in wait list on the basis of 1.7% per year population growth
B = A, less house construction at annual rate of 40 units per year
C = B, plus effects of Meliadine related in migration into Rankin Inlet
D = C, plus effects of Kiggavik related in migration into Rankin Inlet and Baker Lake

Table 11.1-6 Annual Wait List Scenarios

		2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Unit Change
Low Growth Scenario														
Arviat	A	181	184	188	192	196	200	204	208	212	216	221	225	44
	B	181	169	158	142	131	120	104	88	82	71	61	50	-175
	C	181	167	154	138	127	116	100	84	78	67	57	46	-4
	D	181	169	158	142	130	117	99	80	72	58	46	33	-13
Baker Lake	A	99	101	102	104	105	107	109	111	112	114	116	117	18
	B	99	86	72	69	60	52	49	46	37	29	26	17	-100
	C	99	84	70	67	58	50	47	44	35	27	24	15	-2
	D	99	86	72	69	63	57	56	55	49	43	43	37	22
Rankin Inlet	A	92	93	95	96	98	100	101	103	104	106	107	109	17
	B	92	83	75	71	63	60	51	48	39	36	27	24	-85
	C	92	90	86	83	75	73	64	62	53	50	41	38	14
	D	92	83	75	71	66	65	58	57	51	50	44	44	6
Rest of Kivalliq	A	162	165	168	171	174	177	180	183	186	189	192	195	33
	B	162	150	133	126	124	117	115	108	101	94	87	80	-115
	C	162	147	128	120	118	110	108	100	93	86	79	72	-8
	D	162	150	133	126	124	111	107	97	86	77	66	57	-15
Kivallliq Total	A	534	544	553	563	573	583	594	605	615	626	636	647	113
	B	534	489	438	408	378	348	319	290	260	231	201	172	-475
	C	534	489	438	408	378	348	319	290	260	231	201	172	0
	D	534	489	438	408	383	349	320	289	259	229	199	172	0
Medium Growth Scenario														
Arviat	A	181	185	190	194	199	204	209	214	219	224	230	235	54
	B	181	174	167	157	150	144	134	124	121	115	110	104	-131
	C	181	168	158	147	140	134	124	114	112	106	100	94	-10
	D	181	168	158	147	139	130	118	105	100	91	83	75	-19
Baker Lake	A	99	101	103	105	107	109	111	114	116	118	120	123	24
	B	99	90	80	79	73	68	66	65	60	54	53	48	-75
	C	99	86	75	74	68	63	60	59	54	48	47	42	-6
	D	99	86	75	74	73	70	71	72	72	69	72	72	30
Rankin Inlet	A	92	94	96	98	100	102	104	106	108	110	112	114	22
	B	92	86	81	79	73	72	66	64	59	57	52	50	-64
	C	92	107	116	115	111	110	106	105	101	99	94	92	42
	D	92	107	116	115	115	118	117	119	119	120	119	122	30
Rest of Kivalliq	A	162	166	170	173	177	181	185	189	192	196	200	204	42
	B	162	154	143	139	139	136	136	132	129	125	121	118	-86
	C	162	148	131	127	126	121	122	117	113	109	105	102	-16
	D	162	148	131	127	126	115	113	105	96	90	82	76	-26
Kivallliq Total	A	534	546	558	570	582	595	608	621	635	648	662	675	141
	B	534	504	471	453	436	419	402	385	368	352	335	319	-356
	C	534	508	479	462	445	428	412	395	379	362	346	330	11
	D	534	508	479	462	453	433	418	401	387	371	356	345	15
High Growth Scenario														
Arviat	A	181	186	191	196	202	208	213	220	226	232	239	245	64
	B	181	178	176	171	169	168	163	160	161	160	159	158	-88
	C	181	170	164	158	156	155	150	147	148	147	146	145	-13

		2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Unit Change
	D	181	170	164	158	155	150	143	135	133	127	123	119	-26
Baker Lake	A	99	101	104	106	109	111	114	117	120	122	125	128	29
	B	99	94	89	89	86	84	84	84	82	80	80	78	-50
	C	99	89	82	82	79	77	76	76	74	72	72	70	-8
	D	99	89	82	82	88	92	97	103	110	114	123	130	60
Rankin Inlet	A	92	94	96	99	101	104	106	109	111	114	116	119	27
	B	92	89	86	86	84	84	81	81	79	79	76	76	-43
	C	92	130	156	158	159	161	161	163	163	163	160	160	84
	D	92	130	156	158	168	176	182	190	199	205	211	220	60
Rest of Kivalliq	A	162	166	171	175	180	184	189	194	198	203	208	213	51
	B	162	159	153	153	155	154	156	156	156	156	155	155	-58
	C	162	150	136	136	137	135	137	136	135	135	134	134	-21
	D	162	150	136	136	137	126	125	120	112	109	103	100	-35
Kivallliq Total	A	534	548	562	576	591	607	622	639	655	671	688	705	171
	B	534	520	505	499	494	489	485	481	477	474	471	467	-238
	C	534	539	539	534	531	527	525	522	519	516	513	509	42
	D	534	539	539	534	547	544	547	548	554	555	561	569	60

11.1.5 Other Infrastructure and Services

The Project is not itself expected to place significant demand on municipal services, however it is considered likely that again in Baker lake and in Rankin Inlet, additional pressures will be begin to be seen, as a result of increased incomes (which increase demand for power and water for example) and as a result of population growth.

Both residents with increased incomes and employed in migrants are expected to be able to pay for any higher demands for services that are paid for. This does however leave the question of capital costs to supply new infrastructure and infrastructure expansion. In addition, there will be increased demands for community infrastructure and services that are not delivered on a cost recovery basis – examples would include recreational services and landfills for example.

For some other services, in growing economies there may be some potential for a private sector response – child care and some recreational activities might be examples.

11.1.6 Institutional Capacity and Governance

This section briefly addresses only the implications for effects on GN and hamlet governments' financial and human resource capacity to supply what are expected to be Project related increased demands for public infrastructure and services. (Section 10, Assessment of Effects on Individual, Family and Community Wellbeing, and references throughout this volume refer to capacity and governance in the sense of 'capacity building', as this relates to, for example, providing more services in Inuktitut and engaging with the mining sector).

Hamlet governments are responsible to deliver municipal services and fund this activity to some degree through cost recovery, but primarily through transfers from the territorial government. As noted in the socio-economic baseline, GN has significant financial constraints in its ability to fund hamlets' needs and to provide the level and quality of other services that meet the needs of its population and are comparable to levels and quality of services elsewhere in Canada. Both hamlets and GN struggle to find capable staff to deliver services and any inflation in wage rates in response to shifts in the labour market will also affect budgets.

Increased demand for public infrastructure and services is a benefit to the extent that new demand can be met. However where it cannot be met not only are those with increased demand – those who are able to access economic opportunities – disappointed, but others may be crowded out of services as well. Not for all services, but for some, those able to access economic opportunities may have some options for recourse in the private market that either exists or develops to meet demand that can be paid for. Of more concern are people who needs may be higher but have reduced access. This could include, as examples, single women with young children, elders and the more unemployable.

With regard to financial resources, the Project is expected to pay significant royalties and taxes both the GN and NTI, which also provides wellbeing services to Inuit. In addition, increased economic activity generates revenues for government (see Section 13) and reduced dependence on social assistance frees up budget. It is perhaps conceivable that increased demand outstrips revenues generated by economic growth – expectations and aspirations can expand quickly. However, economic growth will provide the revenues for governments and NTI to maintain and improve current levels and quality of service.

In the above regard it is noted that in migration to Baker Lake and Rankin Inlet from other communities in Kivalliq, and in Nunavut, represents a redistribution of demand rather than an increase overall, although it is acknowledged that any smaller communities that lose population to migration will continue to expect the same levels of service. Also timing and predictability of expected revenues are factors, relative to demand.

With regard to human resources, there a number of positive linkages to the ability to supply public infrastructure and services on the part of hamlets as well as GN. These include expected increases in educational achievement and labour force capacity. For example, even where an individual can adapt to rotational work, this can eventually become less preferred, so some rotation between mining work and work in hamlets can be expected, including of people who have become more qualified through mining experience.

The above is not to deny that shorter term disconnects will occur. Baker Lake for example has struggled to find, and pay, municipal service workers in response to high employment levels at Meadowbank. As noted above, there can be some stickiness in response to increased demand.

11.1.7 Residual Effects

Table 11.1-7 presents a summary of residual effects. Although wellbeing challenges are expected to decrease overall, this is not expected to result in any decrease in demand for health, and may not for counseling services. Rather, some increase in demand for health services can be expected. Effects will primarily be seen in Baker Lake and Rankin Inlet as these hamlets are where populations are expected to grow more rapidly as a result of the Project. The need for social assistance will decrease, at least on a percentage of the population basis. The Project will be a contributing factor to increased demand for education across Kivalliq, and particularly in Baker Lake and Rankin Inlet as a result of population growth.

Attributing a direction (positive or negative) to an increased demand for public infrastructure and services is problematical. Insofar as demand can be met, there is a long term benefit for people. Where demand cannot be met there is not, particularly for the more vulnerable. The table indicates that the effect is expected to be positive over the long run, in the expectation that governments will be able to deliver. Effects on government budgets might be considered negative, as more costs are

implied, however increased revenues are expected to more than fully enable government to meet its obligations to provide services in response to new demand.

All effects on demand are considered significant, insofar as they imply a need for government response and insofar as seamlessly accommodating supply and demand does not always happen. Disconnects in this expected accommodation have potential to negatively affect more vulnerable people, a significant effect.

Table 11.1-7 Summary Impact Matrix, Effects on Public Infrastructure and Services

Effect	Project Phase	Mitigation/ Enhancement	Direction	Magnitude	Geographic Extent	Duration	Significance	Likelihood	Prediction Confidence	Monitoring
Residual Project Effects, Public Infrastructure and Services										
Increase in demand for health services	Some potential for changes in demand during construction, but most will be seen during early years of operations	None practical	Positive	Medium	Communities, but primarily Baker Lake and Rankin Inlet	Long	Yes	Medium	Medium	Collaborative monitoring
Increase in demand for counseling services		On site counseling, EFAP	Positive	Negligible	Communities, but primarily Baker Lake and Rankin Inlet	Long	No	Medium	Medium	
Decrease in demand for social assistance		Work force management, life skills training	Positive	Medium	Communities	Long	Yes	High	High	
Increase in demand for policing		None practical	Positive	Medium	Communities, but primarily Baker Lake and Rankin Inlet	Long	Yes	High	High	
Increase in demand for private housing		None practical	Positive	Medium	Communities, but primarily Baker Lake and Rankin Inlet	Long	Yes	Medium	Medium	
Increase in demand for social housing		None practical	Positive	Medium	Communities, but primarily Baker Lake and Rankin Inlet	Long	Yes	Medium	Medium	
Increased costs for governments		Payment of taxes and royalties	Negative	Medium	Communities	Long	No	High	High	
Effects on increased demand for services on the more vulnerable		None practical	Negative	Medium	Communities	Medium	Yes	Medium	Medium	

11.2 Cumulative Effects Analysis for Public Infrastructure and Services

As for other socio-economic effects, the expected rapid expansion of the mining sector could very well accelerate the effects discussed above on public infrastructure and services, as the same processes apply. Such cumulative effects are expected largely to be additive and would be significant as they are for Project residual effects. Irrespective of where the projects selected for the cumulative effects scenario are located, the competitive advantage of Baker Lake and Rankin Inlet will continue to mean that most effects are seen in these hamlets. It is arguable that at some point, populations in Baker Lake in particular could cross thresholds that would warrant not only an expansion of existing services, but the addition of services not seen before. This would be a cumulative benefit of significance.

Effects on public infrastructure and services are largely considered additive, however it is noted that where increased demand manifests as demand for additional services, as opposed to more of the same services, and that demand can be met (by government and/or private sector response to increased incomes) there is potential for significant cumulative benefit. Negative effects on government revenue are addressed below.

While there is some potential for increased costs to government for specific infrastructure and services in specific communities (for example those that may be quickly growing destination communities as a result of multiple mining projects) it is expected that there will be somewhat reduced demand in exit communities and that additional revenues to government will be sufficient to accommodate localized increases (redistributed) demand on the part of Nunavummiut.

Table 11.2-1 summarizes cumulative effects on public infrastructure and services.

Table 11.2-1 Summary Impact Matrix, Cumulative Effects on Public Infrastructure and Services

Effect	Related VSEC	Potential for Project Effects		Potential for Significant Cumulative Effects		Mitigation/ Enhancement		Criteria for More than Additive Cumulative Effects					
		Direction	Significance	Additive	More, or Less, than Additive	AREVA	Governments	Direction	Magnitude	Geographic Extent	Duration	Likelihood	Significance Prediction Confidence
Cumulative Project Effects, Public Infrastructure and Services													
Increase in demand for health services	Social infrastructure and services	Positive	Yes	Yes	No	n/a							
Increase in demand for counseling services	Social infrastructure and services	Positive	No	Yes	No	n/a							
Decrease in demand for social assistance	Social infrastructure and services	Positive	Yes	Yes	No	n/a							
Increase in demand for policing	Policing	Positive	Yes	Yes	No	n/a							
Increase in demand for private housing	Housing	Positive	Yes	Yes	More positive, where the availability of many jobs with multiple mining projects gives people more confidence in security of employment	None	Project sequencing	Positive (more positive)	Not determined	Communities	Long	Not determined	High
Increase in demand for social housing	Housing	Positive	Yes	Yes	No	n/a							
Increased costs for governments	Social infrastructure and services, policing, housing, other infrastructure and services	Negative	No	Yes	No	n/a							
Effects on increased demand for services on the more vulnerable		Negative	Yes	Yes	No	n/a							

11.3 Summary of Effects on Public Infrastructure and Services

Increases in demand for all public infrastructure and services are expected, particularly in Baker Lake and Rankin Inlet. This will require a planning response of government. No climate change or transboundary effects are expected.

12 Assessment of Effects on Non Traditional Land Use and Land Use Planning

12.1 Residual and Cumulative Project Effects Assessment on Non-Traditional Land Use and Land Use Planning

Effects on traditional land use (harvesting) are addressed in Section 9. This section therefore considers potential Project effects on nontraditional land use and on land use planning, which in Nunavut considers both traditional and nontraditional land use, and more importantly, the interfaces between the two.

There are no expected Project effects on current nontraditional land use, outside the municipal boundaries of Baker Lake and the shipping channel into Baker Lake, largely because there is no such use of the lands proposed for development by the Project. The mine site does not overlap with other mineral leases. The access road options do transect prospecting permit and mineral claim lands but do not come close to other current exploration sites. The Project is outside the watersheds of the Thelon and Kazan rivers, the primary tourist attractions in western Kivalliq. With the single exception of the cable ferry for users of the all-weather access road (if built) to cross the Thelon, neither the Project nor any environmental effects will be observable to users of these rivers.

Current territorial and regional economic planning and strategy documents do not foresee that commercial harvesting will become an economic sector of importance in the near to mid-term future in Kivalliq.[107] In any case, the Project is not expected to have any significant environmental effects on resources that could have commercial harvesting value (caribou or fur bearing mammals as examples). Commercial harvesting is therefore not considered further.

