MADRID-BOSTON PROJECT
FINAL ENVIRONMENTAL IMPACT STATEMENT

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Glossary and Abbreviations

Terminology used in this document is defined where it is first used. The following list will assist readers who may choose to review only portions of the document.

AANDC	Aboriginal Affairs and Northern Development Canada (now Indigenous and Northern Affairs Canada [INAC])
AIP	Agreement in Principle
ATV	All-terrain Vehicle
CEA	Cumulative Effects Assessment
CFIA	Canadian Food Inspection Agency
CRA	Commercial, Recreational or Aboriginal
DFO	Fisheries and Oceans Canada
EAA	Existing and Approved Authorizations
EIS	Environmental Impact Statement
GN	Government of Nunavut
GNWT	Government of Northwest Territories
HTO	Hunters and Trappers Organization
IIBA	Inuit Impact and Benefit Agreement
INAC	Indigenous and Northern Affairs Canada
IOL	Inuit Owned Lands
IQ	Inuit Qaujimajatuqangit
KIA	Kitikmeot Inuit Association
KRWB	Kitikmeot Regional Wildlife Board
LSA	Local Study Area
MOU	Memorandum of Understanding
NIRB	Nunavut Impact Review Board
NLUP	Nunavut Land Use Plan
NPC	Nunavut Planning Commission
NSA	Nunavut Settlement Area

NTI	Nunavut Tunnagavik Inc.
NWB	Nunavut Water Board
NWT	Northwest Territories
PDA	Project Development Area
RIA	Regional Inuit Association
RSA	Regional Study Area
TAH	Total Allowable Harvest
TEA	Transboundary Effects Assessment
TIA	Tailings Impoundment Area
TK	Traditional Knowledge
TMA	Tailings Management Area
VEC	Valued Ecosystem Component
VSEC	Valued Socio-economic Component

4. Land Use

The Madrid-Boston Project (the Project, or Phase 2 of the Hope Bay Project) has the potential to have an adverse effect on commercial land and resource use, and on local land use activities and knowledge. Commercial land users are mainly those engaged in the tourism industry (lodge operators, tour guides). Inuit (i.e., local land users) engaged in land use and harvesting activities depend on the land and environment to support their livelihoods. Traditional knowledge informs the ways in which Inuit engage with the land and environment, and is continually evolving in response to changing landscapes. Because of the physical presence of the Project, changes to levels of noise, dust, and visual aesthetics—and potential changes to the abundance, distribution and quality of animals and plants that are harvested—the Project has the potential to adversely affect land use.

Land use interests that are not associated with traditional activities, such as non-commercial land use (e.g., recreational use by southerners), are considered to occur as a commercial land use in conjunction with lodge operators and tour guides and is assessed as such. Therefore, non-commercial land uses are not considered further.

4.1 INCORPORATION OF TRADITIONAL KNOWLEDGE

The following section describes how traditional knowledge (TK) was considered in development of this EIS chapter.

4.1.1 Incorporation of Traditional Knowledge for Existing Environment and Baseline Information

The information provided in the report *Inuit Traditional Knowledge for TMAC Resources Inc. Proposed Hope Bay Project, Naonaiyaotit Traditional Knowledge Project* (NTKP; Banci and Spicker, 2016) was reviewed as a reference point from which to interpret information gathered for land use. The analysis of this information highlights the way in which land use activities have changed as well as the ways in which they have remained similar.

In the past, camps and habitations on the land were seasonal, spread across the landscape, and only used for short periods of time. Among other areas, camping places were situated near narrows along the many bays of the Bathurst Inlet. The Inuinnaqtun name for the Bathurst Inlet is Kiligiktokmik (the inlet). Kingaok (Bathurst Inlet) and Omingmaktok (Bay Chimo) are communities that were used seasonally, and permanent settlements did not become established until after the trading posts were erected in the 1920s and in 1964, respectively (Usher 1971). Travel in the past was founded on the distribution and movement of animals. These travel corridors were located where wildlife resources were most abundant and travel was easier. These corridors linked Inuit to each other and to harvesting areas (Banci and Spicker 2016).

The introduction of trading posts, rifles, and steel traps during the early half of the 20th century altered the use of previously distinct hunting areas used by distinct groups of Inuit. Later (1950s, 1960s), the introduction of snow machines further changed how Inuit hunted, as the ability to travel great distances in a short time period greatly reduced the need for seasonal hunting camps. The introduction of the snow machine, coupled with the availability of goods for trade or purchase at trading posts, initiated the transition from seasonal to more permanent settlement (Banci and Spicker 2016). Two regions within the west Kitikmeot were so rich in wildlife resources that they permitted Inuit to live in a permanent location year-around, especially after they had access to guns and snow

machines. These regions were Tahikyoak (Contwoyto Lake) and Kilogtok (Bathurst Inlet). Tahikyoak is at the heart of the Nunamiut land-use, with a major travel to corridor to Kiligiktokmik (Bathurst Inlet) in the east, and a major travel corridor following the treeline to Kugluktuk at the coast in the west. Kitikmeot gathering places were situated along these travel routes, the largest and most important being at large lakes and along major rivers (Banci and Spicker 2016).

There are a number of ways in which the NTKP report compliments and informs the study of current land use activities. Inuit lifeways[1] tie land use to regional harvesting activities. Travel and harvest routes are places for harvest of natural resources, camps, and cultural connection to one another and the land. The NTKP report presents and discusses cultural landscapes and features associated with regional land use, including (Banci and Spicker 2016):

- major camps;
- water sources;
- fish and seal camps;
- hunting and trapping camps;
- burial sites;
- artifacts;
- carving stone and copper sources; and
- travel routes.

The NTKP report also presents the regional distribution of harvested resources including (Banci and Spicker 2016):

- **Lake and River Ekalok (fish):** ekalukpik (Arctic char), ehok (lake trout), anakheek (broad whitefish), kaphillik (Arctic cisco), hulukpaugan (Arctic grayling), and tiktalik (burbot);
- **Ocean Ekalok (fish):** ekalupik (Arctic char), hiugyuktok (Arctic cod and saffron cod), capelin, rainbow smelt, Etok (herring), eels, wolffish, other new and unknown species (reports of species not previously seen attributed to changes in ocean conditions);
- **Marine Wildlife**: nattik (ringed seal), ugyuk (bearded seal), aivik (walrus), nanok (polar bear), and kilalugak (beluga whale).
- **Plants:** mahok (eskimo potato, licorice root, alpine sweetroot), aaukpik (cloudberries), kingmingat (blueberries), paongak (crowberries and blackberries), cranberries, bearberries, eghot (white Arctic heather), avalakiak (willows), birch, mosses, green alder, puff ball mushrooms, Labrador tea and other plants, including marine plants;
- **Kopanoak (birds) and their eggs:** common eider, king eider, Canada goose, greater white-front goose, snow goose, Ross's goose, Arctic Swan, and species of Brants, loons, ducks, shorebirds, gulls, jaegers, raptors, ptarmigan, and egg harvesting from nesting areas;
- **Terrestrial Wildlife**: tuktuit (caribou), akhak (grizzly bear), amagok (wolf), kalvik (wolverine), omingmak (muskox), tuktukvak (moose), okalik (Arctic hare), hikhik (Arctic ground squirrel),

[1] "Lifeways" is a holistic term used by the Inuit to describe land use.

kayuktok (red fox), avingak (collective term for brown lemmings, Arctic or collared lemmings, and tundra voles), and muskrat.

Traditional knowledge regarding historic and current land use information in the Project area has also been provided through a series of three caribou workshops (Appendices V2-2A to V2-2D). The workshops engaged Elders and harvesters regarding their interests and knowledge of caribou. This information included hunting locations, travel routes, seasonality and changes in hunting activities over time, knowledge of caribou behaviour, and changes to caribou movements and trends over time. This information contributed to the understanding of baseline conditions for wildlife, as well as land use conditions in the area of the Project.

4.1.2 Incorporation of Traditional Knowledge for VSEC Selection

TK helped to identify and confirm the cultural values of the Kitikmeot Inuit and was key to scoping and selecting Valued Socio-Economic Components (VSECs), in particular with respect to traditional land use activities and knowledge. This information came from the NTKP report, as well as the land use baseline research that was carried out for the environmental assessment, consisting of focus groups and interviews with land users. For the scoping of land use VSECs, TK described the cultural values of the past and helped place current land use values in context. Specific information on the regional environment, components of the environment (for example, animals, plants, water), and characteristics of traditional land use and its place within the Inuit way of life was further relied upon to identify and describe the potential interactions between the proposed Project, the existing Doris Project and land use VSECs.

4.1.3 Incorporation of Traditional Knowledge for Spatial and Temporal Boundaries

The NTKP report contextualizes the practice of traditional land use activities in a larger area surrounding the proposed Project and informs the understanding of the evolution of traditional land use in relation to the land on which the Project is situated. The spatial boundaries were selected to identify potential environmental effects of the Project infrastructure and activities that may result in changes to land use activities.

The information in the NTKP report provides the foundation from which to understand and characterize current land use activities. This context strengthens and supports the rationale upon which the spatial boundaries were selected for the review of potential environmental effects of the Project on land use activities and knowledge. Specifically, in recognition of the continuing evolution of traditional land use practices and the importance of different locations at different points in time, the Local Study Area (LSA) is represented by a large five-kilometre boundary around the Madrid-Boston Project infrastructure. This expanded area around the proposed Project infrastructure and activities is to accommodate potential changes in the location of land use activities that may directly interact with the Project.

While the temporal boundaries employed in the assessment represent the phases of the Project over the life of the proposed mine, the assessment considers land use and cultural activities described in the NTKP report, which begins pre-1916 (before the fur traders) and extends to present day conditions (Banci and Spicker 2016). The consideration of past land use activities creates a base or lens through which to understand the current practice of traditional land use activities that are the focus of the assessment. Understanding the past evolution of traditional land use activities informs and strengthens insight into the future evolution of traditional land use and what these changes might mean for Kitikmeot Inuit.

4.1.4 Incorporation of Traditional Knowledge for Project Effects Assessment

TK was utilized alongside other baseline information in the assessment of the potential effects of the Project on land use. It supplemented and enriched the baseline information for a deeper understanding of the environment and characteristics of traditional land use as they may be affected by the Madrid-Boston Project. Inclusion of the information provided in the NTKP report gave insight that was essential for development of a well-informed and accurate assessment.

4.1.5 Incorporation of Traditional Knowledge for Mitigation and Adaptive Management

The mitigation and adaptive management strategies identified for Land Use focus on maintaining current activities and values, and minimizing the potential for land use to be affected by the Project in the future as land use activities and the environment continue to evolve. The NTKP report provided information on past use that was placed in context with current practices. This led to a deeper understanding of the changes that have occurred and what has persisted over time, which provided guidance in developing mitigation and adaptive management measures that seek to maintain and enhance the harvesting activities and traditional knowledge of Inuit. Focus was also given to maintaining traditional harvesting activities and lifestyles of Inuit that become employed with the Project. In this case, consideration of TK helped inform the design of mitigation and management plans that support workers in their pursuit of traditional activities and practices.

Information shared during the three Caribou Workshops (Appendices V2-2A to V2-2D) supported TMAC's development of caribou protection measures within the area of the Hope Bay Project. These measures are important to the land use context, as mitigation of effects to caribou contribute towards reducing or avoiding effects for land users who rely on caribou, and other wildlife for subsistence and livelihood, cultural continuation, and other purposes.

4.2 EXISTING ENVIRONMENT AND BASELINE INFORMATION

The land use baseline identifies existing land uses, users, values, and activities associated with the land and natural resources. This includes both subsistence activities (e.g., hunting, trapping, fishing, and gathering) as well as industrial and commercial activities (e.g., mining, tourism). The land use description focuses on existing, contemporary land use by people and companies active in the local study area, including residents of the nearest communities of Cambridge Bay and Kugluktuk. Contemporary land and resource use and management reflects the importance of hunting, fishing and spending time on the land in the Kitikmeot region. Due to the remoteness of the area, there are no other land use interests that have been identified (e.g., public recreational use), and non-commercial land use has not been considered further in the baseline or assessment.

This section provides a summary of the methods and results of the land use baseline collected for the Hope Bay Project. Community-level research was carried out in 2011 and again in 2017. Detailed information on the methods and results are provided in the *Hope Bay Belt Project 2011 Socio-economic and Land Use Baseline Report* (Appendix V6-3A) and the Madrid-Boston Project: Community Research Report (Appendix V6-3B). Desk-based research was carried out in 2015 and in 2017, and is presented in this section.

4.2.1 Regional Overview and Past Activities

Nunavut encompasses a large proportion of Northern Canada and most of the Canadian Arctic Archipelago. It is the largest of Canada's provinces and territories, yet comprises less than 0.1% of the country's population (Statistics Canada 2017). Most of the Nunavut population is Inuit.

Nunavut is characteristically remote. Communities within the territory are generally isolated from one another, and transportation and communication options are limited. There are no roads into Nunavut nor are there roads within the territory that connect Nunavut's communities. Inter-community travel is mainly by air. Communities can also be reached by sea during an approximately two-month summer window and, for closer communities (e.g., Gjoa Haven and Taloyoak), by snowmobile in the winter.

As described in the NTKP report, Inuit have a long history of traditional land use. For the Inuit historically based in Omingmaktok, Kingaok, Kugyoak and Ekaluktutiak (and now primarily based in Cambridge Bay), land use activities included seasonal travel to hunt game, fish and collect plants, as well as travel to areas for social and trade purposes (Banci and Spicker 2016).

During the early fur trade period, in the mid-1910s, there was an influx of people to the area, and influenced Inuit to modify their seasonal lifestyle and seasonal travel in order to include visits to trade posts to sell furs and purchase goods and provisions. Four main trading areas were established in the region at Cambridge Bay, Kugluktuk (Coppermine), Kingaok (Bathurst Inlet) and Perry River. The fur trade introduced new equipment for harvesters, including rifles and steel traps, resulting in a transition from traditional equipment and hunting styles.

The introduction of snow machines further influenced how Inuit hunted, and as great distances could be covered in shorter times, there was less reliance on seasonal camps. Inuit communities were further established, while traditional harvesting activities continued.

The introduction of mining in the region presented opportunities for paid employment, as well as influenced decisions about where families lived (in order to access employment opportunities) and resulted in changes to traditional lifestyles. Similarly, the growth in tourism activities and sport hunting/guiding has diversified employment opportunities for Inuit.

4.2.2 Data Sources

The collection of baseline information involved both primary and secondary data collection to generate a profile of key land and resource use characteristics for the Kitikmeot Region. Primary data sources included information obtained through a land use focus group conducted for the Hope Bay Project in 2011, interviews with representatives of local Hunters and Trappers Organizations (HTOs)[2] in both 2011 and 2017. During the 2017 community-based research, interviews with local land users (who are also service providers), also provided information regarding land and resource use within the Kitikmeot region. Secondary data sources included publically available information from the Government of Nunavut (GN), Nunavut Planning Commission (NPC), Inuit organizations (including the Kitikmeot Inuit Association, KIA) and other co-management organizations, the private sector, non-government organizations (NGOs), academic literature, and internet publications, as well as the *Inuit Traditional Knowledge for TMAC Resources Inc. Proposed Hope Bay Project, Naonaiyaotit Traditional Knowledge Project (NTKP) report* (Banci and Spicker 2016).

[2] In some communities, such as Kugaaruk, this organization is referred to as the Hunting and Trapping Association. For the purpose of this document, the abbreviation HTO is inclusive of both organization and associations that are involved in overseeing harvesting activities in their local community.

4.2.3 Methods

Community-level land use research was completed in 2011 and included a land use focus group (November 2011) that was attended by five Elders and one harvester active in areas near the Hope Bay Project, specifically near Omingmaktok. The focus group session included resource mapping along with descriptions of land use activities and uses of resources. In addition, key person interviews were conducted with representatives of local HTOs. These interviews included both structured and semi-structured questions, as well as resource mapping, to gather additional information on current use of land and resources to supplement the information collected from the focus group.

A series of three caribou workshops were held to engage with and understand the interests and knowledge of Elders and harvesters, and to consider this information in developing caribou protection measures (Appendices V2-2A to V2-2D). The multi-day workshops were held in September 2016, April 2017, and August 2017.

The first two-day workshop, held in September 2016, engaged Elders and harvesters about potential effects of the Madrid-Boston Project on wildlife, with a focus on caribou and related traditional land use activities. Workshop participants were selected in consultation with the KIA. Participation in the workshop was limited to eight knowledge holders. The workshop focused on gathering information from Elders and harvesters regarding their knowledge of caribou, experience of managing risks on the land, and a discussion about potential risks of the Project to caribou, and ways in which to manage (i.e., mitigate) those risks. The workshop included presentations and discussion about the Project, resource mapping of land uses and caribou, brainstorming about potential effect on and risks to caribou and consensus-building exercises to confirm workshop results (Appendix V2-2A).

The second workshop, held in April 2017, obtained additional input on the potential effects of mining at Madrid-Boston on caribou, and had a focus on the protection measures needed to keep caribou safe. This workshop was attended by five Elders and two harvesters. The workshop included a site visit to the Doris site. Participants were able to see the application of many of the proposed protection measures during this site visit (Appendix V2-2B).

The final workshop in the series was held in August 2017, and was attended by five Elders and one harvester. This final workshop included the review and further discussion of mitigation measures and monitoring that have been developed to protect caribou and other wildlife. The third workshop included presentations, group discussion, facilitated activities, and site visits to the Doris and Madrid-Boston sites. Discussion focused on the following topics: cumulative impacts, caribou protection measures, protection measures for other wildlife, and monitoring (Appendix V2-2C).

TMAC also collected primary research through community research undertaken in 2017 (Appendix V6-3B). The 2017 community research program consisted of semi-structured interviews with key informants in the five Kitikmeot communities of Kugluktuk, Cambridge Bay, Gjoa Haven, Taloyoak and Kugaaruk. Key informants with specific knowledge and/or experience concerning the community and/or region were identified. Information regarding land use, travel and subsistence activities was obtained from representatives of local HTOs. In some cases, other key informants who are active land users (e.g., local business leaders, local government representatives) also provided information regarding primary land uses and travel routes in the areas surrounding their community. In each interview, key informants were provided with an overview of the Hope Bay Project and the proposed Madrid-Boston Project, as well as a description the purpose of the research, and how information provided during the interview would be used in the FEIS. When discussing land use activities with HTO representatives and commercial land users, maps of the Project area were available and key informants were asked to describe and identify the location of specific land use activities and features. Following the interviews, researchers e-mailed the

key informants with a summary of the discussion, for their review and reference, and requested that they inform the researchers of any inaccuracies or misinterpretations. In the case that key informants provided input or revisions to the interview summary, changes were incorporated into the summary notes and community research report. Secondary information was obtained through desk-based research including literature review. An internet and bibliographic search was completed to identify potential information sources. The identified sources were reviewed, and applicable information was compiled and then analyzed at the regional level. Additionally, recently published literature was reviewed to further investigate key themes and trends.

4.2.3.1 Land Use Study Areas

The land use study first presents an overview of the land and resource use activities of individuals residing in the western Kitikmeot Region. This overview highlights the continued influence of subsistence activities in the region. This is followed by presenting the results from analyzing land use within the defined boundaries of the Regional Study Area (RSA) and Local Study Area (LSA).

The LSA for land use represents 105,200 hectares and encompasses the development area of the Madrid-Boston Project and Hope Bay Project and the immediately surroundings, extending out to a distance of five kilometres from the proposed Project infrastructure (Figure 4.2-1). The LSA was chosen as the area within which Project activities associated with the development and operation of the Project may directly affect land use and land user activities.

The RSA for land use is defined as the areas of land and water that encompass the Madrid-Boston Project and extend out to the largest boundary of the wildlife and terrestrial regional study areas (Figure 4.2-1). Areas within this boundary represent the strong link between these environmental components and traditional land use activities. This approach recognizes the relationship between the environment (e.g., habitat, fish, wildlife, and vegetation) and the people who use the land and rely on its resources. The RSA is approximately 534,000 hectares.

4.2.3.2 Information Caveats and Limitations

In accordance with standard data collection practices, TMAC used a variety of methods including community-level and desk-based research. By undertaking data collection through the caribou workshops and the 2017 community-based research program, TMAC has obtained current land use information and reduced potential data gaps. Notwithstanding, there may be limitations of the baseline information, which are dependent on the data collection, analysis, and presentation methods. Secondary information depended on the methodology and quality assurances provided by the source. In all cases, reputable sources for secondary information were employed. Primary data collection occurred in 2011 and 2017.

<u>Primary and Qualitative Information</u>

Community research was based on interviews with key knowledge holders in the communities, focusing on collecting both local quantitative data and perception-based qualitative information. Qualitative information primarily came from these interviews. A limitation of this qualitative data collection methodology is that it included perception-based information, which may be subject to bias or strategic responses. In order to minimize such errors, a standard practice in qualitative methodology was employed and information was triangulated among sources to confirm findings, wherever feasible. It is not possible to provide definitive statements regarding confidence in the data provided; however, error has been minimized through the application of well-established, best practices in information collection and analysis. Additionally, by requesting that key informants review a summary of the

interview, the research was able to identify and rectify, where applicable, any inaccuracies or misinterpretations in the information recorded by the researchers.

Secondary and Quantitative Information

TMAC utilized the most current secondary information available at the time of writing. In all cases, reputable sources for secondary information were employed. Secondary data was primarily obtained through government statistical agencies or other corporate sources, where professional standards in data collection, analysis and reporting are followed. For secondary data (e.g., Statistics Canada sources), levels of confidence vary depending on the specific data source and statistic. A limitation of the secondary and (and often quantitative information) is that consistent data is not always collected or data is not collected at a regular interval. For example, in 2008, Statistics Canada reported information on harvest participation rates; however, this information has not been updated by Statistics Canada since 2008. Notwithstanding, through interviews undertaken in 2017, it is possible to compare 2008 data versus information obtained during interviews to get an understanding if there has been significant change relative to information collected in the past.

Data for Kingaok and Omingmaktok

Kingaok and Omingmaktok are small communities situated on the shores of Bathurst Inlet (Figure 4.2-1). Community-based research conducted for the Back River Project indicates that residents of Kingaok relocated to Cambridge Bay in 2006 and residents of Omingmaktok relocated to Cambridge Bay in the fall of 2011. Kingaok and Omingmaktok are now used primarily as seasonal camps to facilitate land-based travel and as a cultural area of significance for former residents at selected times throughout the year.

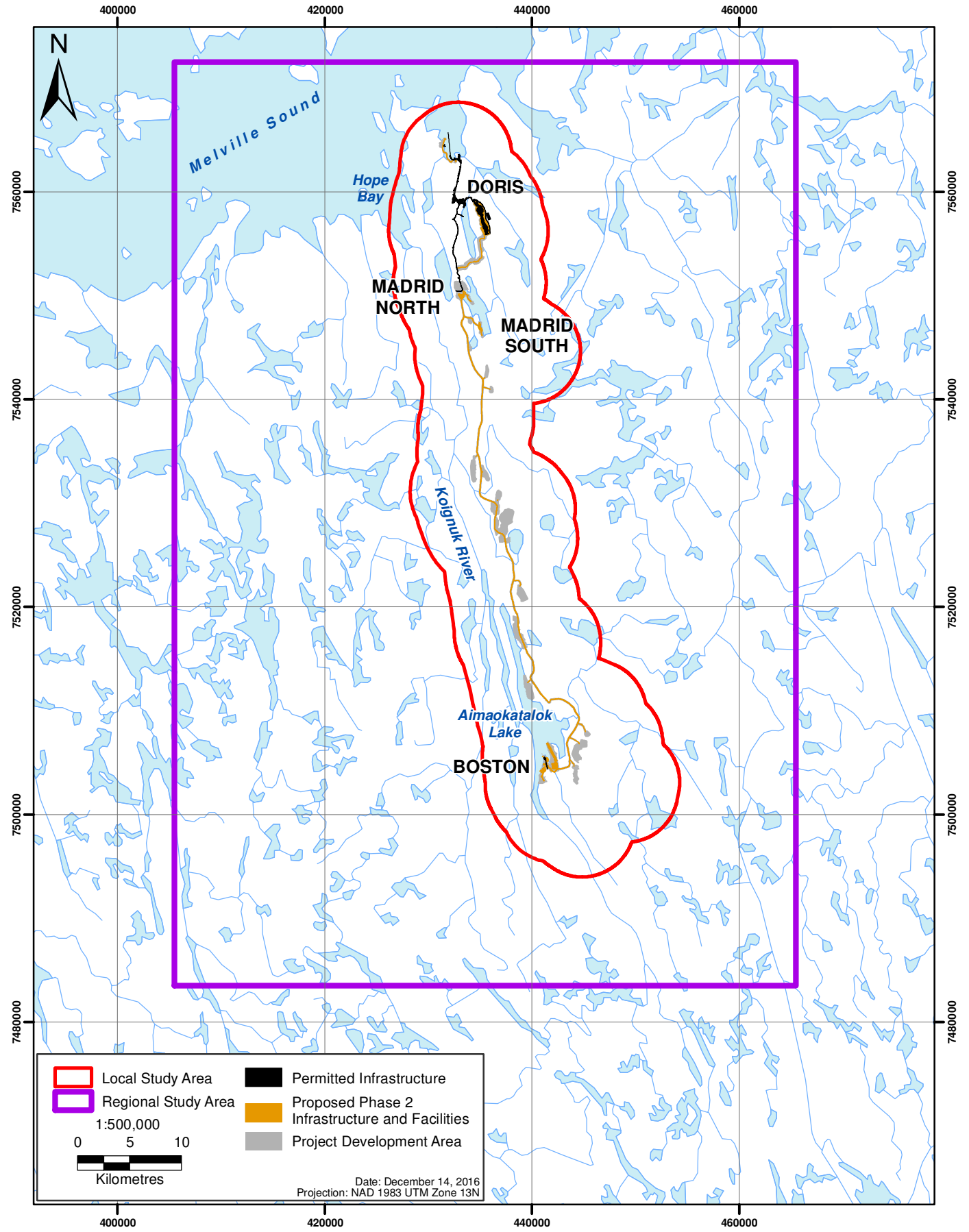
The Nunavut Bureau of Statistics counted the populations of Kingaok (Bathurst Inlet) and Omingmaktok as zero each year from 2006 to 2012. As a result, there are no censuses or other data for those communities. Therefore, information for Kingaok and Omingmaktok included in this baseline study is based on information from key informant interviews and land use focus group sessions conducted in 2011.

Outpost Camps

During primary research, land users described the location and use of camps and cabins. These were sometimes described as outpost camps. The term “outpost camp” has a specific meaning under the Nunavut Agreement, and is defined as a camp occupied by families or groups of Inuit on a temporary, seasonal, intermittent, semi-permanent or year round basis for the purpose of wildlife harvesting. The Nunavut Agreement further indicates that outpost camps include the residential base and surface lands on which the residential base is located and within 2 km of the residential base.

The term is now also used to refer to camps that are licenced by the GN in relation to commercial tourism operations. Within this report, the term “outpost camp” is reserved for use in reference to those outpost camps licenced by the GN as part of commercial tourism operations. References to camps that are made by local land users are assumed to mean unregistered or unlicensed camps or cabins that are used by Inuit individuals and families to support traditional harvesting activities. The use of the term “outpost camp” in this report may not necessarily be equivalent to its use within the Nunavut Agreement.

Figure 4.2-1
Land Use Local and Regional Study Areas



4.2.4 Characterization of Existing and Baseline Conditions

Land use components for this Project were selected through a review of the EIS Guidelines (NIRB) for the Madrid-Boston Project; completed environmental assessments of previous projects in Nunavut (i.e., Back River, Doris, High Lake, Meadowbank, and Mary River); recent government environmental assessment guidelines for other mine projects in Nunavut; values and concerns local community stakeholders expressed during field studies; consideration of the existing land use trends and conditions within the Kitikmeot region; and professional judgement. The components include:

- Regulatory regime and Nunavut land title and tenure (Section 4.2.4.1);
- Land use planning and designations (Section 4.2.4.2);
- Industrial land use (Section 4.2.4.3), including mining and oil-and-gas industries;
- Commercial land use (Section 4.2.4.4), including commercial hunting, trapping, food production, outfitters, ecotourism, and other activities;
- Culture and land use (Section 4.2.4.5), including Inuit culture and knowledge, and relationship to the natural environment and management of resources; and
- Traditional land and resource use activities (Sections 4.2.4.6 and 4.2.4.7), including harvesting and country foods in the western Kitikmeot, and in the land use RSA and LSA.

The following sections describe and characterize each of the components and their main information sources.

4.2.4.1 Regulatory Regime and Nunavut Land Title and Tenure

Nunavut was formally established on April 1, 1999 when it separated from the Northwest Territories, in accordance with the provision of the *Nunavut Land Claims Agreement Act* (1993b) and the *Nunavut Act* (1993a). The Nunavut Agreement established a set of collective rights exercised by Inuit beneficiaries. Under the Nunavut Agreement Inuit surrendered their Aboriginal claims, rights, and title to lands and waters in exchange for the rights and benefits provided in the agreement.