However, there is some potential for the Project to be a stimulus to mining sector development in western Kivalliq, the cumulative effects of which could in turn have potential to affect development of tourism (and traditional land use as well) in this part of Kivalliq. So, whereas the Project does not infringe on existing land uses, there are relationships between the Project and what could happen in the future.

[107] This refers to large scale commercial harvesting of fish and meat for southern markets. As noted in Section 9, Assessment of Effects on Traditional Culture, it is considered likely that there will be more commercialization of country food by individuals in Kivalliq over time.

This section therefore considers potential effects of the Project on mining sector development, consequent effects on tourism (and inter alia on land use planning challenges that can be foreseen), as well as the potential for effects on Baker Lake.

12.1.1 Analytical Methods

The analysis of effects on nontraditional land use and land use planning is largely based on information from the NPC, and on the context for land use planning in the territory.

Land use planning in Nunavut remains a work in progress. In 2000, land use plans for two of the six planning regions in Nunavut – Keewatin and North Baffin (now Kivalliq and northern *Qikiqtaaluk)* – were approved (NPC, 2000). Subsequently, rather than complete additional regional plans, NPC determined to move forward with a single land use plan, or framework to guide land use, in Nunavut as a whole. An important part of the initial phase of developing a land use plan for Nunavut was documenting current land use.

NPC has prepared an interactive land use map, based on available data, consultant reports and community input, that identifies lands known to have – or can be expected to have – various uses, including for example, archeological sites, concentrations of wildlife, protected areas, general community interest areas, tourism, commercial fishing, and mining and oil and gas extraction. In addition, NPC has prepared a 'priority areas' map, that identified lands that are of particular environmental conservation interest (NPC, 2011).

There are overlaps in some of these areas, including potentially conflicting land uses. Extractive industry is not obviously compatible with wildlife breeding grounds or potential value to the tourism sector for example. NPC's expectation is that as land use planning advances beyond the data collection phase, and as projects come forward in the interim, complex issues will need to be discussed and resolved.

As noted above, Kivalliq has a land use plan. The plan does not come to conclusions on how any particular land area within Kivalliq is to be used, but continues to provide guidance to decisions on use. The plan foresees that mineral development will play an important role in the development of Kivalliq's economy, and takes the position that this is acceptable provided environmental issues can be adequately addressed and that benefits will accrue to people in Kivalliq communities.

It is noted that the Kivalliq land use plan was being developed at the time of controversy over uranium mining – the plan acknowledges that at the time of its development the people of Baker Lake were opposed to uranium mining, but that they were continuing to evaluate the potential for impacts and benefits. The plan therefore does not exclude the possibility of uranium mining in the future, but expects that any new uranium mining proposal will be scrutinized carefully, including with full community participation.

In addition to the land use planning context in Nunavut and Kivalliq, AREVA's scenario for far future mining sector developments in western Kivalliq is used in the assessment that follows. This scenario includes three additional uranium mines within a 200 km radius of the Project (likely implying a bridge over the Thelon). This scenario is used to assess the Project's effects on mining sector land use.

With regard to land use in Baker Lake, the Project will involve building infrastructure in the hamlet – docking facilities and related access roads are on Crown land, outside municipal boundaries. However, any Project related economic stimulus can be expected to increase demand for both residential and industrial use land inside the hamlet and on the hamlet's shipping needs. Baker Lake does not have a land use plan, but has made available a map of land and buildings that has been referred to.

12.1.2 Mining

As the socio-economic baseline makes clear, there is high interest in developing the mining sector in Kivalliq, on the parts of mining companies, governments and at least some part of the region's people. Over one third of Kivalliq's 28 active exploration projects in 2012 were for uranium, west of Baker Lake (AANDC et al, undated). The Project thus has the potential to affect land use for uranium mining through:

- the precedent it would set for uranium mining in Kivalliq
- infrastructure and processing plant capacity that under certain conditions could affect the economics of additional uranium mining projects west of Baker Lake
- capacity building of labour forces, businesses and educational institutions specific to uranium mining

With regard to precedent: Uranium mining remains controversial in Nunavut and in Kivalliq. Both GN and NTI launched uranium policy reviews in 2011, reviews that included public consultation. It was clear at the time that there was no consensus on continuing – or not continuing – support for uranium exploration and mining (Brubacher, 2011). Both GN and NTI determined that they would continue to support exploration and mining of uranium under certain conditions, including that any uranium produced is to be used for peaceful and environmentally responsible purposes only, environmental and worker health and safety standards are to be met, Nunavummiut are to be major beneficiaries, and projects require the support of Nunavummiut, and particularly of people in nearby communities. Should Kiggavik be approved, and should there some openness to other uranium mining at least in Kivalliq, this will be an encouragement to at least some other uranium mine developers.

The NPC has completed and continues to consult on its Draft Nunavut Land Use Plan (NPC, 2014). The Kiggavik mine site is designated for a land use of 'encouraging sustainable economic developed' (mining is permitted) and both the mine site and all associated facilities are within a much larger area

designated for 'mixed use' (all uses, including mining, are permitted). All currently active uranium exploration projects are also on lands designated for mixed use.

The Land Use Plan also, however, delineates much larger areas where recommendations are that project development 'take account' of various sensitivities. For Kiggavik, this includes considering the potential for effects on the Thelon River as a Heritage River, and a possible commercial fishing zone along the Hudson Bay coast stretching from south of Arviat to north of Chesterfield Inlet. In addition to these two sensitivities (which would apply equally to other exploration sites in northwest Kivalliq), many other exploration sites are in delineated areas where there it is considered that there is potential for effects on caribou calving grounds, migratory birds and Baker Lake's potable water supply. The question then is how permitted mixed uses interact to achieve the Land Use Plan's goals of protecting and sustaining the environment (and thus traditional land use as well), encouraging conservation planning, building healthier communities and encouraging sustainable economic development in mixed use areas.

With regard to infrastructure and processing plant capacity: The Project's infrastructure and transportation plans also have potential to facilitate exploration for uranium (or other mineral resources) and subsequently development of mines. It is foreseeable that any of the road options will provide some support to AREVA's ongoing explorations in western Kivalliq and/or could be used under negotiated conditions, or at least partly used, by other mining companies.[108] The Project's design for a 25 year processing plant life is based on an expectation of use, again by AREVA or others. Docking facilities may also be available to an alternative user. Any or all of these have some potential to make more cost effective additional projects, particularly uranium projects, west of Baker Lake.

Concern has been expressed in Rankin Inlet over increased shipping activity due to the new mine (IQ RIJ 2011). AREVA's analysis is that their summer marine shipping requirements will bring use of the route from Chesterfield Inlet to Baker Lake to very close to full capacity at the narrows. As well, the expected economic stimulus to Baker Lake suggests that the hamlet's shipping requirements will increase over time. It may therefore prove necessary that any large development west of Baker Lake will need to build a road to bypass the narrows. Increased capital costs of road construction, as well as increased transportation costs, would represent increased costs to development.

[108] AREVA's transportation plans are not yet fully developed. The highest base case number of vehicles, of 3,300 trips on a winter road open for a conservative estimate of 90 days is equal to less than two trips per hour, less than capacity (see Section 2, Project Overview).

Finally, with regard to capacity building: With the advance of the Project to construction and operations, AREVA expects to invest in education, training and business development in Kivalliq. Much, although not all, of this will be specific to uranium mining – for example training in radiation technology and uranium related health and safety. This will also affect the feasibility of new uranium projects in Kivalliq (and elsewhere in Nunavut) insofar as capacity to supply goods and services to the uranium mining sector from Kivalliq would increase.

Mining development costs in Nunavut are considered to be comparably high. With the exception of a transportation bottle neck that may be foreseeable on the shipping route into Baker Lake, the above factors all have potential to contribute to lowering costs for subsequent mining projects and can therefore be expected to increase the probability that at least some of the many ongoing exploration activities will advance.

12.1.3 Tourism

There are few tourists in Kivalliq, and fewer still who travel to the western parts of the region. Nevertheless, tourism remains an economic sector of some potential and is a particularly attractive option in Nunavut because of its coincidence with traditional culture. In community consultations related to planning for management of the Thelon and Kazan watersheds, GeoVector (2008) found that people valued environmental integrity here not only for reasons related to traditional culture but also because they felt tourism presented an economic opportunity. The Thelon and Kazan heritage rivers, and the Thelon Game Sanctuary, are arguably the major tourist attractions in western Kivalliq. Baker Lake, the closest community to the mouths of both rivers, is particularly well located to take advantage of the tourism potential in western Kivalliq. However, baseline information indicates that little of this potential is realized, beyond services provided to business travelers.

The Project is in neither watershed and is not expected to have significant biophysical effects (including on wildlife abundance) outside the immediate area of the mine site and access road options. Like the Nunavut Land Use Plan, the management plan for the Thelon River (NWTEDT, 1990) allows multiple use of a corridor along the river, subject to environmental and other necessary regulatory approvals. It is not considered likely that a cable ferry across the Thelon would be enough of a negative to discourage tourist use of the river. Although there could be some potential for the all-weather access road to facilitate outfitting, heavy vehicle mining traffic is not likely to make road transport for tourists in the north attractive. Nor is the mine site a tourist destination itself (although the NPC maps from 2010 indicate that char fishing on the eastern side Judge Sissons is of interest to tourists). Thus the project is not expected to have effects on tourism as a result of its own activities. However, many of the uranium exploration projects referred to the section above are in the Thelon watershed.

As noted in the socio-economic baseline, in the absence of some confidence in tourist markets, people in Kivalliq find little incentive to make the necessary investments to develop the outfitting business that would see returns to any increased tourism go to Kivalliq communities. GeoVector also

considers that growing tourism in Baker Lake, as a complement to outfitting or not, would require development of community tourist attractions (including opportunities to experience traditional culture), services and infrastructure. These in turn imply significant investment – in training, business development and physical plant.

In a context of aspirations to build a tourism sector, the Project may represent a disincentive insofar as it has potential to stimulate mining in areas of tourist interest. There are for example image effects – some tourists will find that other attractions in Nunavut or elsewhere in the north are preferable to travel through a uranium mining area. This raises the possibility of land use conflict, with the added dimension of selecting uncertain future economic benefits (dependent on investment of funds that have not been identified) over more certain benefits. However it is noted that the land and resource characteristics that support tourism are essentially the same as those that support traditional use. Thus the issue will not be one of the compatibility of mining and tourism, but of mining and environmental conservation more broadly.

12.1.4 Baker Lake

Baker Lake's zoning map shows that, even taking into consideration building in the hamlet since the years since the map was prepared, there is ample room for increased building, both in areas designated residential and in areas designated as appropriate for commercial use, at least in the shorter term. Although Section 8, Assessment of Effects on Community Economies, foresees comparatively rapid growth in Baker Lake, it is expected that this would manifest over time rather than as an unmanageably large growth spurt. The land surrounding Baker Lake is Crown land, and therefore it is considered reasonable to expect that should conditions become crowded, municipal boundaries could be amended. It is noted in regard to land use in Baker Lake that the Project's motivating effects on additional uranium mining in Kivalliq will have additional land use effects in Baker Lake.

Of more importance is Project effects on available capacity to increase shipping over time into Baker Lake. AREVA's highest base case number of barge trips would bring shipping activity close to capacity, when considered in conjunction with Baker Lake and Agnico Eagle shipping over a shipping season conservatively estimated at 60 days.

There are however a number of mitigating factors. As for road transportation plans, it is not yet clear whether in fact AREVA;s highest base case number will be actual for Kiggavik shipping, or actual throughout the shipping season. Meadowbank is now scheduled for premature closure in 2017, the earliest AREVA might expect to start construction, meaning very little, or no, overlap between Agnico Eagle's and AREVA's shipping. As well, any lengthening of the shipping season with climate change would ease any evolving capacity constraints. It is therefore not considered likely that capacity constraints would become unmanageable over the short to medium term. To the extent that such constraints may evolve in the longer term, due to growth in Baker Lake, AREVA will put in place transport plans to enable sufficient shipping to meet Baker Lake community needs.

12.1.5 Residual and Cumulative Effects

The primary effect of the Project on nontraditional land use in Kivalliq is expected to be some increase in uranium mining over what might have occurred in the absence of the Project. Such an effect is not inevitable. The expansion of both exploration and uranium mining will continue to be subject to Nunavut's land use planning and environmental assessment regulatory decisions as these are taken over the coming years. On the assumption that more uranium mining is a desired outcome by the people of Kivalliq, the effect of the Project is positive, and significant, primarily in Kivalliq but potentially also elsewhere in Nunavut.

With regard to tourism, the eventual effect of discouraging tourism would be a cumulative one. The effect could be considered a negative one on the development of tourism. However, as noted above this would only occur if regulatory decisions favoured mining in western Kivalliq. The presumption is thus made that this is a choice that people and government in Nunavut, Kivalliq and certainly Baker Lake would have made. It is emphasized that the effect is largely one of forestalling future development of tourism rather than one of affecting current levels. Any potential positive effect of the Project on tourism, through added infrastructure for example, is considered to be negligible in this context.

Project effects in Baker Lake of the Project and associated migration and economic growth are likely to be increased demand for land for residential and business construction. The indications are that land is available and more could be made available over time, thus the effect may not be considered significant in the shorter term. However, to the extent that Baker Lake starts to grow faster than it is growing now, and to the extent that there are cumulative effects as a result of more mining projects, the effects could become significant. A hamlet land use plan may be a good initiative to guide planning not only of the layout of the community but also of service delivery.

A summary of residual effects on land use and land use planning is in Table 12.1-1. It is noted that there is much uncertainty as to both regulatory decisions that will be made in Nunavut and Kivalliq in the future and, if additional uranium mining is a desired outcome, the timing of any new uranium projects in western Kivalliq. Thus likelihood and prediction confidence are not often high. Significance of the potential for cumulative effect is undetermined since the effect largely depends on Nunavut decisions with regard to land use and the relative priority these decisions give to mining and tourism sectors.

Table 12.1-1 Summary Impact Matrix, Cumulative Effects on Non-Traditional Land Use and Land Use Planning

Effect	Related VSEC	Potential for Project Effects		Potential for Significant Cumulative Effects		Mitigation/ Enhancement		Criteria for More than Additive Cumulative Effects					
		Direction	Significance	Additive	More, or Less, than Additive	AREVA	Governments	Direction	Magnitude	Geographic Extent	Duration	Likelihood	Significance Prediction Confidence
Cumulative Project Effects, Land Use and Planning													
Increase in uranium mining as a land use	Mining, tourism, commercial harvesting	Positive	Yes	Yes	No	n/a							
Disincentive to tourism as a result of expanded uranium mining	Tourism	Negative	Not determined	Yes	More negative	Mitigation for biological cumulative effects	Land use planning	Not determined	Not determined	Communities	Long	Not determined	High
Development of tourism as a result of shared use of infrastructure	Tourism	Positive	No	Yes	No	n/a							
Effects on land use in Baker Lake	Land use in Baker Lake	Positive	Yes	Yes	No	n/a							
Effects on shipping into Baker Lake	Land use in Baker Lake	Negative	No	Yes	No	n/a							

12.2 Summary of Effects on Non Traditional Land Use and Land Use Planning

The Project could be a stimulus to other mining sector activity that will raise complex issues needing resolution through regulatory decision making in Nunavut. Such decisions will determine potential for effects of the Project on tourism, for example. No negative effects on land use and shipping into Baker Lake are expected.

The transboundary effects on land use and land use planning attributable to the Project are limited to the connection between Nunavut's eventual land use planning decisions and potential for effects on land use in NWT, given the importance people there give to the Thelon Basin. Tourism in NWT includes trips into the Thelon Basin. Any expansion of mining in the basin could represent a transboundary impact on tourism, again to the extent that mining activity may be a disincentive to such tourism. It is noted that Kiggavik is not located in the Thelon Basin but that there is a possibility of an all weather road being constructed across the Thelon River downstream of the Thelon Game Sanctuary eastern boundary.

Without knowing what Nunavut's land use planning decisions will be, criteria cannot be assigned to determine significance. However, it might not be considered likely that Nunavut would make land use planning decisions overly prejudicial to the interests of people in the NWT – on this speculative basis it may be considered that effects would not be significant.

Table 12.2-1 provides a summary of effects on non-traditional land use and land use planning.

Table 12.2-1 Summary Impact Matrix, Effects on Non-Traditional Land Use and Land Use Planning

Effect	Project Phase	Mitigation/ Enhancement	Direction	Magnitude	Geographic Extent	Duration	Significance	Likelihood	Prediction Confidence	Monitoring
Residual Project Effects, Land Use and Planning										
Increase in uranium mining as a land use	Construction, operations	Openness to shared use of infrastructure, education and training initiatives	Positive	Medium	Kivalliq primarily	Long	Yes	Medium	Medium	AREVA will not monitor effects on land use in Kivalliq
	Final closure and post closure	Disposition of infrastructure		Medium		Long				
Disincentive to tourism as a result of expanded uranium mining	Operations	None	Negative	Medium	Baker Lake primarily	Long	Undetermined	Medium	Medium	
Development of tourism	Operations	Openness to shared use of infrastructure	Positive	Negligible	Baker Lake primarily	Long	No	Low	Medium	
Effects on land use in Baker Lake	Construction, operations	Planning assistance if requested	Positive	Medium	Baker Lake	Long	Yes	Medium	Low	Ongoing engagement, collaborative monitoring
Effects on shipping into Baker Lake	Construction	Iterative transportation planning	Negative	Negligible	Baker Lake	Medium	No	High	High	Ongoing engagement, collaborative monitoring
	Operations		Negative	Medium	Baler Lake		No	Medium	Medium	
Stimulus to complexity of land use planning	Construction, operations and final closure	None	n/a	Medium	Nunavut and Kivalliq	Long	Yes	Medium	High	AREVA will not monitor effects on land use planning in Kivalliq

13 Assessment of Effects on the Economy of Nunavut

13.1 Residual Project Effects Assessment on the Economy of Nunavut

The Project will have effects on the economy of Nunavut, through expenditures in the territory, job creation and revenues to GN and NTI. These effects will be seen as bumps, or swings, in economic indicators. This will happen as construction ramps up, and down, and then as production ramps up, remains approximately stable and ramps down at closure. As the socio-economic baseline's description of the experience of Meadowbank shows, these bumps can be quite large and have potential to introduce some volatility in Nunavut's economic performance.

13.1.1 Analytical Methods

To estimate the economic effects of the Project on Nunavut, other provinces and territories in Canada and on Canada as a whole, simulations for each of the construction and operations phases were run by Statistics Canada using their inter provincial input output model. The model estimates the direct, indirect and induced effects of economic shocks on gross domestic product, employment and labour income, and the distribution of these effects among industries and provinces.

The shocks used were a capital cost of $1,600 million on the 'construction industry'[109] and a production value of $885 million on the 'other metal ore mining industry'. These values derive from i) the Project's estimated construction costs[110]; and ii) for operations, the conservative (low) annual production rate of 3,200 tonnes uranium and an average price of U_3O_8 in 2007 of CDN $106.69. Shocks associated with other Project options have not been modeled, but are briefly addressed in Section 13.1.5, below.

There are some important limitations to input output models in general and Statistics Canada advises all users of model results that results should be interpreted cautiously (Statcan, 2009). Input output

[109] Terminology for industries discussed in this section is that used in the model. The model groups industries for purposes of characterizing production functions and has three levels of disaggregation. Where input data are sufficient, the highest level of disaggregation produces the most accurate results.

[110] The value of $1,600 million excludes contingency and is in 2007 dollars, as the most recent input output model is based on the economy in 2007.

model development uses data on actual economic interactions to derive the coefficients that describe flows between different economic sectors and geographic areas. The small size and breadth of the economy in Nunavut mean that there are not sufficient data available as input variables for model development for many economic sectors. Further, there is a three year lag in model development by Statistics Canada because it takes that long to develop the database to be used as the model input. So the results for Nunavut model runs are necessarily based on the structure of the Nunavut economy in 2007, which included no large mine construction and no operating mines. Thus for Nunavut in particular, extreme caution is warranted because:

- Model data for the construction sector reflect economic interactions characteristic of the construction of housing and community infrastructure that made up much of Nunavut's construction sector in 2007, a much more labour intensive activity than construction of large mines. Thus the coefficients do not well represent what the economic response would be to the construction of a project the size of the Project. One implication is that model can be expected to overstate effects on jobs and labour income.
- Nunavut had, in 2007, one small diamond mine operating and a large number of exploration projects ongoing. Again, the economic interactions for 2007 are not representative of those that might be expected as a result of the Project operations.[111] The difference between the economic interactions resulting from exploration and from large mine operations are large. Two model runs for Nunavut at different levels of disaggregation[112] produced results dramatically inconsistent with experience of the economic effects of large uranium mines.

The results for the construction phase model run were considered, in consultation with Statistics Canada, to be approximately correct. They are presented and cautiously interpreted in Section 13.1.2 below. However because the results for the operations phase were considered to be so at odds with might realistically be expected,[113] a number of alternative model runs were done by Statistics Canada.

[111] This is particularly true insofar as more mines, and associated economic developments, are expected in the interim to 2021 when operations is scheduled to begin.

[112] It is possible to run the model at different levels of aggregation, provided input data are available. In the case of a uranium mine for example, the model can be run, in order of decreasing aggregation, for each of 'mining and oil and gas extraction', 'mining (except oil and gas extraction)' and 'other metal ore mining industry'. Because there was no 'other metal ore mining industry' in Nunavut for 2007, the model could only be run for the two higher levels of aggregation, by definition less accurate because the input data reflect activity quite different than that of uranium mining.

[113] Direct employment effects were projected at ten times what is characteristic of uranium mining for example.

This necessarily involved running the model at different levels of disaggregation for jurisdictions outside Nunavut, specifically Saskatchewan and Ontario, as proxies for Nunavut. The Saskatchewan results were considered, again in consultation with Statistics Canada, to be the closest approximation Statistics Canada models could achieve for economic effects of the Project in Nunavut. This is of course because Saskatchewan has uranium mines, and only uranium mines, in the most disaggregated sector of 'other metal ore mining industry'. So the input data very accurately reflect economic interactions characteristic of uranium mines.

It is acknowledged that running the model for Saskatchewan introduces other difficulties with regard to the results, although these are considered to be much less significant than those introduced by running the model based on the only available (but inappropriate) input data for Nunavut. The two major difficulties are:

- Because Saskatchewan has only three uranium mining companies. Statistics Canada considers the results for direct effects confidential and has suppressed them. Running the Saskatchewan model at a less disaggregated level, for the 'mining (except oil and gas extraction) industry' provided some insight into direct effects, in some part addressing this difficulty.
- Saskatchewan as a proxy introduces some inaccuracy because Saskatchewan has a more mature uranium mining sector and a different cost environment than Nunavut. It was therefore expected that the Saskatchewan results would overestimate the economic effects as they would be seen in Nunavut. This is because with more capacity to supply uranium mines on the part of businesses in Saskatchewan, there is more potential for economic interactions inside the province that there would be inside Nunavut. Running the model at AREVA's most conservative production rate scenario in some part addresses this difficulty.

There are also additional limitations of the models, not specific to Nunavut. The price of uranium in 2007 was exceptionally high, double what it had been in previous years, what it was in subsequent years or is expected to be over the life cycle of the AREVA project. This does not affect the construction phase model run, does not have an effect on the results for direct employment and labour income, and has only small effect on indirect and induced employment and labour income, but it does have a very large effect on GDP.[114] For purposes of the presentation of the operations model results, GDP effects have therefore been recalculated at the price AREVA estimates will be

[114]. It is not possible to run models for specific years using alternative prices as all input data is based on actual prices.

paid for the Project product, $74 dollars per pound of U_3O_8, for purposes of presentation of results in Section 13.1.2 below.

Input output models do not address the ability of an economy to respond to rapid increases in economic activity. Shocks that are large relative to the size of an economy, as is the case for the Project, can strain limited resources. For example, the models estimate employment, but cannot differentiate between employment of residents as compared to imported labour. For both the construction and operations phases, the jobs and labour income will not all accrue to residents of Nunavut. The exit from Nunavut of labour income also means that induced effects for all economic parameters addressed in the model are likely overestimated because so little of the earned income of non-resident workers will be spent in Nunavut.

Because the model is based on coefficients that are fixed (in this case, as of 2007), it does not consider future adjustments in economic interactions, such as growing capacity in the labour force or increased efficiencies in production. Because construction will not begin for some years for example, growing capacity in the labour force that is expected to occur over this interim is not reflected in the results. Nor does the model capture externalities, such as environmental effects, which can have economic implications.

The limitations noted above, and other model limitations, have implications for both overestimation and underestimation. On balance while there is some tendency towards overestimation, this is compensated for by the use of conservative assumptions about construction costs, and operations production levels. Irrespective of model limitations, in contrast to the information on direct Project employment and expenditures provided in Section 8, Effects on Community Economies, the results of the model runs do provide a quantitative estimate of indirect and induced economic effects. The use of Statistics Canada's input output model also provides a common, replicable methodology for estimating economic effects in Nunavut that, if used to analyze other shocks to Nunavut's economy, permits comparisons between different projects.

The input output model includes results for taxation on production, a fiscal effect. In addition AREVA has estimated tax and royalty payments to each of the federal government, GN and NTI. Some additional fiscal effects, such as income taxes paid by direct Project labour and suppliers, have been very roughly and conservatively estimated but others, largely taxes on indirect and induced economic activity, cannot be estimated without making tenuous assumptions.

The assumptions for the model are that Kiggavik is a stand alone operation. AREVA, however, pays corporate taxes on its Canadian operations, not on individual projects. AREVA will allocate its corporate taxable income based on the relevant sections and regulations contained in the *Income Tax Act.* AREVA assumed a consistent payment of property taxes to the GN of $2.5M per year once development commences for the purposes of modelling.

Attachment C includes the full model run results for the construction phase and for the operations phase using Saskatchewan at the highest level of disaggregation, as a proxy for Nunavut. Summary results for five other model runs, some of which aid in the interpretation of the operations proxy run, are included in the appendix for comparison purposes.[115]

13.1.2 Economic Effects

13.1.2.1 Construction

Summary results for the construction phase are presented in Table 13.1-1. Attachment C can be referred to for more information, for example on distribution of effects between industries and provinces.

The increase to Nunavut GDP would average over $160 million annually, in the order of 13% of GDP in 2010 (in 2010 dollars).[116] The percentage change in 2017 would be lower – the Conference Board of Canada (2010) expects real GDP growth of about 25% between 2010 and 2017, thus the effect would then be in the order of 10%. In 2017 then, GDP would increase (bump up) by about 10% relative to what it would be without the Project, and in subsequent years the Project would continue to account for about 10% (and less as the Nunavut economy continues to grow) of total GDP. It is noted that the Conference Board of Canada's projections of GDP growth take into account only Meadowbank and Meliadine. Construction and operations of mines have very large economic effects, thus if Mary River (and/or other mining projects) were to proceed, Nunavut's economy would grow more quickly than projected and the Project's percentage contribution to GDP would be smaller.

[115] The full results for Saskatchewan in the Attachment are not completely consistent with the presentation of data in Section 13.1.2 as these latter have been adjusted for price expectations. The five model runs for which summary results are included are i) Nunavut at the level of mining and oil and gas extraction; ii) Nunavut at the level of mining (except oil and gas extraction; iii) Saskatchewan at the level of mining and oil and gas extraction; iv) Saskatchewan at the level of mining (except oil and gas extraction; and v) Ontario at the level of other metal ore mining industry.

[116] All results are presented in 2010, rather than 2007 dollars, as 2010 dollars are used in AREVA's Project costing and 2010 is the most recent year for which we have data on the Nunavut economy.

Table 13.1-1 Summary Input Output Model Results, Construction

	Total Effects (over 4 years)	Annual Effects		
	Nunavut	Nunavut	Rest of Canada	Total Canada
GDP, income based at basic prices ($ thousands)				
direct	485,877	121,469	0	121,469
indirect	102,915	25,729	184,900	210,629
induced	59,588	14,897	73,944	88,841
total	648,380	162,095	258,844	420,939
Full time equivalent jobs (no.)				
direct	2,442	611	0	611
indirect	1,197	299	1,859	2,158
induced	412	103	714	817
total	4,051	1,013	2,573	3,586
Labour income ($ thousands)				
direct	222,501	55,625	0	55,625
indirect	80,774	20,194	122,533	142,726
induced	36,896	9,224	42,350	51,574
total	340,171	85,043	164,883	249,926
Multipliers				
GDP	1.33	1.33	2.13	3.47
jobs	1.66	1.66	4.21	5.87
income	1.53	1.53	2.96	4.49
Taxes on products ($ thousands)				
federal	7,867	1,967	4,733	6,700
provincial/ territorial	4,423	1,106	6,557	7,663

Source: Statistics Canada input output model

Notes: All financial figures are in thousands of 2010 dollars. Annual effects are based on an even distribution over the construction phase. Multipliers show total effects as a function of direct effects – for example for every 3 direct jobs created there are an additional 2 indirect and induced jobs created.

In fact, construction expenditure is likely to vary, ramping up and then down over four years. Using the Conference Board of Canada's projections for GDP growth to 2020, and assuming a pattern of construction expenditures in the order of 15%, 30% 40% and 15% in 2017, 2018, 2019 and 2020 respectively, the Project's contribution would range between about 6% in 2017 and about 15% in 2019. This again assumes no other large projects proceed over this time period.

The model predicts an average of about 900[117] full time equivalent direct and indirect jobs annually over the construction phase, with another approximately 100 induced jobs. One thousand jobs represents employment equal to about 7% of Nunavut's labour force and 50% of the total number of unemployed in 2010. Considering that the labour force can be expected to grow much larger by 2017 and that not all jobs will be accessible by Nunavut residents, actual percentages will be quite a bit smaller.