There are two main types of land title and tenure within Nunavut – Inuit-owned Land (IOL) and Crown land (Figure 4.2-1; NTI 2004). IOL is designated under the Nunavut Agreement as lands that vest in a Designated Inuit Organization, while Crown land refer to lands currently held by the federal government (NTI 2004). The Nunavut Tunnagavik Inc. (NTI) is responsible for IOL and Indigenous and Northern Affairs Canada (INAC)[3] for most Crown lands. NTI by-laws guide the management of IOL (Johnson 2009).

Inuit-owned Land

The NTI Department of Lands and Resources manages IOL on behalf of all Inuit. There are two main types of title to IOL - surface and subsurface. Surface IOL are "*fee simple saving and excepting the mines and mineral that may be found to exist within, upon, or under such lands, together with the right to work the same, but including the right all specified substances*" (Nunavut Agreement, S. 19.2.1(b)). Subsurface rights on surface IOL are held by the Crown and are administered by INAC (NTI 2004; Johnson 2009). The subsurface IOL are "*fee simple including the mines and minerals that may be found to exist within, upon or under such lands*" (Nunavut Agreement, S. 1.9.2.1(a)). Subsurface IOL accounts for 2% of all IOL in Nunavut.

[3] Indigenous and Northern Affairs was referred to as Aboriginal Affairs and Northern Development Canada (AANDC) prior to October 2015.

Regional Inuit Associations (RIAs) hold surface IOL title including the land and all specified substances (e.g., carving stone and aggregate, earth, soil, and peat). Mineral and mine deposits linked to subsurface IOL are held by the NTI on behalf all Inuit (NTI 2011).

The RIAs administer access to surface IOL rights through the provision of land use licences; commercial leases; right-of-way, residential, and recreational leases; and quarry rights. Leases are issued by the RIAs after considering the advice of community committees (Johnson 2009). In the Kitikmeot region, the RIA is the KIA.

The NTI administers access to subsurface IOL rights. Exploration agreements may be granted by the NTI for a term of one year, renewable in up to 20 subsequent years, with an annual fee and work requirement, for areas limited to 10,000 hectares. Once it can be proven that a resource exists, the proponent can apply for a production lease with an original term of 10 years. The original production lease can be renewed for two subsequent five-year terms, if sufficient proof of progress is received by the NTI. Once production is initiated the production lease is automatically renewed for 21 years and an IOL royalty is paid on production.

If mineral rights were held on subsurface IOL prior to the signing of the Nunavut Agreement, the NTI retains ownership of the minerals, but the rights are administered by INAC (NTI 2004; Johnson 2009). As part of the administration of this 'grandfathered' right, INAC pays quarterly lease payments to NTI. In the 2006-2008 reporting period, approximately 60 such leases were administered by INAC (AANDC 2011).

The location of IOL in the LSA and RSA is shown in Figure 4.2-2.

Crown Land

The Land Administration Division of INAC administers Crown land in Nunavut. Inuit have rights to portions of the resource royalties from extractions on Crown land and must be consulted about all resource developments (NTI 2004; INAC 2005). The Land Administration Division of INAC also administers surface and subsurface rights on Crown land in accordance with the *Territorial Lands Act* (1985) and the *Federal Real Property and Federal Immovables Act* (1991) under the guidance of the new Nunavut Mining Regulations (Baffinland 2014), which are now separate from the formerly applicable Northwest Territories Mining Regulations (2014). The regulations came into force in March 2014 as the devolution of responsibility for natural resources was transferred from the federal government to the Government of the Northwest Territories (AANDC 2014a).

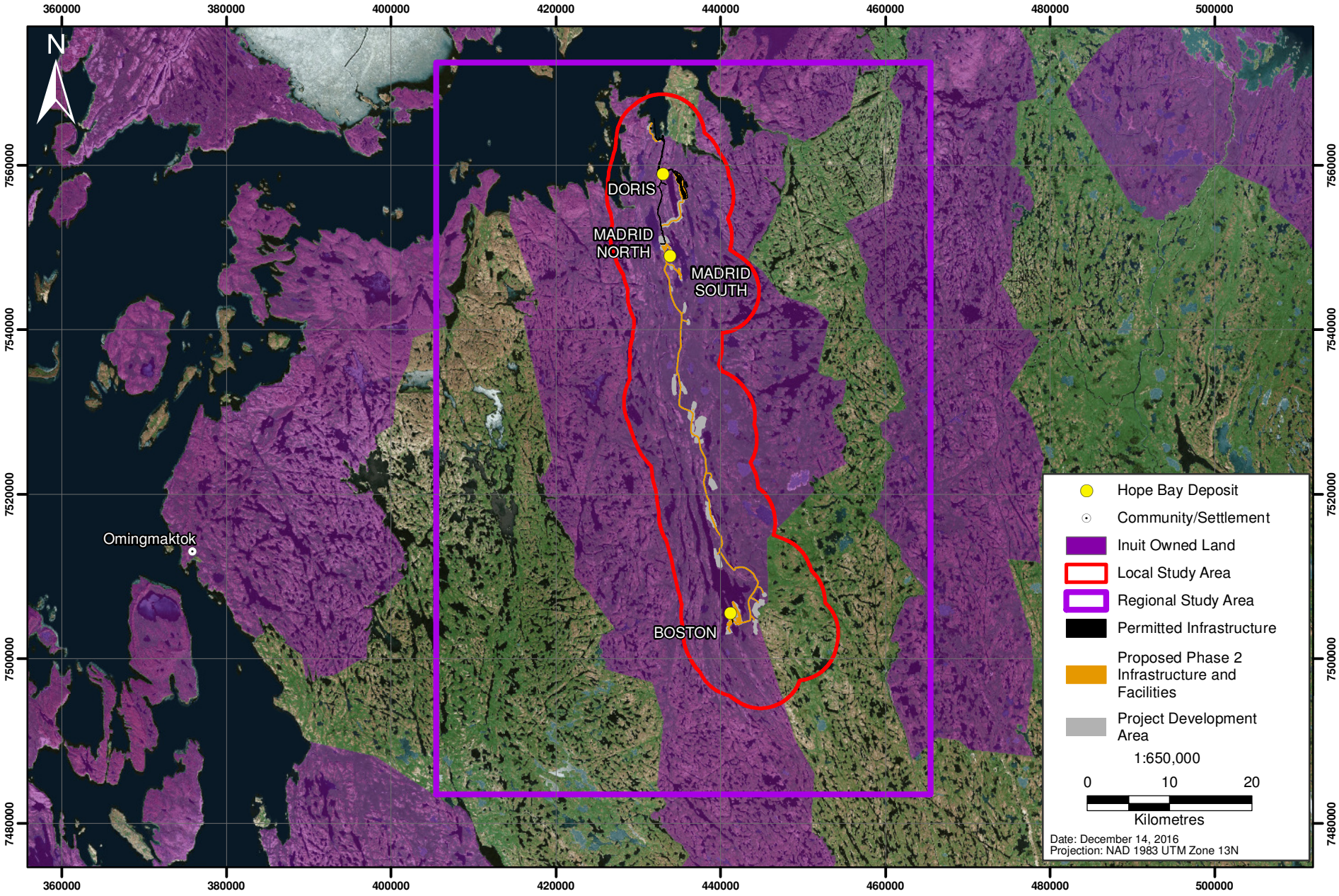
Nunavut has been working toward devolution under the guidance of a negotiations protocol established with the Government of Canada in 2008. Formal negotiations on a devolution Agreement-in-Principal (AIP) began in October 2014. The AIP will serve as a guide for the negotiation of a final devolution agreement (AANDC 2014c).

4.2.4.2 Land Use Planning and Designations

Nunavut Land Use Plan

The Nunavut Planning Commission (NPC), as established under the Nunavut Agreement, developed a draft Nunavut Land Use Plan (NLUP) for all Nunavut lands outside of municipal boundaries. The draft NLUP provides guidance for resource use and development and contains goals, objectives, and policies for land use planning(NPC 2016). The NLUP was updated in June 2016 based on consultation and input received from community stakeholders. Going forward, the NLUP must be approved by the NTI, the RIAs, the Government of Nunavut, and the Government of Canada (NPC 2016). The NLUP is still in draft form and may be subject to revision later. Once approved, this Nunavut-wide plan will replace the North Baffin and Keewatin Regional Land Use Plans (NPC 2016), which are currently applicable within the Baffin and Kivalliq regions.

Figure 4.2-2
Inuit Owned Land in the Land Use Study Areas



As shown in Figures 4.2-3 and 4.2-4, the draft NLUP categorizes areas within the Nunavut Settlement Area (NSA) into one of three land use designations:

- **Protected Areas** support environmental protection and cultural priorities including wildlife conservation, protection, and management. Land uses that are incompatible with environmental and cultural values are prohibited. A Protected Area Designation also takes into account the natural resource base and existing patterns of resource use, environmental considerations, cultural priorities, and special local and regional considerations.
- **Special Management Areas** support the identified value of the area and allows for more flexible management in comparison to protected areas. This designation also includes management for areas of economic potential and with existing land uses.
- **Mixed Use Areas** support a variety of opportunities and land use activities, taking into account economic opportunity, conservation initiatives, and the social well-being of residents. Types of use include industrial, traditional, conservation, transportation and infrastructure, tourism, shipping, research, and local economic development.

The Hope Bay Project is located within a Special Management Area with high mineral potential (see Figure 4.2-4). Prohibited land uses within the area include the establishment of tourism facilities, conservation areas, and parks (NPC 2016).

The implementation of the NLUP is based on broad planning policies, objectives, and goals. The draft Plan outlines five key goals to inform and guide land use and development in the NSA. The five goals are as follows:

- **NLUP Goal 1- Strengthening Partnership and Institutions: A Nunavut-Specific Land Use Planning Process.** This goal supports good governance and provides direction for land use planning through recognition and respect for all jurisdictions and participants, discussion and consensus, and working together for a common cause through the integration and application of the principles of Inuit Qaujimajatuqangit (IQ) (NPC 2016).
- **NLUP Goal 2- Protecting and Sustaining the Environment: Protecting Wildlife, Air, Land, and Water.** Protecting and conserving Nunavut's air, land, and water, including wildlife and wildlife habitat, is critically important to the sustainability of Nunavut's communities, Inuit culture, and the continuation of a viable long-term economy (NPC 2016).
- **NLUP Goal 3- Encouraging Conservation Planning.** The purpose of conservation planning is to protect the natural environment, culturally significant areas, and special places for the benefit of Nunavummiut and all Canadians. Conservation planning is an important part of land and resource management in Nunavut and includes Parks and Conservation Areas designated through legislation, as well as the protection of other Areas of Interest through the application of zoning in the land use plan (NPC 2016).
- **NLUP Goal 4- Building Healthier Communities.** This goal reflects the primary purpose of land use planning under Article 11 of the Nunavut Agreement, specifically, the protection and promotion of the well-being of Nunavut's residents and communities. The promotion and strengthening of Inuit culture and heritage is integral to the goal of building healthy communities in Nunavut (NPC 2016).
- **NLUP Goal 5- Encouraging Sustainable Economic Development.** This goal promotes the economic well-being of communities and increased self-reliance toward the development of diverse economic opportunities, and a healthy, sustainable renewable and non-renewable resource economy The goal provides for a range of economic opportunities such as renewable resources, tourism, energy, and mineral and petroleum sectors (NPC 2016).

Figure 4.2-3
Draft Nunavut Land Use Plan Designations

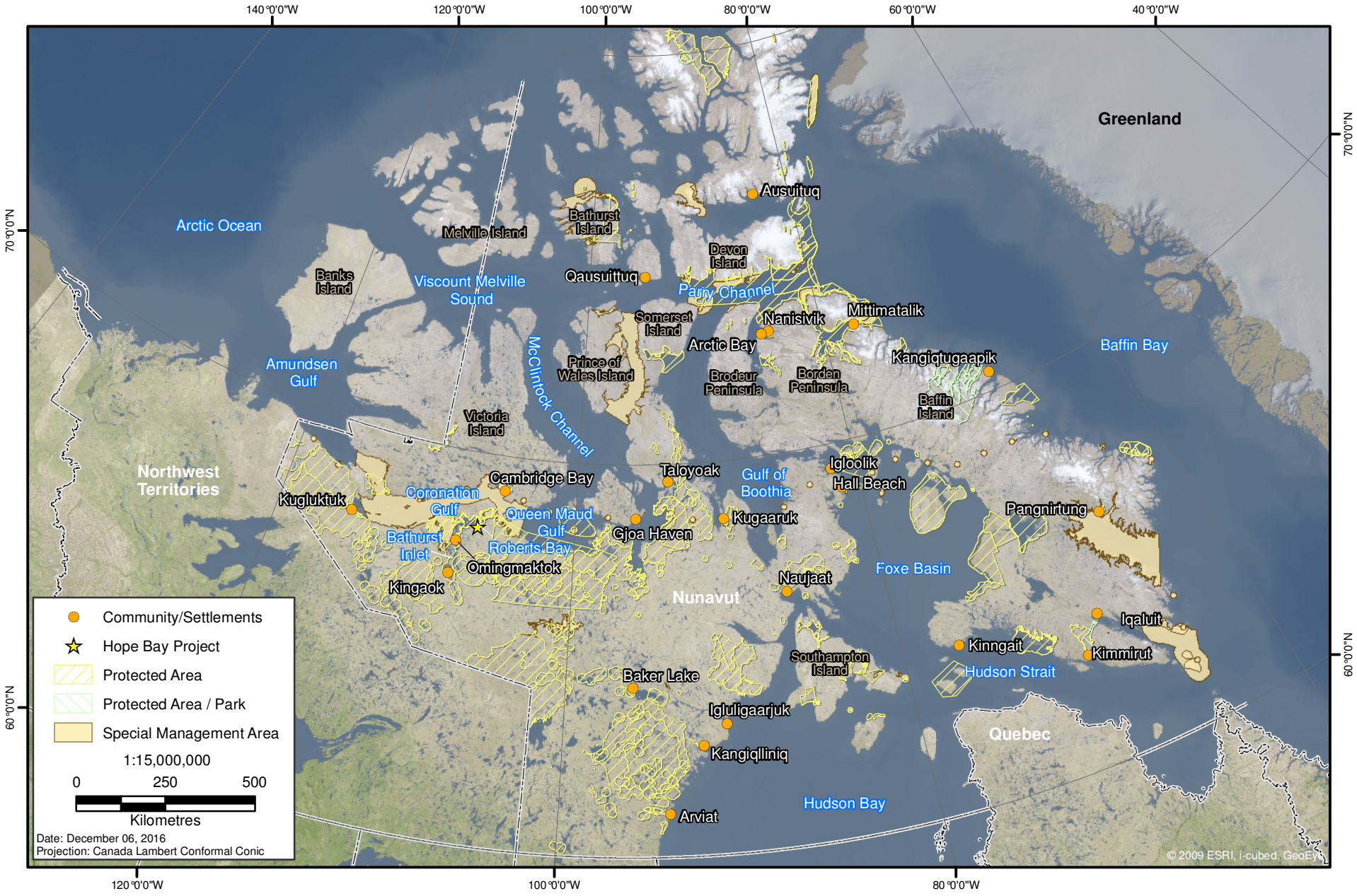
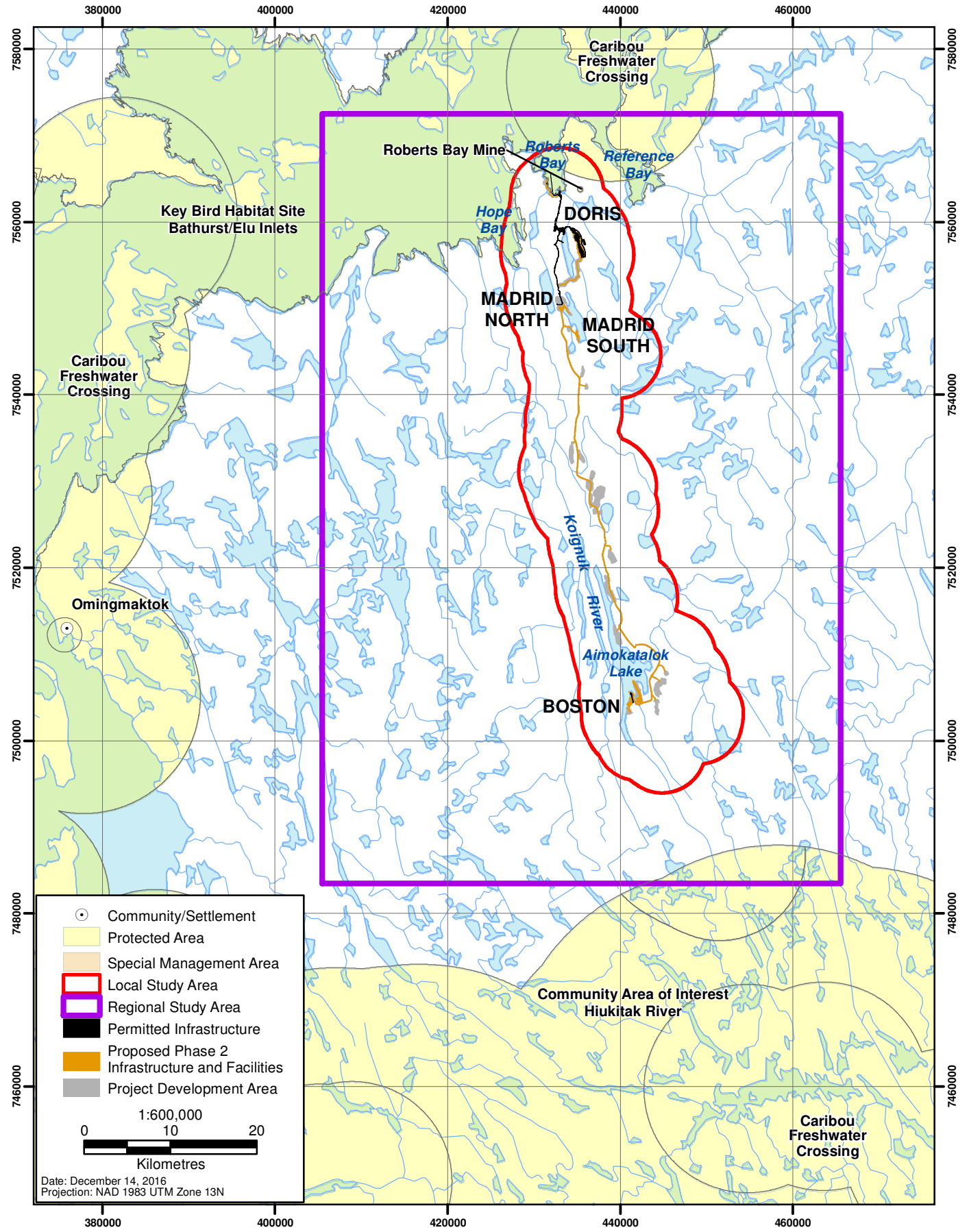


Figure 4.2-4

Draft Nunavut Land Use Plan Designations in the Land Use Study Areas



To support the implementation of the NLUP, the Nunavut Planning Council (NPC) will develop an on-line Public Registry which will contain:

- notices of the receipt of project proposals and a summary of the Hope Bay Project;
- an annual land use plan implementation report;
- other planning reports, notices of public hearings; and
- the draft land use plans and plan feedback received, as well as other procedural reports.

Once approved, all territorial and federal agencies will conduct their activities and operations in accordance with the Plan, as approved. The NLUP also outlines a process for amendments as well as periodic monitoring. Finally, future research and additional land use studies will guide the implementation of the NLUP (NPC 2016).

Parks and Protected Areas

The largest protected area near the Project is the Queen Maud Gulf Migratory Bird Sanctuary (see Figure 4.2-5), a legislated conservation area that supports nearly the entire global population of Ross' Geese (NPC 2004). Designated conservation zones are also found near Hood River in the Wilberforce Falls area and the Hiukitiak River watershed, east of the Bathurst Inlet area. These zones are of cultural importance for local Inuit and serve as a destinations for eco-tourists (NPC 2004).

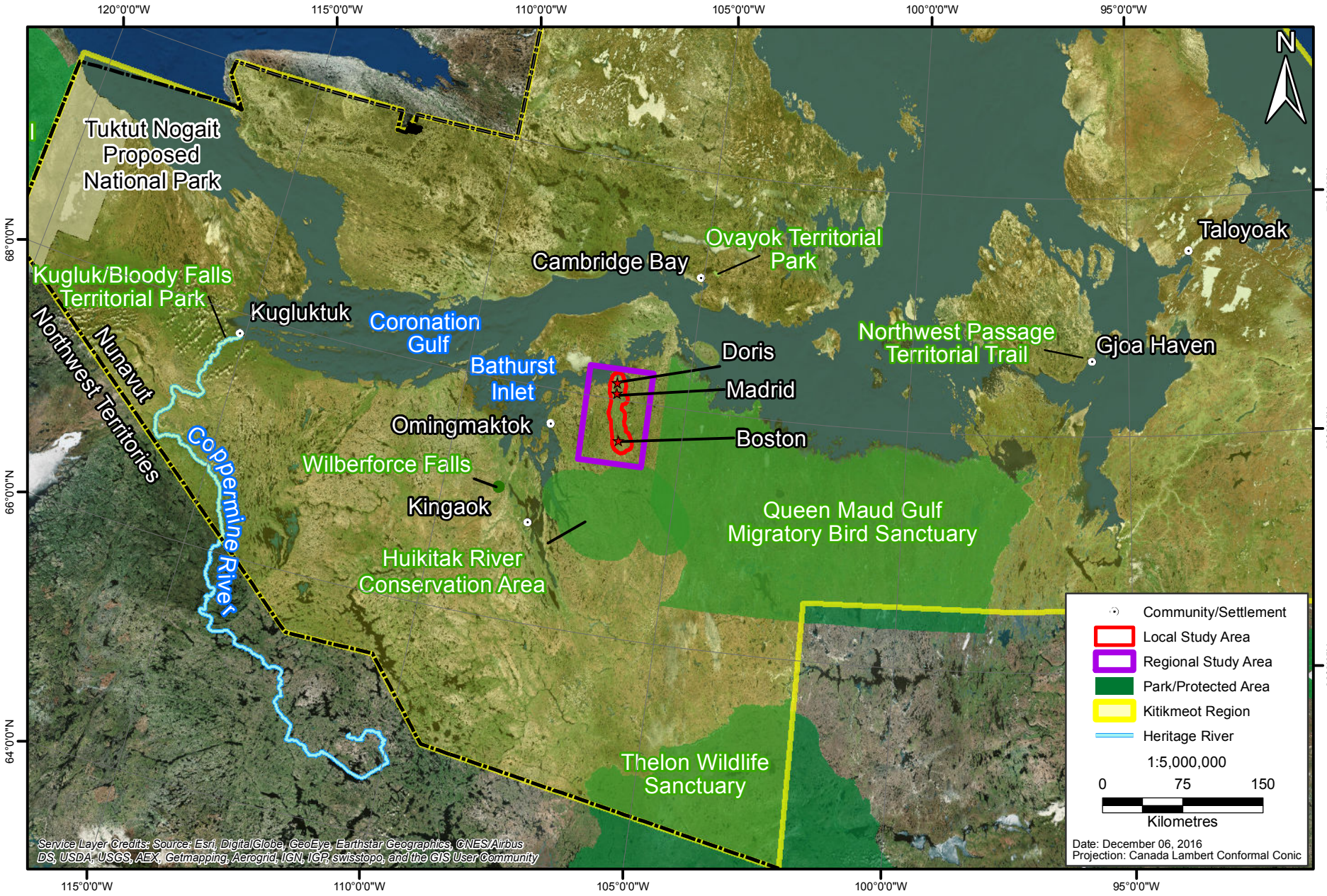
The draft NLUP also defines protected areas. Area Nine – Key Bird Habitat Site, Bathurst/Elu Inlets is nearest to the Project. Within Area Nine, oil and gas exploration and production (as well as related research) are prohibited. As per the draft NLUP, regulatory authorities require standard setbacks for all migratory birds in permits, licences, and other authorizations. For example, when birds are present, overflying aircrafts must maintain a minimum vertical setback of 1,100 m (3,500 feet) and a lateral aerial setback of 1.5 km in areas with concentrations of birds (e.g., bird breeding colonies and moulting areas) if safe to do so and at the discretion of the pilot. A terrestrial setback of 300 m from concentrations of birds is also required. Other setback specifications are required for Ivory gulls, northern fulmars, all seabirds, sea-level coastal besting birds, and coastal waterfowl and seaducks. For example, there is a lateral aerial setback of three kilometres as well as a marine setback of 500 m for coastal waterfowl and seaducks (NPC 2016).

The Hope Bay Project is also located in the vicinity of a wildlife area of significant interest, as seen in the draft NLUP map of Special Management Areas (Figure 4.2-5). However, beyond reference to wildlife areas of significant interest as a component of Special Management, this designation is not discussed within the NLUP. The NLUP does note that the protection of other Areas of Interest may also be achieved through the application of zoning in the Plan (NPC 2016).

There are also a number of areas within the Kitikmeot region that are identified as wildlife areas of significant interest, including an area around Kent Peninsula and Elu Inlet (NPC 2016). In addition, the Kitikmeot Region includes numerous territorial parks, such as Ovayok (Mount Pelly) Territorial Park, the Northwest Passage Trail, and Kugluk/Bloody Falls (NPC 2016).

There are no existing or proposed parks or conservation areas near the proposed Project. The nearest conservation area is the Queen Maud Gulf Migratory Bird Sanctuary approximately 50 km east of Roberts Bay by air and over 300 km by water (as Melville Sound is isolated from the Queen Maud Gulf by the Kent Peninsula).

Figure 4.2-5
Parks and Protected Areas in the Kitikmeot Region



Other sites of importance include the Coppermine River, which was nominated as a Canadian Heritage River in 2002. The Canadian Heritage Rivers Systems gives national recognition to rivers that have outstanding natural or human heritage values and significant recreational opportunities. A management plan for the Coppermine River was completed in 2008 and submitted to the Canadian Heritage Rivers Board. In accordance with the Nunavut Agreement, the Kugluktuk HTO and the KIA coordinated the management plan.

4.2.4.3 Industrial Land Use

Mine Development and Mineral Exploration

Nunavut is being explored for uranium, diamonds, gold and precious metals, base metals, iron, coal, and gemstones. There are several projects that are expected to be developed in the near future (NPC 2016). The potential for mine development in the west Kitikmeot region is recognized to be high, and mining and mineral exploration activities have contributed substantially to local and regional economies and employment. In the Kitikmeot region, the major commodities of interest are gold, zinc, and copper, as well as diamonds, platinum group elements, and uranium.

Past-producing mines in the Kitikmeot region include the Lupin Gold Mine and Jericho Diamond Mine, both located southeast of Kugluktuk, and the Roberts Bay and Ida Bay Silver Mines, located southwest of Cambridge Bay near the Hope Bay Project. Exploration activity in the region is focused primarily on gold, and exploration and development of base metals also occurs (AANDC 2015) (Frizzell 2017a).

Despite challenging market conditions, there was an increase in active mineral tenures in the Kitikmeot region in recent years with the addition of three IOL parcel Exploration Agreements, eight prospecting permit applications, and more than one hundred newly staked claims. In 2016, there were 124 permits, 3,335 claims, and 477 leases in Nunavut that were in good standing (INAC 2016). Within the Kitikmeot region there is one operating mine (TMAC's Doris Project), advanced exploration projects (including TMAC's Madrid and Boston Advanced Exploration projects, described in Section 4.4.1) and several active mineral exploration projects.

Natural Resources Canada's annual estimates of spending on exploration and deposit appraisal in the Canadian territories identified 2011 as a peak year for spending in Nunavut and Yukon. In 2014, an estimated $148 million was spent, a reduction of 72% since 2011 (Table 4.2-1). The latest national survey of company spending intentions indicates that mineral exploration and deposit appraisal expenditures in Canada are expected to increase 18% to $1.8 billion in 2017 from $1.6B in 2016 (Natural Resources Canada 2017) In 2016, as with many provinces with the exception of New Brunswick and Quebec, Nunavut experienced a decline in spending on exploration and deposit appraisal relative to 2015; however, since 2015, Nunavut has retained its position as fifth in Canada in terms of overall exploration and deposit investment (AANDC 2015; NWT & Nunavut Chamber of Mines 2015) (Natural Resources Canada 2017).