If employment followed the expenditure scenario described above, the number of actual jobs would range between about 600 and 1,600 depending on the year. It is emphasized that the largest fraction of the direct and many indirect jobs are expected to be taken up by out of area workers rather than residents of Nunavut for the duration of the construction phase. This is also a relevant observation on the large increase in employment income – out of area workers will take home and spend employment income in their provinces and territories of residence. Induced jobs are more likely to be taken up by people in Nunavut as most of these jobs are in retail.

The model calculates taxes accruing to each of the federal and territorial governments only on production, for example from goods and service taxes (GST) and gas taxes. That is, the tax values in the table above do not reflect corporate income taxes or personal income taxes of the employed which will make up the bulk of fiscal effects (see Section 13.1.3 below). Nevertheless, on average, Nunavut's share of these production taxes represents about 1% of the territory's own generated tax revenues, which were $95.4 million in 2010.

Over 75% of GDP effects would be seen in the construction industry. Production is also estimated to increase by over $5 million annually in the industries of i) finance, insurance, real estate and renting and leasing; and ii) support activities for mining and oil and gas extraction. Production would also increase by over $2 million annually in i) retail trade; ii) municipal and territorial government services;

[117] This approximates AREVA's conservative estimate of average construction employment levels of 750, which includes both direct and a portion of what the model considers indirect employment.

and iii) professional, scientific and technical services. Many other industries would also see increased output.

Over 60% of the 1,000 new jobs (and labour income) the model predicts annually would be in the construction industry and a further 10% in support activities for mining and oil and gas extraction. However the model also projects the creation of 25 jobs and more in each of the following industries, in order of magnitude: i) retail trade; ii) municipal and territorial government services; iii) finance, insurance, real estate and renting and leasing; iv) administrative and support services; and v) professional, scientific and technical services. Many other industries would see at least some job creation. About 98% of all jobs created are expected to be full time/full year.

Aside from effects in Nunavut, which will see about 39% of the Project's total GDP effects and almost 30% of jobs, the rest of Canada will see indirect and induced effects largely associated with necessary imports to build the Project. The biggest beneficiaries would be Alberta and Ontario, followed by Quebec and British Columbia.[118]

Although the rest of Canada, in total, will see a higher percentage of total Project effects than Nunavut will see, the economic effect is in fact very much smaller in percentage terms, given the comparatively large size of the Canadian economy.

13.1.2.2 Operations

Summary results for the operations phase are presented in Table 13.1-2 below. Model results are presented at the \$107/lb U_3O_8 price to demonstrate the relative effects between Nunavut and the rest of Canada. Nunavut results are also presented as recalculated at a price of \$74/lb, the price considered more representative of market conditions as they are expected to be post 2021. A comparison between the annual effects at each of the two prices also provides an indication of the sensitivity of GDP effects to U_3O_8 price changes – every \$1 dollar change in the price of U_3O_8 produces an almost \$10 million change in GDP.

[118] Saskatchewan will likely benefit more than the model indicates, given its capacity to supply the uranium industry, which is not reflected in the 'construction industry' model coefficients.

Table 13.1-2 Summary Input Output Model Results, Operations

	Total Effects (over 14 years)	Annual Effects			
	($74/lb)	($74/lb)	($107/lb)		
	Nunavut (Saskatchewan as proxy)	Nunavut (Saskatchewan as proxy)	Nunavut (Saskatchewan as proxy)	Rest of Canada	Canada
GDP, income based, basic prices ($ thousands)					
direct + indirect	6,820,731	487,195	789,749	92,456	882,205
induced	409,013	29,215	47,360	54,914	102,274
total	7,229,744	516,410	837,109	147,370	984,479
Full time equivalent jobs (no.)					
direct + indirect	25,900	1,850	1,850	855	2,705
induced	6,622	473	473	529	1,002
total	32,522	2,323	2,323	1,384	3,707
Labour income ($ thousands)					
direct + indirect	1,864,144	133,153	133,153	55,232	188,385
induced	356,530	25,466	25,466	31,452	56,919
total	2,220,674	158,620	158,620	86,684	245,304
Multipliers					
GDP	1.27	1.27	1.27	0.22	1.49
jobs	2.56	2.56	2.56	1.31	3.87
income	1.89	1.89	1.89	0.81	2.70
Taxes on products ($ thousands)					
federal	75,085	5,363	5,363	2,619	7,982
provincial/territorial	187,300	13,379	13,379	3,575	16,954

Source: Statistics Canada input output model

Notes: All financial figures are in thousands of 2010 dollars. Multipliers show total effects as a function of direct effects.

Comparison of Table 13.1-2 with Table 13.1-1 for the construction phase will show that operations effects are greater than the averages for construction on an annual basis, and because they will accumulate over 14 years, are much greater in total. Operations effects are also expected to be more consistent over time. AREVA expects to achieve a fairly constant production rate.

The increase to Nunavut GDP is over $500 million, in the order of 40% of GDP in 2010. The percentage change in 2021 would be lower – the Conference Board of Canada's estimate that GDP will grow about 28% between 2010 and 2020[119] means the contribution would then be in the order of something under 30% of GDP in 2021 (if no other large Projects are developed in the interim).

The model predicts an average of 1,850 full time equivalent direct and indirect jobs annually over the operations phase, with another approximately 470 induced jobs. This number is 17% of Nunavut's 2010 labour force and more than 100% higher than the total number of unemployed in 2010. Again, it is noted that by 2021, labour force characteristics are expected to be quite different than they were in 2010.

Reference to the results of the less disaggregated model run for Saskatchewan suggests that about half of these 1,850 jobs would be direct and half indirect. AREVA estimates that the Project will directly employ about 550 people during operations. Thus the estimate appears somewhat high, although AREVA's estimate is considered quite conservative. As for construction, the expectation is that many of these jobs will be taken up by out of area workers and much of the increase to labour income will also leave the territory. The multiplier effects on direct Project employment are much larger for operations than construction. As noted earlier, induced jobs are likely to be filled in much higher proportion by Inuit.

Over 80% of GDP effects would be seen in the mining industry, and output is also estimated to increase substantially in i) finance, insurance, real estate and renting and leasing; and ii) support activities for mining and oil and gas extraction. Many other industries would also see increased output.

Regarding job creation, about 30% of the over 2,000 new jobs (and associated labour income) the model estimates annually would be in the mining industry. The model also estimates the creation of jobs economy wide, including between 130 and 225 in each of the following industries, in order of magnitude, i) support activities for mining and oil and gas extraction; ii) finance, insurance, real estate and renting and leasing; iii) retail trade; iv) administrative and support services; v) transportation; and vi) professional, scientific and technical services. Almost all other industries would see at least some job creation, and over 90% of jobs created would be full time/full year.

[119] There are currently no projections beyond 2020 available.

Aside from effects in Nunavut, which will see over 80% of total GDP effects and over 60% of jobs, the rest of Canada will see limited indirect and induced effects. The biggest beneficiaries according to the model would be first Alberta and then Ontario for GDP, and the order reversed for jobs. However Saskatchewan is certain to see benefits as well. Using Saskatchewan as a proxy means that benefits to Saskatchewan cannot be separated out.

The production taxes are inaccurate, as they are based on Saskatchewan tax rates which overall are higher than Nunavut's (for example gas tax rates are more than twice as high in Saskatchewan and the province has a provincial sales tax of 5% – these two taxes account for more than 99% of the total provincial production taxes in the table).

13.1.3 Other Economic Effects

The models do not predict effects on other macroeconomic indicators such as the personal savings rate, inflation rate, trade balance or business investment. Although no quantitative estimates have been done for such effects, some observations can be made.

Nunavut's savings rate is the highest in Canada, and is predicted by the Conference Board of Canada to remain above 30% (as compared to recent figures for Canada of about 4%) until 2020, as it has since 2000. It is noted that although Conference Board of Canada projections do take into account the effects of Meadowbank and the expected effects of Meliadine construction and operations, the projections do not vary over time by more than a single percentage point. Large projects are not expected to shock savings rates in Nunavut as they may do other macroeconomic indicators. GNDoF (2011) figures show that savings rates are not well correlated with either income or disposable income.

Savings rates are however better correlated with consumer expenditure patterns. Rising incomes and aspirational shifts could start to bring Nunavut's savings rates down. If for example, significant people moved into the private housing market, savings rate could fall – mortgage payments are counted as expenditures in savings rates calculations. A fall in the savings rate on this account might be considered a statistical artifact, insofar as for most people housing is one of the biggest investments they ever make. The savings rate in any case appears to be a poor indicator of economic health in Nunavut – much of what is saved currently is expected to be saved by non Inuit who do not invest in the territory but take their savings with them when they move. Also saving rate calculations depend on tracked financial transactions in the economy – for example, illicit expenditures on drugs and alcohol are not tracked and will show up in the statistics as savings.

Nunavut's inflation rate broadly tracks that of Canada, insofar as so much of Nunavut's final domestic demand is in fact made up from imports from the rest of Canada. There is some potential for short term inflation in response to excess supply over demand, primarily for labour in Kivalliq communities, but this is not expected to result in significant effects at the level of the territorial economy. Again,

reference can be made to Conference Board of Canada and GNDoF projections and history to establish that there has been so such effect in response to Meadowbank and none is expected in response to Meliadine.

Trade balances are a different matter, as large projects necessarily imply large imports of capital equipment and consumables during construction and of consumables during operations. Again, references to Nunavut's economic response to Meadowbank indicate that negative trade balance and business expenditures movements over the period 2007 to 2009 essentially followed the ramping up, peaking and ramping down of construction activity (Statcan, 2013d). The Project will have a similar effect.

The Project's capital cost represents a very large business investment in Nunavut. AREVA's socio-economic management includes measures to assist businesses to increase their capacity to supply the Project. To the extent that these measures are successful, some Kivalliq businesses will need to spend capital to expand or diversify in order to successfully supply goods and services to the Project, representing additional business investment to that of AREVA.

13.1.4 Fiscal Effects

During construction, AREVA will not be producing uranium and will not be generating revenue. There will nevertheless be some small increase to GN revenues. In addition to over $1.1 million in taxes on production in the economy, employment as a result of direct, indirect and induced economic activity will generate personal income tax payments and payroll taxes will be paid on newly hired employees. Nunavut businesses contracted to supply the Project will pay corporate taxes. While none of these is necessarily large in its own right, cumulatively they are estimated to approach at least $2.5 million[120] annually, an increase to GN own source revenues in 2010 of over 2.5%.

During the operations phase, corporate taxes and royalties will be paid by AREVA. These are assessed on the basis of the value of output, which in turn depends on costs and revenues. Corporate taxes and royalties over the life of the Project will therefore be a function of:

- the production level in a given year, as this may be affected by operational considerations but also by interruptions of operations by weather, emergencies or other events

[120] This would include $1.1 million in taxes on production, and – on direct jobs only -- about $1 million in payroll taxes.

- the price paid for U_3O_8
- any future legislative or regulatory changes to the current basis used to assess corporate taxes and royalties, or to the distribution of royalties between the federal government and NTI

However, an approximate global amount for a 14 year operations phase can be estimated on the basis of a set of assumptions. The following assumptions derive from the Project's conservative assessment case, expectations of an average U_3O_8 price over the life of the Project, and the currently understood distribution of the uranium ore over Inuit owned and Crown land:

- 3,200 tonnes per year production level and a US $74/lb price for U_3O_8
- current corporate tax rates in Nunavut and Canada
- 35% of the uranium mined from Crown land, and the remaining 65% from NTI land
- for uranium on Crown land, annual royalties paid to the federal government, which remits 50% of the first $2 million and 5% of the remainder to NTI
- for uranium on NTI land, because the claim was held prior to the NCLA, royalties paid to the federal government, which remits the entire amount to NTI

The results are in Table 13.1-3. Payments to GN would average about $19 million per year, or about 20% of own source revenue in 2010 (although it is noted that actual payments in any one year could vary from this average). Payments to NTI are about the same. The federal government pays these into the Nunavut Trust, valued at the end of 2009 at about $1.1 billion (Nunavut Trust, 2010). Royalty payments would then represent in the order of 25% additional funding for the trust. NTI currently disburses in the order of $35 million annually on its programs for Inuit beneficiaries on the basis of trust investment returns – this also has potential to increase by 25%.

Table 13.1-3 Operations Phase Tax and Royalty Payments ($ million)

	Government of Canada	Government of Nunavut	NTI	Total
Corporate income tax	333	267	-	600
Royalties, Crown land	136	-	16	152
Royalties, NTI land	-	-	248	248
Total	**469**	**267**	**264**	**1,000**

Source: AREVA

As for the construction phase, there will be additional tax payments to GN, from personal and corporate income, payroll and production taxes in a total amount in the order of $2.5 million.

13.1.5 Final Closure and Post Closure

As noted in Section 8, Assessment of Effects on Community Economies, final closure is inherent in the non-renewable resource extraction industry. GNDoF (2010) notes the importance of encouraging the development of multiple mining projects in order to stabilize Nunavut's economy in face of inevitable closures. To the extent that other opportunities open up as the Project comes to its final closure will determine what actually happens in the economy – the final closure of the Project will result in economic contraction in the absence of new activity that takes its place.

Based on the current production plan, final closure is scheduled to begin in 2035 (the effects of finding additional reserves to extend the Project life are addressed in Section 13.1.5, below). As noted in Section 8, final closure and the subsequent post closure phase represent reductions, over the operations phase, in expenditures of over 85% and in employment over 90%, with consequent reductions in other economic parameters. Corporate tax and royalty payments to government and NTI will end. Large reductions in contracting and employment also imply that business and personal income tax receipts would be expected to decrease.

As noted in Section 6, Socio-Economic Management, AREVA will remain mindful of the potential for negative effects throughout the Project life cycle, integrating sustainable development principles into mitigation and benefit enhancement measures in an effort to minimize to the extent possible the negative socio-economic effects of closure on individuals. Enhanced capacity of the labour force and businesses, institutional strengthening of civil society, social investment and increased government revenues are expected to position people to achieve improved socio-economic status over the life of the Project. This should have the result of improved capacity to absorb the effects of closure.

On the assumption that at least some other mining projects in Nunavut go forward and that the industry grows with time, Nunavut's economy can be expected to be, by 2035, much larger than it is today. Thus, although closure in fact reverses most of the Project's economic benefits, the relative contribution to economic performance should be lower than in the early years of the Project. Further, ongoing development in the mining sector may imply that there are other projects in the pipeline to replace the Project.

13.1.6 Assessment of Options

There is potential for the production rate to increase to 4,000 tonnes of uranium per year, which would increase the economic benefits described above for the operations phase in Table 13.1-2 by 25% on an annual basis and, if this production rate were sustained over the 14 year operations phase, total benefits would increase by 25% as well, including both economic and many of the larger fiscal effects.[121]

The extension of the Project operations phase from 14 to 25 years would not have a major effect on annual averages shown in Table 13.1-2, but would increase the total benefits as outlined by over 75%, or by more than double at a sustained production rate of 4,000 tonnes uranium per year. Any realized potential for increases to the conservative assumptions used to run the operations model would counteract any tendency to overestimation the run results represent. Most fiscal effects, both of an increase in the production rate and of an extension of the Project life, would also increase proportionately.