Table 4.2-1. Mineral Exploration in the Canadian Territories, 2006 to 2016, and 2017 Spending Intentions

	Mineral Exploration Spending (millions)											
	2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Nunavut	$210.6	$338	$432.6	$187.6	$256.7	$536	$427	$258	$158	$215	$204	$156
Northwest Territories	$176.2	$193.7	$147.7	$44.1	$81.7	$94	$136	$78	$102	$101	$73	$71
Yukon	$106.4	$144.7	$134	$90.9	$156.9	$332	$292	$101	$107	$92	$90	$133

Source: (Natural Resources Canada 2017)

The total number of prospecting permits issued in Nunavut, as of December 2016, was 124, which is a decrease from the previous year (2015), when there were 132 active permits (INAC 2016). In 2014, there were no new mineral lease or coal licences issued; the standing total was 167 recorded claims (as at November 1, 2014). Twenty-two land use permits were issued and 20 extensions granted, for a total of 173 active land use permits (AANDC 2015).

Operational Mines

As of 2017 there were three operational mines in Nunavut - Agnico-Eagle's Meadowbank Gold Mine, located approximately 80 km north of Baker Lake (in the Kivalliq Region), Baffinland's Mary River Iron Ore Mine (in the Baffin Region; Baffinland 2014), and TMAC's Doris North, located within the Hope Bay Project area (Kitikmeot region). Agnico Eagle received a Type A Water Licence for their Meliadine Gold Mine Project in May 2016 (INAC 2016), and is currently undergoing construction (Agnico Eagle 2017), and has projected to commence production in 2020 (INAC, 2016). In 2016, Agnico Eagle received regulatory approval for the expansion of Meadowbank's Vault pit, which will extend the mine life to late 2018, and will help bridge a gap in production until mining can begin at the proposed Whale Tail pit at Agnico Eagle's Amaruq project, located 50 km northwest of Meadowbank. Production at Amaruq is anticipated to begin by 2019. In 2016 regulatory authorizations were issued to allow the construction of a 64 km all-weather access road linking Meadowbank to Amaruq (INAC 2016).The Meadowbank mine was the only operational mine in Nunavut in 2013, a year in which the mining sector accounted for 18% of Nunavut's GDP (NWT & Nunavut Chamber of Mines 2015).

Exploration Projects

Advanced exploration projects in the Kitikmeot region include: Hood River (WPC Resources), Izok Corridor (MMG), and Hope Bay (TMAC). MMG notified the NIRB in 2014 of their intention to delay updates to the Izok Corridor project description while attempting to identify additional mineral resources, and also to address concerns about the project's economic viability in light of needed infrastructure. In 2014, MMG submitted a proposal for a 325-km road that would connect the deposits to Grays Bay in Coronation Gulf. In 2016, the GN and the KIA revised this proposal and proposed to develop a 227 km all-season road linking the northern point of the Tibbitt-Contwoyto winter road to a deep-water port at Grays Bay (INAC 2016). WPC Resources completed a 2014 field exploration program on both the Ulu and Hood River properties, announcing the results and subsequent 2015 drill program (AANDC 2015).

One advanced exploration project has progressed through the environmental assessment process. Sabina Gold and Silver Corp. submitted their Back River Final Environmental Impact Statement (FEIS) in 2015 (Sabina Gold & Silver Corp. 2015). Following the final hearing, NIRB provided a recommendation that the project should not be allowed to proceed at this time. In January 2017, INAC requested additional studies to support the review, particularly relating to the proposed mine's effects on caribou and other wildlife, the marine environment, freshwater wildlife, water quality and climate change (Brockman 2017). In July 2017, following additional hearings, NIRB revaluated its 2016 decision and issued a recommendation to INAC that the proposed mine proceed (Frizzell 2017b).

Areva Resources Canada's Kiggavik Uranium Project has completed the environmental review process, and submitted their FEIS in September 2014. The final hearing in the review of the Kiggavik Project was held in March 2015. The NIRB concluded that the Kiggavik Uranium Mine Project should not proceed at this time, due to the lack of start date and project development schedule (NIRB 2015). There have been no recent public announcements on the advancement of this project. Figure 4.2-6 and Table 4.2-2 detail exploration projects and advanced exploration projects in the Kitikmeot region.

Figure 4.2-6
Other Mining and Exploration Projects near to the Project

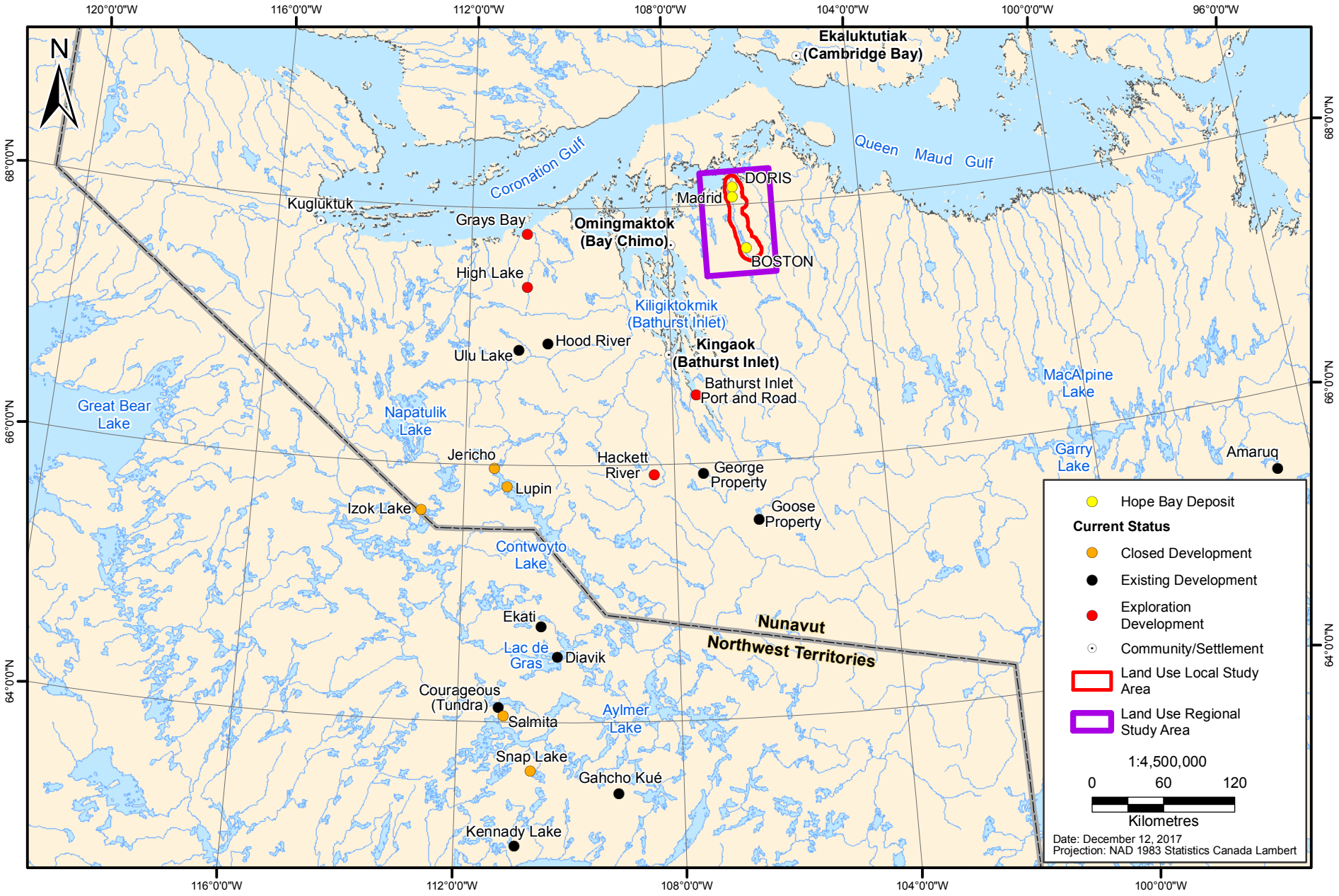


Table 4-2-2. Exploration Projects in the Kitikmeot Region (2016)

Closest Community	Project Name	Commodity	Operator
Kingaok	Hackett River	Base Metals	Glencore Xstrata plc
	George (Back River Project)	Gold	Sabina Gold & Silver Corp.
	Goose (Back River Project)	Gold	Sabina Gold & Silver Corp.
	Wishbone	Base Metals and Gold	Sabina Gold & Silver Corp.
	High Lake (Izok Corridor Project)	Gold and Base Metals	MMG Limited
	Izok Lake (Izok Corridor Project)	Base Metals and Gold	MMG Limited
	Ulu	Gold	Mandalay Resources Corp., WPG Resources Inc.
	Hood River	Gold	WPC Resources Inc.
	Itchen Lake	Gold	Transition Metals Corp., Nunavut Resources Corp.
Cambridge Bay	Doris (Hope Bay Project)	Gold	TMAC Resources Inc.
	Madrid (Hope Bay Project)	Gold	TMAC Resources Inc.
	Boston (Hope Bay Project)	Gold	TMAC Resources Inc.
	Chicago (Hope Bay Project)	Gold	TMAC Resources Inc.
Kugluktuk	Coppermine River	Copper, Silver	Kaizen Discovery Inc.
	Arctic Copper	Copper, Silver	Arctic Copper Corp.
	Contwoyto, Hood River and Muskox	Diamond	Crystal Exploration Inc.
	CO-20	Gold, Copper	Nunavut Alliance: Transition Metals Corp. and Nunavut Resources Corp.
	Grumpy, Happy Thought, Park Place Gold and South Kitikmeot Gold Project	Gold	Silver Range Resources
Kugaaruk	Committee Bay Gold Project	Gold	Auryn Resources Inc.

Source: (INAC 2016).

Mine Acquisitions

Other recent mine property acquisitions in the Kitikmeot include the past-producing (1982 to 1998 and 200 to 2005) Lupin Mine Project which was closed indefinitely in mid-2013 following corporate financial losses and falling gold prices (Nunatsiaq 2013; AANDC 2015). WPC Resources Inc. has entered into a letter of intent to acquire 100% interest in the Lupin Gold Mine, as well as the advanced Ulu Gold Project from Mandalay Resources. WPC has also entered into an agreement to acquire Inukshuk Exploration Inc., a 100% owner of the Hood River property which is contiguous to the Ulu Gold Project (WPC Resources Inc. 2015).

Oil and Gas Development

Approximately 38% of Canada's remaining natural gas and 35% of crude oil are located in northern Canada (AANDC 2014b). Oil exploration in Nunavut began in 1962 and continued to 1986. Discovered petroleum resources are held in 20 licensed fields, mostly in the Sverdrup Basin in the High Arctic, and are estimated to be nearly 2 billion barrels of crude oil and 27 trillion cubic feet of natural gas (AANDC 2015). Oil and gas-related exploration and development in Nunavut are concentrated in the Eastern Arctic (northern Hudson Bay and around Baffin Island), the Arctic Islands, and Sverdrup Basin (INAC 2011c, 2011d, 2011b, 2011a). A number of exploratory and delineation wells are concentrated in the northwest of Qikiqtani Region (NPC 2008). Two of the largest undeveloped gas fields in Canada are in the Arctic Islands (INAC 2000).

Discovered oil and gas supplies in Nunavut and offshore in the Arctic are described in Table 4.2-3. The discovered gas supplies in the Arctic Islands are comparable to those in the Beaufort Sea-Mackenzie Delta Region; however, industry has not shown a strong interest in the exploration and development of reserves in the Arctic Islands (INAC 2009).

Table 4.2-3. Oil and Gas Resources in Nunavut and Arctic Offshore

	Discovered Resources		Undiscovered Resources		Ultimate Potential	
Resources	**10^6m^3**	**MMbbls**	**10^6m^3**	**MMbbls**	**10^6m^3**	**MMbbls**
Oil Resources	51.3	322.9	371.8	2339.4	423.1	2662.3
Gas Resources	449.7	16.0	1191.9	42.3	1641.6	58.3

Source: INAC (2009).
[1] m^3 refers to cubic metres.
[2] MMbbls refers to millions of barrels

The majority of the southern Kitikmeot region is not recognized as having oil and gas potential (NPC 2008). As of 2008, the only oil and gas infrastructure in the Kitikmeot Region was an exploratory well in northern Kitikmeot region on Prince of Wales Island, which is located northeast of Victoria Island approximately 600 km from the Project.

Contaminated Sites and Reclamation

There are approximately 330 contaminated sites and waste sites across Nunavut, with a substantial number located in the Kitikmeot region (NPC N.d.). As a representative of the Crown, INAC is the custodian of many of these sites and associated remediation activities (INAC 2010). Many of the sites became INAC's responsibility after private owners relinquished their properties or when corporate operators became insolvent. The Department of National Defence also controls a number of other contaminated sites on Crown land in Nunavut (INAC 2010). INAC works with the NPC, the Nunavut Impact Review Board (NIRB), the Nunavut Water Board, the Government of Nunavut, NTI, and other regulatory agencies to fulfil their responsibilities for clean-up and management (INAC 2008a).

Remediation of two sites near to the Hope Bay Project, the decommissioned Roberts Bay and Ida Bay Silver Mines, was initiated in 2008 and completed in 2010 (Indigenous Peoples Issues and Resources 2010). These sites are located within the Land Use LSA, approximately 14.6 km northeast of the Doris deposit. The mines were active in the 1960 and 1970s, ceasing operation in 1975. The mine opening areas were unsecured and contaminated with mine wastes, litter, and contaminated soil (INAC 2010). Monitoring of the sites will continue for 25 years (INAC 2008b).

4.2.4.4 Commercial Land Use Activities

Non-industrial commercial land use activities are of increasing importance throughout Nunavut. In the Kitikmeot region, this includes activities such as commercial food harvesting, sport hunting, guide outfitting and lodges, and nature tourism, as well as commercial recreation and other tourism activities (e.g., cruise ships).

Hunters and Trappers Organizations

Each community in Nunavut has a HTO that shares responsibilities with respect to the management of hunting, trapping, and fishing activities, as well as management of the environment and wildlife with the Government of Nunavut. Each HTO typically employs one local person as a manager and performs various functions based on local need. HTOs are governed by a board.

The HTOs in Cambridge Bay, Kugluktuk, Gjoa Haven, Taloyoak and Kugaaruk are active and currently facilitate a variety of programs and projects.

There are two HTOs operating near to the Project at Omingmaktok and Bathurst Inlet, representing land users who occupied these (now seasonal) communities. The Bathurst Inlet HTO is referred to as the Burnside HTO. Community research conducted for the Back River Project indicates that the Burnside and Omingmaktok HTO managers now coordinate their work with the Cambridge Bay HTO, as those formerly resident in Omingmaktok and Bathurst Inlet now reside in Cambridge Bay for a portion of the year (Back River FEIS 2015). That is, the interests of the Burnside and Bathurst Inlet HTOs continue to be represented by an HTO chairman, in conjunction with the Cambridge Bay HTO.

Each HTO typically employs one local person as a manager and performs various functions based on local need. HTO functions may include:

- facilitation of programs and services for local hunters and trappers (e.g., the Nunavut Harvesters Support Program);
- distribution of harvest to community members in need (e.g., Elders, single parent families);
- coordination of research projects (e.g., polar bear monitoring, fish tagging);
- assistance with the commercial hunt (e.g., identify local hunters available for short-term employment who can obtain animals for commercial sale);
- coordination of community hunts that include adult/elders and youth to promote youth involvement in hunting activities, as well as the transfer of cultural knowledge generally;
- organization and implementation of the community harvest;
- coordination of the sport hunt (e.g., connect clients with local hunters able to provide service); and
- production of annual reports, reporting to members, and participation in local and regional meetings.

The Cambridge Bay HTO has developed a 10-day guide training course, which was delivered for the first time in 2016. The course involved 12 participants, with representation from across the Kitikmeot Region (Appendix V6-3B).

The Nunavut Harvesters Support Program typically provides financial support to harvesters for the purchase of equipment and other supplies (e.g., boats, snowmobiles, fuel) needed for harvesting. Hunters who receive equipment are often selected by lottery or at the recommendation of the local HTO. The program began in 1993 with an initial fund of $30 million invested in the Nunavut Hunters Income Support Trust. However in 2014, the support program was discontinued to allow for a review of spending (NTI 2014). The program was relaunched in April 2017 (NTI 2017).

Kitikmeot Foods and the Commercial Food Harvest

Established in 1990 and incorporated in 1993, Kitikmeot Foods is a food processing facility located in Cambridge Bay that is owned by the Nunavut Development Corporation and the Ekaluktutiak (Cambridge Bay) HTO. Kitikmeot Foods Ltd. is approved by the Canadian Food Inspection Agency (CFIA) to export fish, and the company specializes in Arctic char, for sale in commercial markets. The facility operates year round, processing fresh fish from July to September, and processing fish throughout the year to produce hot-smoked and cold-smoked fish, fish jerky and candied fish. As such, Kitikmeot Foods creates employment for local people including harvesters.

Kitikmeot Foods employs approximately eight people full-time, and during the harvest season, employment increases to approximately 15 people to help with the annual commercial harvest. In order to meet CFIA guidelines, Kitikmeot Foods conducts the commercial harvest within 30 to 35 miles of the community to limit the time of transport from the kill site to the processing facility (Kitikmeot Foods Ltd. 2008). Kitikmeot Foods' Arctic char is caught at Wellington Bay, Byron Bay, Surrey Lake, and Jako Lake (all on Victoria Island). Two of these sites are fished using gillnets, and two sites use weirs. The process of obtaining CFIA approval includes: facility inspection, an approved operational plan that details the harvest and transport of the carcass to an abattoir as well as the operation of the abattoir, and other processes to ensure the hygienic production of value-added products (e.g., controls for sanitation, equipment usage, product flow, staff, temperature, and disposal) (Kitikmeot Foods Ltd. 2008). Fisheries and Oceans Canada (DFO) is actively monitoring the fisheries at the four fishing sites used by Kitikmeot Foods. Kitikmeot Foods has a total quota for each site, established by DFO, and in total from all four sites, Kitikmeot Foods harvests 91,000 pounds (lbs) of Arctic char each year (Appendix V6-3B).

In the past, Kitikmeot Foods also harvested and processed muskox; however, they no longer have a commercial muskox harvest license, and do not intend to reapply. This is because the number of muskox near to the community decreased, and accessing areas farther afield increases hunter expenses; additionally, the muskox population has declined. Without a commercial muskox license, Kitikmeot Foods is still able to sell muskox within the territory. In 2016, hunters provided four muskox to Kitikmeot Foods for processing and sales within the territory; in previous years, up to 15 muskox have been processed and distributed locally by Kitikmeot Foods. In the case of purchasing muskox from harvesters, Kitikmeot Foods reviews the hunting license received from the wildlife management office, as well as the tag number (Appendix V6-3B).

Following the cancellation of the annual commercial hunt and as part of the ongoing management of muskox in the west Kitikmeot, the Government of Nunavut held a workshop in October 2014. Participants included NTI, the Kitikmeot Regional Wildlife Board (KRWB), and HTO members from Kugluktuk, Cambridge Bay, Omingmaktok, Bathurst Inlet, and Gjoa Haven. The workshop included the presentation of current research and a review of current harvesting practices and the development of a management planning process for the West Kitikmeot Muskox Management Plan (Government of Nunavut 2015a).

While the muskox population on Victoria Island has varied over the past few decades, the absence of the animals in areas near Cambridge Bay presented challenges for the local HTO and Kitikmeot Foods. Namely, the avoidance of areas near to the community presents a problem for Elders accustomed to travelling short distances to harvest, and for Kitikmeot Foods, who are required to harvest within a specified number of kilometers from their processing facility in Cambridge Bay (Government of Nunavut 2015a).

Muskox Management

Muskox management regulations came into effect on September 1, 2015. The regulations updated the boundaries of the management zones for muskox and the total allowable harvest (TAH) for each zone. There are 13 management zones in Nunavut and eight of those have a yearly TAH, including the management zone in which the Hope Bay Project is located (muskox management unit 11; MX-11). MX-11 is bordered by the Coronation Gulf in the north, the Nunavut/NWT border in the south, and extends from Kugluktuk in the east up to and including the western half of the Queen Maud Gulf Migratory Bird Sanctuary in the west. MX 11 is inclusive of the Bathurst and Elu Inlets as well as Kent Peninsula. The muskox management unit in which the Project and both lodges are located has a TAH of 225 (Government of Nunavut 2015b, 2017).

Muskox management and harvesting practices vary by community and are based on differing traditional knowledge perspectives of historical population trends. Previously on Victoria Island, muskox management

actions were undertaken to decrease the population. The Cambridge Bay HTO has expressed the desire to adjust the harvest ratio to promote a small population increase. The Gjoa Haven HTO aims to maintain or slightly reduce the muskox harvest numbers. The Kugluktuk HTO is concerned by the large herd size which is thought to contribute to increased disease and wish to increase their TAH to reduce the muskox population (Government of Nunavut 2015a).

Efforts to manage the muskox population include the development of a West Kitikmeot Muskox Management Plan focused on harvest management recommendations, HTO by-laws, and voluntary community-approved management decisions. The Plan will incorporate scientific knowledge, IQ, and Inuit harvesting customs such as: take only what you need, sharing your catch, and using all parts of the animal, regardless of whether the wildlife life is threatened or abundant. The first priority for the Plan is the sustainable management of the muskox herd. Additional management priorities identified by the HTOs focus on muskox health, hunter education, habitat protection, land use planning, reduction of human disturbance, food safety, and harvest management.

The muskox population west of Kugluktuk (MX–12) used to be plentiful but has now declined drastically, according to local Inuit knowledge. As a result, Kugluktuk harvesters focus their efforts east of the Coppermine River and have taken voluntary measure to exclude harvest in MX–12 (Government of Nunavut 2015b).

Licenced Outfitters and Sport Hunting

Licenced outfitters and other commercial entities, such as HTOs, conduct sport hunting activities. In addition to guided hunts, licenced outfitters offer a range of services, including outdoor recreation activities, eco-tourism lodges/accommodation and other services (e.g., transportation, food, tours). A big game licence is required for a person to act as a guide (for compensation) to a person harvesting game. Big game licences are issued within specific authorized areas, approved by the local HTO, and require the licence holder to carry a minimum of two million dollars public liability insurance coverage (2015).

The Cambridge Bay (Ekalututiak) HTO conducts sport hunts, mainly for grizzly bear, wolf, and muskox (B. Sitatak, pers. comm.; B. Warner, pers. comm.). The HTO also provides guide outfitting services for sport hunting, wildlife observation, and research expeditions. Although strict boundaries are not delineated, grizzly sport hunting typically takes place during spring in the areas east and north of Omingmaktok and north of Hope Bay on the Kent Peninsula. Inuit hunters act as guide outfitters for grizzly bear sport hunts throughout Kent Peninsula to Halfway Point (Land Use Focus Group, pers. comm.; Appendix V6-3B).

Sport hunting associated with the Burnside (or Kingaok/Bathurst Inlet) HTO occurs in the southern portion of the land use LSA but was primarily located outside of this area. Based on an agreement between the Burnside HTO and Omingmaktok HTO, the Burnside HTO conducts a sport hunt close to but not infringing upon the area overseen by the Omingmaktok HTO. For the Burnside HTO, the spring grizzly bear and wolf hunt takes place from April to May within a fifty mile radius of the Bathurst Inlet Lodge (outside the Land Use RSA). In the past, there has also been an August to September hunt. Clients for the sport hunt are typically flown into Kingaok from Yellowknife (B. Warner, pers. comm.). Snowmobiles usually provide access to the sport hunting areas from Kingaok. Four to five muskox sport hunting tags are available for areas surrounding Kingaok and Omingmaktok; however, only one to two tags are typically used (Government of Nunavut 2015a).

The Taloyoak HTO has provided guide outfitter services in past years, and is currently working to re-obtain the necessary outfitting licences (Appendix V6-3B). The focus of the renewed guide outfitting activities would be a sport muskox hunt. Based on the distance between Taloyoak and the Madrid-Boston Project, it is not expected that the muskox hunting facilitated by the Taloyoak HTO

would occur near the Project (Appendix V6-3B). Adventure Northwest, a big game outfitter, has been operating in the Canadian North for over 30 years. Based in Yellowknife, the company offers guided caribou hunts that include overnighting at Contwoyto Lake within the southwestern Kitikmeot region (outside the land use RSA) (Aventure Northwest 2015). The most recent caribou sports hunt conducted by Adventure Northwest likely occurred during 2014/2015. Some sport hunts operated by the Burnside HTO were marketed and sold through Adventures Northwest. Adventures Northwest has about ten guide outfitting clients per year (B. Warner, pers. comm.). Guides are exclusively Inuit and only local hunters and trappers who possess the proper licences are able to guide. In 2011, there were two main guides from the Burnside HTO (B. Warner, pers. comm.).

In the past, Adventures Northwest and the Burnside HTO have collaboratively organized a muskox hunt in the spring within a fifty mile radius of the Bathurst Inlet Lodge (outside of the Land Use RSA). The large majority of clients for the muskox hunt were American but due to depressed economic conditions in the United States, the muskox hunt has been halted. However, organizers expect that it may be restarted if the economic conditions improve (B. Warner, pers. comm.). Typically, muskox sport hunters take the fur and head of the animal for trophies while the community receives the meat; some sport hunters may also take small portions of the meat for personal use (Anonymous 7, pers. comm.).

In addition to Adventure Northwest, there are three other licenced outfitters in the Kitikmeot region that provide commercial hunting services including the Cambridge Bay HTO (Ekaluktutiak Sports Hunt Ltd.), Hakongak Outfitting, and the High Artic Lodge (Table 4.2-4). Each of the HTOs in the Kitikmeot region may apply to for specific tags to support a commercial hunt. For example, though not listed in Table 4.2-4, the Omingmaktok HTO held an Outfitter Licence for hunting activities[4] in 2014 (GN DED&T 2015a), likely to support sport hunting.

Table 4.2-4. Outfitter Licenses in the Kitikmeot Region (2017)

License Holder	Community of Operation	Establishment Licence	Nunavut Based	Outfitter Licence (OL) Number	Activities
Outfitters providing Commercial Hunting Activities					
Hakongak Outfitting	Cambridge Bay	Yes	Yes	2017.OL.410.022	ATVing or snowmobiling, bird watching & wildlife viewing, fishing, hunting, tours, accommodation
Ekaluktutiak Sports Hunt Ltd.	Cambridge Bay	Yes	Yes	2017.OL.410.018	ATVing, snowmobiling, accommodation and hunting
High Arctic Lodge	Cambridge Bay	Yes	No	2016.OL.410.041	Accommodation, arts and culture, bird watching, wildlife viewing, boating, camping and hiking, canoeing and kayaking, fishing, food and beverage, hunting, meetings and events, tours, and transportation

[4] Licence number KIT-2014-OL-007.

License Holder	Community of Operation	Establishment Licence	Nunavut Based	Outfitter Licence (OL) Number	Activities
Outfitters providing Adventure Services (without Accommodation)					
Koda Adventure Tours	Kugluktuk	Yes	Yes	2017.OL.420.001	ATV or snowmobile, bird watching and wildlife viewing, boating, fishing, parks visits, tours
Complete Expeditions Inc.	Cambridge Bay, Gjoa Haven, Kugluktuk, Taloyoak,	No	No	2017.OL.111.025	Arts and culture, eco-tourism, fishing, parks visits, transportation
Black Feather	Kugluktuk	No	No	2017.OL.255.013	Camping and hiking, canoeing and kayaking, eco-tourism, floe edge
Outfitters providing Multiple Services (Including Accommodation)					
B&J Flyfishing Adventures	Cambridge Bay	Yes	Yes	2017.OL.410.016	Accommodation, arts and culture, food and beverage, tours, and transportation
4660 Nunavut Ltd.	Gjoa Haven	No	Yes	2017.OL.415.014	Accommodation, ATV or snowmobile, bird watching and wildlife viewing, camping and hiking, tours
Bathurst Inlet Lodge Ltd.	-	Yes	No	2017.OL.444.008	Accommodation, arts, culture, bird watching, wildlife viewing, boating, camping, hiking, canoeing, kayaking, eco-tourism, fishing, food, beverage, meetings, events, and tours.
Bathurst Inlet Developments Ltd.	-	Yes	No	2017.OL.444.006, and 2017.OL.444.007	Accommodation, arts, culture, bird watching, wildlife viewing, boating, camping, hiking, canoeing, kayaking, eco-tourism, fishing, food, beverage, meetings, events, and tours.

Source: (GN DED&T 2017)

Other licenced outfitters provide outdoor tourism and recreation services based on day trips for those already visiting the area (e.g., Koda Adventure Tourism; Table 4.2-4). These operators may partner with other licenced businesses providing accommodation or with local hotels, as well as providing tours to passengers from cruise ships or private vessels that visit the area. The three licences associated with the Bathurst Inlet Lodge/Developments are linked to the operation of the lodge and outpost camps[5] which are licenced as Tourist Establishments (see Table 4.2-5; further information is provided below).