Other Project options could have implications for capital costs and for AREVA's operating costs and revenues, the latter of which would in turn have an effect on corporate tax and royalty payments. For example, the construction of the all-weather road would be an additional capital expense (with associated economic benefits and some effects on fiscal benefits during construction), but would also be built only if it decreased operating costs (implying increased fiscal benefits during operations). However, none of these other Project options are considered to have costs that would affect economic or fiscal benefits to the economy of Nunavut, except at the margin.

13.1.7 Residual Effects

A summary of residual economic and fiscal effects is in Table 13.1-4. Although it is emphasized that the quantitative results need to be considered with some caution, the margin of error would have to be extremely high to conclude anything other than that the Project will have significant positive economic effects. That is, confidence in the prediction of positive economic effects is high. Nationally and in the rest of Canada's provinces and territories, decimal place percentage increases in GDP and unemployment rates are analyzed for their importance. The Project's economic effects in

[121] Ramping up of the production rate is not expected to include a proportionate increase in employment for example. Some fiscal effects, from payroll and personal income taxes as examples, would not increase by a full 25%.

Nunavut are so large in comparison, and will remain so for the life of the Project irrespective of what else happens in Nunavut's economy, that they must be considered significant.

Fiscal effects to GN and to NTI, particularly in an environment of substantial resource constraints and a policy priority of reducing dependence on federal transfers, are also positive and significant.

Table 13.1-4 Summary Impact Matrix

Effect	Project Phase	Mitigation/ Enhancement	Direction	Magnitude	Geographic Extent	Duration	Significance	Likelihood	Prediction Confidence	Monitoring
Residual Project Effects, Economy of Nunavut										
Contribution to GDP	Construction	None required, preferential employment and contracting, education and training and other Project socio-economic management measures are expected to maximize the retention of economic benefits in Nunavut	Positive	$162 m/year	Nunavut	Medium	Yes	High	High	Economic effects will not be monitored at the territorial or national level
	Operations			$500 m/year		Long				
Contribution to employment and labour income	Construction		Positive	1,000 jobs		Medium				
	Operations			2,000 jobs		Long				
Contribution to revenues of GN and NTI	Construction		Positive	$2.5 m/year		Medium				
	Operations			$20 m/year to each of GN and NTI		Long				
Reversal of economic effects in Nunavut	Final closure and post closure		Negative	High	Nunavut	Long				
Economic effects in the rest of Canada	Construction		Positive	Medium	Canada	Medium				
	Operations					Long				

13.2 Cumulative Effects Analysis for the Economy of Nunavut

Cumulative effects assessment generally considers reasonably foreseeable projects – projects that can be expected to advance to construction and operations. A project is defined as reasonably foreseeable for purposes of this subsection if it has initiated, or has publicly indicated an intention to initiate, an environmental approval process in Nunavut. In the case of socio-economic cumulative effects there are also other considerations – the socio-economic environment is not as static as the biophysical environment is often considered to be (barring climate change). Socio-economic conditions will be quite different in Nunavut into the future – the labour force is growing rapidly, educational achievement is likely improving, traditional culture and attitudes to wage employment are evolving, capacity to supply the mining industry is expanding and various changes to the ways that mining companies operate in the territory are being contemplated.

Only the largest of reasonably foreseeable projects are considered here, and they are all mining projects. Smaller projects, such as the Nanisivik Naval Facility, the Canada High Arctic Research Station and the new Iqaluit airport, are excluded because their individual effects are dwarfed by those of the large mining projects (although it is noted that many smaller projects can together have important economic effects). The projects included are each large enough to alone have significant effects on the economy of Nunavut but in combination may suggest challenges and/or opportunities that are more than additive.

The assessment essentially is limited to the period extending through the decade of 2020s – there are no reasonably foreseeable projects expected to begin construction later than about 2018. Refer to Tier 1 Technical Appendix 1E for a details related to the definition of reasonably foreseeable and the designations of projects in the territory.

The approach is again through the building of a plausible scenario. This is most straightforward with respect to employment. Estimates of the employment levels of large projects during construction and operations can be arrived at on the basis of information publicly available from project proponents or can be approximated on the basis of available information on project size, expressed variously as expected capital costs, reserves and/or comparisons with similar projects.

Table 13.2-1 presents what may be considered a plausible scenario.[122] Note: less reasonably foreseeable than plausible on a longer time horizon, many will require improvements in commodity prices.

Table 13.2-1 Cumulative Effects Scenario, Employment

	Construction			Operations		
	Employment	**Start Date**	**End Date**	**Employment**	**Start Date**	**End Date**
Meadowbank				780	2010	2017
Hope Bay	300	2010	2014	400	2015	2018
Meliadine	1,500	2014	2017	700	2018	2029
Mary River	4,200	2013	2016	1,050	2017	2037
AREVA	750	2018	2021	550	2022	2036
Hackett River	1,200	2015	2017	700	2018	2032
Back River	1,500	2015	2016	900	2017	2028
Izok Corridor	1,150	2015	2016	700	2017	2028

Sources:

	Project applications submitted to NIRB, 2013 (Back River), 2013 (Izok Corridor)
	Draft Environmental Impact Statement submitted to NIRB, 2011 (AREVA), 2013 (Meliadine)
	FEIS addendum submitted to NIRB, 2013 (Mary River)
	Presentation to Nunavut Mining Symposium, 2013 (Meadowbank, Hackett River)
	Very approximate estimates based on available information

Note: NIRB submission figures are generally conservative, that is, are low estimates

Inuit labour demand is calculated as a percentage of total project employment, rising from 20% in 2015 to 50% in 2027 on assumptions of improved capacity to take up mining jobs over time. Predictions dictate high demand over the years 2015 and 2016, in largest part because of the extraordinarily high demand for construction labour from Mary River. With the completion of Mary

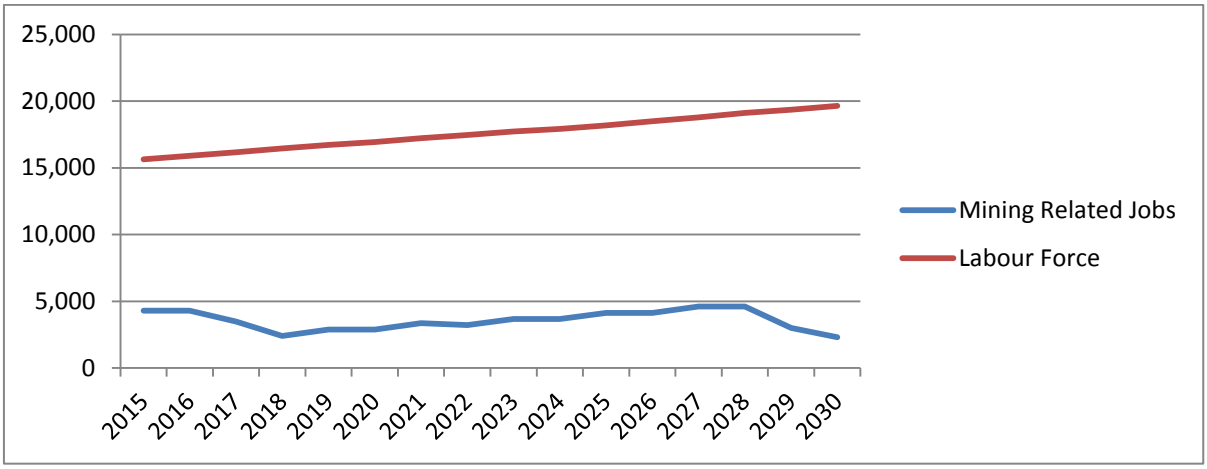
[122] It is noted that with time, the available information on large mining projects changes often, sometimes quite substantially. Some of the figures in Table 13.2-1 have been superseded by new data in the matter of months since the scenario was first constructed. Such changes are not considered to affect the broad conclusions of the assessment of cumulative employment effects however.

River construction, demand falls off, but then despite some ups and downs the trend line is expected to consistently rise over the period 2018 to 2028. The subsequent decline assumes no other mining projects advance in the interim.

Taking into account the multipliers in the tables in subsection 13.1.2, the total number of new jobs attributable to mining industry growth will be higher. For example, on an assumption that Inuit will take up 50% of indirect jobs and 100% of induced jobs in 2028 when all projects considered in that year are in their operations phase, total new employment would approach 5,000 rather than the 2,300 otherwise expected.

In 2014 it might seem unlikely that 5,000 plus new employees could be identified to fill these jobs, recalling that the total number of unemployed in Nunavut in 2013 was just 2,300 people (NBS, 2014c). However, expectations for labour force growth, calculated on the same basis as in Section 8.1 on community economies, indicate that for the foreseeable future, Nunavut will see an average annual net addition of 275 people to its labour force between 2013 and 2030, as the high numbers of young grow up and look for work, for a net addition of about 4,900 workers by 2030.[123] The demand for workers in parts of the economy related to mining projects (direct, indirect and induced) will not rise as quickly as the labour force will grow in the longer term. This is demonstrated in Figure 13.2-1.

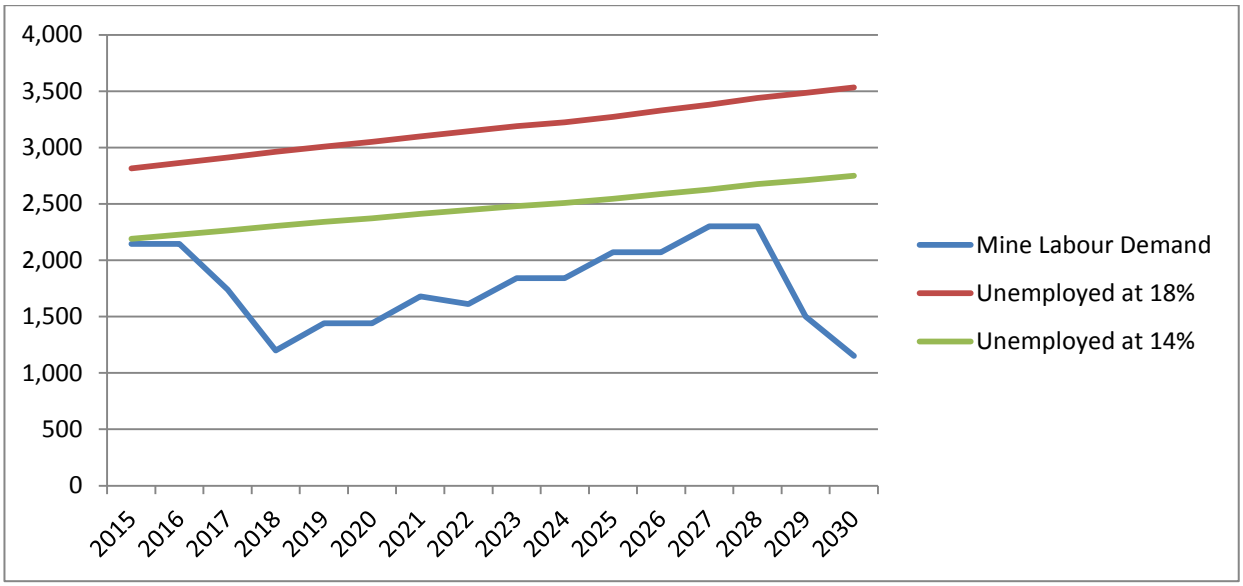
Figure 13.2-1 Mining Related Jobs and Labour Force Size



[123] This figure is based on numbers of people turning 18 each year, an average participation rate of 65%, and the numbers of people turning 65 each year and therefore exiting the labour force.

Figure 13.2-2 below shows the expectations regarding labour force demand by mining projects as compared to numbers of unemployed, at two unemployment rates.

Figure 13.2-2 Labour Force and Mine Labour Demand



Note: Unemployment numbers at each of 18% and 14% are based on labour force projections (new entrants by year minus new leavers times at estimated participation rate of 65% over the period to 2030 derived from NBS population and labour force data (NBS, 2014c).

It is noted that the figure does indicate some potential for labour shortages for the years 2015 and 2016 at the lower unemployment rate of 14%. This would be of concern as it would indicate that more out of area employees will be needed to supplement the available Nunavut workforce. However delays against expectations, which might be considered characteristic of the mining industry, would push the blue line to the right, eliminating some of the apparent labour shortage in short term.

Different scenarios can be constructed on the basis of different assumptions of labour force growth rates, lower or higher direct Inuit employment rates by mining projects or a different constellation of projects for example. However unless assumptions were radically altered, scenario changes would not change the major conclusions, which are that:

- although in the shorter term, in 2015 and 2016, there is some potential for competition for labour, over the longer term labour demand should not exceed Nunavut's capacity to supply
- the mining industry currently holds out the most promise in creating the jobs that a rapidly growing workforce will need but currently foreseeable projects will not provide all the jobs Nunavut will need to create over the coming decades

- the capacity of labour to respond to mining industry workforce requirements is a critical component – with the exception of many induced jobs, skilled and productive workers will be needed to achieve and exceed the employment numbers presented in Figure 13.2-1 and Figure 13.2-2.
- provided there are more than a very few mining projects in Nunavut, development of the industry can smooth out bumps in unemployment – as projects open and close, alternative employment opportunities are opened for retrenched employees.

An updated Labour Market Analysis for the AREVA Kiggavik Uranium Project is provided as Attachment B to this Volume. The report was completed in September 2014, evaluates a low, medium, and high growth scenarios, and concludes that 50% Inuit employment for the Project is achievable assuming turnover rates are not excessive.

Because economic systems are so integrated, employment can also be considered a sort of surrogate for other economic parameters characteristic of an industry. Although there will be many differences in detail, large mining projects will have roughly comparable relationships between work force requirements, capital expenditures, and revenues. Cumulative effects on GDP, labour income and revenues to government would approximate those developed for employment above – increasing over time and smoothing out the bumps in economic performance as compared to a scenario of occasional large projects. It is noted that as for labour, a growing capacity on the part of businesses to respond to mining projects goods and services will be an important component of cumulative economic effects.

AREVA's far future scenario, that of more mining projects (currently not foreseeable) in Kivalliq, cannot be assessed using the same means as above. However, it is clear from the above that there is, in the far future, both a capacity to provide labour to other developments in the mining sector and a need for mining projects in view of the eventual closure of foreseeable projects.

Territorial cumulative economic effects are significant benefits, and do not require either mitigation or monitoring by AREVA. It is noted however that government planning for enhancing capacity of labour and businesses and for sequencing of mining projects (particularly over the very short term when there may be more constraints to Inuit participation) can enhance cumulative benefits.

Cumulative effects on the economy of Nunavut are described in Table 13.2-2.