Fisheries Licences

The DFO oversees the authorization of Fisheries licences in Canada. The New Emerging Fisheries Policy defines the three stage process for obtaining a commercial fisheries licence. There is one exploratory licence for an Arctic char fishery located at 66˚47'N, 108˚10'W near Kingaok. An exploratory licence is

[5] The outpost camps described in Table 4.2-4, as per the GN ED&T webpage, are each connected to commercial enterprises that may or may not be Nunavut-based and are assumed to be considered differently than described in the Nunavut Agreement. Outpost camps are defined in the Nunavut Agreement as a camp occupied by families or groups of Inuit on a temporary, seasonal, intermittent, semi-permanent or year round basis for the purpose of wildlife harvesting. The Nunavut Agreement further indicates that outpost camps include the residential base and surface lands on which the residential base is located and within 2 km of the residential base.

required to determine whether the stock can sustain a commercially viable operation and to collect additional biological data. To progress from the exploratory licence to a commercial fisheries licence, the applicant must, among other tasks, complete an exploratory harvesting strategy that details the processing plants to be used and market destinations (DFO 2009).

Sport fishing is not reported to take place in the land use LSA.

Ecotourism Lodges

Ecotourism lodges and guide outfitters provide opportunities for Inuit to share their lifestyle and culture with visitors, thereby raising awareness of their way of life. These activities also provide a livelihood and means of employment for people who live in remote communities such as Kingaok and Omingmaktok (B. Warner, pers. comm.). Licenced lodges and outpost camps in the Kitikmeot region facilitate tourism and outdoor recreation. The location of ecolodges in relation to the Project are identified in Figure 4.2-7.

Bathurst Inlet Lodge

The Bathurst Inlet Lodge is an ecotourism venture located in Kingaok. Established in 1969, the lodge occupies an old Hudson Bay Company post. The lodge is a business owned by two families and operated in partnership. One family resides in Edmonton and the other family previously lived in Kingaok. In recent years, Kingaok community members relocated to Cambridge Bay and elsewhere, but have continued to return to Kingaok in the summer months to help operate the lodge and host ecotourism clients (Weaver 2014). It has been lauded as one of the best lodges in northern Canada (Bathurst Inlet Lodge 2011). The lodge is associated with 11 outpost camps that include facilities to host between 12 and 34 guests (Table 4.2-5).

The Bathurst Inlet Lodge offers ecotourism packages of six-to-seven days with meals and tours included. Ecotourism activities include boating in Bathurst Inlet, hiking, sightseeing, and culture and nature interpretation, and take place within an 80 km radius of the Lodge (B. Warner, pers. comm.; outside of the Land Use RSA). Prior to the economic downturn in 2008, the company hosted approximately 100 to 120 lodge clients per year and approximately 100 canoe outfitting clients (B. Warner, pers. comm.). The company also operated remote camps for tourists, including the Burnside Lodge near Kathawachaga Lake, which has five separate insulated cabins. Activities at these camps included watersports (canoeing, kayaking, rafting) and sport-fishing.

The lodge was closed for the summer in 2014 for upgrades to older infrastructure and possible ownership changes. The increasing cost of flights to the Bathurst Inlet Lodge coupled with competition from cruise ships that now travel through the lower reaches of the Northwest Passage, are new challenges facing the Bathurst Inlet Lodge, which is considering a new marketing approach (Weaver 2014).

The Elu Inlet Lodge

The Elu Inlet Lodge is located east of Bathurst Inlet, on the shores of the Elu Inlet near the Itibiak River, and offers summer season eco-tourism adventures (e.g., hiking, wildlife and bird observation, photography, Inuit culture and heritage tours, and fishing excursions; L. Coady, pers. comm.). The Elu Inlet Lodge is accessible by floatplane from Cambridge Bay. Facilities include: lodging, meeting space, an outdoor hot tub, canoes and kayaks and motorized aluminum boats used for day excursions. (L. Coady, pers. comm.). In 2009, Elu Inlet Lodge was selected as one of National Geographic Traveler Magazine's "50 Tours of a Lifetime" (Elu Inlet Lodge 2011).

Figure 4.2-7
Ecolodges in the Kitikmeot Region

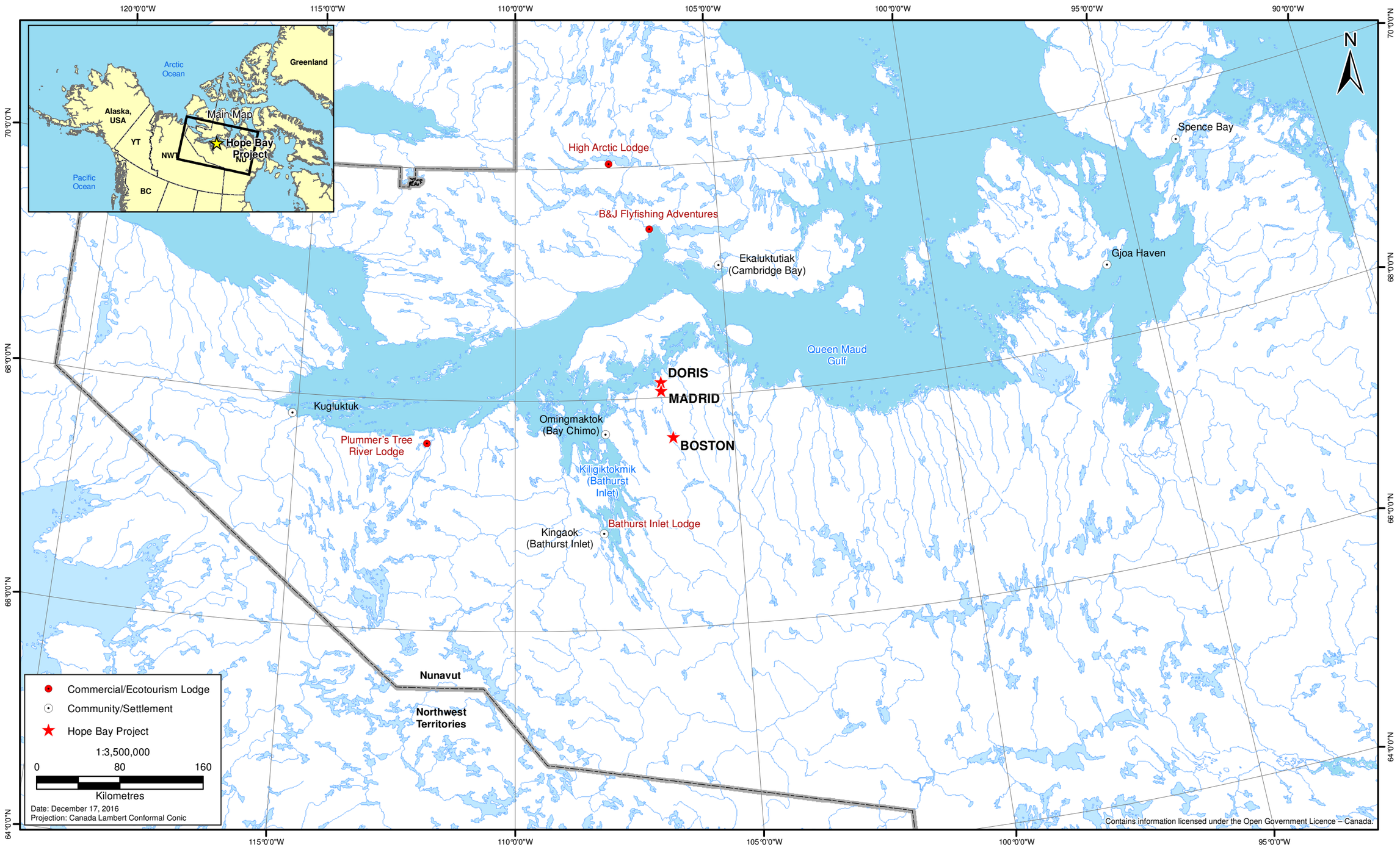


Table 4.2-5. Licenced Tourism Operators in the Kitikmeot Region (2017)

Licence Name	Company Name	Type of Operation	Outfitter Licence	Nunavut Based	Max Capacity	Establishment Licence (EL) Number
B&J Flyfishing Adventures	B&J Flyfishing Adventures	Lodge in Cambridge Bay	Yes	Yes	15	2017.EL.410.012
Bathurst Inlet Lodge	Bathurst Inlet Lodge Ltd.	Lodge	Yes	No	34	2017.EL.410.030
Burnside River Outpost Camp	Bathurst Inlet Developments Ltd.	Outpost Camp	Yes	No	15	2017.EL.420.027
Char Lake Outpost Camp	Bathurst Inlet Developments Ltd.	Outpost Camp	Yes	No	15	2017.EL.444.025
Contwoyto Lake Outpost Camp	Bathurst Inlet Developments Ltd.	Outpost Camp	Yes	No	15	2017.EL.420.026
Ekaluktutiak Sports Hunt Ltd./	Ekaluktutiak Sports Hunt Ltd.	Outpost camp	Yes	Yes	12	2017.EL.410.047
Fishing Creek Outpost Camp	Bathurst Inlet Developments Ltd.	Outpost Camp	Yes	No	15	2017.EL.444.031
Hakongak Outfitting	Hakongak Outfitting	Outpost Camp	Yes	Yes	12	2017.EL.410.057
High Arctic Lodge – Merkley Lake	High Arctic Sportfishing Camps Ltd.	Lodge	Yes	No	12	2016.EL.410.063
High Arctic Lodge – Hadley Bay	High Arctic Sportfishing Camps Ltd.	Outpost Camp	Yes	No	4	2016.EL.410.062
High Arctic Lodge – Nonook River	High Arctic Sportfishing Camps Ltd.	Outpost Camp	Yes	No	4	2016.EL.410.065
Hiukitak River Outpost Camp	Bathurst Inlet Developments Ltd.	Outpost Camp	Yes	No	15	2017.EL.410.028
Hood River Outpost Camp	Bathurst Inlet Developments Ltd.	Outpost Camp	Yes	No	15	2017.EL.420.024
Nose Lake Outpost Camp	Bathurst Inlet Developments Ltd.	Outpost Camp	Yes	No	15	2017.EL.420.021
Pellat Lake Outpost Camp	Bathurst Inlet Developments Ltd.	Outpost Camp	Yes	No	15	2017.EL.420.023
Plummers Arctic Lodges	Plummers Great Bear Lake Lodge Ltd	Lodge in Kugluktuk	Yes	No	20	2017.EL.420.052
Wilberforce Falls Outpost Camp	Bathurst Inlet Developments Ltd.	Outpost Camp	Yes	No	15	2017.EL.444.022

Source: (GN DED&T 2017)
Note: Hotels in the Kitikmeot Region are also licenced as Tourist Establishments and are discussed in V6-C3.

While the area used by Elu Inlet Lodge extends into the land use LSA, their ecotourism activities were focussed within Elu Inlet, east of the narrow channel northeast of Ida Bay. The lodge conducted day excursions by boat and focussed on the larger lakes and shorelines. Activities remained within the Inlet with the exception of the rare visit to Ida and Roberts Bay. In the past, the lodge offered heli-fishing tours in partnership with Arctic Heli Fishing (L. Coady, pers. comm.).

Elu Inlet Lodge is owned and operated by four partners including Inuit owners. At the peak of their business, the lodge hosted over 100 clients per year. However, business has slowed with the market downturn in recent years (L. Coady, pers. comm.; Appendix V6-3B).

B&J Flyfishing Adventures

B& J Flyfishing Adventures focus their catch and release fishing operation on the Ekaluk River near Cambridge Bay. The Ekaluk River is open for a limited sport fishery for sea-run Arctic char. The business owners cater to small groups of fly fishers, naturalists, and wildlife enthusiasts; the business includes a wilderness camp on the Ekaluk River. Located 30 minutes from Cambridge by float plane, the facilities at the wilderness camp include five cabins that each accommodates three to four guests, and one main cabin providing staff accommodation, kitchen, and a gathering area. The cabins have electricity, propane heating, satellite phone, and high frequency radio. The camp operates on the short season for Arctic char on the Ekaluk River, which is from mid-August until mid-September. B&J Flyfishing Adventures operated for three successful weeks with a number of guests in August 2015 and has been operational since 2000 (B&J Flyfishing Adventures 2015).

High Arctic Lodge and Sport Fishing Camps

The High Arctic Lodge has provided fishing, fly-fishing, hunting, naturalist, and canoeing trips since 1971. Fishing in the area is for Arctic char and lake trout and hunting is for muskox and caribou. The season for muskox is the last two weeks of August. The fishing season is mid-July to mid-August. Hunting packages are available and include air transfer from Cambridge Bay to the High Arctic Lodge, hide preparation, guides, boats, motors, and accommodation. The business reported successful hunting and fishing trips in 2014 and 2015 and has posted available dates for 2016 (High Arctic Lodge 2015).

Plummer's Arctic Lodge

Located approximately 80 km west of the Bathurst Inlet, Plummer's Arctic Lodge is located on Tree River and provides fishing trips for Arctic char from the main lodge on Great Bear Lake, NWT or from Kugluktuk. The season for fishing at Tree River is July and August. The camp at Tree River provides meals, guided fishing, and air transfers. Overnight trips are available from the main lodge in the NWT in addition to five-and-seven-day trips. Fishing in the Tree River is catch-and-release. Plummer's Lodge has an agreement with the Inuit that includes Inuit employment at the lodge and community tourism benefits. The airfield at Tree River is operated by people from Kugluktuk (Plummer's Arctic Lodges 2015).

Outdoor Tourism and Recreation Activities

In addition to the lodges, Nahanni River Adventures and Bathurst Arctic Services offers guided or self-supported river rafting and canoe outfitting on rivers throughout Nunavut and the NWT, and partnered with Bathurst Inlet Lodge in the past to provide these activities to lodge clients. Rivers visited are southwest (and outside) of the land use RSA, and include the Burnside, Mara, and Huikitak rivers (Bathurst Inlet Lodge 2011; B. Warner, pers. comm.).

Cambridge Bay is a base for tourism in the region. Some of the main attractions are the Arctic Coast Visitors Centre and the Kitikmeot Heritage Centre which reports approximately 2,000 visitors each year (NEDA 2008). Gjoa Haven has become known for the 2014 discovery of the Franklin Expedition's shipwrecks, HMS Terror and HMS Erebus.

Other tourism companies operate in the wider area. Recent changes to the sea ice, and a 2006 listing of the southern routes of the Northwest Passage as navigable, have prompted an increase in vessel traffic through the waters of the Kitikmeot region. Pleasure craft traffic in the Canadian Arctic increased from approximately ten vessels in 2010 to over 25 vessels in 2012 (NORDREG 2013) and has included private yachts, and luxury vessels (Canadian Geographic 2013). Commercial vessel traffic has

typically included small ship expeditionary cruises, such as those of Adventure Canada, which has offered cruises in the Canadian north since 2009 (Nunavut Tourism 2011).

A number of cruise companies offering expeditions through the Northwest Passage often stop in Cambridge Bay, and Taloyoak, Gjoa Haven and Kugluktuk have also been visited by cruise ships (Appendix V6-3B). Cruise ships visiting Cambridge Bay and continuing through to the Coronation Gulf may navigate through waters north of Elu Inlet and north of the land use RSA. Cruise companies offering various trips include:

- Wild Earth Travel, which travels through the Northwest Passage with stops in Cambridge Bay and Gjoa Haven (Wild Earth Travel 2015);
- Polar Cruises, which leaves Kugluktuk in mid-September, journeying into Bathurst Inlet before heading east through the Bellot Strait, on to Greenland, and ending in Denmark (Polar Cruises 2015); and
- Quark Expeditions, which stops in Cambridge Bay before travelling into the Bathurst Inlet and then stopping in Kugluktuk (Quark Expeditions 2015).

The vessels supporting each of these ventures have the capacity to accommodate between 110 and 120 passengers (Polar Cruises 2015; Quark Expeditions 2015; Wild Earth Travel 2015).

Other cruise ships operating in the Northwest Passage include the Crystal Serenity ship operated by Crystal Cruises which has a capacity of 1500 passengers; in 2017, there were approximately 1,000 passengers that travel on the boat through the Northwest Passage. The cruise ship included a stop in Cambridge Bay (Griffin 2014).

In 2017, as part of Canada's 150th celebrations, the Canada 150 C3 Expedition traveled from Toronto, Ontario to Victoria, BC, passing through the Northwest Passage. Several stops were made in the Kitikmeot region, including in Bathurst inlet. The trip included a science program that included incorporation of traditional ecological knowledge (Canada C3 Expedition 2017).

In 2017, six cruise ship operators were licenced to operate in/land in communities in the Kitikmeot region (Table 4.2-6). Each company holds an licence under the Nunavut *Travel & Tourism Act*[6] is required to hold one million dollars of public liability insurance (GN DED&T 2015b).

Tourism in Nunavut is guided by the 2013 "Tunngasaigi: A Tourism Strategy for Nunavummiut" (GN DED&T 2013). Tourism activities and tourism-based businesses in Nunavut have typically included outfitters as well as arts and crafts producers. The tourism industry has expanded to include cruise ships, big game outfitters, fishing operators, outdoor adventure providers. Similarly, supporting sectors such as transportation (airlines and taxis), accommodation, and foods services have also expanded. The tourism strategy aims to expand tourism and related activities by 23% over five years (2013 to 2018; (GN DED&T 2013).

[6] Departments of the GN have provided new summary guidelines for operators in advance of the introduction of the new Nunavut *Travel and Tourism Act* in Nunavut's Legislative Assembly in 2016.

Table 4.2-6. Cruise Ship Companies with Travel in the Kitikmeot Region (2017)

License Holder	Company Name	Community of Operation	Nunavut Based	Outfitter Licence Number	Activities
Crystal Serenity	Crystal Cruises LLC	Cambridge Bay	No	2017.OL.111.028	Cruise ship
Hanseatic and Bremen	Hapax-Lloyd Kreuzfahrten GMBH	Cambridge Bay, Gjoa Haven	No	2017.OL.111.023	Cruise ship, eco tourism
Koda Adventure Tours	Koda Adventure Tours	Kugluktuk	Yes	2017.OL.420.001	Cruise ship, arts and culture, ATVing, snowmobiling, bird watching, wildlife viewing, boating, camping, hiking, fishing, food and beverage, tours, and transportation.
Le Boreal	Compagnie du Ponant	Gjoa Haven	No	2017.OL.111.032	Cruise ship
Ocean Endeavor	Adventure Canada	Gjoa haven, Kugluktuk	No	2017.OL.111.017	Cruise ship, bird watching, wildlife viewing, and tours
One Ocean Expeditions Ltd.	One Ocean Expeditions Ltd.	Cambridge Bay	No	2017.OL.111.037 2017.OL.222.036	Cruise ship, bird watching, wildlife viewing, canoeing and kayaking.

Source: (GN DED&T 2017).

4.2.4.5 Culture and Land Use

Culture

The Inuit are descendants of the Thule and Dorset cultures that historically gathered at the mouth of the Ekalluk River, northwest of Cambridge Bay. While there is some disagreement as to whether or not the Thule and Dorset cultures overlapped in time and space, anthropologists have continued to study the issue through the excavation and examination of artifacts to reconstruct chronology, economy, and social organization for all periods. Recent research concludes the two groups were almost certainly aware of each other and likely were in contact at least occasionally (Friesen 2004). Other sources report that the Thule are the ancestors of today's Canadian Inuit (ITK n.d.).

The two groups within the Kitikmeot region are the Copper and Netsilik Inuit. People residing in Cambridge Bay and Kugluktuk, as well as those connected to the land surrounding Bathurst Inlet are likely descendants of the Copper Inuit. Residents of Gjoa Haven, Taloyoak, and Kugaaruk are Netsilik Inuit (Inuit Tapiriit Kanatami n.d).

Prior to contact with Europeans, the Inuit had an entirely oral culture and relied on stories and songs to transmit culture from one generation to the next (Tagalik 2010). Much of indigenous culture links to the ability to harvest and process food; to hunt, herd, fish, and gather, as the practice of these activities informs and are based on a continuing social relationship between people, animals, and the environment (Nuttal 2004). While these stories and messages served a variety of purposes, all were intended to help Inuit to lead a good life (National Collaborating Centre for Inuit Health 2010). The "good life" is having a sufficient proper attitude to be able to contribute to the common good, help others, and make improvements for future generations (Tagalik 2010).

For Inuit, residents of the Kitikmeot region are associated with one of three regional Inuit groups: the Ocean Inuit, the Nunamiut, and the Kiligiktokmiut. The Ocean Inuit or 'people of the sea' lived on

Victoria Island, the Coronation Gulf coast, and on the sea ice in the winter. The Nunamiut, or 'people of the land', lived inland near to Contwoyto Lake, Rockinghorse Lake, and Napaktolik. Nunamiut travelled to the coast to trade with Ocean and coastal people (an exchange of marine products for furs). The Kiligiktokmiut, or 'people of the small stiches', lived adjacent to the Bathurst Inlet and in the Perry and Ellice River drainages. Kiligiktokmiut were known for their fine sewing skills. While these were distinct groups, Inuit were mobile and travelled throughout their regions visiting and trading with one another (Banci and Spicker 2016).

Inuit culture varies and is adaptive. Historically, the Inuit used dogs used for hunting and travel on land while seal skin kayaks were used for travel on water. Commonly used tools included: whips, harpoons, fishing spears, lances, bows and arrows, furs or skin clothing, the ulu, soapstone lamps and pots, snow knives, and bow drills. Many of these tools assisted Inuit in the pursuit and use of land and marine mammals. Though previously nomadic, a greater supply of food from whales and greater ability of large groups to harvest led to the construction of semi-permanent villages from stone and cut sod supported by a whalebone framework. Inuit historically travelled to seasonal camps and built igloos (of snow) in the winter and skin tents in the summer while following the migration of animals (Inuit Tapiriit Kanatami n.d). Many of these activities continue today.

Inuit Qaujimajatuqangit

Inuit cultural traditions and world view are propagated through the intergenerational transmission of Inuit Qaujimajatuqangit (IQ). IQ refers to "the traditional, current, and evolving body of Inuit values, beliefs, experience, perceptions, and knowledge regarding the environment, including land, water, wildlife and people, to the extent that people are part of the environment" (Qikigtani Inuit Association 2009). The *Inuit Qaujimajatuqanginnut* Task Force (2002) identified a number of guiding principles that stem from IQ:

- *Pijitsirnjiq* – the concept of serving (a purpose or community) and providing for (family and/or community);
- *Aajiiqatigiingni* – the Inuit way of decision-making; the term refers to comparing views or taking counsel;
- *Pilnimmaksarniq* – the passing on of knowledge and skills through observation, doing, and practice;
- *Piliriqatigiingniq* – the concept of collaborative working relationships or working together for a common purpose;
- *Avatittinnik Kamattiarniq* – the concept of environmental stewardship; and
- *Qanuqtuurniq* – the concept of being resourceful to solve problems.

These principles inform the nature of the relationships that characterize Inuit culture, world view, and IQ. There are four relationship types of particular importance to the Inuit culture: 1) relationships between the people and their land; 2) relationships between family members; 3) relationships between individuals and their own internal Spirit; and 4) relationships between individuals and their social groups (e.g., communities and organizations) and between social groups (Inuit Qaujimajatuqannut Task Force 2002). These relationships, in conjunction with the principles noted above, are the foundations for Inuit cultural philosophy and IQ; their existence helps to ensure the sustainability of Inuit culture into the future.

Land Use Values

The Inuit of the Kitikmeot region have a longstanding relationship of reciprocity and respect with their region's wildlife and environment as a whole, as is manifested within IQ (Golder Associates Ltd 2003).

The values that guide land use activities and subsistence harvests are reflected in the Inuit approach to historic and contemporary land and resource use activities in the Kitikmeot region.

The Inuit culture and way of life is intrinsically connected with the land, as is reflected in the following quote from a hunter in the Kitikmeot region: "The land is important to us. Eating animals and fish is very important to us. Keep it as clean as possible. We don't waste any; we use most of it" (J. Avalak, pers. comm.). Land users from Omingmaktok emphasized that wildlife and fish habitat needs to be protected, and that mining activities should only occur if there is little or no impact on habitat (Land Use Focus Group, pers. comm. 2011).

Maintaining the health and the ability of the land to support the subsistence economy, including hunting, trapping, fishing, and gathering, is essential to the Inuit lifestyle. This includes ensuring the sustainability of wildlife populations in the area. Muskox, caribou, grizzly bear, wolf, and wolverine are among the species people in the Kitikmeot Region rely upon, with caribou being the most harvested terrestrial mammal.

Importance of Caribou and Other Species

"Caribou is a way of life" (B. Sitatak, pers. comm.) for the Inuit. The Dolphin Union caribou herd (Schedule 1, Special Concern, *Species at Risk Act* (2002)) is important for Kugluktuk, Omingmaktok, Kingaok, and Cambridge Bay harvesters (Anonymous 6, pers. comm.). Harvest occurs in and around Cambridge Bay when thousands of the caribou pass through during their migration. Kugluktuk community members also harvest the caribou along the coast (Anonymous 6, pers. comm.).

Caribou and caribou hunting are central to Inuit culture, identity, recreation, and kinship. Caribou are of economic and cultural importance to the Inuit and other residents of Nunavut, and the most important wildlife species for the western Kitikmeot region (Banci and Spicker 2016). Caribou is the most harvested terrestrial mammal in the Kitikmeot region and many families from the region supplement their diet with caribou or rely on it as a main food source (Rescan 2013).

The life cycle of the caribou was a major influence on where Inuit travelled and lived as they relied on caribou for food and clothing (Banci and Spicker 2016). Most northern communities, including Bathurst Inlet, Kugluktuk, and Omingmaktok, harvest caribou, including the Bathurst, Beverly, Ahiak, Dolphin and Union, and Bluenose East caribou (GNWT ENR 2012).

In addition to their importance to Inuit, barren-ground caribou are a biological keystone species in the Arctic. Caribou are a main prey item for grizzly bears and wolves. Other carnivores such as wolverine, foxes, and golden eagles scavenge on the caribou remains left from grizzly bear and wolf predation. Inuit TK of the Kitikmeot region includes observations of close associations of the abundance of these carnivore species to caribou abundance at a local scale (Banci and Spicker 2016).

Two caribou herds have the potential to interact with the Hope Bay Project: the Dolphin and Union caribou herd and the Beverly herd (includes Beverly herd and Ahiak herd).

Other wildlife species that are highly regarded by Inuit include grizzly bears, muskox, wolverine and furbearers, birds (e.g., raptors and migratory birds) and marine mammals such as seals (Banci and Spicker 2016).

- Grizzly bear is culturally significant for the communities of Kugluktuk and Kingaok, where it is more a part of the diet and living supplies than in other communities (Anonymous 6, pers. comm.). Grizzly bears are respected by Inuit and many legends and stories exist about them

(Banci and Spicker 2016). Historically, grizzly bears were hunted for meat and fat typically in spring or fall before denning (Banci and Spicker 2016).

- Muskox are valued by Inuit as a source of food, hides, horns, and wool, as well as for the commercial sale of meat. According to TK, muskox have generally increased in the Elu Inlet area since the early 1900s. Muskox were historically hunted by the Inuit when caribou and seals were not available. Inuit did not hunt muskox during the summer months as the meat is not as good to eat during this season and the pelts are of poor quality. Besides meat, muskox provided bedding, dog mats, and the horns were made into a wide assortment of tools and crafts (Banci and Spicker 2016).
- Wolverine is important both socially and culturally, and those who harvest it are deemed to have a high skill level and status. Inuit have generally regarded wolverines as pests because they cause damage to caches, destroy property, and steal food (Banci and Spicker 2016). Wolverine pelts were used as fur mats when hunting seals otherwise wolverines were historically seldom hunted. Their status as pests has changed because the value of their pelts has increased, leading to a dramatic increase in trapping and hunting of wolverines by Inuit (Banci and Spicker 2016). The use of wolverine fur as trim on parkas is a relatively recent custom, and very important to the Inuit (Banci and Spicker 2016). Inuit TK indicates that wolverines use the RSA (Banci and Spicker 2016).
- Some species of waterbirds are important food sources to Inuit communities, including eiders, geese, loons, ducks, mergansers, shorebirds, gulls and jaegers (Banci and Spicker 2016).
- Smaller species such as ptarmigan are important sources of food. Arctic char and whitefish are staple foods (Anonymous 6, pers. comm.).

Cultural Knowledge and Education

Maintaining cultural knowledge and education, particularly as it relates to land use, is critical to sustaining Inuit culture. Active participation in subsistence activities, by current knowledge holders and youth, helps to protect IQ and ensures the transfer of traditional knowledge to subsequent generations. Inuit recognize the importance of passing on knowledge to younger generations (B. Sitatak, pers. comm.). The intergenerational transfer of knowledge occurs during travel to hunting and fishing camps (B. Sitatak, pers. comm.), through the teachings of elders, and during participation in Elder's camps that focus on fishing in the summer and fall, and sealing and caribou hunting in the spring (M. Uqqarqluk, pers. comm.).

Youth may also participate in sport hunts, working with the guide outfitters (J. Avalak, pers. comm.). By participating in these hunts, they also learn land use skills and traditional knowledge. Finally, an "Out on the Land" education program offered by the public schools also provides opportunities for youth (B. Sitatak, pers. comm.; Appendix V6-3B).

With the continuing development of the local market economy and the increasing connectedness with people, businesses, and cultures from outside of Nunavut, Nunavummiut continue to adjust to a substantial amount of change within their communities.

4.2.4.6 Land and Resource Use Activities in the Kitikmeot Region

The following sections provide an overview of the community harvest and the traditional economy as it relates to present-day land use in the Kitikmeot region. These sections are followed by a focused account of land and resource use in the Land Use LSA and RSA (Sections 4.2.4. and 4.2.4.10).

Country Foods and Land Use

Each year, HTOs in each community conduct the community harvest that is financially supported by the GN through the Nunavut Harvesters Support Program's Community Hunt Program (up to $3,000; Nunavut Tunnigavik Inc. N.D.) (NTI 2017). The meat harvested is distributed either through a community feast or to select members of the community, and generally prioritize those people with limited means to get on the land, such as Elders, single parent families, families with no means of hunting, widowed people, and youth, among others (Appendix V6-3B). The HTO is responsible for applying for the subsidy and organizing a group of hunters as well as the following community feast (NTI 2017).

Community harvests are not sold for income, but are freely shared among members of the community. The demand for country foods remains high in the communities and it can be challenging for HTOs to keep up with the demand (Appendix V6-3B).

At times, sport hunts provide muskox meat to the community. Sport hunters typically only take the head and hide as a trophy.

Hunters have learned to screen and assess animal health based on visual indicators. Muskox is harvested primarily in the fall, as the hot summer weather reduces their movement and allows the muskox to fatten. Young muskox are often the targets of subsistence harvesters, as it is thought that younger animals have healthier meat, free of contaminants and disease. Sport hunters, on the other hand, typically target older bulls for their heads and hides (rather than for the meat). Other rules and norms govern the act of hunting for the Kitikmeot Inuit. For example, there is a belief that the meat of muskox chased during the hunt taste sour. For those using an ATV or snow machine, therefore, the last kilometre of the approach must be done on foot (Government of Nunavut 2015a).

The Nunavut Harvesting Equipment Program provides direct financial assistance for equipment to support harvesting activities (e.g., boats and snowmobiles, safety equipment and harvesting equipment lost in an accident). The Government of Northwest Territories (GNWT) and Tungavik Federation of Nunavut each contributed $15 million to Nunavut Hunters Income Support Trust when they established the program in 1993. The program was paused between 2014 and 2017 to provide time to review the future of the program; the program was relaunched in April 2017 (NTI 2017).

The Nunavut Wildlife Harvest Survey (1996 to 2001) remains the most comprehensive information source on subsistence harvests in the Kitikmeot region (NWMB 2004). The survey collected data on non-commercial hunting, trapping, gathering, and fishing of mammals, birds (and their eggs and feathers), fish, and shellfish. Hunters were categorized based on hunting frequency (NWMB 2004).

The results indicated that caribou was the most hunted game in Kingaok, Omingmaktok, and Cambridge Bay; while in Kugluktuk caribou and Canada goose were equally hunted. Other commonly harvested species included Arctic ground squirrel, Arctic and red fox, grey wolf, wolverine, and seal. Bird species were harvested at varying levels in the communities and included ptarmigan, seagulls and their eggs, Canada goose, and eider duck. Lastly, fish harvested included Arctic char, cod, lake trout, and whitefish (NWMB 2004).

The survey indicated there were approximately 17 to 18 hunters registered annually in Kingaok. In Omingmaktok, the number of hunters decreased from 31 in 1996/97 to 11 in 2001, which reflected the overall decline in the community's population over the same period. Cambridge Bay reported between 330 and 350 hunters each year and Kugluktuk was estimated to have between 263 and 294 hunters between 1996 and 2001 (NWMB 2004).

A 2008 study indicated that the proportion of the community member who participate in hunting ranges from approximately 62% in Cambridge Bay to 82% in Kugaaruk; for fishing the range was between 68% in Cambridge Bay to 92% in Taloyoak and Kugaaruk, and for plant gathering the range was from 29% in Gjoa Haven to 89% in Kugluktuk (Statistics Canada 2008a, 2008b).

The results of interviews conducted in 2011 and in 2017 indicated that the current number of intensive and active hunters in each of these communities was as reported in the 2004 NWMB survey and the 2008 study (i.e., the majority of families have at least one active hunter) (Appendix V6-3B). In 2011, it was reported that approximately 20 to 25 hunters were active within and near the land use study areas (Figure 4.2-1): about 10 from Omingmaktok and Kingaok and 10 to 15 from Cambridge Bay. In 2017, the Cambridge Bay HTO representatives indicated that the number of people actively hunting has changed over the years, and the perception is that more people are on the land now compared to about five years ago; as well, many people hunt every few days throughout the hunting season (Appendix V6-3B).

Information on wildlife population sizes and trends, which are an indicator of the availability of country foods, can be found in the wildlife chapters of the FEIS (Volume 4, Chapter 9).

Traditional Economy

Traditional economic activities are of great importance in the Kitikmeot communities, particularly among Inuit residents. The subsistence economy includes non-commercial hunting, fishing, trapping, and gathering. It also includes the transformation of harvested products into useful articles such as clothing, tools or arts and crafts. Subsistence harvests have real value for households because harvests decrease the need to purchase food and other necessities. In addition, products made from or acquired through land-based activities (e.g., furs, clothing, and arts and crafts) may be sold to provide income and linkage to the cash economy. The economic value obtained from subsistence activities, however, is supplementary to the deep social and cultural values associated with use of the land.

In 2006, the latest year for which published statistics are available, the majority of Cambridge Bay and Kugluktuk residents hunted, fished, trapped, or gathered wild plants and berries, in comparable proportions to Nunavut as whole. In addition, the number of community members participating in traditional economic activities appears to be increasing over time. Specifically, the number of adults in Cambridge Bay and Kugluktuk who reported participating in hunting activities in 2006 was approximately 14% greater than the number reported in 2001 (Statistics Canada 2008b).

Historically, Inuit harvesting activities during the winter were focused on seal (Pauktuutit Inuit Women of Canada 2006). In 2009, the European Union announced a general ban on seal products that caused pelt prices to collapse, even though the ban included a measure to allow seal products accompanied by an ‘attestation’ from a ‘recognized body’ that the pelt resulted from a hunt that was traditionally conducted by Inuit and other indigenous communities. Despite this measure, the effect of the ban drastically reduced demand for seal products, since a formal process to designate products as traditionally hunted was not in place (Government of Canada 2013).

In August 2015, the GN announced that an agreement had been reached with the European Union for an exemption on Nunavut sealskins. As a result of the agreement, Nunavut hunters can once again sell seal pelts on the European market. Funding for research, marketing, and training for the seal and long fur industry will be provided by the territorial and federal governments as well as through academic institutions (CBC News North 2015).

During the 2017 community research, it was noted that many community members hunt wolf, wolverine and polar bear to sell the furs at auction, in order to supplement their income. These furs are not bought directly by retail stores in the community (Appendix V6-3B).

In Cambridge Bay and Kugluktuk, harvesters are collecting and selling qiviut, muskox underwool harvested from muskox hides (B. Sitatak, pers. comm.; (Rohner 2017); Appendix V6-3B). Qiviut is highly valued on the international market. Community members in Cambridge Bay have been trained on how to shear the muskox hides to obtain qiviut, rather than having to bring a skilled shearer up from the south (B. Sitatak, pers. comm.). In Kugluktuk, a local community member is working with local hunters to obtain and shear muskox hides for qiviut. Some of the wool is locally dyed and spun, while some raw wool is sold and shipped south for processing, and marketing.

Through the guide outfitting operations of the HTOs, Cambridge Bay (the Ekaluktutiak HTO), Omingmaktok and Kingaok also conduct sport hunts for muskox and/or grizzly, as well as other guiding services. These guiding activities provide a source of income for local harvesters.

Harvesting and Food Security

Harvested animals are used for a variety of purposes, first and foremost as food for household and community consumption. The use of the land and eating of animals and fish is very important to Nunavummiut (J. Avalak, pers. comm; Appendix V6-3B). The sharing of the harvest strengthens and upholds community and family relations and values, especially as country foods are shared more than store bought foods. The specific processes through which animals are hunted, harvested, prepared, and consumed, sustain Inuit culture and inform social roles.

Country foods are available in Kitikmeot communities and, for many, continue to be eaten on a daily basis. This is particularly true for the smaller, eastern communities of Kugaaruk and Taloyoak which are considered to have a "more traditional" lifestyle; there is also a strong demand for country foods in the larger communities and the Cambridge Bay HTO indicated it can be hard at time to meet the demand for country foods (S. Qingnaqtuq, L. Nakoolak and P. Qayatinuak, pers. comm.; M. Uqqarqluk, pers. comm; Appendix V6-3B). Community research in 2011 found that in Gjoa Haven and Cambridge Bay, most people ate country foods every day, though they are sometimes mixed with store bought foods (T. Carter, pers. comm.; B. Sitatak, pers. comm.). In 2011, community research found that approximately 31% of residents reported eating caribou meat daily or almost daily while 16% reported rarely or never eating it. Community research in 2017 found that in Taloyoak, it was estimated that the majority (around 80%) of households rely on country foods daily; this percentage has remained the same for many years (Appendix V6-3B). In Gjoa Haven, the Wellness Department serves country foods at the Elders' Lunch and Canadian Pre-Natal Programs; the availability of the country foods has encouraged participation in these programs (Appendix V6-3B). Estimates of daily country food consumption rates were not obtained from other communities.

The distribution of country foods by hunters and the local HTOs is an important component of community livelihoods, as they provide food security to elders and single parent families. Country foods consumption also includes fish, seal, ptarmigan, and muskox which combine for an estimated average of 1,000 to 1,500 kg of product per hunter. The meat and fish harvested by each hunter every year has an estimated replacement value of $10,000 to $15,000 (NPC 2004).

The economic value of harvested animals is multidimensional and includes: consideration for the economic benefits derived from consuming country foods (e.g., less money spent on store bought foods), obtaining other goods/services in trade for country foods, the sale of country foods, and the sale of cultural products and pelts or the offsetting of the need to purchase clothing and personal items.

The transition from a subsistence society to a mixed wage-based economy/subsistence society is currently underway in Nunavut. However, while the generational differences may be greater today than at any other time in history, culture and harvesting continue to unite people of all ages (youth, adults, and Elders). Participation in the subsistence economy partially offsets the high cost of living in Nunavut as less money is required for store-bought foods (Socio-economic Effects Assessment, Volume 6, Chapter 3). Although harvesting partially offsets food costs, the cost of equipment and fuel needed to participate in harvesting is also high.

Harvesting and food security are interconnected concepts for Nunavummiut. The Nunavut Food Security Coalition (Coalition) provides a definition of food security as follows:

> *"Food security exists when all people at all times, have physical and economic access to sufficient, safe, and nutritious food to meet their daily dietary needs and food preferences for an active and healthy life. Food insecurity exists when these conditions fail to be met" (Nunavut Food Security Coalition 2014a).*

The Coalition indicates that 70% of Inuit homes are food insecure and outlines a number of factors affecting food security in Nunavut:

- having wildlife on the land or groceries in the store;
- having money to go hunting or grocery shopping;
- having healthy food that is culturally valued; and
- having knowledge to choose, prepare, and eat healthy food.

Table 4.2-7 lists what the Coalition describes as the four components of food security and factors affecting them. In order to improve food security in Nunavut, the Coalition has identified six themes: Country Food, Store-bought Food, Local Food Production, Life Skills, Programs and Community Initiative, and Policy and Legislation.

Table 4.2-7. The Components of Food Security and Related Factors (2014)

Availability	Accessibility	Use	Quality
• Large family sizes • Increased human population • Inadequate grocery supplies • Changing wildlife stocks • Variable distribution of wildlife • Changing environmental conditions	• High costs and low incomes • Gambling and substance abuse • Transportation delays • Weakening sharing networks • Changing access to hunting grounds • Climates change	• Loss of traditional knowledge • Limited food preparation skills • Limited budgeting skills • Low literacy rates • Language barriers	• Limited nutritional knowledge • Unhealthy store-bought food • Poor wildlife health • Food spillage • Environmental contaminants

Source: Nunavut Food Security Coalition (2014a)

The Coalition describes that country food contributes to strong, sustainable, self-reliant communities, yet it has decreased as a percentage of daily energy intake since 1999. Current challenges to the consumption of country foods includes: loss of traditional knowledge, high cost of harvesting equipment and fuel, rapid population growth, poverty that limits people's ability to pursue land use activities, changing food preferences, changing climate conditions (e.g., restricted access to areas,

changes to the distribution and movement of wildlife), and the scarcity of wildlife due to population fluctuations (Nunavut Food Security Coalition 2014a).

Subsistence harvesting and land use activities are directly related to food security and household economics. Food insecurity increases the risk of chronic disease, impacts to mental health, and lowering of learning capacity (Nunavut Food Security Coalition 2014b). The Conference Board of Canada indicated that relative to the rest of Canada, Nunavut is affected more than any other province or territory by household food insecurity (Le Vallée 2016). Research undertaken in 2010, (2010) indicates that Inuit women may be particularly vulnerable to food insecurity and report skipping meals and cutting the size of their meals to let other family members eat first. The study focused on women living in Igloolik, a community of approximately 1,500 on the northeastern tip of Melville Peninsula in Nunavut, and reported on the gendered dimensions of food insecurity. Women, including Elders, often make sure that children and men have eaten first. This practice is rooted in the perception that allowing the hunter to eat and maintain his energy serves to benefit the family as a whole. Trends noted in the study that are likely common to many Nunavut communities include the following:

- Women admitted to having purchased country food from a hunter within the past year, a practice that is not traditional and was not previously reported in other studies conducted in Igloolik. Historically (and currently), country foods are shared freely and hunters would not accept anything in return.
- Women emphasized that budgeting skills presented a challenge to planning their monthly expenses and described running out of food before they could afford to buy more. Food budgets were described as most flexible and were drawn upon to cover shortfalls in the power and rent budgets.
- Women were concerned about the decrease in the number of people hunting full-time; reasons for decreased number of hunters included illness, injury, death, and the lack of youth participation in full-time hunting as elders reduce their hunting activities.
- Women reported that increased hunting costs have resulted in decreased food sharing (Beaumier 2010).

The concern that youth are not engaging in land use activities such as hunting, and that their harvesting activities can fulfill demand currently met by aging Inuit hunters must be understood within the context of a culture in transition. Specifically, the introduction of the wage economy and western-style or modern education system conflicts with the approach and schedules for providing youth with training regarding land use activities. The expectation that youth participate in western education directly conflicts with the ability of youth to participate in and learn harvesting. An approach to incorporate cultural and land use training in the school system is through hunts organized at the school. For example, in Taloyoak, one school program includes an annual hunt, which involves Elders and youth and facilitates learning the entire process of the caribou hunt, from food preparation and packing to hunting (Appendix V6-3B).

Harvesting, Inuit Culture, and Well-being

In the past, Inuit culture defined what might be thought of as ‘success’ as providing for one’s family (immediate and extended) via the mastery of gender-specific tasks that, when completed by a number of individuals within a group, resulted in a functional, Inuit subsistence lifestyle based on land use activities. These tasks are based on the use of land and connection to the land and environment. Modern society defines success as completing formal education, obtaining employment, and being able to provide for oneself and one’s immediate family with a wage income; tasks that are not specifically connected to the land or land use activities. Consequently, there is increased emphasis for youth to

focus on obtaining high school credentials. In summary, the basis of livelihoods is transitioning from a sole reliance on land use and land-based activities to a combination of land use/land-based activities and the wage economy.

There are other social changes relating to the functioning of a subsistence-based society. These changes include reduced access to knowledge holders due to the aging population, which can affect the capacity for younger people to learn about harvesting and food preparation; and a family's primary hunter may not have the ability to support the number of individuals in need of country food, due to limited access to equipment or the need to travel further distances to access wildlife. Further, a hunter's contribution may not have the same meaning to a family, considering the presence of grocery stores and other more modern conveniences. Research indicates that Inuit now prefer a mix of traditional and modern food, requiring the head of household to both have time to hunt effectively and to participate in the wage-economy, contribute to household income, and enable the purchase of store-bought foods. Notwithstanding, land use and harvesting continue alongside the introduction of modern economies.

This complex existence is encapsulated in a phase that is frequently used to describe Nunavummiut youth as "caught between two worlds". The concept of 'two worlds' refers to past Inuit lifestyles which focused solely on land use and harvesting in comparison to modern Inuit lifestyles which are comprised of a mix of land use activities with modern technologies and the wage economy.

4.2.4.7 Land and Resource Use Activities in the Land Use RSA

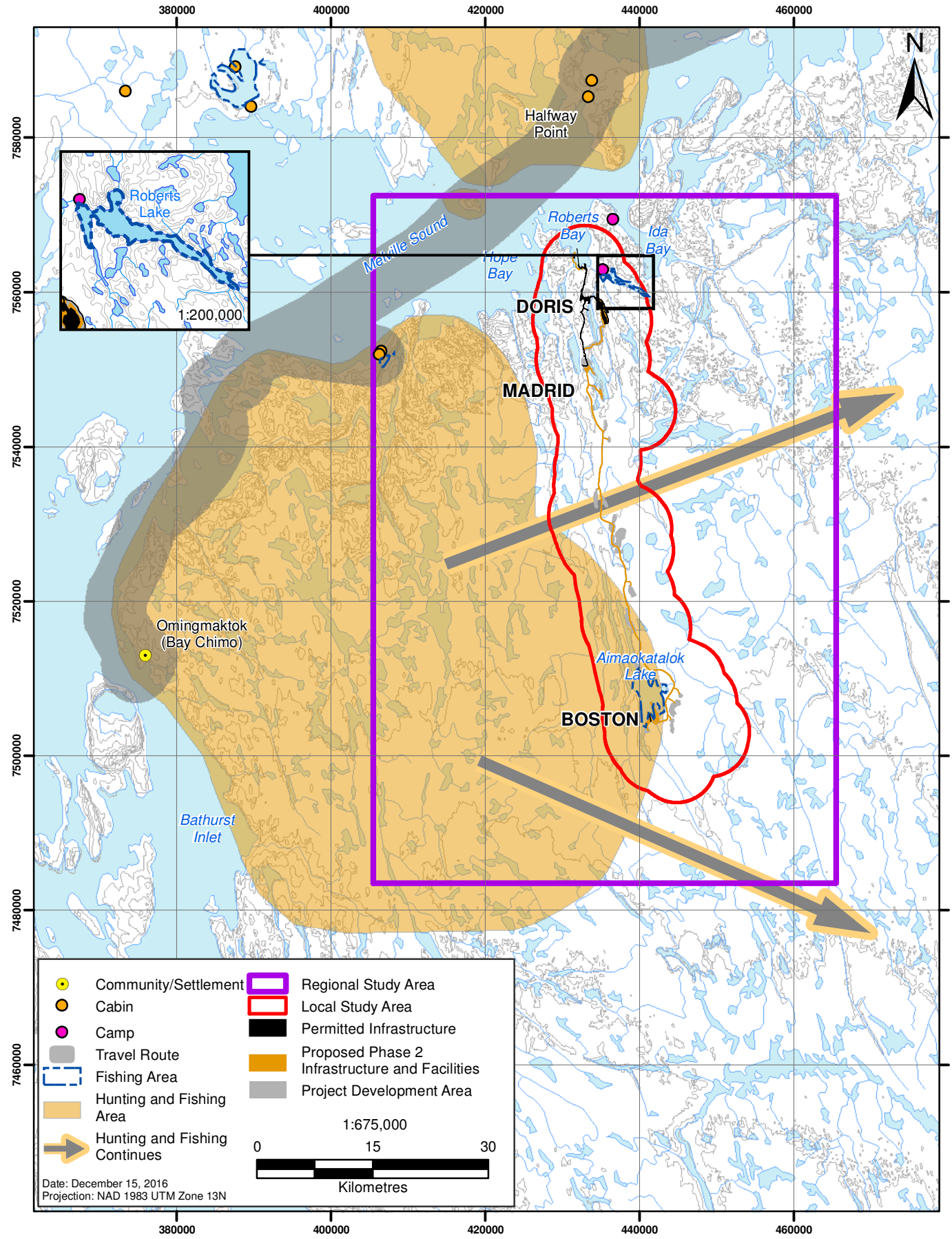
Land use in the RSA and nearby areas is illustrated in Figure 4.2-8. Information about current land use activities was obtained during community research undertaken in 2011 and 2017, and included interviews with HTO representatives in each Kitikmeot community, as well as engagement with local hunters, and government land and resource managers. A land use focus group session was held in Cambridge Bay in November 2011 with land users from Omingmaktok (Bay Chimo), the community closest to the Project. A series of three caribou workshops held in September 2016, April 2017, and August 2017, also contributed towards understanding of land and resource use within the Land Use RSA (Appendices V2-2A to V2-2D).

Land Users

Community based research undertaken in 2011 indicated that areas near to the Project were used by approximately 20 to 25 active hunters, including approximately 10 individuals from Omingmaktok and Kingaok, and 10 to 15 intensive hunters from Cambridge Bay. Land use intensity in this area varies from year to year. The 2017 community research reported that the number of people who actively hunt has changed over the years, and there is a sense that more people out on the land now, when compared to five years ago. Many people go hunting every few days throughout the hunting season (Appendix V6-3B). The land use RSA is accessible by snow machine during the winter months and travel to this area takes a minimum of three hours; local land users noted that the Land Use RSA is not typically visited during the summer months, as the crossing by boat is time consuming (Appendix V6-3B).

Representatives of the Taloyoak, Gjoa Haven, and Kurtairojuark HTO (based in Kugaaruk) indicated that they are not aware of any of their members hunting or trapping near the land use RSA, and that there are areas close to each of these communities that the focus for community harvesting (Appendix V6-3B).

Figure 4.2-8
Land Use in the RSA



Hunting and Trapping

Although the land use RSA area is difficult to access, community-based research indicates that land users participate in subsistence harvesting activities including hunting, trapping, fishing, and camping throughout the land use RSA. In 2011, local land users noted there were few people active in trapping (J. Avalak, pers. comm.). Trapping areas were identified during the September 2016 caribou workshop (Appendix V2-2A); however, trapping was not discussed during the 2017 community-based research.

Land users follow animal movements throughout the land use RSA and change hunting locations based on animal abundance, movements, and/or weather (J. Avalak, pers. comm; Appendix V6-3B). Wildlife hunted within the land use RSA includes caribou, muskox, wolverine, grey wolf, and fox (Anonymous 7, pers. comm.; B. Sitatak, pers. comm.; Land Use Focus Group, pers. comm; Appendix V6-3B; Appendix V2-2A) The number of animals harvested by the average hunter depends on the size of their family (Land Use Focus Group, pers. comm.).

Migratory animals may change their movement patterns between years, and hunters adjust their hunting efforts accordingly (Anonymous 7, pers. comm.; B. Sitatak, pers. comm.; J. Avalak, pers. comm.). The series of caribou workshops (Appendix V2-2A and Appendix V2-2C) confirmed that the migration pattern for island caribou has been changing over the last ten years. In past years, Elders hunted in areas extending from Hope Bay to Roberts Bay, as wildlife was plentiful; however, more recently, hunters have moved to other areas, in response the wildlife pattern changes (Anonymous 7, pers. comm.; B. Sitatak, pers. comm.). Changes to wildlife population and movement patterns identified by workshop participants include a cyclical change in caribou population since the 1960s (lows in 1960s and highs in 1980s), and more wolves in the area, which have led to a decline in caribou numbers (Appendix V2-2A).The Nunavut Wildlife Regulation (2015) indicates that wildlife harvesting is permissible throughout the year and there is no closed season for any wildlife species or population. However, local land users report that most hunting occurs December through April. Caribou are hunted as they travel closer to communities during migration. Wolverines, wolves, and fox are hunted from October to April/May (Anonymous 7, pers. comm.; B. Sitatak, pers. comm). Polar bear is occasionally hunted, to sell the fur (Appendix V6-3B). Land users active in the land use RSA have observed changes in the location of wildlife. For example, the grizzly bear population has increased throughout Kent Peninsula. Not coincidentally, there are fewer muskox sightings and harvesting muskox and caribou is more difficult. Grizzly and wolf have a year round presence on Kent Peninsula (Land Use Focus Group, pers. comm.). More wolves in the area have led to a decline in caribou numbers (Appendix V2-2A).

Figure 4.2-8 indicates two large areas that are frequented for hunting and fishing. These were areas of focus for land users from Omingmaktok who also reported hunting further west on the mainland past the Boston deposit at times. On Kent Peninsula, Omingmaktok land users reported a focus on the hunting and fishing area shown in Figure 4.2-8. Omingmaktok land users also reported using the western portion of Kent Peninsula for guided grizzly bear hunts (Land Use Focus Group, pers. comm; Appendix V2-2C, Appendix V6-3B).

Local land users report hunting on the islands between Kent Peninsula and Hope Bay; of these, certain islands are known to be particularly optimal locations for seal hunting (Anonymous 7, pers. comm.; B. Sitatak, pers. comm; Appendix V2-2C). Opportunistic hunting for migratory birds occurs in the spring and summer, particularly in the area west of the Doris Site (Anonymous 7, pers. comm.; B. Sitatak, pers. comm). Hunters from Omingmaktok noted that birds, including geese, swans and eider ducks are also harvested throughout the land use RSA (Land Use Focus Group, pers. comm.).

Seal hunting is popular; however they are generally not harvested in the Roberts Bay area. While sightings are rare, narwhal are known to appear in the marine areas north of the Project (Land Use Focus Group, pers. comm.).

Fishing

Fish are harvested in winter, spring and summer. Fishing methods includes the use of weirs and nets (Land Use Focus Group, pers. comm.; Appendix V6-3B). Fishing is often undertaken at waterbodies located within the vicinity of communities or camps. The NTKP report identifies frequented fishing areas within the land use RSA, and based on information obtained through interviews, there are prominent fishing areas located within the land use RSA and LSA (Figures 4.2-8 and 4.2-9), but local land users have indicated that these areas are generally used opportunistically while undertaking other land use activities (Appendix V6-3B). The fishing area within the RSA is located approximately 25 km northwest of the Hope Bay Project on Kent Peninsula near a small lake at the edge of Melville Sound (Figure 4.2-8). The NTKP report indicates this lake is known as Naoyak or Tahikyoaknahik (Banci and Spicker 2016). People from Cambridge Bay use this lake for ice fishing in the spring. This location is used for fishing Arctic char in the fall and fishermen set nets through the ice. Grizzlies frequent the area because of the Arctic char (Land Use Focus Group, pers. comm.).