Table 13.2-2 Summary Impact Matrix, Cumulative Effects on the Economy of Nunavut

Effect	Related VSEC	Potential for Project Effects		Potential for Significant Cumulative Effects		Mitigation/ Enhancement		Criteria for More than Additive Cumulative Effects					
		Direction	Significance	Additive	More, or Less, than Additive	AREVA	Governments	Direction	Magnitude	Geographic Extent	Duration	Likelihood	Significance Prediction Confidence
Cumulative Project Effects, Economy of Nunavut													
Contribution to GDP	Economic effects, fiscal effects	Positive	Yes	Yes	Less positive, where there is constrained ability in labour force to take advantage of employment opportunities	As for AREVA's mitigation and enhancement for the local study area	As for government mitigation and enhancement for the local study area	Negative (less positive)	Not determined	Nunavut	Long	Not determined	High
Contribution to employment and labour income	Economic effects, fiscal effects	Positive	Yes	Yes									
Contribution to revenues of GN and NTI	Fiscal effects	Positive	Yes	Yes									
Reversal of economic effects in Nunavut	Economic effects, fiscal effects	Negative	Yes	Yes	Less negative, where there is increased availability of alternative employment			Positive (less negative)					
Economic effects in the rest of Canada	Economic effects, fiscal effects	Positive	Yes	Yes	No	n/a							

13.3 Summary of Effects on Economy of Nunavut

Project effects on the economy of Nunavut are significant benefits, from both economic and fiscal points of view. If climate change facilitates resource extraction in Nunavut, through reduced costs to the mining industry, the benefits discussed above would increase to the extent that Nunavut has capacity to access those benefits. Depending on the speed of any growth in the mining industry, the primary danger lies in leakage of economic effects outside Nunavut as workers and suppliers have to be sourced from elsewhere in Canada.

The Project will also have transboundary effects on the economy of Canada and its provinces although given the sizes of federal and provincial economies, such benefits are much smaller in percentage terms that they are in Nunavut.

14 Summary of Residual Effects

14.1 Residual Effects

14.1.1 Project Effects

Table 14.1-1 summarizes residual Project effects on the basis of a single conclusion for each of 26 VSECs assessed in Sections 8 to 13 above. It is fully acknowledged that the table does not capture the detail of effects on different individuals, genders, age groups, vulnerable groups and communities in Kivalliq, many of which can be negative in a context of overall benefit.

Further, many actual effects will depend on socio-economic conditions as these will be in Kivalliq in 2017 and beyond. In a rapidly changing socio-economic context, extrapolating current baseline trends can introduce substantial error. Further, the effects of the Project will be additional to those of Meliadine (for which there is no socio-economic assessment yet prepared), which is fully expected to be in construction, and perhaps operation, by the time the Project moves to construction.

Table 14.1-1 does not differentiate in terms of Project phase. Although there are some differences in detail, many of the processes are the same in both construction and operations and change in response to the Project will be continuous. Overall, as people adjust to change with time, most negative effects are expected to moderate and positive effects to gain momentum. At closure, the same processes may reverse, however in 2035, or 2046 with an extended Project life, the socio-economic conditions in Kivalliq will again be quite different.

Effects on community economies are positive and significant. The Project will preferentially employ, educate and train and contract in Kivalliq. Incomes will increase for many people and community economies will grow. Although the Project will come to an end, the life-long benefits of job experience and learning are not reversed.

Some migration is expected into Baker Lake and Rankin Inlet. This overall is a positive effect for individuals who choose to migrate and will stimulate additional economic growth in receiving communities.

Effects on traditional culture are overall expected to be negative and significant. The Project will not force or require changes to traditional culture of course – AREVA's mitigation measures are intended to support and facilitate people's choices. However some drift away from harvesting, use of Inuktitut, and traditional values and knowledge must be expected, particularly in the context of other forces of cultural change. Climate change is also a factor.

Effects on individual, family and community wellbeing are overall expected to be positive and significant. Although negative effects on traditional culture have potential to erode wellbeing for some, broadening choices and opportunities for livelihoods are counteracting factors. There will be individual exceptions to improved wellbeing, and there is some expectation that crime, or awareness of crime, could increase in response to, for example, any developing inequities.

Increased demand for public infrastructure and services would be a negative effect if government were unable to meet that demand. Table 14.1-1 shows the effect as positive and significant. Revenues to GN and NTI will allow the provision of additional services, to the benefit of people. In this regard it is noted that the Project itself is not expected to be a source of increased demand.

The Project is expected to stimulate interest and may facilitate in some respects additional mining, and uranium, projects, particularly in western Kivalliq. This is a benefit, and significant, insofar as the ongoing land use planning process determines that this is the path forward Nunavut and Kivalliq choose. The consequent negative effect on tourism is considered of low magnitude because of little current use of the area by tourists. Land use effects in Baker Lake (including use of the shipping channel) are considered highly manageable, and therefore not significant.

Economic and fiscal effects at the territorial level are positive and significant. There will be very large jumps in gross domestic product, employment, labour income, own source GN revenues and payments to NTI. Subsequently the Project will represent a sustained contribution to the economy and revenues until closure.

Table 14.1-1 Summary Impact Matrix

Valued Socio-Economic Component	Mitigation/ Enhancement Measures	Residual Effect	Direction	Residual Environmental Effects Characteristics					Significance	Likelihood	Prediction Confidence	Recommended Follow-up and Monitoring
				Magnitude	Geographic Extent	Duration	Frequency	Reversibility				
Effects on Community Economies												
Employment	Preferential hiring and contracting, education and training, work force management	Yes	Positive	High	Communities	Long	Continuous	In part	Yes	Very likely	High	Operations, collaborative monitoring
Education and training		Yes	Positive	High								
Contracting		Yes	Positive	High								
Economic growth and diversification		Yes	Positive	Medium								
Incomes		Yes	Positive	High								
Population change		Yes	Positive	Medium								
Effects on Traditional Culture												
Harvesting	Work force management measures	Yes	Positive/ negative	Medium	Communities	Long	Continuous	No	Yes	Very likely	Medium	Collaborative monitoring
Food security		Yes	Positive/ negative	Medium								
Language		Yes	Negative	Medium								
Values and knowledge		Yes	Negative	Medium								
Cultural heritage sites		No	n/a									
Effects on Individual, Family and Community Wellbeing												
Health	Work force management measures, contributions to communities	Yes	Positive	Medium	Communities	Long	Continuous	No	No	Likely	Medium	Collaborative monitoring
Family function		Yes	Positive	Medium								
Savings		Yes	Positive	Medium								
Public security		Yes	Negative	Medium								
Public health and safety		No	n/a									
Social cohesion and participation		Yes	Positive/ negative	Medium	Communities	Long	Continuous	No	Yes	Likely	Medium	
Effects on Public Infrastructure and Services												
Social infrastructure and services	None practical	Yes	Positive	Medium	Communities	Long	Continuous	No	Yes	Likely	Medium	Collaborative monitoring
Policing		Yes	Positive	Medium								
Housing		Yes	Positive	Medium								
Other infrastructure and services		Yes	Positive	Medium								
Institutional capacity and governance		Yes	Positive	Medium								

Valued Socio-Economic Component	Mitigation/ Enhancement Measures	Residual Effect	Direction	Residual Environmental Effects Characteristics					Significance	Likelihood	Prediction Confidence	Recommended Follow-up and Monitoring
				Magnitude	Geographic Extent	Duration	Frequency	Reversibility				
Effects on Non-Traditional Land Use and Land Use Planning												
Mining	None required	Yes	Positive	Medium	Nunavut and Kivalliq	Long	Continuous	No	Yes	Likely	Medium	None
Commercial harvesting		No	n/a									
Tourism		Yes	Negative	Low	Nunavut and Kivalliq	Long	Continuous	No	Yes	Likely	Medium	
Land Use in Baker Lake		No	n/a									Collaborative monitoring
Effects on the Economy of Nunavut												
Economic effects	None required	Yes	Positive	High	Nunavut	Long	Continuous	In part	Yes	Very likely	High	None
Fiscal effects		Yes	Positive	High								

Baker Lake, the closest community to the Project, has the potential to experience effects that, in some cases, deviate from those predicted in Table 14.1-1. Table 14.1-2 provides a breakdown of residual effects specific to Baker Lake.

As with the LAA as a whole, most negative effects in Baker Lake are expected to moderate over time, while positive effects gain momentum. At closure, both positive and negative effects may reverse, however in 2035 (or 2046 with an extended Project life), the socio-economic conditions in Baker Lake will again be quite different.

Effects on Baker Lake's community economy are positive and significant. The Project will preferentially employ, educate and train and contract in Kivalliq. Given its size and proximity to the Project, Baker Lake is well positioned to maximally benefit from Project employment, education and training. Incomes will increase for many people and the local economy will grow. Although the Project will come to an end, the life-long benefits of job experience and learning are not reversed.

Some migration is expected into Baker Lake. This overall is a positive effect for individuals who choose to migrate, and will stimulate additional economic growth in receiving communities. Economic growth is expected to be most apparent in Rankin Inlet, given the community's relatively well established infrastructure, services and economic activity. Baker Lake, while likely providing employment, may not realize the same level of economic growth and diversification.

Effects on traditional culture are overall expected to be negative and significant. The Project will not force or require changes to traditional culture – AREVA's mitigation measures are intended to support and facilitate people's choices. However, transition into the wage economy and natural cultural change may result in some drift away from use of Inuktitut, and traditional values and knowledge. While some hunters note that participation in the wage economy affords them the resources needed to go hunting (e.g., snowmobiles, guns), Elders have identified the overall shift in cultural practices associated with movement into wage employment as having a negative effect on knowledge and practice of traditional hunting. These effects are as true for Baker Lake as other LAA communities.

Effects on individual, family and community wellbeing are, overall, expected to be positive and significant. Although negative effects on traditional culture have the potential to erode wellbeing for some, broadening choices and opportunities for livelihoods are counteracting factors. There will be individual exceptions to improved wellbeing, and there is some expectation that crime, or awareness of crime, could increase in response to, for example, any developing inequities. These effects may be more apparent in Baker Lake than in other communities (other than Rankin Inlet), but will likely be of the same consequence.

Table 14.1-2 Summary Impact Matrix – Baker Lake Specific

Valued Socio-Economic Component	Mitigation/ Enhancement Measures	Residual Effect	Direction	Residual Environmental Effects Characteristics					Significance	Likelihood	Prediction Confidence	Recommended Follow-up and Monitoring
				Magnitude	Geographic Extent	Duration	Frequency	Reversibility				
Effects on Community Economies												
Employment	Preferential hiring and contracting, education and training, work force management	Yes	Positive	High	Baker Lake	Long	Continuous	In part	Yes	Very likely	High	Operations, collaborative monitoring
Education and training		Yes	Positive	High								
Contracting		Yes	Positive	High								
Economic growth and diversification		Yes	Positive	Low								
Incomes		Yes	Positive	High								
Population change		Yes	Positive	High								
Effects on Traditional Culture												
Harvesting	Work force management measures	Yes	Positive/ negative	Medium	Baker Lake	Long	Continuous	No	Yes	Very likely	Medium	Collaborative monitoring
Food security		Yes	Positive/ negative	Medium								
Language		Yes	Negative	Medium								
Values and knowledge		Yes	Negative	Medium								
Cultural heritage sites		No	n/a									
Effects on Individual, Family and Community Wellbeing												
Health	Work force management measures, contributions to communities	Yes	Positive	Medium	Baker Lake	Long	Continuous	No	No	Likely	Medium	Collaborative monitoring
Family function		Yes	Positive	Medium								
Savings		Yes	Positive	Medium								
Public security		Yes	Negative	Medium								
Public health and safety		No	n/a									
Social cohesion and participation		Yes	Positive/ negative	Medium	Baker Lake	Long	Continuous	No	Yes	Likely	Medium	
Effects on Public Infrastructure and Services												
Social infrastructure and services	None practical	Yes	Positive	Medium	Baker Lake	Long	Continuous	No	Yes	Likely	Medium	Collaborative monitoring
Policing		Yes	Positive	Medium								
Housing		Yes	Positive	Medium								
Other infrastructure and services		Yes	Positive	Medium								
Institutional capacity and governance		Yes	Positive	Medium								

Valued Socio-Economic Component	Mitigation/ Enhancement Measures	Residual Effect	Direction	Residual Environmental Effects Characteristics					Significance	Likelihood	Prediction Confidence	Recommended Follow-up and Monitoring
				Magnitude	Geographic Extent	Duration	Frequency	Reversibility				
Effects on Non-Traditional Land Use and Land Use Planning												
Mining	None required	Yes	Positive	Medium	Western Kivalliq, Baker Lake Region	Long	Continuous	No	Yes	Likely	Medium	None
Commercial harvesting		No	n/a									
Tourism		Yes	Negative	Yes	Negative	Yes	Negative	Yes	Negative	Yes	Negative	
Land Use in Baker Lake		No	n/a									Collaborative monitoring
Effects on the Economy of Nunavut												
Economic effects	None required	No	Not experienced at the level of Baker Lake, beyond territorial allocations to the community									None

Increased demand for public infrastructure and services would be a negative effect if government were unable to meet that demand. Table 14.1-2 shows the effect as positive and significant. Revenues to GN and NTI will allow the provision of additional services in Baker Lake, to the benefit of people. In this regard it is noted that the Project itself is not expected to be a source of increased demand.

The Project may facilitate additional exploration and mining projects, particularly in western Kivalliq. This is a benefit, and significant, insofar as the ongoing land use planning process determines that this is the path forward Nunavut and Kivalliq choose. Baker Lake, as a main hub in Western Kivalliq, would likely experience benefits associated with further mining development. Land use effects in Baker Lake (including use of the shipping channel) are considered highly manageable, and therefore not significant.

Economic and fiscal effects at the territorial level are positive and significant, but will not have a direct effect on Baker Lake beyond territorial funding to the community.

Chesterfield Inlet may also experience specific effects deviating from those predicted in Table 14.1-1. While most effects would be the same, the residual effect on harvesting, in particular of marine mammals, is expected to be negative in nature overall (rather than both positive and negative, context depending), but still of medium magnitude given mitigations associated with shipping. Seal and Beluga harvesting effects associated with shipping activities in the inlet would be most felt by residents of Chesterfield Inlet.

14.2 Cumulative Effects

For purposes of assessing cumulative socio-economic effects, the scenario is the construction and operations of a total of nine large mining projects in Nunavut over the interim to 2028. The projects are Meadowbank, the Project, Meliadine, Mary River, Doris North phases 1 and 2, Hackett River, Izok Lake and Back River. Most of these projects are not in Kivalliq. However their very high demands for labour and goods, the imperative to maximize Project benefits to Inuit and rapidly growing capacity in Kivalliq to supply the mining sector suggest that there will be spillover effects into Kivalliq Region even where projects are located elsewhere in Nunavut.

These projects are expected to have the same types of socio-economic effects as the Project. Most of these effects will be additive, for example more people will be employed, economies will grow more quickly, there will be more demand for land in Baker Lake and crime levels may go up. However there is some potential that the total effects of all these projects together could be more, or less, than additive. That is, the combination of effects from multiple projects can result in a shift in the socio-economic environment to a state that adding up effects from multiple projects does not fully account for.

In the shorter term, should the combined demand for labour and goods outstrip capacity to supply simply on account of shortages of people in the labour force and should mining proponents then be forced to go south, benefits that notionally could have been retained by Inuit will not be. Nunavut's labour force is growing so quickly that this is not a longer term worry however.