Camps and Cabins

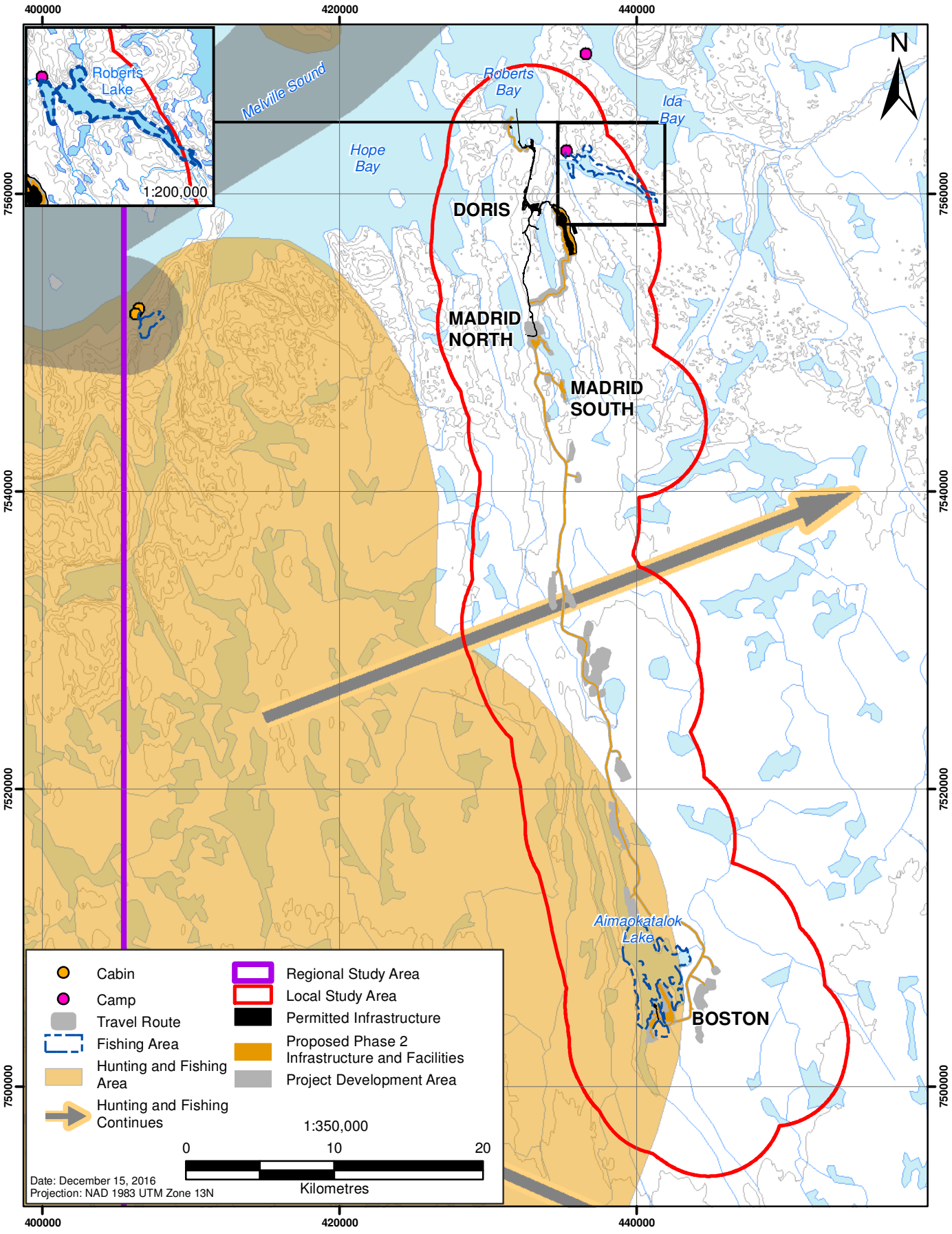
Camping may take place anywhere on the land (J. Avalak, pers. comm.). There are two cabins[7] and two camps within the land use RSA (Figure 4.2-8). The seasonal camp is located on the peninsula between Roberts and Ida Bays used primarily in the spring and summer (Figure 4.2-8; J. Avalak, pers. comm.; Appendix V6-3B). Local land users hunting and fishing in the area use the camp for short-term stays. Cabins are typically located near popular fishing areas. The two cabins located within the RSA are located at a popular fishing site as indicated in Figure 4.2-8. Elders reported that camps have historically been located along the shores of Roberts Bay, around Hope Bay, and at river mouths and confluences (Golder Associates Ltd 2003).

On occasion, local land users stop in and/or stay over at the Doris Site while travelling and hunting in the land use RSA (Appendix V6-3B).It was noted that TMAC is welcoming to land users that visit the Hope Bay Project site for shelter.

Outside the RSA, there are two cabins located on the south side of the Kent Peninsula, near Halfway Point and a well-known trail (L. Coady, pers. comm.). These cabins are used as a base for hunting, fishing, and accommodation during travel between Cambridge Bay and Omingmaktok or Kingaok (Figure 4.2-8; Anonymous 7, pers. comm.; B. Sitatak, pers. comm.; Land Use Focus Group, pers. comm.). Other facilities in the general area include the Walker Bay Research Facility and cabins belonging to the GNs Department of Environment near the west end of the Kent Peninsula (Figure 4.2-8; D. Fredlund, pers. comm.; S. Sather, pers. comm.; Land Use Focus Group, pers. comm.).

[7] See Section 4.2.3.2 for a discussion of the definition of camps pertaining to traditional land use activities, the Nunavut Agreement, and as presented by the GN DED&T.

Figure 4.2-9
Land Use in the LSA



Travel

Community based research undertaken in 2011 and 2017, and during the three caribou workshops (Appendix V2-2A, 2B and 2C) identified that land users' travel throughout the land use RSA to hunt, fish, and camp. Travel patterns are seasonally-dependent and most travel within the land use RSA is by snowmobile during the ice season (usually late November to early June). Travel by snowmobile is over land and ice-covered water. Few people travel by dogsled. During the ice-free period, the area can be accessed by boat, and travel over land is dominated by ATVs. Inland travel usually becomes more difficult as a result of snowmelt and ends by mid-May (Anonymous 7, pers. comm.; Land Use Focus Group, pers. comm.).

People travelling between Kingaok, Omingmaktok, and Cambridge Bay generally follow a route along the coast and across waterways towards the Kent Peninsula. A popular route to Cambridge Bay by snowmobile goes through Elu Inlet and across the narrow band of land at the east end of Kent Peninsula. During the winter months, land users traveling between Cambridge Bay and the land use RSA typically cross through an area on Kent Inlet, to land at Roberts Bay or the bay located just east of Roberts Bay. Although most people originally from Omingmaktok have moved to Cambridge Bay, seasonal travel continues: *"they still go home whenever they feel like it – that's their home"* (Land Use Focus Group, pers. comm.).

Individuals travelling between Kingaok, Omingmaktok, and Cambridge Bay may stop to hunt for wolverine, wolf, and caribou (J. Avalak, pers. comm.). Travelling on the land, hunting, and fishing remain important cultural activities within the land use RSA and throughout the Kitikmeot Region.

Spiritual and Ceremonial Areas

The results of interviews did not identify any specific locations within the land use RSA that people visit for ceremonial and spiritual reasons. However, it was noted that an Elders group has recently started to go to old camp sites and places where relatives were born with the purpose of visiting the sites with family and friends.

4.2.4.8 Land and Resource Use Activities in the LSA

Land use activities within the land use LSA are shown on Figure 4.2-9 are focused on hunting and fishing. In 2011, community-based research identified that approximately 20 to 25 hunters were active within the RSA and LSA; these individuals were identified as residents of Omingmaktok, Kingaok, and Cambridge Bay. In 2017, community-based research identified that there is a perception that more people are actively hunting near Cambridge Bay and within the land use LSA, compared to five years ago. Many people go hunting every few days throughout the hunting season (Appendix V6-3B).

Hunting, Trapping, Fishing, Camps and Cabins within the Land Use LSA

Local land users participate in harvesting activities such as hunting, trapping, fishing, and camping throughout the land use LSA[8] (Figure 4.2-9)

Within the land use LSA, species of focus for hunting reflect that of the wider region and include: caribou, muskox, wolverine, grey wolf, and fox (Anonymous 7, pers. comm.; B. Sitatak, pers. comm.; Land Use Focus Group, pers. comm.; Appendix V2-2A; Appendix V6-3B). In 2011, an Omingmaktok resident indicated seal are generally not harvested in the Roberts Bay area (Land Use Focus Group,

[8] In 2011, focus group participants noted trapping activities are minimal, and trapping was not raised as a land use activity during the 2017 community based research. Trapping areas were identified during the September 2016 caribou workshop (Appendix V2-2A).

pers. comm.); in 2017, seal hunting within the land use LSA was not raised during community-based research, although seal hunting was noted to be a common activity that occurred near Cambridge Bay.

Local land users pile rocks in a particular formation to mark good fishing spots. When travelling the land, people follow big lakes and rivers and look for fish markers (Land Use Focus Group, pers. comm.). Within the land use LSA, fishing occurs, however fishing is often conducted in an opportunistic manner when land users are in the area for other activities. Roberts Lake (Figure 4.2-9) was highlighted by Omingmaktok residents as having abundant fish (e.g., whitefish, char, cod, sculpins, flatfish). However, it is minimally used because of its proximity to Doris. Generally, Omingmaktok harvesters focus on whitefish, trout and cod (Land Use Focus Group, pers. comm.). Larger lakes and rivers that connect to the ocean are important as they usually have an abundance of fish such as Arctic char, whitefish and trout. A fishing site on the west-bank of Aimaokatalok, the lake adjacent to the Boston deposit, was also highlighted as an area for fishing (Appendix V2-2A, Appendix V6-3B); the site was identified for fishing grayling.

Local land users reported one camp located on the northwest edge of Roberts Lake, within the LSA, that has been occupied on a long-term basis and is also used for hunting and fishing during short-term stays (Figure 4.2-9; J. Avalak, pers. comm.)

Travel

Land users travel throughout the land use LSA to hunt, fish, and camp. Winter travel is by snow machine, while ATVs are reportedly used to travel over land in the summer (Anonymous 7, pers. comm.; Land Use Focus Group, pers. comm.; Appendix V6-3B). The NTKP report includes a map showing many of the historically used travel routes in areas near to the proposed Project, Elu Inlet, and the Bathurst Inlet (Banci and Spicker 2016). Some of these travel routes continue to be used today including a trail west of the Doris property. The September 2016 caribou workshop includes a map developed by the workshop participants that shows caribou movement areas, as well as winter and summer trapping and hunting areas (Appendix V2-2A).

The NTKP report indicates that Inuit from Cambridge Bay have historically travelled greater distances based on a seasonal harvesting cycle for social and trade purposes. Areas travelled include the Bathurst Inlet and Perry River areas (Banci and Spicker 2016).

Based on the results of the caribou workshops and 2017 community-based research, it is common to travel from Cambridge Bay to the mainland, particularly to areas around Bathurst Inlet and the land use LSA. To cross over to the land use LSA and further inland, land users cross through an area on Kent Inlet, and land on the mainland at Roberts Bay or the bay located just east of Roberts Bay. Travelling this route is common in the winter, and the area is not typically visited during the summer months, as the crossing by boat is time consuming (Appendix V6-3B).

Land users stop in or stay over at the Hope Bay Project while travelling and hunting in the area. The majority of individuals who have visited the Doris Site are from Omingmaktok and Cambridge Bay (Land Use Focus Group, pers. comm.).

4.2.4.9 Summary

As outlined in the Nunavut Agreement, there are two main types of land tenure in Nunavut: IOL and Crown land. IOL is land that is vested in a Designated Inuit Organization, while Crown land belongs to the federal government. Access and rights are administered by RIAs for IOL and by INAC for Crown land. Various licenses are required to access both types of land depending on the nature of the proposed projects. The draft NLUP will guide future development in the territory and represents the further

implementation of the Nunavut Agreement. NPC has developed the NLUP in consultation with Nunavummiut, the GN, and numerous government and other organizations.

There are both current and commercial land uses in the vicinity of the Hope Bay Project. Current land use typically consists of hunting, trapping, fishing, camping, and travelling, and is guided by traditional knowledge and a longstanding relationship of reciprocity and respect between Inuit and their environments. Commercial land use consists of sport hunting, mining and mineral exploration, and tourism.

The traditional economy is important to the livelihoods in the Kitikmeot region. Many individuals within the communities are actively engaged in harvesting; 2017 community-based research found that participation in harvesting has remained consistent in many communities, and in Cambridge Bay, there is a sense that participation is increasing. Harvest activities include hunting, fishing, and gathering, with harvests being used mainly for food, clothing, and arts and crafts. Elders' camps, school hunting trips, and other education activities directly involve youth in land use activities, which allows them to learn about Inuit cultural and traditional practices.

Baseline studies indicate that Cambridge Bay, Kingaok, and Omingmaktok are active harvesters within the land use RSA as portions of their larger hunting areas. Overall, land use within the RSA reflects current land use patterns throughout the western Kitikmeot region. While some land users have frequented to use other areas, land use activities have continued within the land use LSA despite the presence of Project camps and other infrastructure. The Hope Bay Project's facilities are commonly used by land users as a rest stop while in the area (Appendix V6-3B)

4.3 VALUED COMPONENTS

4.3.1 Potential Valued Components and Scoping

The identification and assessment of Valued Socio-Economic Components (VSECs) aims to establish an understanding of activities and trends in the region potentially affected by the proposed Madrid-Boston Project. VSECs are aspects of the human environment that are important to people and may include the local economy, heath, demographics, land use and livelihoods, cultural well-being, community well-being and social life, infrastructure and services, education and employment, commercial land use, and community and local government organizations.

The VSECs considered in this Land Use chapter are intended to address the Project's potential effects on local and commercial land uses, as these land uses are important aspects of the human environment and shape the lives of Inuit and other Kitikmeot residents. The assessment of the potential effects of the Project on other human environment VSECs is presented in the Socio-economics chapter (Volume 6, Chapter 3).

The EIS guidelines (NIRB 2012b) identify VSECs that may be relevant to the Project. Though not a comprehensive or exhaustive listing, the identified VSECs represent an appropriate starting point to guide the identification and scoping of VSECs (NIRB 2012b). The selection of VSECs began with those proposed in the EIS Guidelines (NIRB) and was further informed through consultation with communities, regulatory agencies, available IQ, and professional expertise.

VSECs to be examined in the land use assessment were selected based on the potential interaction between land uses and Project activities. Specifically, the determination of land use VSECs and potential effects for inclusion in this effects assessment considered and was informed by:

- 2011 and 2017 community-based research conducted for the Project (Appendices V6-3A and V6-3B) including:
  - interviews with individuals engaged in local tourism activities; and
  - key informant interviews, focus group and mapping sessions with local land users from Kugluktuk, Cambridge Bay, Omingmaktok, and Kingaok.
- the EIS guidelines (NIRB 2012b);
- the public, from feedback provided during ongoing public consultation and during community meetings held in the Kitikmeot (May 2 to 6, 2016); and
- three caribou workshops undertaken in 2016 and 2017 (Appendices V2-2A to V2-2D)
- meetings with Inuit organizations (for example, the KIA).

Other key data sources that have informed the land use setting (Section 4.2), the selection of VSECs and effects to be assessed, include the Hope Bay Baseline Report (Rescan 2012)Appendix V6-3A), the revised draft NLUP (NPC 2016), NIRB reference and guidance documents (NIRB 2013a, 2013b, 2013c), and the NTKP Report (Banci and Spicker 2016). Comments and concerns expressed during community meetings, focus groups, interviews, and other meetings with the KIA and relevant government bodies were integrated within specific VSECs for further examination in the assessment process.

The assessment of the potential effects of the Madrid-Boston Project on land use is further informed by other EIS chapters including Traditional Knowledge (Volume 2, Chapter 2), Public Consultation and Engagement (Volume 2, Chapter 3), Air Quality (Volume 4, Chapter 2), Noise and Vibration (Volume 4, Chapter 3), Vegetation and Special Landscape Features (Volume 4, Chapter 8), Terrestrial Wildlife and Wildlife Habitat (Volume 4, Chapter 9), the Freshwater and Marine Environment (Volume 5), and the Human Health and Environmental Risk Assessment (Volume 6 Chapter 5). Specific chapters and sections of these volumes are referenced, where appropriate, as they are considered in the land use effects assessment.

4.3.1.1 The Scoping Process and Identification of Land Use VSECs

The scoping of Land Use VSECs follows the process outlined in the Effects Assessment Methodology (Volume 2, Chapter 4).

The EIS Guidelines (NIRB 2012b) suggest that the land use assessment should address the potential effects of the Madrid-Boston Project on both traditional and commercial land use. The VSECs proposed by the EIS Guidelines to commence scoping for land use include:

- Traditional activities and knowledge including:
  - Land use and mobility;
  - Food security;
  - Language;
  - Cultural and commercial harvesting; and
- Non-traditional land and resource use.

The above land use VSECs were considered to guide the identification and scoping of VSECs (NIRB 2012b). The selection of land use VSECs was further informed through consultation with communities, regulatory agencies, TK, professional expertise, and the NIRB's final scoping report (Appendix B of the EIS Guidelines).

The scoping process examined whether there was a potential interaction between the Madrid-Boston Project and the VSEC. For an interaction to occur there must be spatial and temporal overlap between a land use VSEC and a Project component and/or activities. Project-related changes to the environment (e.g., from noise and emissions, or direct physical impact on or displacement of animals and vegetation or their habitats) may have implications for access to land and resources, the experience of the natural environment, and harvesting practices and/ or success.

The determination of VSECs and potential effects for inclusion in this effects assessment considered the following sources of information:

- review of recently completed Nunavut EAs (e.g., Back River, Meliadine);
- the Hope Bay Project Inuit Impact and Benefit Agreement (IIBA; (KIA and TMAC 2015);
- consultation and engagement with local and regional Inuit groups (for example, the KIA);
- the EIS guidelines and appendices (NIRB 2012b);
- the public, during public consultation and community meetings held in the Kitikmeot in May, 2016 and in October and November, 2017 (Volume 2, Chapter 3); and
- series of Caribou Workshops (Appendices V2-2A to V2-2D).

4.3.1.2 NIRB Scoping Sessions

Scoping sessions hosted by NIRB (NIRB 2012c) with key stakeholders and local community members focused on identifying components important to land users and land use generally, as related to the Project. Comments made during these sessions were compiled and analysed. It is commonly understood that land use, harvesting activities, and country foods are highly valued elements of the human environment.

All comments were considered during VSEC selection. Comments made during the scoping sessions are summarized below:

- Operations may impact traditional hunting grounds; for example there may be impacts to calving grounds.
- *"Inuit are connected to the land, we eat fish when we go out, and that is part of healing group, it is very important that we go out; it is where some of us grew up."*
- Char and breeding seals may be impacted from the number of ships between July and September.
- Concern regarding the impact of docking area on whales and char.
- Concern regarding the number of ships in the Northwest Passage and impacts to sea life.
- Concern regarding the impact of ice breakers coupled with barges that bring supplies damaging to sea life.

4.3.1.3 TMAC Consultation and Engagement Informing Land Use VSEC Selection

Community research undertaken in 2011 and 2017, including key informant interviews with HTO representatives, land use mapping focus groups with local land users, interviews with lodge owners and

guides, and with Kitikmeot Foods regarding commercial harvesting, also informed the selection of land use VSECs. Discussion of the importance of the region to local land users and business highlighted aspects of the environment relevant to land use and services. The results of community research, as well as community and public consultation and scoping sessions, collectively informed the selection of VSECs for land use, as both traditional and commercial land users may experience changes as a result of the Project.

Community meetings for the Project were conducted in each of the five Kitikmeot communities as described in Chapter 3 of Volume 2. The meetings are a central component of engagement with the public and an opportunity to share information and seek public feedback. Overall, the community meetings were well attended. Public feedback (questions, comments, and concerns) about the proposed Project was obtained through open dialogue during Madrid-Boston and Hope Bay Project presentations, through discussions that arose during the presentation of Project materials and comments provided in feedback forms. There were no specific land use questions, comments, and concerns raised during the May 2016 and October/November 2017 community meetings.

4.3.2 Valued Components Included in the Assessment

4.3.2.1 Land Use VSECs

Based on the scoping analysis described in Section 4.3.1, the following VSECs are included in the land use assessment:

- Commercial Land and Resource Use; and
- Traditional Activities and Knowledge.

These VSECs were selected to guide the assessment on land use based on the following considerations:

- there is potential for these VSECs to interact with Madrid-Boston Project components and activities;
- the importance of these VSECs has been identified by local communities, Inuit organizations, governments, regulators, and other stakeholders during consultation and engagement; and
- they are informed by IQ (Volume 2, Chapter 2) and professional judgement.

These two VSECs provide structure to the assessment of the potential effects of the Madrid-Boston Project on land use. These VSECs represent two types of land users known to be present in the area that may be affected by Project components and activities. These VSECs are broadly defined to be inclusive of varying aspects of land use that exist in the region.

There are no existing or proposed parks or conservation areas near the proposed Madrid-Boston Project. The nearest conservation area is the Queen Maud Gulf Migratory Bird Sanctuary approximately 50 km east of Roberts Bay by air and over 300 km by water. Therefore, no further assessment is warranted on protected areas, visual and aesthetic resources.

Similarly, this assessment does not evaluate potential effects on industrial land and resource use, including mining exploration and development. Aside from the development of Doris and ongoing exploration activities undertaken by TMAC within the Hope Bay Greenstone Belt, no other mineral interests are identified in the land use LSA or RSA. Thus, the Madrid-Boston Project is not expected to interact with other mining activities, mineral tenures or other related licences or leases held by other companies, with respect to land use. As a result, there is no potential for the Project to interaction with mining-related or other industrial land users and this effect is not explored further in the effects assessment.

Commercial Land and Resource Use

Commercial operations that undertake land uses in the Project area include commercial harvesting/sport hunting and the tourism industry (i.e., activities led by lodge owners, tour operators, and guide outfitters). For the purposes of the assessment, HTOs as commercial entities are considered within the commercial land and resource use assessment (including HTO commercial and community hunts). Other commercial hunting activities include muskox harvesting (i.e., muskox harvesting within MX-11) and guided hunting activities by licenced outfitters.

The Madrid-Boston Project does not interact with Kitikmeot Foods commercial fishing areas, as fishing occurs within proximity to the processing facility in Cambridge Bay and only at fishing sites on Victoria Island. Kitikmeot foods does not operate a commercial muskox harvesting operation. Other types of land and resource use for commercial gain (e.g., exploratory fisheries, plant harvesting) are considered, although these activities are not known to occur within the land use LSA or RSA.

Traditional Activities and Knowledge

Local Inuit engaged in land use and harvesting activities depend on the land and environment to support their livelihoods. Traditional knowledge, or IQ, informs their engagement with the land, environment, and resources and is continually evolving in response to changing landscapes as a result of processes such as climate change, technological developments, and other resource development projects.

Traditional activities, for the purpose of this assessment, relate to harvesting for personal use/ subsistence harvesting as well as personal/family cultural land uses. These activities are referred to as "land use activities" throughout this chapter, in recognition of current (and traditional) land use practices. Land users rely on wildlife, fish, birds, and to a lesser extent, vegetation, and, inherently, the terrestrial and aquatic environments that support those populations.

Land uses considered in this assessment include hunting (primarily for caribou) and trapping (primarily for furbearers), fishing at Roberts Lake and Aimaokatalok, and use of cultural sites or travel routes (i.e., camping, and travelling). There are two cabins and two camps identified within the land use RSA; one of the camps is located within the land use LSA. There are placenames that have been identified throughout the RSA (Banci and Spicker 2016); placenames provide an entryway to Inuit oral knowledge and language. Many placenames relate to land features, and are important for navigation on the land. There is limited information about land use activities at placenames; however, as they are tied to Inuit language they are considered to be culturally important. Using conservative approach, the assessment considers potential effects of the Madrid-Boston Project to placenames, as navigational landmarks, that may be affected by the Project.

Table 4.3-1 summarizes the land use VSECs included in the assessment and indicates whether the VSECs originally proposed by the EIS Guidelines (NIRB 2012b) have either been included as indicated, included as part of another VSEC, or otherwise addressed elsewhere in the EIS.

4.3.2.2 Land Use Effects and Indicators

Three potential effects to land use VSECs have been identified as a result of potential environmental effects of the Project. These potential effects are considered in relation to both *"Commercial Land and Resource Use" and "Traditional Activities and Knowledge."* The potential effects are:

- Changes in access to land and resources;
- Changes to harvesting success or harvesting practices; and
- Changes to the experience of nature.

Table 4.3-1. Valued Socio-economic Components Included in the Land Use Assessment

VSECs Proposed in the EIS Guidelines	Included/ Excluded	Rationale	Final VSEC
Non-traditional land use and resource use	Included	• The Madrid-Boston Project has potential to interact with commercial harvesting/sport hunting or, tourism, and/or recreation due to changes in access to land and resources, changes in experience of people using land and resources, and changes in the abundance of available resources.	Commercial Land and Resource Use
Traditional Activities and Knowledge – Land use and mobility	Included	• The Madrid-Boston Project has potential to interact with land uses (such as harvesting and cultural practices) due to changes in the abundance of available resources and changes in the quality of resources. • The Madrid-Boston Project has potential to interact with mobility due to changes in access to land and resources.	Traditional Activities and Knowledge
Traditional Activities and Knowledge – Cultural [activity] and commercial harvesting	Included	• The Madrid-Boston Project has potential to interact with cultural activities and harvesting due to changes in access to land and resources/frequented harvesting areas. • The Madrid-Boston Project has potential to interact with commercial harvesting due to changes in access to land and resources, changes in experience of people using land and resources, and changes in the abundance of available resources.	Traditional Activities and Knowledge
Traditional Activities and Knowledge – Food security	Excluded	• Potential effects of the Madrid-Boston Project on food security are found in Volume 6, Chapter 3 (Socio-economics) as food security is tied to community health and well-being.	Refer to Volume 6, Chapter 3 (Socio-economics)
Traditional Activities and Knowledge – Language	Excluded	• Potential effects of the Madrid-Boston Project on language are found in Volume 6, Chapter 3 (Socio-economics) as the main pathways through which the Project may impact language are largely social.	Refer to Volume 6, Chapter 3 (Socio-economics)

Changes in access to land and resources: this potential effect is defined as reduced or loss of use of an area of land and its resources because of the physical displacement by or close proximity to the Madrid-Boston Project, including disruption to travel routes, or access to harvesting areas. This effect considers effects to areas used for hunting, fishing, travelling, and commercial activities (e.g., guided sport hunting) as well as areas of land and water used for marine harvesting or travel in marine areas. The Project components and activities that may cause changes in access include:

- construction activities and traffic during construction;
- physical presence of Project infrastructure; and
- traffic and road maintenance during operations.

Changes to harvesting success and/or harvesting practices: this potential effect considers the consequences of changes to the abundance, and distribution of wildlife and birds (including their eggs) and fish. Consideration is given to the potential effects of the Project on the availability of animals for harvesters (e.g., reductions in habitat or population size, changes to movement or migration patterns). This effect considers Project components and/or activities that have potential to impact marine fish and wildlife, which could result in a change to harvester practices and/or success.

The Project is not anticipated to result in exceedances of contaminants of concern and, therefore, no quantified change is anticipated to the quality of wildlife, fish or plants and no assessment of quality of resources is warranted. However, there is potential for land users to *perceive* changes in quality of resources. Perceived changes may result in avoidance of harvesting areas, which can reduce the overall success of harvesting practices. As such, where information is available regarding perceived quality of resources, it has been considered in the effect of 'changes to harvesting success and/or harvesting practices'.

No substantive plant harvesting is known to occur in the land use RSA, and as a result, changes to abundance of plant, berries and medicines are not considered further.

Project components and activities that may cause changes to harvesting practices/success include:

- clearing and grubbing activities resulting in habitat loss or alteration for wildlife species;
- sensory disturbance from construction and operations activities resulting in disturbance of wildlife species; and
- avoidance of frequented harvesting areas due to perceptions of environmental effects or health risks.

Changes to experience of nature: this potential effect is defined as a change to the quality of experience for land users in the vicinity of the Project due to sensory changes or disturbances. The sensory experience is characterized by sound, vibration, air quality, light, and visual aesthetics and in some cases the absence of a characteristic (e.g., limited view of stars for orientation due to light disturbance). The development of the Madrid-Boston Project may alter land users' experience of the natural environment by causing changes to levels of noise, emissions (e.g., dust and exhaust) and vibrations.

Project components and activities that may cause changes to the quality of experience of the natural environment include:

- blasting, drilling, vehicular and air traffic resulting in noise, light and air emissions; and
- introduction of visual effects (e.g., light, physical infrastructure within natural setting) or changes to landforms.

Where perceptual data are available, such as descriptions of important viewscapes, sense of place, feelings of safety on the land, this information has been considered. However, to date, limited perceptual information is available.

Table 4.3-2 describes the potential effects and the indicators used to measure these effects for the assessment of Land Use VSECs.

4.3.2.3 Concordance with NIRB Guidelines

The NIRB guidelines for the Project (NIRB 2012) identified a variety of potential impacts to be evaluated for land use VSECs. Table 4.3-3 provides a summary of the potential effects and how they are considered in the assessment.

Table 4.3-2. Potential Effects to Land Use VSECs and Measurement Indicators

Potential Effects	Indicator/Measurement of Potential Effects
Change in access to land and resources	• Presence of Boston-Madrid Project-related obstructions (including traffic) on roads, trails, and waterways within the land use LSA, used to access land and resources for harvesting, cultural practices. • Change in effort (time and expense) required to access current or alternate land use sites within the RSA.
Change in harvesting success/ harvesting practice	• Change in the quantity of harvestable resources within the RSA resulting from Madrid-Boston Project-related changes in wildlife habitat size or wildlife population size, and wildlife, and fish habitat and fish. • Change in the quantity of harvestable resources within the RSA as a result of increased pressure on harvested resources due to Madrid-Boston Project-related workforce. • Change in the distribution or of harvestable resources within the RSA resulting from Project-related changes in wildlife movement. • Avoidance of frequented harvesting area due to potential or perceived environmental effects or perceived health risks, based on qualitative information/consultation records.
Change in the experience of nature	• Quantitative change in noise levels experienced by land users. • Qualitative change to visual aesthetic of the landscape /contrasting visual characteristics in the environment, based on qualitative information/consultation records. • Quantitative change in presence of wildlife within the RSA. For Traditional Activities and Knowledge VSECs: • Change in number of Madrid-Boston workforce interactions while undertaking land use activities, resulting in changes in feelings of safety on the land. • Qualitative change in perceptions or altered sense of place for land users, based on qualitative information/consultation records.

Note: There is no assessment on the quantity or quality of cultural land uses; the assessment addresses access and the quality of experience of using other cultural and traditional land use sites.

4.3.3 Valued Components Excluded from the Assessment

All of the land use VSECs described in the EIS guidelines (NIRB) have been included in the effects assessment. The EIS guidelines (NIRB) also suggested a number of sub-VSECs for inclusion in the assessment; each has been included within the land use assessment, with the exception of Language and Food Security, both of which are assessed as sub-VSECs of the Socio-economic assessment (Volume 6, Chapter 3). Measures taken to maintain compliance with Nunavut's *Official Languages Act* (2006) are described in the socio-economic effects assessment (Volume 6, Chapter 3) and in the Doris North Human Resources Plan (Annex V8-7).

Potential Effects Not Considered Further in the Assessment

Some potential effects identified in the EIS Guidelines (NIRB 2012b) have not been considered further in the land use effects assessment, either because the topic is considered as part of another effect, or because Madrid-Boston Project activities and/or components are not expected to interact with a land use activity or land user group. The reader is encouraged to review additional content provided elsewhere in the EIS that supports these conclusions.

By refining the list of potential effects to avoid duplication (with other Valued Ecosystem Components [VECs]/VSECs) and 'scope out' effects that are unlikely to result from the Project, the overall EIS is more focused and realistic. The aim of the scoping process was to clearly define the potential land use VSECs and effects, and determine how each effect is linked to the Project. The rationale for not including certain effects is provided in Table 4.3-3.

Table 4.3-3. NIRB Guidelines for Potential Effects Included and Excluded in the Land Use VSECs Effects Assessment

NIRB Guidelines for Impact Assessment	Land Use Potential Effect Considerations and Inclusions	Potential Effect Exclusions	Relevant Land Use VSECs
Potential effects of the Project on the accessibility of caribou and other wildlife species to harvesters, where such may be affected by reductions in habitat and herd sizes and/or expected changes to migration patterns or human travel routings. The risk to present and future generations of harvesters should be considered.	• Considered in Section 4.5.2.2: Traditional Activities and Knowledge: 'change in access', 'changes in harvesting practices/success' and 'changes in natural experience'. • Effects to wildlife are assessed in Volume 4, Chapter 9.	Not applicable	Traditional Activities and Knowledge
Potential impact to cultural and traditional values and traditional lifestyles in the communities potentially affected by the Project. This discussion should give consideration to the decreased availability of caribou and other wildlife species.	• Considered in Section 4.5.2.2: Traditional Activities and Knowledge: 'change in access', 'changes in harvesting practices/success' and 'changes in natural experience'.	• Effects of the Madrid-Boston Project wage employment on lifestyle considered in Volume 6, Chapter 3.	Traditional Activities and Knowledge
Description on how the Proponent will comply with the *Official Languages Act*.	Not applicable	• Potential effects to language are considered in Volume 6, Chapter 3, Socio-economics.	Not Considered within Land Use VSECs. Refer to Volume 6, Chapter 3
Potential socio-economic impacts from shipping, taking into account potential impacts to marine species on which local residents rely upon for food sources.	• Not applicable	• Project-related marine transportation (i.e., sealift) occurs within the commercial shipping lane that presently provides passage for a number of vessels and will be limited to the summer months. During construction and operations there will be approximately seven trips per year, and these activities occur during open water season. As a result, the potential for sealift activities to adversely interact with commercial or traditional land use activities is low. Therefore, the sealift route and activities have not been included in the study area for the land use effects assessment. • Economic impacts are assessed as socio-economic assessment (Volume 6, Chapter 3)	Traditional Activities and Knowledge

NIRB Guidelines for Impact Assessment	Land Use Potential Effect Considerations and Inclusions	Potential Effect Exclusions	Relevant Land Use VSECs
Potential socio-economic impacts from shipping, taking into account potential impacts to marine species on which local residents rely upon for food sources *(cont'd)*.		• Potential effects to food security considered in the socio-economic assessment (Volume 6, Chapter 3)	
Potential effects to the practices associated with a traditional lifestyle that may arise from a potentially increased level of contaminants found in traditional foods.	• The Madrid-Boston Project is not anticipated to cause significant changes to the quality of country foods due to contamination (see Volume 7, Chapter 5). • Potential effects of *perceived* contamination considered in Section 4.5.2.2 'changes to harvesting practices and/or harvesting success'.	Not applicable	Traditional Activities and Knowledge
Potential impacts that the contamination of traditional food sources, including those trapped, fished, hunted, harvested or grown for subsistence or medicinal purposes (i.e., berries, etc.), may have on individuals, families, and communities.	• The Madrid-Boston Project is not anticipated to cause significant changes to the level of contaminants in country foods (see Volume 7, Chapter 5) • Potential effects of perceived contamination considered in Section 4.5.2.2 'changes to harvesting practices and/or harvesting success'.	Not applicable	Traditional Activities and Knowledge
Potential changes in the traditional ways of life and household function due to wage employment associated with the Project.	Not applicable	• Potential effects of the Madrid-Boston Project on wage economy are considered as part of the socio-economic effects assessment (Volume 6, Section 3).	Not Considered within Land Use VSECs. Refer to Volume 6, Section 3
Potential impacts to Aboriginal fisheries species, including fish of cultural or practical importance.	• Potential effects to fishing activities reliant on fish species, including fish of cultural or practical importance, is considered in Section 4.5.2.2 - Potential effects on land uses: fishing 'changes in harvesting practices/success'.	Not applicable	Traditional Activities and Knowledge
Potential impacts to marine wildlife of cultural or practical importance to northerners.	• Potential effect to marine wildlife considered in Section 4.5.2.2 - Potential effects on land uses: fishing 'changes in harvesting practices/success'.	Not applicable	Traditional Activities and Knowledge

NIRB Guidelines for Impact Assessment	Land Use Potential Effect Considerations and Inclusions	Potential Effect Exclusions	Relevant Land Use VSECs
Impacts to vegetation of cultural or practical importance.	Not applicable	• The NTKP report (Banci and Spicker 2016) does not identify use of vegetation resources in the land use RSA, therefore no interaction between the Project and plant gathering is anticipated and potential effects to harvesting activities are not assessed. • Potential effects to vegetation are assessed in Volume 4, Chapter 8.	Not Considered within Land Use VSECs. Refer to Volume 4, Chapter 8.
Potential impacts on known non-traditional land and resource use including protected areas, visual and aesthetic resources.	• Although no visual or aesthetic resources are identified within the land use RSA, perceived changes to the landscape are considered within 'change of experience of nature' for both commercial and other land users.	• There are no protected areas within the land use LSA. Huikitak River Conservation Area is the closest conservation area and is adjacent to the RSA. The Queen Maud Gulf Migration Bird Sanctuary is approximately 50 km east of Roberts Bay by air and over 300 km by water. Further information about protected areas in the region is provided in Section 4.2.4.3. The Project is not anticipated to affect protected areas and this potential effect is not considered further in the assessment. • There are no designated visual or aesthetic resources identified within the land use LSA; therefore, visual effects were not considered further in the assessment.	Commercial Land and Resource Use Traditional Activities and Knowledge

NIRB Guidelines for Impact Assessment	Land Use Potential Effect Considerations and Inclusions	Potential Effect Exclusions	Relevant Land Use VSECs
Discussion of anticipated interactions between project development and land use activities by local residents in the Project RSA, in particular at the mine site, all-weather road and shipping routes.	Not applicable	• While it is acknowledged that areas near to the Project are used by local harvesters, no individuals reside within the land use RSA. The nearest permanent community is Cambridge Bay which is 130 km from the Hope Bay Project. Interactions between land users and the Madrid-Boston Project components are considered for safety reasons and will be managed as described in the Hope Bay Project Human Resources Plan (Annex V8-7).	Not applicable
Potential impacts on the ongoing productivity of local or regional commercial, recreational, or Aboriginal (CRA) fisheries.	• Effects to fisheries considered in "Traditional Activities and Knowledge" VSEC. Refer to Section 4.5.2.2 (Potential effects on land uses: fishing 'changes in harvesting practices/success').	• Baseline studies indicated there were no commercial fisheries operating within the land use LSA and RSA. Therefore, there will be no interaction between commercial fisheries and the Project. • There is no reported recreational fishing in the Project land use LSA or RSA; therefore, there will be no interaction between recreational fisheries and the Project.	Traditional Activities and Knowledge
Potential impacts related to accessibility of areas used for hunting, fishing, marine harvesting, traveling, recreation and religious activities as a result of Project development.	• Impacts to access harvesting, travelling and recreational areas are considered in Commercial Land and Resource Use VSEC and Traditional Activities and Knowledge. Refer to Section 4.5.2.1 and 5.5.2.2 (Potential effect on Commercial Land and Resource use: 'change in access'; and Potential effect on Traditional Activities and Knowledge 'change in access' for hunting, fishing and cultural sites).	• Baseline studies and TK (Banci and Spicker 2016)did not indicate any specific use of land or locations within the land use LSA and RSA for religious activities. Therefore, changes to accessibility and land used for religious activities as a result of the Project were not considered further in the assessment.	Commercial Land and Resource Use Traditional Activities and Knowledge

NIRB Guidelines for Impact Assessment	Land Use Potential Effect Considerations and Inclusions	Potential Effect Exclusions	Relevant Land Use VSECs
Potential effects on sustainable resource use, such as country food availability and accessibility of carving stone deposits, taking into account the CEA throughout the entire lifespan of the Project.	• Potential effects of the availability of country food is considered in Section 4.5.2.2: Traditional Activities and Knowledge: 'change in harvesting success/harvesting practice'. • Changes to availability of country foods is also considered is included socio-economic effects assessment (Volume 6, Chapter 3).	The location of carving stone deposits in relation to the Project is provided in Figure 6 in the NTKP (2016). Carving stone deposits have not been identified within the land use RSA. If during Project activities, earth works uncover carving stone deposits, TMAC will endeavour to set aside these deposits for communities, where practicable. Changes to sustainable resource use are not anticipated to result from the Project; therefore, this potential effect is not considered further in the land use effects assessment.	Traditional Activities and Knowledge
Discussion of the potential impacts of the all-weather road on Inuit harvesting activities.	• Potential effects of all-weather roads considered in Sections 4.5.2.1: Commercial Land and Resource Use: 'change in access' and in Section 4.5.2.2: Traditional Activities and Knowledge: 'change in access'.	Not applicable	Commercial Land and Resource Use Traditional Activities and Knowledge
Describe the potential impact on the tourism industry from the Project's development which may impair the wilderness experience of tourism in the Project RSA.	• Considered in Commercial Land and Resource Use VSEC. Refer to Section 4.5.2.1 (Potential effect on Commercial Land and Resource use: 'changes in harvesting practices/success' and 'changes in natural experience').	Not applicable	Commercial Land and Resource Use

4.4 SPATIAL AND TEMPORAL BOUNDARIES

The spatial boundaries selected to shape this assessment are determined by the Project's potential impacts on land and resources use and TK. The spatial boundaries have been developed in consideration of the relationship between resources (e.g., caribou and fish) and commercial and traditional land use activities. Information gathered during baseline data collection, including key informant interviews with HTO representatives and land users, focus groups, and the caribou workshops, and in the review of the NTKP report, supported the development of the spatial and temporal boundaries.

Temporal boundaries are selected that consider the different phases of the Project and their durations. The Project's temporal boundaries reflect those periods during which planned activities will occur and have potential to affect the land use VSECs.

The determination of spatial and temporal boundaries also takes into account the development of the entire Hope Bay Greenstone Belt. The assessment considers both the incremental potential effects of the Madrid-Boston Project as well as the total potential effects of the additional Project activities in combination with the existing and approved Projects including the Doris Project and advanced exploration activities at Madrid and Boston.

4.4.1 Project Overview

The Madrid-Boston Project consists of proposed mine operations at the Madrid North, Madrid South and Boston deposits. The Madrid-Boston Project is part of a staged approach to continuous development of the Hope Bay Greenstone Belt, comprised of existing operations at Doris, a bulk sample followed by commercial mining at Madrid North and Madrid South, and commercial mining of the Boston deposit. The Madrid-Boston Project would use and expand upon the existing Doris Project infrastructure.

The Madrid-Boston Project is the focus of this application. Because the infrastructure of existing and approved projects will be utilized by the Madrid-Boston Project, and because the existing and approved projects have the potential to interact cumulatively with the Madrid-Boston Project, existing and approved project are described below.

4.4.1.1 Existing and Approved Projects

Existing and approved projects include:

- the Doris Project (NIRB Project Certificate 003, NWB Type A Water Licence 2AM-DOH1323);
- the Hope Bay Regional Exploration Project (NWB Type B Water Licence 2BE-HOP1222);
- the Madrid Advanced Exploration Program (NWB Type B Water Licence 2BB-MAE1727); and
- the Boston Advanced Exploration Project (NWB Type B Water Licence 2BB-BOS1727).

<u>The Doris Project</u>

The Doris Project was approved by NIRB in 2006 (NIRB Project Certificate 003) and licenced by NWB in 2007 (Type A Water Licence 2AM-DOH0713). The Type A Water Licence was amended in 2010, 2011 and 2012 and received modifications in 2009, 2010, and 2011.

Construction of the Doris Project began in early 2010. In early 2012, the Doris Project was placed into care and maintenance, suspending further Project-related construction and exploration activity along the Hope Bay Greenstone Belt. Following TMAC's acquisition of the Hope Bay Project in March of 2013,

NWB renewed the Doris Project Type A Water Licence (Type A Water Licence 2AM-DOH1323), and TMAC advanced planning, permitting, exploration, and construction activities. In 2016, NIRB approved an amendment to Project Certificate 003 and NWB granted Amendment No. 1 to Type A Water Licence 2AM-DOH1323, extending operations from two to six years through mining two additional mineralized zones (Doris Connector and Doris Central zones) to be accessed via the existing Doris North portal. Amendment No. 1 to Type A Water Licence 2AM-DOH1323 authorizes a mining rate of approximately 2,000 tonnes per day of ore and a milling throughput of approximately 2,000 tonnes per day of ore. The Doris Project began production early in 2017.

The Doris Project includes the following components and facilities:

- The Roberts Bay offloading facility: marine jetty, barge landing area, beach laydown area, access roads, weather havens, fuel tank farm/transfer station, waste storage facilities and incinerator, and quarry;
- The Doris site: 280 person camp, laydown areas, service complex (e.g., workshop, wash bay, administration buildings, mine dry), two quarries (mill site platform and solid waste landfill), core storage areas, batch plant, brine mixing facilities, vent raise (3), air heating units, reagent storage, fuel tank farm/transfer station, potable water treatment, waste water treatment, incinerator, landfarm and handling/temporary hazardous waste storage, explosives magazine, and diesel power plant;
- Doris Mine works and processing: underground portal, overburden stockpile, temporary waste rock pile, ore stockpile, and processing mill;
- Tailings Impoundment Area (TIA): Schedule 2 designation for Tail Lake with two dams (North and South dams), sub-aerial deposition of flotation tailings, emergency tailings dump catch basins, pump house, and quarry;
- All-season main road with transport trucks: Roberts Bay to Doris site (4.8 km, 150 to 200 tractor and 300 fuel tanker trucks/year);
- Access roads from Doris site used predominantly by light-duty trucks to: Tail Lake (5.9 km), the explosives magazine (0.5 km), Doris Lake float plane dock (0.5 km), solid waste disposal site (0.2 km), and to the tailings decant pipe (0.4 km),from the Roberts Bay offloading facility to the location where the discharge pipe enters the ocean (0.6 km); and
- All-weather airstrip (914 m), winter airstrip (1,524 m), helicopter landing site and building, and Doris Lake float plane and boat dock.

Water is managed at the Doris Project through:

- freshwater input from Doris Lake for mining, milling, and associated activities and domestic purposes;
- freshwater input from Windy Lake for domestic purposes;
- process water input primarily from Tail Lake;
- saline water from mining, porewater from waste rock, and ore discharged to Tail Lake;
- sewage and greywater treated in a waste water treatment plant and discharged to Tail Lake; and
- water from Tail Lake treated and discharged to Roberts Bay via a discharge pipeline, with use of a marine outfall mixing box (MOMB).

Hope Bay Regional Exploration Project

The Hope Bay Regional Exploration Project has been renewed several times since 1995. The current extension expires in June 2022. Much of the previous work for the program was based out of Windy Lake and Boston camps. These camps were closed in October 2008 with infrastructure either decommissioned or moved to the Doris site. All exploration activities are now based from the Doris site and in the future from the Boston site. Components and activities for the Hope Bay Regional Exploration Project include:

- operation of helicopters from Doris (4 hours per day in the summer months); and
- the use of exploration drills, which are periodically moved by helicopter.

Madrid Advanced Exploration

In 2017, the NWB approved a Type B Water Licence (2BB-MAE1727) for the Madrid Advanced Exploration Program to support continued exploration and a bulk sample program at the Madrid North and Madrid South sites, located approximately 4 km south of the Doris site. The program includes extraction of a bulk sample totaling 50 to 60 tonnes, which will be trucked to the mill at the Doris site for processing and placement of tailings in the tailings impoundment area (TIA). All personnel will be housed in the Doris camp.

The Madrid Advanced Exploration Program includes the following components and activities.

- Use of existing infrastructure associated with the Doris Project:
  - camp facilities to support up to 70 personnel as required to undertake the advanced exploration activities;
  - mill to process ore;
  - TIA;
  - landfill and hazardous waste areas, particularly if closure and remediation becomes required for the Madrid Advanced Exploration Program infrastructure;
  - fuel tank farms; and
  - Doris airstrip and Roberts Bay facility for transport of personnel and supplies.
- Use of existing infrastructure at the Madrid and Boston areas:
  - borrow and rock quarry facilities: existing Quarries A, B, and D along the Doris-Windy all-weather road (AWR);
  - AWR between Doris and Windy Lake for transportation of personnel, ore, waste, fuel, and supplies; and
  - future mobilization of existing exploration site infrastructure, should it become necessary.
- Construction of additional facilities at Madrid North and South:
  - access portals and ramps for underground operations at Madrid North and at Madrid South;
  - 4.7 km extension of the existing AWR originating from the Doris to the Windy exploration area (Madrid North) to the Madrid South deposit, with branches to Madrid North, Madrid North vent raise, and the Madrid South portal;
  - development of a winter road route (WRR) from Madrid North to access Madrid South until AWR has been constructed;
  - all weather access road and tailings line from Madrid North to the south end of the TIA;

- borrow and rock quarry facilities; two quarries referenced as Quarries G and H;
- waste rock and ore stockpiles;
- water and waste management structures; and
- additional site infrastructure, including compressor building, brine mixing facility, saline storage tank, air heating facility, four vent raises, workshop and office, laydown area, diesel generator, emergency shelter, fuel storage facility/transfer station.

o Undertaking of advanced exploration access to aforementioned deposits through:

- continue field mapping and sampling, as well as airborne/ground/downhole geophysics;
- diamond drilling from the surface and underground; and
- bulk sampling through underground mining methods and mine development.

Boston Advanced Exploration

The Boston Advanced Exploration Project Type B Water Licence No. 2BB-BOS1217 was renewed as Water Licence No. 2BB-BOS1727 in July 2017 and includes:

o the Boston camp (120 person), maintenance shops, workshops, laydown areas, water pumphouse, vent raise, warehouse, site service roads, sewage and greywater treatment plant, fuel storage and transfer station, landfarm, solid waste landfill and a heli-pad;

o mine works, consisting of underground development for exploration drilling and bulk sampling, temporary waste rock pile, and ore stockpile;

o potable water and industrial water from Aimaokatalok Lake; and

o treated sewage and greywater discharged to the tundra.

4.4.1.2 The Madrid-Boston Project

The Madrid-Boston Project includes: the Construction and Operation of commercial mining at the Madrid North, Madrid South, and Boston sites; the continued operation of Roberts Bay and the Doris site to support mining at Madrid and Boston; and the Reclamation and Closure and Post-closure phases of all sites. Excluded from the Madrid-Boston Project for the purposes of the assessment are the Reclamation and Closure and Post-closure components of the Doris Project as currently permitted and approved.

Construction

Madrid-Boston construction will use the infrastructure associated with Existing and Approved Projects. This may include:

o an all-weather airstrip at the Boston exploration area and helicopter pad;

o seasonal construction and/or operation of a winter ice strip on Aimaokatalok Lake;

o Boston camp with expected capacity for approximately 65 people during construction

o Quarry D Camp with capacity for up to 180 people;

o seasonal construction/operation of Doris to Boston WRR;

o three existing quarry sites along the Doris to Windy AWR;

o Doris camp with capacity for up to 280 people;

o Doris airstrip, winter ice strip, and helicopter pad;

- Roberts Bay offloading facility and road to Doris; and
- Madrid North and Madrid South sites and access roads.

Additional infrastructure to be constructed for the proposed Madrid-Boston Project includes:

- expansion of the Doris TIA (raising of the South Dam, construction of West Dam, development of a west road to facilitate access, and quarrying, crushing, and screening of aggregate for the construction);
- construction of an off-loading cargo dock at Roberts Bay (including a fuel pipeline, upland mooring points, beach landing and gravel pad, shore manifold);
- construction of an additional tank farm at Roberts Bay (consisting of two 5 ML tanks);
- expansion of accommodation facility (from 280 to 400 person), mine dry and administrative building, water treatment at Doris site;
- complete development of the Madrid North and Madrid South underground workings;
- incremental expansion of infrastructure at Madrid North and Madrid South to accommodate production mining, including vent raise, access road, process plant buildings;
- construction of a 1,200 tpd concentrator, fuel storage, power plant, mill maintenance shop, warehouse/reagent storage at Madrid North;
- all weather access road and tailings line from Madrid North to the south end of the TIA;
- AWR linking Madrid to Boston (approximately 53 km long, nine quarries for permitting purposes, four of which will likely be used);
- all-weather airstrip, airstrip building, helipad and heliport building at Boston;
- construction of a 2,400 tpd process plant at Boston;
- all infrastructure necessary to support mining and processing activities at Boston including construction of a new 300-person accommodation facility, mine office and dry and administration buildings, additional fuel storage, laydown area, ore pad, waste rock pad, diesel power plant and dry-stack tailings management area (TMA);
- infrastructure necessary to support ongoing exploration activities at both Madrid and Boston; and
- wind turbines near the Doris (2), Madrid (2), and Boston (2) sites.

Operation

Madrid-Boston Project is intended to cover the proposed incremental development of the Hope Bay Greenstone Belt. The Operation phase includes:

- mining of the Madrid North, Madrid South, and Boston deposits;
- operation of a concentrator at Madrid North;
- transportation of ore from Madrid North, Madrid South, and Boston to the Doris process plant, and transporting the concentrate from the Madrid North concentrator to the Doris process plant;
- extending the operation at Roberts Bay and Doris;

- processing the ore and/or concentrate from Madrid North, Madrid South, and Boston at the Doris process plant with disposal of the detoxified tailings underground at Madrid North, flotation tailings from the Doris process plant pumped to the expanded Doris TIA, and discharge of the TIA effluent to the marine environment;
- operation of a concentrator at Madrid North and disposal of tailings at the Doris TIA;
- operation of a process plant and wastewater treatment plant at Boston with disposal of flotation tailings to the Boston TMA and the detoxified leached tailings in the underground mine at Boston;
- operation of two wind turbines for power generation; and
- on-going maintenance of transportation infrastructure at all sites (cargo dock, jetty, roads, and quarries).

Reclamation and Closure

Areas which are no longer needed to carry out Madrid-Boston Project activities will be progressively reclaimed during Construction and Operation. Where practicable, progressive rehabilitation will be implemented to achieve the site abandonment goal and closure principles (see Volume 3, Chapter 5).

At Reclamation and Closure, all sites will be deactivated and reclaimed in the following manner (see Volume 3, Chapter 5):

- Camps and associated infrastructure will be demolished and/or disposed of in approved non-hazardous site landfills.
- Non-hazardous landfills will be progressively covered with quarry rock, as cells are completed. At final closure, the facility will receive a final quarry rock cover which will ensure physical and geotechnical stability.
- Rockfill pads occupied by construction camps and associated infrastructure and laydown areas will be re-graded to ensure physical and geotechnical stability and promote free-drainage, and any obstructed drainage patterns will be re-established.
- Quarries no longer required will be made physically and geotechnically stable by scaling high walls and constructing barrier berms upstream of the high walls.
- Landfarms will be closed by removing and disposing of the liner, and re-grading the berms to ensure the area is physically and geotechnically stable.
- Mine waste rock will be used as structural mine backfill.
- The Doris TIA surface will be covered waste rock. Once the water quality in the reclaim pond has reached the required discharge criteria, the North Dam will be breached and the flow returned to Doris Creek.
- The Madrid to Boston AWR and Boston Airstrip will remain in place after Reclamation and Closure. Peripheral equipment will be removed. Where rock drains, culverts or bridges have been installed, the roadway or airstrip will be breached and the element removed. The breached opening will be sloped and armoured with rock to ensure that natural drainage can pass without the need for long-term maintenance.

A low permeability cover, including a geomembrane, will be placed over the Boston TMA. The contact water containment berms will be breached and the liner will be cut to prevent collecting any water. The balance of the berms will be left in place to prevent localized permafrost degradation.

4.4.2 Spatial Boundaries

4.4.2.1 Project Development Area

The Project Development Area (PDA) is shown in Figure 4.4-1 and is defined as the area which has the potential for infrastructure to be developed as part of the Madrid-Boston Project. The PDA includes engineering buffers around the footprints of structures. These buffers allow for latitude in the final placement of infrastructure based on detailed design, engineering, and geotechnical considerations. Compounds with buildings and other infrastructure in close proximity are defined as pads with buffers, whereas roads are defined as linear corridors with buffers. The buffers for pads varied depending on the local physiography and other buffered features such as sensitive environments or riparian areas. The average engineering buffer for roads is 100 m either side.

Since the infrastructure for the Doris Project is in place, the PDA exactly follows the footprints of these features. In all cases, the PDA does not include the Madrid –Boston Project design buffers applied to potentially environmentally sensitive features. These are detailed in Volume 3, Chapter 2 (Project Design Considerations).

4.4.2.2 Local Study Area

The land use LSA is defined as the PDA and the area surrounding the PDA within which there is a reasonable potential for immediate effects on the land use VSECs due to an interaction with a Project components or physical activity. The land use LSA includes a 5km expanded area around the PDA totalling 105,200 hectares, and includes both land and water (Figure 4.4-1).

4.4.2.3 Regional Study Area

The RSA is defined as the broader spatial area representing the maximum limit where potential direct or indirect effects may occur. The land use RSA is defined as an area of land and water that encompass the Madrid-Boston Project and related activities, consistent with the largest boundary of the wildlife and terrestrial study areas as defined by those disciplines (Figure 4.4-1). The land use RSA encompasses approximately 534,000 hectares, and includes both land and water. This boundary is chosen because of the strong link between terrestrial and wildlife components and land use activities that depend on these environmental resources.

4.4.3 Temporal Boundaries

The Project represents a significant development in the mining of the Hope Bay Greenstone Belt. Even though this Project spans the conventional Construction, Operation, Reclamation and Closure, and Post-closure phases of a mine project, the Madrid-Boston proposal is a continuation of development currently underway. The Project has four separate operational sites: Roberts Bay, Doris, Madrid (North and South), and Boston. The development of these sites is planned to be sequential. As such, the temporal boundaries of this Project overlap with a number of Existing and Approved Authorizations (EAAs) for the Hope Bay Project and the extension of activities.

For the purposes of the EIS, distinct phases of the Madrid-Boston Project are defined (Table 4.4-1). It is understood that construction, operation and closure activities will, in fact, overlap among sites; this is outlined in Table 4.4-1 and further described in Volume 3 (Project Description).

The assessment also considers a Temporary Closure phase should there be a suspension of Project activities during periods when the Project becomes uneconomical due to market conditions. During this phase, the Project would be under care and maintenance. This could occur in any year of Construction or Operation with an indeterminate length (one to two year duration would be typical).