The integrity of traditional culture will in the longer term depend on a substantial proportion of people maintaining its practice. The Project alone will not create economic opportunities for all, but any potential for much fuller employment, particularly of the young, may have long term negative implications for traditional culture. Government programs in support of traditional culture and ongoing importance given by people to maintaining cultural integrity will mitigate the potential for this to some extent, and Inuit do accept that culture evolves.

Rapid development of the mining sector has important implications for the interfaces between traditional and non-traditional land use, including for aspirations to develop a tourism sector. Land use planning in Nunavut has not advanced yet to the phase of delimiting areas appropriate for different uses.

Finally, the cumulative effects of multiple projects will be a significant benefit to the economy of Nunavut. Mining projects eventually close, with potential to cause severe economic and consequent social dislocation for both individuals and the territorial economy. The availability of new projects to take the place of older ones provides alternative jobs and markets for labour and business.

14.3 Socio-Economic Management

To manage socio-economic effects, AREVA has developed a Community Involvement Plan (see Technical Appendix 3C) and a Human Resource Development Plan (see Technical Appendix 9C). Project design has been adjusted, in response to community input, to protect environmental resources (and any consequences on harvesting) and to alleviate any fears associated with the storage of uranium in Baker Lake. Socio-economic management however is primarily effected through commitments to implement measures to mitigate the potential for negative effects and more importantly to enhance benefits for Inuit. Socio-economic management also includes extensive opportunities for community engagement and participation in Project decision making, and collaborative monitoring.

It is noted that AREVA's intentions as listed below are expected to be included in the IIBA negotiated with KIA. The measures are derived from lessons learned elsewhere in Nunavut and northern Canada, and people's suggestions during engagement. AREVA's corporate experience in Saskatchewan has also been drawn upon.

AREVA's will maximize **employment and contracting opportunities** for people in Kivalliq communities. The major elements of this are i) preferential hiring, including points of hire in each of the Kivalliq communities; ii) preferential contracting, and helping businesses to overcome barriers to accessing Project contracting; iii) education, training and scholarship programs; iv) accommodating Inuit culture in the workplace as practical for improved job satisfaction; v) wide dissemination of information on available employment and business opportunities; and vi) requiring similar benefit enhancement on the part of contractors.

It is noted that **education and training** will include pre-employment, life skills, high school completion, postsecondary, on the job, and mentoring programs for workers and prospective workers. AREVA will also work with Kivalliq education authorities to implement school based programs for children, to contribute to their ability over the longer term to successfully participate in both wage and land based economic activity.

Work force management policies are largely intended to ensure that Inuit employees are equitably compensated, have opportunity to engage in traditional activity and are provided workplace conditions that accommodate Inuit culture. There is also the expectation that all workers will conduct themselves appropriately both at the mine site and when in communities. Workforce management measures emphasize; i) rotational work schedules to enable trips on the land in weeks off work; ii) worker codes of conduct (including expectations of respect for difference); and iii) facilitating, where appropriate, use of Inuktitut and traditional practices at the mine site.

AREVA's initiatives to support individual, family and community **wellbeing** include: i) providing a confidential employee and family assistance program; ii) staffing the mine site with peer or elder counselors; iii) providing staff in communities to facilitate the transition between work and home life; iv) providing communication systems for people to stay in touch with families; and v) supporting community initiatives to address community priorities towards enhanced wellbeing, including as examples, assistance to elder and child care and recreational opportunities for youth. .

Risks to worker and public health and safety are largely related to the Project land and marine transportation routes. Risks are managed through i) the application of best health and safety practice; ii) emergency response planning; and iii) avoiding and minimizing any environmental effects that have potential to affect livelihood resources and/or public health. Nevertheless heightened perception of risk is expected. This will be addressed through continuing education on uranium mining, and its environmental and socio-economic effects.

As throughout Project development, AREVA will continue to **engage**, including with elders to capture **IQ**, for input on socio-economic management measures and needed adjustments (adaptive management). AREVA will also continue to provide the information people need to engage and participate in the Project effectively. AREVA fully acknowledges the importance to conduct meetings and provide information not only in English but also in Inuktitut.

Monitoring with include reporting on the uptake of economic opportunities, but AREVA also expects to collaborate with communities, KIA, GN and AANDC to develop a framework for collaborative monitoring of community wellbeing, primarily through participation with the Kivalliq SEMC. Details remain to be worked out as the Project moves towards construction.

Closure (premature or final) effects are most keenly felt in the coming to an end of employment and business opportunities and the consequent negative social effects of an economic downturn. The measures described above include a number of elements that are intended to enhance economic and social resiliency in communities, which will go some way to attenuating the potential for negative closure effects. Work and business experience will give people a competitive edge in competing elsewhere in the economy. The emphasis on education and training will enhance work force and business capacity to offer services. As well, at closure retrenchment programs and alternative livelihood training will be offered where necessary.

It is noted that many of the residual effects described in Section 14.1 above are contributions of the Project to the ongoing socio-economic dynamic and trends in Kivalliq. As such, governments already have in place a large number of legal instruments and programs that have been developed to address the same kinds of socio-economic change, positive and negative, that has potential to result from the Project. Examples include language preservation, support to traditional harvesting, expansion of postsecondary education and public health programs.

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Attachment A Socio—Economic Data Collection Events

Eighteen interviews with elders in Baker Lake were done in 2008, and 11 interviews with elders in Chesterfield Inlet were done on May 6 and 7, 2009. Sixty nine other interviews and focus groups were done over the period February 27 to May 14, 2009. The household survey was done over the period March 30 to April 9, 2010. All events are chronologically listed below (asterisks indicate focus groups).

1. Elder interviews (18), Baker Lake – 2008
2. Hamlet Government, Rankin Inlet – February 27 2009
3. Health and Social Services, Rankin Inlet – February 27 2009
4. KIA, Rankin Inlet – February 27 2009
5. Education, Rankin Inlet – February 27 2009
6. Resident, Rankin Inlet – February 27 2009
7. Resident, Rankin Inlet – February 28 2009
8. Resident, Rankin Inlet – February 28 2009
9. Policing, Rankin Inlet – March 2 2009
10. Education, Rankin Inlet – March 2 2009
11. *Other, Rankin Inlet – March 2 2009
12. Agnico-Eagle, Baker Lake – March 3 2009
13. Hamlet Government, Baker Lake – March 3 2009
14. *Hunters, Baker Lake – March 4 2009
15. *Rotational Workers, Baker Lake – March 4
16. *Young Adults, Baker Lake – March 5
17. *Elders, Baker Lake – March 5
18. Health and Social Services, Arviat – March 30
19. Policing, Arviat – March 30
20. Hamlet Government, Arviat – March 30
21. Hamlet Government, Arviat – March 30
22. Resident, Arviat – March 30
23. Health and Social Services, Arviat – March 30
24. *Hunters, Arviat – March 30
25. Hamlet Government, Arviat – March 31
26. Education, Arviat – March 31
27. Health and Social Services, Arviat – March 31
28. Resident, Arviat – March 31
29. *Elders, Arviat – March 31
30. Education, Arviat – April 1
31. Resident, Rankin Inlet – April 2
32. *Hunters, Rankin Inlet – April 2
33. *Young Adults, Rankin Inlet – April 2
34. *Elders, Rankin Inlet – April 3
35. *Women, Rankin Inlet – April 3
36. Education, Rankin Inlet – April 3
37. Health and Social Services, Rankin Inlet – April 3, 2009
38. *Rotational Worker Spouses, Baker Lake – April 4 2009
39. Education, Baker Lake – April 6 2009
40. Policing, Baker Lake – April 6 2009
41. Health and Social Services, Baker Lake – April 6 2009

42. *Women, Baker Lake – April 6 2009
43. Hamlet Government, Whale Cove – April 8 2009
44. Resident, Whale Cove – April 8 2009
45. Education, Whale Cove – April 8 2009
46. Health and Social Services, Whale Cove – April 8 2009
47. Policing, Whale Cove – April 8 2009
48. Hamlet Government, Whale Cove – April 8 2009
49. Health and Social Services, Whale Cove – April 9 2009
50. *Elders, Whale Cove – April 9 2009
51. *Young Adults, Whale Cove – April 9 2009
52. Resident, Whale Cove – April 9 2009
53. Health and Social Services, Chesterfield Inlet – May 6 2009
54. KIA, Chesterfield Inlet – May 6 2009
55. *Women, Chesterfield Inlet – May 6 2009
56. Elder interviews (11) – May 6 and 7 2009
57. Education, Chesterfield Inlet – May 7 2009
58. Policing, Chesterfield Inlet – May 7 2009
59. Hamlet Government, Chesterfield Inlet – May 8 2009
60. Hamlet Government, Chesterfield Inlet – May 8 2009
61. *Elders, Chesterfield Inlet – May 8 2009
62. *Young Adults, Chesterfield Inlet – May 8 2009
63. *Elders, Repulse Bay – May 11 2009
64. *Hunters, Repulse Bay – May 11 2009
65. Hamlet Government, Repulse Bay – May 12 2009
66. *Young Adults, Repulse Bay – May 12 2009
67. *Hunters, Coral Harbour – May 13 2009
68. *Young Adults, Coral Harbour – May 13 2009
69. Education, Coral Harbour – May 14 2009
70. *Elders, Coral Harbour – May 14 2009
71. Health and Social Services, Coral Harbour – May 14 2009
72. Household Survey (89 households), Baker Lake – March 30 to April 9 2010

In addition, over XX comments provided during engagement events between 2008 and 2014 were reviewed for relevance to the socio-economic component of the EIS.

Attachment B Kiggavik Labour Market Analysis

Labour Market Analysis for the AREVA Kiggavik Uranium Project

Final Report

Prepared For Golder Associates

September 2014

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1.0 Executive Summary

The AREVA Resources Canada Kiggavik Project (the Project) is currently under review. The Final Environmental Impact Statement is to be submitted to the Nunavut Impact Review Board later in 2014. Construction is expected to be from 2017 to 2019 and with a 14 year mine life. Construction employment will be 750 persons per year with operational employment at approximately 550.

As part of the review process Nunavut Impact Review Board (NIRB) asked the Project proponent to "Update and refine the labour force projections in Section 13.2 of the FEIS, including consideration of people expected to exit the workforce, employment growth in non-mining sectors and other relevant factors."

In addition, the project proponent was asked by the NIRB to “Provide a more comprehensive analysis of labour force projections, using the most recent labour market analysis, which includes a clear delineation of project development phases and anticipated Inuit employment levels at each phase of the project, the required efficacy of training programs and estimated turnover rates and to present the analysis in terms of AREVA’s plan to meet a 50% Inuit hiring target”.

The cumulative economic effects of mineral development on employment, notably Inuit employment, are dependent on the number and timing of other mining activities. However, as the number, location, and timing of future projects is not predictable without a measure of certainty, Golder Associates contracted SJ Research Services to assess the employment effects of a number of scenarios that include/or exclude other currently proposed Projects. In addition, the latest long term employment forecast by the Conference Board of Canada (CBOC) and estimated attrition rates were incorporated into the analysis. This provides the basis for a meaningful discussion of potential Inuit employment opportunities and available Inuit labour pool.

Three mining growth scenarios for Nunavut were developed: Low, Medium, and High. Under the Low Growth Scenario, only Nunavut mines currently in production or advanced construction are considered. In the Medium Growth Scenario, mining employment is projected only for projects currently in the review/permitting process, as well as those in the Low Growth Scenario. In the High Growth Scenario, all projects currently in the exploration stage are projected to move to production in addition to those in the Low and Medium Growth Scenarios.

1.1 Summary of Future Labour Market Developments

Total employment (both operational and construction), was estimated for 16 mining projects in Nunavut, at various stages of exploration, review, and operation for the period of 2014 to 2040. There are 9 projects in the exploration stage (High Growth), 5 in the review/permitting stage (Medium Growth), and 2 in the operational stage (Low Growth). Low Growth includes the Project as it is assumed that it will go forward. In addition the latest CBOC Territorial Outlook was incorporated to estimate non-mining employment and key labour force indicators.

Table 1.1 Mining Operational Employment Nunavut 2014 to 2024

	Mining Operational Employment										
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
High Growth	678	728	968	2,378	4,678	4,600	5,800	6,765	7,315	7,015	7,015
Medium Growth	678	678	678	1,388	3,738	3,060	3,610	3,875	3,875	3,875	3,875
Low Growth	678	678	678	678	1,378	700	700	700	700	700	700

Table 1.2 Mining and Non-Mining Employment Nunavut 2014 to 2024

Mining and Non-Mining Employment 2014 to 2024 Medium Growth Scenario											
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Mining Employment	678	678	678	1,388	3,738	3,060	3,610	3,875	3,875	3,875	3,875
Non-Mining Employment CBOC	12,322	13,722	13,722	12,412	9,862	11,240	10,890	10,825	11,025	11,225	11,425

Table 1.3 Available Nunavut Inuit Labour Force 2014 to 2024

Available Nunavut Inuit Labour Force 2014 to 2024	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
High Growth	3,339	2,946	3,692	4,073	4,043	3,671	4,017	4,115	4,201	4,275	4,346
Medium Growth	3,339	2,944	3,684	4,046	4,017	3,628	3,957	4,035	4,106	4,188	4,259
Low Growth	3,339	2,944	3,684	4,026	3,952	3,563	3,876	3,947	4,018	4,100	4,171

1.2 Analysis

Application of an 11% turnover rate (national average) to non-mining employment, a 5% turnover rate to mining employment (mining specific), plus forecasted new employment opportunities provides an estimate of available vacant positions each year. Using the Inuit employment rate as the absorption rate and an estimate of Inuit unemployed, the remaining Inuit labour pool can be estimated. This varies from 2,900 to 4,300 each year between 2014 and 2024 for Nunavut as a whole.

1.3 Conclusion

Under the Low Growth Scenario, only Meliadine and the Meadowbank Mine (Agnico-Eagle Mines Ltd) are expected to be operational. However, 2018 will be the final year of production for Meadowbank. Mining employment remains at 700 positions for the bulk of the forecast period.

Mining operational employment demand under the Medium Growth Scenario rises to 3,875 by 2024. Under the High Growth Scenario, mining labour demand will be 5,725 in 2028. With annual turnover again anticipated to be 11%, 649 vacant positions will be available to absorb project employment. Given a certain amount of Project employment attrition (retirements, etc), High Growth Scenario mining employment will be sufficient to fully mitigate Project closure in 2027/28.

Given a relatively static absorption rate of a growing Inuit population of labour force age, the available Inuit labour pool varies from 2,900 to 4,300 each year between 2014 and 2024. However, it should be noted that not all of these will be workforce ready, trainable, living in the mine vicinity, or willing to relocate from within Nunavut to the Kivalliq region. Despite this the 275 (50% of 550) positions targeted for the project for Inuit employees should be achievable assuming project turnover rates are not excessive.

2.0 Introduction and Methodology

2.1 Background

Golder Associates contracted SJ Research Services to update and refine labour force projections for Nunavut including attrition, employment growth in non-mining sectors, employment growth in mining sectors with a clear delineation of project development phases and anticipated Inuit employment levels.

2.2 Methodology

Three growth scenarios were developed: Low, Medium, and High. Under the Low Growth Scenario, only Nunavut mines currently in production or advanced construction are considered. In the Medium Growth Scenario, mining employment is projected only for projects currently in the review/permitting process, as well as those in the Low Growth Scenario. In the High Growth Scenario, all projects currently in the exploration stage are projected to move to production in addition to those in the Low and Medium Growth Scenarios.

Total employment (both operational and construction), was estimated for 16 mining projects in Nunavut, at various stages of exploration, review, and operation for the period of 2014 to 2040. There are 9 projects in the exploration stage (High Growth), 5 in the review/permitting stage (Medium Growth), and 2 in the operational stage (Low Growth). Low Growth includes the Project as it is assumed that it will go forward. Details on data sources and estimation methodology are detailed below on a project by project basis.

Meliadine (Agnico-Eagle Mines Ltd.) - Low Growth Scenario. Project employment is readily available in the Socio-economic project study. Construction employment is 4600 person years over 4 years and operational employment is 700 positions per year for 10 years.

Meadowbank Mine (Agnico-Eagle Mines Ltd.) - Low Growth Scenario. Project employment was available on the mine operations website at 678 per year. Construction employment was not estimated because the construction phase has already wound down.

Back River (Sabina Gold and Silver Corp) - Medium Growth Scenario. The project is currently under review with the NIRB - Final Environmental Impact Statement expected in 2014. With production scheduled for 2017, a three year construction period is assumed beginning in 2015. Construction employment (1500 person years) was estimated based on project capex relative to the Meliadine project. 700 person operational employment was used because the rate of annual production is the same as Meliadine's. Mine life (12 years) was based on deposit size divided by annual production rate.

Mary River (ArcelorMittal and Nunavut Iron Ore) - Medium Growth Scenario. The Project was approved in 2013 with construction scheduled to start in late 2013/early 2014 and finish in late 2017. Productive life is 21 years (2018 to 2039). The construction workforce will range in size from 1,700 to 2,700 persons and operational employment will be 950. Project details were available in the project Final Environmental Impact Statement.

Izok corridor Project - Hood and Izok Lake (MMG Resources Inc) - Medium Growth Scenario. MMG submitted its Izok Corridor Project Proposal to the Nunavut Impact Review Board (NIRB) and key authorising agencies in September 2012. MMG since advised it will continue its feasibility study and exploration program in 2014 and expects to provide NIRB with an update in the fourth quarter 2014. Construction is expected to run from 2015 to 2016 and production from 2017 to 2029. The average on-site construction work force is expected to be approximately 670. The total workforce will be approximately double that at 1140 workers based on a fly-in-fly-out (FIFO) rotation. Operational employment will be 710. Project details were available in the Project Proposal submitted in September 2012.

Hackett River (Xstrata Zinc Canada) - Medium Growth Scenario. The EIS was expected by end of 2013. Sabina was originally submitted an EIS in 2008, however, an updated submission by Xstrata is not yet available. Construction is forecasted to start in 2018 assuming the probability of restarting the review process. The original Sabina submission was used for employment estimates with pushed out construction and production dates. Under this assumption, 2020 will be the first year of production with a mine life of 14 years. Construction employment will be 450 (150 per year). Operational employment will range from 225 to 300 with an average of 260.

Kiggavik (AREVA Resources Canada) - Medium Growth Scenario. This project is under review with the NIRB and the Final Environmental Impact Statement in 2014. Construction will be from 2017 to 2019 and a 14 year mine life. Construction employment will be 750 persons per year with operational employment at 550. Project data was obtained from: Kiggavik Project Environmental Impact Statement Tier 2 Volume 9 Part 1 - Socio-Economic Environment.

Roche Bay (Advanced Explorations Inc) - High Growth Scenario. The project proponent believes pre-stripping is possible in 2015 with production ending in 2016. Capex is $1.37B and construction employment is 1100/yr based on the same capex as Meliadine but half the construction time length. Operational employment is estimated at 600 as most mines with this level of capex employ 500 to 700. The remaining data was sourced from the project feasibility study.

Angilak Lac 50 Uranium Deposit (Kivalliq Energy Corporation) - High Growth Scenario. This project is currently at the exploration stage. It is assumed a 5 year lag time before construction could begin (2019). The operational and construction time frames and employment levels are assumed to be the same as the Kiggavik project, another uranium mine of approximately the same scale.

Ulu Deposit (Elgin Mining Inc.) - High Growth Scenario. This project is currently in the Exploration phase. Construction is unlikely to happen before 2018 based on the approval process. Based on deposit size, relative to Meliadine, construction time, productive life, and workforce are estimated to be slightly less than 50% of Meliadine's: 1,800 person years of construction and 300 operational positions. Productive life is 3 years based on deposit size and a rate of extraction equivalent to Meliadine's.

Hope Bay (TMAC Resources) - High Growth Scenario. Construction is expected to begin in 2014 and end in 2015. Mine life will be to 2025. Capex is $276M. Construction employment is 345 per year (inferred from construction camp capacity). Operational employment is 240. Data is sourced from: the Preliminary Economic Assessment Study on the TMAC Project, Hope Bay Nunavut Canada.

Committee Bay Greenstone Belt – Three Bluffs (North Country Gold Corporation) – High Growth Scenario. This project is at the exploration stage. Earliest construction would be in 2018 based on

regulatory milestones. Construction would be for 2 years (2018 and 2019) at roughly half of Meliadine's construction workforce (1100 per year) with production in 2020. Productive life is estimated at 5 years based on Meliadine's extraction rate. Operational employment is 50% of Meliadine's size (350 persons) based on relative deposit sizes.

Qilaq Project (Peregrine Diamonds Ltd) – High Growth Scenario. Based on the 9 year period between initial surveying and construction experienced by the Diavik Diamond mine in the Northwest Territories, construction is not expected to occur until 2019. Construction will take 2 years and operational employment will be 700 persons per year. Construction employment is estimated at 1,000 persons per year based on the Kiggavik and Meliadine estimates.

Chidliak (Peregrine Diamonds Ltd) – High Growth Scenario. The employment estimates are based on assumptions identical to the Qilaq Project, above. The only difference is a 2 year later start date because exploration at the Qilaq Project is less advanced than the Qilaq Project. Construction is estimated to start in 2021, rather than 2019. All other assumptions are identical to Qilaq.

Jericho Diamond Mine (Shear Diamonds Inc.) – High Growth Scenario. The project is a diamond reclamation project, currently dormant due to low prices versus high operating costs and capitalization difficulties. In the High Growth Scenario, the project will re-enter production in 2015, as a regulatory and construction process is unlikely to be required. Production is assumed to be until 2017 because the original mine only produced for 3 years. Operational Employment is estimated to be 50 persons (rounded up) based on a scaled 375,000 carats per year vs. Diavik at 7.5m carats/yr) and 700 persons.

Lupin Gold Mine (Elgin Mining Inc.) – High Growth Scenario. This project is currently suspended but originally was a mine rehabilitation/construction project. The project was suspended in 2013 due to lower than anticipated gold prices. In the High Growth Scenario, construction will resume in 2015, the earliest most analysts expect a rebound in gold prices. Production will continue to 2016 based on deposit size and Meliadine's extraction rate. Operational employment is expected to be 100 persons per year, based on employment per deposit size using Meliadine as a baseline.

3.0 Employment Forecast

In the Low Growth Scenario, 2014 employment consists entirely of 678 for the Meadowbank Mine (Agnico-Eagle Mines Ltd). Employment peaks at 1,378 in 2017, the only period where both the Meliadine and Meadowbank are simultaneously operational. From 2018 to 2027, employment remains steady at the project operational level of 700.

In the Medium Growth Scenario, 2014 to 2018 employment consists entirely of 678 for the Meadowbank Mine (Agnico-Eagle Mines Ltd) and the Project. Employment hits its first peak in 2018 at 3,738 when the Izok corridor Project, Mary River, and Back River are expected to enter production. Employment hits a second and higher peak at 3,875 in 2025 with the addition of the Kiggavik and Hackett River projects. Employment begins to taper off in 2030 as Back River and Izok reach the end of their productive lives.

In the High Growth Scenario, employment in 2014 to 2016 mirrors the Medium and Low Growth Scenarios with the exception of another 50 positions at the Jericho project. Employment increases steadily to 7,315 in 2022 with the addition of Qilaq, Committee Bay Greenstone Belt – Three Bluffs, Hope Bay, Ulu Deposit, Angilak– Lac 50 uranium deposit, and Roche Bay. After this peak, employment slowly tapers to the 2000 person level in 2039/40.

Table 3.1 Mining Operational and Construction Employment Nunavut 2014 to 2024

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
High Growth Const. Employment	3,011	6,619	7,446	4,792	3,900	4,650	1,900	750	-	-	-
Med Growth Const. Employment	2,838	5,046	6,046	3,792	900	900	150	-	-	-	-
Low Growth Const. Employment	1,138	1,706	1,706	842	-	-	-	-	-	-	-
High Growth Op. Employment	678	728	968	2,378	4,678	4,600	5,800	6,765	7,315	7,015	7,015
Med Growth Op. Employment	678	678	678	1,388	3,738	3,060	3,610	3,875	3,875	3,875	3,875
Low Growth Op. Employment	678	678	678	678	1,378	700	700	700	700	700	700
Total High Growth Employment	3,689	7,347	8,414	7,170	8,578	9,250	7,700	7,515	7,315	7,015	7,015
Total Med. Growth Employment	3,516	5,724	6,724	5,180	4,638	3,960	3,760	3,875	3,875	3,875	3,875
Total Low Growth Employment	1,816	2,384	2,384	1,520	1,378	700	700	700	700	700	700

In addition, the Conference Board of Canada (CBOC) provides a long term forecast for Nunavut from 2014 to 2015. The bulk of key indicators are covered: GDP, CPI, Incomes, Labour force components, and population. The CBOC forecast Nunavut's population to grow from 36,400 in 2014 to 43,400 in 2024. Employment will grow from 13,000 to 15,300 over the same time period, with modest decline in 2017 and 2018. The Labour Force, those working and seeking work, is expected to grow from 14,900 in 2014 to 17,500 in 2024 with a corresponding small decline in 2017 and 2018.

It should be noted that the CBOC does not provide an industry breakdown of employment. As such, non-mining employment was estimated by subtracting the project based mining employment by scenario from total CBOC forecasted employment.

Inuit population and labour force components were forecasted as follows: Inuit population aged 15 to 64 (Labour force age) is available from the 2011 census. This population is forecasted to grow at the same rate as territorial population (26,363 in 2011 to 31,433 in 2024). Using the Inuit participation rate of 71% (Aboriginal Affairs and Northern Development Canada), the Inuit Labour Force can be estimated for each year. From this is subtracted Inuit Unemployed (22.5% of the Labour Force from the Caledon Institute) to arrive at Inuit employed and unemployed (4,200 to 5,000) for each year.

Absorption of Inuit unemployed into employment was assumed to be 46.2% per year, the Inuit employment rate or the percentage of adults working for pay. (Caledon Institute of Social Policy. Poverty and Prosperity in Nunavut. November 2013)

Available positions are the combination of new positions (mining and non-mining employment growth) and existing vacant positions which are estimated by applying turnover rates to total employment. The Conference Board of Canada's latest national turnover (both voluntary and involuntary) of 11% is used for non-mining employment. The absence of a Nunavut mining industry turnover figure necessitated the use of a national mining industry turnover figure. The Canadian Mining Industry Human Resources Council (MiHR) predicts national mining turnover for the next 10 years based on historical averages, age of labour force, economic conditions and expected attrition.

From MiHR's forecast an annual mining industry turnover rate was calculated.

Table 3.2 Cumulative Hiring Requirements Forecasts Baseline Scenario to 2023

Sector	Employment in 2013	Net Change in Employment	Replacement Requirements		Cumulative Hiring Requirements
			Retirement	Non-Retirement	
Exploration	51,395	-1935	13,075	10,550	21,690
Mining and Quarrying (except oil and gas)	70,690	10,425	20,965	16,860	48,250
Mineral Processing	72,080	17,136	22,555	18,120	57,811
Support Activities for mining	40,650	-1,040	10,595	8,545	18,100
Total	234,815	24,586	67,190	54,075	145,851

Source: Mining Industry Human Resources Council, 2013

According to MiHR, 121,265 workers (67,190 and 54,075) will be required over the next 10 years through retirement and non-retirement attrition, an average of 12,127 per year. Dividing 12,127 by current employment of 234,815 yields an annual turnover rate of 5.2%.

Given the above noted assumptions, the Inuit labour pool available to meet AREVA's 50% Inuit higher goal can be estimated as below:

Table 3.3 Detailed Labour Force Analysis:

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Available Inuit Labour Force	18,718	19,129	19,541	19,695	20,055	20,415	20,826	21,186	21,546	21,958	22,318
Employed	14,506	14,825	15,144	15,264	15,543	15,822	16,140	16,419	16,698	17,017	17,296
Unemployed	4,212	4,304	4,397	4,431	4,512	4,593	4,686	4,767	4,848	4,940	5,021
Not in LF	7,645	7,813	7,981	8,044	8,191	8,339	8,507	8,654	8,801	8,969	9,116
Inuit pop 15-64	26,363	26,943	27,522	27,740	28,246	28,753	29,333	29,840	30,347	30,926	31,433
Non Mining Turnover (11%) Plus new jobs											
High	1,855	2,854	1,238	-754	-1519	1845	-43	108	484	1,389	1,111
Med	1,855	2,909	1,509	55	-1465	2614	848	1126	1413	1,435	1,457
Low	1,855	2,909	1,509	843	444	2874	1718	1740	1762	1,784	1,806
Mining Turnover (5.2%) plus new Mining jobs											
High	34	86	288	1529	2534	152	1490	1303	916	51	351
Med	34	34	34	779	2537	-525	731	459	194	194	194
Low	34	34	34	34	769	-643	35	35	35	35	35
Assumed absorption into new positions = Inuit Employment rate times remaining Labour Pool											
High	873	1,358	705	358	469	923	669	652	647	665	675
Med	873	1,360	713	386	495	965	729	732	742	752	763
Low	873	1,360	713	405	561	1,031	810	820	830	840	851
Remaining Inuit to meet Areva 50% hiring target											
High	3,339	2,946	3,692	4,073	4,043	3,671	4,017	4,115	4,201	4,275	4,346
Med											

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
	3,339	2,944	3,684	4,046	4,017	3,628	3,957	4,035	4,106	4,188	4,259
Low	3,339	2,944	3,684	4,026	3,952	3,563	3,876	3,947	4,018	4,100	4,171

Given a relatively static absorption rate of a growing Inuit population of labour force age, the available Inuit labour pool in Nunavut varies from 2,900 to 4,300 each year between 2014 and 2024. However, it should be noted that not all of these will be workforce ready, trainable, living in the mine vicinity, or willing to relocate. Despite this the 275 (50% of 550) positions targeted for the project for Inuit employees should be achievable assuming project turnover rates are not excessive.

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Attachment C Interprovincial Input-Output Model

Available in the FEIS DVD and online.