Figure 4.4-1
Land Use Local and Regional Study Areas

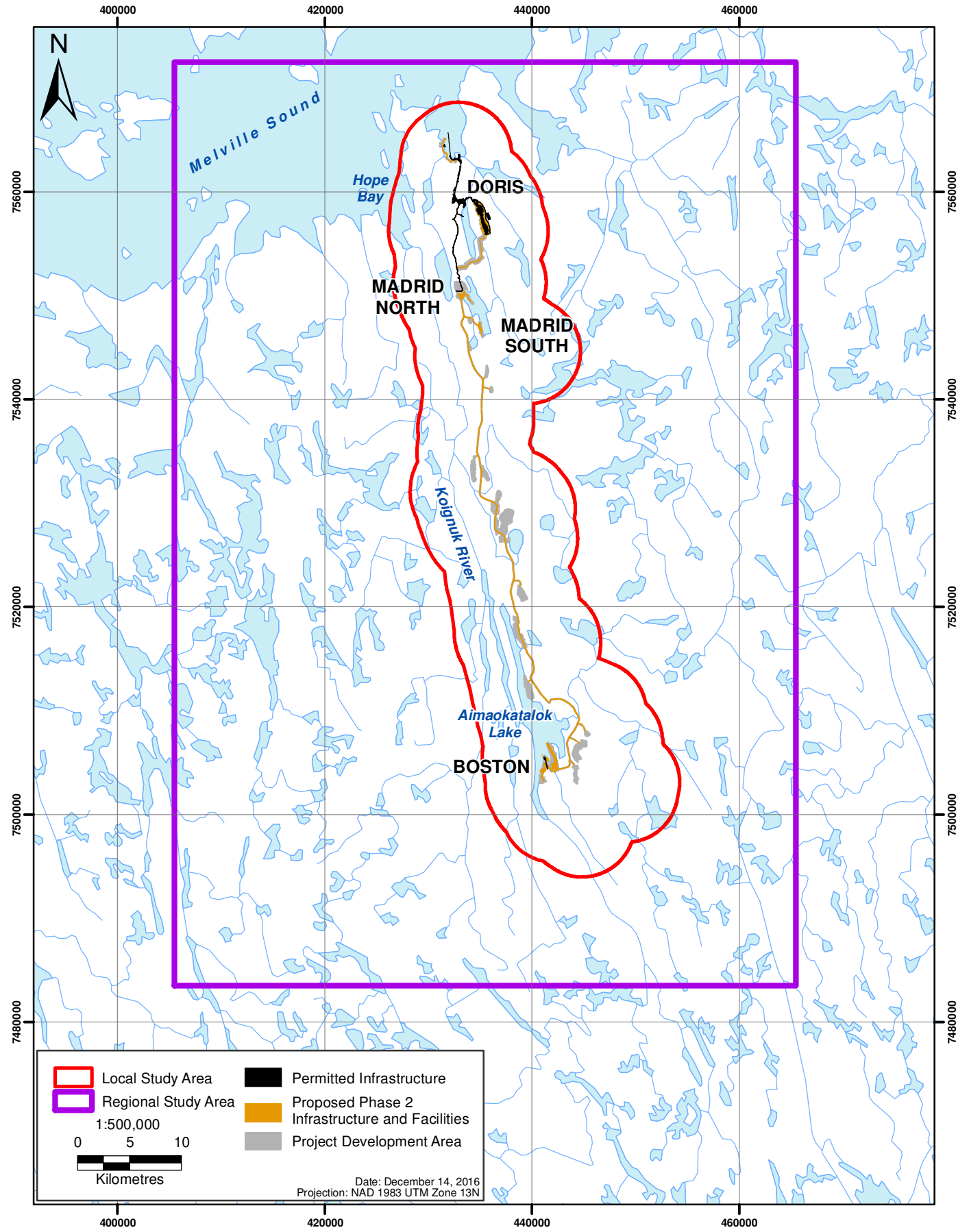


Table 4.4-1. Temporal Boundaries for the Effects Assessment for Land Use

Phase	Project Year	Calendar Year	Length of Phase (Years)	Description of Activities
Construction	1 - 4	2019 - 2022	4	• **Roberts Bay:** construction of access road (Year 1), marine dock and additional fuel facilities (Year 2 – Year 3); • **Doris**: expansion of the Doris TIA and accommodation facility (Year 1); • **Madrid North:** construction of concentrator and road to Doris TIA (Year 1 – Year 2); • **All-weather Road**: construction (Year 1 – Year 3); • **Boston**: site preparation and installation of all infrastructures including process plant (Year 2 – Year 5).
Operation	5 - 14	2023 - 2032	10	• **Roberts Bay**: sealift operations (Year 1 – Year 14) • **Doris**: processing and infrastructure use (Year 1 – Year 14); • **Madrid North:** mining (Year 1 – 13); ore transport to Doris process plant (Year 1 -13); ore processing and concentrate transport to Doris process plant (Year 2 – Year 13); • **Madrid South:** mining (Year 11 – Year 14); ore transport to Doris process plant (Year 11 – Year 14); • **All-weather Road**: operational (Year 4 – Year 14); • **Boston**: winter access road operating (Year 1 – Year 3); mining (Year 4 – Year 11); ore transport to Doris process plant (Year 4 – Year 6); and processing ore (Year 5 – Year 11).
Reclamation and Closure	15 - 17	2033 - 2035	3	• **Roberts Bay**: facilities will be operational during closure (Year 15 – Year 17); • **Doris**: camp and facilities will be operational during closure (Year 15 – Year 17); mine, process plant, and TIA decommissioning (Year 15 – Year 17); • **Madrid North:** all components decommissioned (Year 15 – Year 17); • **Madrid South:** all components decommissioned (Year 15 – Year 17); • **All-weather Road**: road will be operational (Year 15 – Year 16); decommissioning (Year 17); • **Boston**: all components decommissioned (Year 15 – Year 17).
Post-Closure	18 - 22	2036 - 2040	5	• **All Sites:** Post-closure monitoring.
Temporary Closure	NA	NA	NA	• **All Sites:** Care and maintenance activities, generally consisting of closing down operations, securing infrastructure, removing surplus equipment and supplies, and implementing on-going monitoring and site maintenance activities.

4.5 PROJECT-RELATED EFFECTS ASSESSMENT

4.5.1 Methodology Overview

This assessment was informed by a methodology used to identify and assess the potential environmental effects of the Madrid-Boston Project and is consistent with the requirements of Section 12.5.2 of the Nunavut Agreement and the EIS Guidelines (NIRB). The effects assessment evaluates the potential direct and indirect effects of the Project on the environment and follows the general methodology provided in Volume 2, Chapter 4 (Effects Assessment Methodology), and comprises a number of steps that collectively assess the manner in which potential environmental effects of the Project will interact with Land Use VSECs defined for the assessment (Section 4.3).

Traditional knowledge has informed the approach through the integration of descriptions of historical and current land and resource uses and land use knowledge. Traditional knowledge describes travel routes, camps and cabins, and information pertaining to species use, availability and distribution and changes to land uses over time. The assessment of effects on commercial land and resource use also integrated TK, as many of the lodges offer services regarding Inuit culture and land based activities, and HTO commercial hunting/guided sport hunting relies on an understanding of target species and the environment. Table 4.5-1 identifies how TK has been considered in the evaluation of effects for land and resources uses.

Table 4.5-1. Land Use VSECs and Integration of Traditional Knowledge

VSEC	Integration of Traditional Knowledge
Commercial Land and Resource Use	• TK indicates what is valued and importance to the practice of land based activities. • Many of the services provided lodges are informed by IQ and are based in nature. • TK perspectives used to describe change to land and resources, and informs the measurement of change. • TK describes past and recent species availability and distribution inform trends over time.
Traditional Activities and Knowledge	• TK describes historic travel and mobility on the land and informs the current use of trails and mobility on land. • TK describes historic and current use of camps and cabins; change over time informs trends and variability. • TK describes historic and current land and resource use patterns, as well as country foods availability and quality. • TK describes species availability and distribution; change over time informs trends and variability.

This assessment draws on conclusions related to air quality and noise (Volume 4, Chapters 2 and 3), wildlife (Volume 4, Chapter 9), aquatic environment (Volume 5, Chapters 6, 10 and 11), landforms (Volume 4, Chapter 7), heritage/archaeology (Volume 6, Chapter 2), and health (Volume 6, Chapter 5).

To provide a comprehensive understanding of potential effects, the Project components and activities are assessed on their own as well as in the context the Existing and Approved Projects within the Hope Bay Greenstone Belt. The effects assessment process is summarized as follows:

1. Identify potential interactions between the Project and the VECs or VSECs;
2. Identify the resulting potential effects of those interactions;
3. Identify mitigation or management measures to eliminate or reduce the potential effects;

4. Identify residual effects (potential effects that would remain after mitigation and management measures have been applied) for the Madrid-Boston Project in isolation;
5. Identify residual effects of the Madrid-Boston Project in combination with the residual effects of Existing and Approved Projects; and
6. Determine the significance of combined residual effects.

The methodologies used for the assessment of potential cumulative and transboundary effects are described in Section 4.6 and Section 4.7, respectively.

4.5.1.1 Methods for Characterization of Residual Effects and Significance

Residual effects on Land Use VSECs identified in the assessment will be characterized by using the following attributes: direction, magnitude, equity, duration, frequency, geographic extent, and reversibility. The assessment will identify the probability (defined as the likelihood) that the effect will occur. Combined with the probability that the effect will occur, a significance rating will be identified as *Significant or Not Significant*. The level of confidence (certainty of the effect) will be presented. The definitions for characterization of residual effects are described in Section 4.5.5.1.

4.5.1.2 Identification of Project Interactions with Land Use VSECs

Land and resource use activities occur in the vicinity of the Madrid-Boston Project, and there is potential for effects on the land use VSECs:

- Commercial Land and Resource Use; and
- Traditional Activities and Knowledge.

Commercial land users active within the land use RSA (i.e., commercial receptors of potential effects) include hunting and tourism operators.

- Commercial hunting operators include HTOs-led hunts, muskox management and licensed guide outfitters. Kitikmeot Foods is not active in the area (due to distance from the processing plant) and, therefore, Kitikmeot Foods and related activities are not a commercial receptor.
- Tourism operators include ecotourism and recreational activities in the area (e.g., guide outfitters leading wildlife viewing, ecolodges – primarily Elu Inlet Lodge).

Collectively, these land users are referred to as 'commercial land users'.[9]

Other land use receptors include individuals or groups using land and resources within the land use RSA for cultural or subsistence purposes. For the purposes of this assessment, these receptors are referred to as local land users and their harvesting and cultural practices are referred to as 'land and resource use' activities.

Based on information presented in the baseline, Table 4.5-2 summarizes land use activities that have potential to interact with the Madrid-Boston Project. Where, for a given land user group no interactions

[9] There is no evidence of commercial fishing or plant harvesting within the land use RSA; therefore, commercial operators of these activities are not considered further in this assessment. Additionally, cruise ships are not considered within commercial land use as the cruise ship route is not within the boundary of the land use RSA.

are identified, no further assessment is undertaken. Where, for a given land use activity, no interactions are identified for any land user group, no further assessment is undertaken for that land use activity.

Table 4.5-2. Land and Resources Uses Potentially Interacting with the Madrid-Boston Project

		Land User Groups		
		Commercial Land Users		
Land Use Activity	Description	Commercial Hunters (Guide outfitters and HTOs)	Tourism /Recreational Users	Local Land Users
Hunting and Trapping	Hunting and/or trapping activities occur in areas that have the potential to interact with environmental changes caused by the Project. This includes both subsistence hunting and commercial harvest/sport hunting.	X	-	X
Fishing	Fishing activities occur in areas that have the potential to interact with environmental changes caused by the Project.	-	-	X
Gathering	Vegetation and wood gathering activities occur in areas that have the potential to interact with environmental changes caused by the Project.	-	-	-
Use of Cultural Sites and Travel Routes	Cultural and/or recreational uses (e.g., guiding, wildlife viewing, use of seasonal camps, travel routes) occur in areas that have the potential to interact with environmental changes caused by the Project.	X	X	X

Notes:
'-' = an interaction is not expected, no effect anticipated and no further assessment is warranted.
'X'= an interaction is expected, and may result in an adverse effect requiring active management, mitigation and/or monitoring; warrants further consideration.

In summary, commercial land uses (e.g., tourism activities led by lodges, and commercial harvests or sport hunting, led by guide outfitters) occur within the Land Use RSA and LSA and therefore, potential effects to hunting, tourism and associated travel are considered in the assessment. One exploratory fishing licence is located outside the land use RSA and there are no reports of sport fishing in the land use RSA. Therefore, potential effects to commercial fishing are not considered further. Similarly, there is no description of commercial plant harvesting in the area; therefore, potential effects to commercial plant harvesting are not carried forward.

Local land users practice hunting and trapping in the land use RSA; in 2011 there were approximately 20 to 25 active hunters including individuals from Omingmaktok, Kingaok, and Cambridge Bay, and 2017 community-based research found that there is a perception of more land users in the area in recent years. Aimaokatalok (adjacent to the Boston Site) and Roberts Lake (adjacent to the Doris Site) are identified as well-used fishing areas within the LSA. There are two cabins and one camp within the land use RSA, and one seasonal camp within the land use LSA. There are also several named places (i.e., navigational markers/placenames) within the land use RSA. The land use RSA is within travel routes used to access hunting, fishing and camping areas. Therefore, effects to hunting, trapping, fishing and use of cultural sites and routes are considered further in the assessment. The NTKP report (Banci and Spicker 2016) does not identify plant harvesting or use of plants by local land users in the land use RSA. Similarly, no plant harvesting sites or activities were described during interviews with Elders and harvesters conducted as part of baseline research (Appendices V6-3A and V6-3B). Therefore, therefore potential effects to plant gathering and related culture or knowledge transmission are not considered.

4.5.2 Identification of Potential Effects

The potential effects of the Project on the two Land Use VSECs are identified and described in Section 4.3.2.2, and include:

- Change in access to land and resources (i.e., change in access);
- Change in harvesting success/ harvesting practice; and
- Change in experience of nature.

These effects were determined using the EIS Guidelines (NIRB), TK report (Banci and Spicker 2016), professional judgement, information obtained during baseline data collection, and experience at other projects in Nunavut and the Northwest Territories. Project components and activities throughout the duration of the Project (i.e., Construction, Operation, Reclamation/Closure, Post-Closure and Temporary Closure phases) were considered for their potential interactions with the land use activities.

Project components and activities have the potential to cause physical and/or environmental changes that could affect Land Use VSECs, as presented in Table 4.5-3. To determine whether an interaction is possible, the Project Description was reviewed through the lens of activities, uses, plans and other elements of land use, as well as reviewing the results of the assessment of effects of the Madrid-Boston Project on other VECs and VSECs. Interactions marked with an 'X' are carried forward into the characterization of potential effects in Section 4.5.4.

4.5.2.1 Potential Effects on Commercial Land and Resource Use

Overview of Commercial Land and Resource Use –Commercial Harvesting/Guided Hunting and Tourism

Within the land use RSA, there are sport and guided hunting activities, including HTO-led community hunts, a muskox management area and guide outfitter-led sport hunts for paying clients. The occurrence of sport or guided hunting activities is dependent on client demand. Generally, commercial hunters will travel by snow machine during spring hunts and by ATV during summer hunts. Some hunters stop at the Doris Site while hunting; discussions with these hunters have indicated that most groups hunt furbearers for their furs, and not for caribou (Volume 4, Chapter 9). Hunting in the land use RSA occurs primarily in the spring and summer months. In accordance with the *Mines Health and Safety Act (1994)*, no firearms are to be discharged within two (2) km of the Project site for safety reasons, and Hope Bay 'no hunting' policy prohibits harvesting animals within this 2 km radius of the Project.

Tourism activities offered by one lodge (i.e., Elu Inlet Lodge) occur during the summer and extend into the land use LSA, however reportedly focus on areas within Elu Inlet; no other tourism activities are reported to occur within the land use LSA. Due to the limited overlap between Elu Inlet Lodge activities and the land use LSA, it is not anticipated that the Elu Inlet Lodge or any future tourism operators will experience any change (i.e., reduction) in access to existing or new tourism areas as a result of the Project. Notwithstanding, outdoor recreation users may experience a change to the quality of experience while on the land within visual or auditory range of the Project.

Change in Access to Land and Resources

Travel throughout the land use RSA involves navigating natural features including lakes, mountains and streams. Construction and operation activities may cause minor or temporary delays in certain locations on the Hope Bay Belt, but Project-related activities that may affect access will be avoidable at the local scale. Construction activities will be sequential, thereby reducing the extent of construction activities during any given time period in locations on the Hope Bay Belt

(e.g., construction at Roberts Bay for the off-loading cargo dock and additional tank for occurs in Year 1, construction of the AWR linking Madrid to Boston occurs from Year 1 to Year 3, and site preparation and installation of facilities at Boston occur between Year 2 and Year 5).

Commercial land users may use alternate routes to or from Kent Peninsula to avoid construction at Roberts Bay, although overall access throughout the coastal area will be possible during all seasons.

Development of the Madrid and Boston sites, expansion of the PDA, and the AWR are not expected to result in delays or restricted access to hunting or fishing areas. Construction activities may cause minor or temporary delays in site specific locations, particularly during the construction of the AWR. The ongoing presence of facilities at the Madrid and Boston sites is not expected to result in delays or restricted access to hunting or fishing areas. During Operations, ore and concentrate haulage between Boston and Doris is anticipated to be approximately 60 round trips per day, and road maintenance on the AWR will occur weekly to monthly (depending on levels of traffic and snow). This level of traffic activity is not expected to delay access to harvesting areas due to the infrequent passage of vehicles on the road. Areas which are no longer needed to carry out Madrid-Boston Project activities will be progressively reclaimed during Construction and Operations. As a result, during Reclamation/Closure, infrastructure (e.g., camps and associated infrastructure) will be removed and no change in access for commercial land users is expected during this phase. Commercial land users will not experience any change access following decommissioning of the AWR in Year 17.

Based on available about tourism activities offered by Elu Inlet Lodge in the land use RSA and LSA, is not anticipated that tourism operators or recreational users will experience delayed or restricted access as a result of the Project.

There is potential for temporary and site specific interaction between the Madrid-Boston Project and access to land use areas for commercial harvesters as a result of the Project, primarily during Construction and Operation use of the AWR. However, overall the Project is not expected to reduce or delay access or result in a change in effort to access tourism areas for the Elu Inlet Lodge or recreational users.

Change in Harvesting Success / Harvesting Practice

Hunting activities are interconnected to the presence of wildlife in an area. Guided/HTO-led hunts (e.g., community and commercial hunts) use areas where wildlife may be affected by the Project, including areas within and adjacent to the mine sites, AWR, mine access roads, and airstrips. During Construction and Operation, there is potential for intermittent disruption of caribou movement due to Project-traffic on the road; however, it is not expected to change caribou movement in the land use RSA. Since, under the Mines Health and Safety Act (1994), no firearms are to be discharged within approximately 2km of Project infrastructure, change in caribou movement within range of the road does not affect harvesting practices, as no hunting will occur within range of the road. Upon decommissioning of the AWR, no changes to wildlife movements are expected. No other significant residual effects on wildlife have been identified during any phase of the Project (Volume 4, Chapter 9), because Project components will remove a limited amount of habitat available to wildlife regionally (e.g., negligible loss of high value winter and annual range habitat for caribou), sensory disturbances (e.g., noise from trucks) are not anticipated to result in movement patterns for wildlife, no increased predation is expected, and traffic controls are expected to limit any wildlife-vehicle collisions for larger mammals.

Table 4.5-3. Interaction of Environmental Changes Caused by Madrid-Boston and Land Use VSECs

Phase	Project Components and Activities	Anticipated Changes to the Environment	Commercial Land and Resource Use			Traditional Activities and Knowledge		
			Change in access	Change in harvesting success/practices	Change in Experience of Nature	Change in access	Change in harvesting success/practices	Change in Experience of Nature
Construction	Roberts Bay cargo dock and construction; use of existing approved and permitted infrastructure (site roads); and marine transport of goods	Changes to the physical environment (Volume 3): • Based on information about access routes/landing areas within the land use RSA, presence of infrastructure and laydown areas is not expected to delay or disrupt access or travel routes for land users. • Project-related traffic on roads between Roberts Bay and Doris during construction is not expected to result in delays or change of effort to access land use RSA. • Marine sealift during open water season is not anticipated to disrupt access for land users; during construction, approximately seven vessels per year. Changes to wildlife and wildlife habitat (Volume 4, Chapter 9): • Habitat loss and disturbance to wildlife resulting in reduced availability/abundance of wildlife for harvesters. Change in attraction for grizzly bear and wolverine, as species may become accustomed to the site; no significant residual effects for wildlife are anticipated. • Loss of beach habitat and disturbance for ringed and marine birds; no change in movement of marine mammals is anticipated due to marine transport. No residual effects to marine wildlife are anticipated. • Potential avoidance of frequented harvesting area due to perceived effects to wildlife. Changes to fish and fish habitat (Volume 5, Chapter 10): • Loss or alteration of fish habitat or changes to water and sediment quality may result in change in marine fishing; no significant residual effects to marine fish are anticipated. • Potential avoidance of frequented fishing area due to perceived effects to marine environment; Roberts Bay has not been identified as an area frequented for fishing or marine mammal harvesting. Changes to the sensory environment: • Change in visual character at Roberts Bay due to infrastructure and marine transport activity, resulting in in changes to experience of nature; the coastal topography is anticipated to minimize views of the Project unless within close proximity. • Sensory disturbance from construction noise; the residual effect of noise is not significant (Volume 4, Chapter 3).	X	X	X	X	X	X
	Mine, process plant and camp facility and airstrip construction, raising the TIA, installation of wind turbines (as applicable to Doris, Madrid North and South, Boston)	Changes to the physical environment (Volume 3): • Expansion of the PDA at Madrid North, Madrid South and Boston is not expected to result in changes to land use activities • Construction of infrastructure, and airstrip and raising the TIA is not expected to delay or disrupt access or travel routes for land users. Changes to wildlife and wildlife habitat (Volume 4, Chapter 9): • Habitat loss and disturbance for wildlife (caribou, muskox, furbearers, raptors, waterfowl and upland birds, and disruption of movement to caribou, resulting in potential reduced availability/abundance of wildlife for harvesters. Residual effects to wildlife are rated as not significant. Attraction to the site for grizzly bear and wolverine; no significant residual effects is anticipated for attraction. • No residual effects of hunting pressure from increased access or influx/presence of workers. • Potential avoidance of frequented harvesting area due to perceived effects to wildlife (e.g., due to water discharge into the environment); to date, area is not avoided by harvesters active in the land use RSA and no reports of perceived environmental effects. Change to freshwater fish and fish habitat (Volume 5, Chapter 6): • Loss or alteration of fish habitat or change to water quality may result in changes to fishing activities; no significant residual effects are anticipated for freshwater fish. • Potential avoidance of frequented fishing area due to perceived effects to fish (e.g., due to water discharge into the environment); to date, area is not avoided by harvesters in the land use RSA and no reports of perceived environmental effects. Changes to the sensory environment: • Presence of workers resulting in change in the experience of nature, and/or perceptions of safety/remoteness on the land. • Sensory disturbance (e.g., noise and vibration) from construction activities; the residual effect of construction noise is not significant (Volume 4, Chapter 3). • Change in visual character of landscape due to infrastructure (e.g., wind turbines, raised TIA at Doris, site infrastructure at Madrid North, Madrid South and Boston) within range of land users, resulting in potential change to the experience of nature; a topography of gentle rolling hills is anticipated to minimize views of the Project, unless within close proximity.	X	X	X	X	x	X

Phase	Project Components and Activities	Anticipated Changes to the Environment	Commercial Land and Resource Use			Traditional Activities and Knowledge		
			Change in access	Change in harvesting success/practices	Change in Experience of Nature	Change in access	Change in harvesting success/practices	Change in Experience of Nature
Construction	Quarry use and activity (as applicable to Doris, Madrid North and South, Boston)	Changes to wildlife and wildlife habitat (Volume 4, Chapter 9): • Disturbance (e.g., blasting and vibration) to terrestrial and marine wildlife resulting in resulting in reduced availability/abundance of game. Residual effects of noise disturbance for wildlife rated as not significant. Changes to the sensory environment: • Sensory disturbance from noise (i.e., blasting) may change the experience of nature; the residual effect of quarry noise is rated as not significant (Volume 4, Chapter 3); to date, sensory disturbance due to noise at Doris has not resulted in avoidance of the land use RSA by land users.	-	X	X	-	X	X
	Madrid-Boston all weather road (AWR) construction, use of existing site roads/air strips associated vehicular and air traffic	Changes to the physical environment (Volume 3): • Presence of infrastructure (AWR, winter ice strip on Aimaokatalok) is not expected to delay or disrupt access or travel routes for land users. Changes to wildlife and wildlife habitat (Volume 4, Chapter 9): • Habitat loss and disturbance to wildlife resulting in reduced availability/abundance of wildlife for harvesters. Intermittent disruption of movement for caribou due to traffic on the AWR. Residual effects to wildlife are rated as not significant. No wildlife mortality to large mammals due to vehicle collisions are expected. • Potential avoidance of frequented harvesting area due to perceived effects to wildlife; to date, area is not avoided by harvesters active in the land use RSA and no reports of perceived environmental effects. Changes to the sensory environment: • Sensory disturbance from aircraft and helicopter noise; the residual effect of construction noise is not significant (Volume 4, Chapter 3). • Change in visual character due to presence of roads within range of land use areas resulting in potential change to the experience of nature; a topography of gentle rolling hills is anticipated to minimize views of the Project, unless within close proximity.	X	X	X	X	X	X
	Roberts Bay cargo dock and operation-phase marine transport activity	Changes to the physical environment (Volume 3): • Based on information about access routes/landing areas within the land use RSA, presence of infrastructure and laydown areas is not expected to delay or disrupt access or travel routes for land users. • Project-related traffic is not expected to result in delays or change of effort to access land use RSA. • Marine sealift during open water season is not anticipated to disrupt access for land users; during operations, approximately seven vessels per year. Changes to wildlife and wildlife habitat (Volume 4, Chapter 9 and Volume 5, Chapter 11): • Habitat loss and disturbance to terrestrial and marine wildlife resulting in resulting in reduced availability/abundance of wildlife for harvesters. The residual effects to wildlife are assessed to be not significant. No change in marine mammal movement in the study area due to marine transport. • Potential avoidance of frequented harvesting area due to perceived effects to wildlife; to date, area is not avoided by harvesters active in the land use RSA and no reports of perceived environmental effects. Changes to fish and fish habitat (Volume 5, Chapter 10): • No significant residual effects to marine fish are anticipated as best management practices and mitigation measures are anticipated to minimize impacts of underwater noise and management of contact water, effluent and dust. • Potential avoidance of frequented fishing area due to perceived effects to marine environment; Roberts Bay has not been identified as an area frequented for fishing or marine mammal harvesting. Changes to the sensory environment: • Change in visual character due to Project infrastructure, resulting in changes in experience of nature; the coastal topography is anticipated to minimize views of the Project unless within close proximity. • Sensory disturbance from noise; the residual effect of operational noise is rated as not significant (Volume 4, Chapter 3).	X	X	X	X	X	X
Operation								

Phase	Project Components and Activities	Anticipated Changes to the Environment	Commercial Land and Resource Use			Traditional Activities and Knowledge		
			Change in access	Change in harvesting success/practices	Change in Experience of Nature	Change in access	Change in harvesting success/practices	Change in Experience of Nature
Operation	Mine, process plant and camp facility operation, wind turbines, TIA/TMA (as applicable to Doris, Madrid North and South, Boston)	Changes to the physical environment (Volume 3): • Expansion of the PDA at Madrid North, Madrid South and Boston, and presence of infrastructure is not expected to delay or disrupt access or travel routes for land users. Changes to wildlife and wildlife habitat (Volume 4, Chapter 9): • Habitat loss and disturbance for wildlife, and disruption of movement for caribou, resulting in reduced availability/abundance of wildlife for harvesters. Residual effects to wildlife are assessed as not significant. • No residual effects of hunting pressure from increased access or influx/presence of workers. • Potential avoidance of frequented harvesting area due to perceived effects due to water discharge to environment or perceived effects to wildlife; to date, area is not avoided by harvesters active in the land use RSA and no reports of perceived environmental effects. Change to freshwater fish and fish habitat (Volume 5, Chapter 6): • Loss or alteration of fish habitat or change to water quality may result in changes to fishing activities; no significant residual effects are anticipated for freshwater fish. • Potential avoidance of frequented fishing areas due to perceived effects due to water discharge to environment or perceived effects to fish; to date, area is not avoided by harvesters active in the land use RSA and no reports of perceived environmental effects. Changes to the sensory environment: • Influx/presence of workers resulting in potential changes in the experience of nature/perceptions of safety/remoteness on the land. • Sensory disturbance from general operational noise; the residual effect of noise is not significant (Volume 4, Chapter 3) • Change in visual character due to presence of infrastructure (e.g., site surface infrastructure, TMA, expanded TIA, wind turbines) within range of land use areas; a topography of gentle rolling hills anticipated to minimize views of the Project unless within close proximity.	X	X	X	X	X	X
	Quarry use and activity	Changes to wildlife and wildlife habitat (Volume 4, Chapter 9): • Disturbance (e.g., blasting and vibration) to terrestrial and marine wildlife resulting in resulting in reduced availability/abundance of game. Residual effects of noise disturbance for wildlife rated as not significant. Changes to the sensory environment: • Sensory disturbance from noise (i.e., blasting) may change the experience of nature; the residual effect of quarry noise is rated as not significant (Volume 4, Chapter 3); to date, area is not avoided by harvesters active in the land use RSA due to sensory disturbances.	-	X	X	-	X	X
	All weather road (AWR); local site roads and road transport	Changes to the physical environment (Volume 3): • Presence of roads and Project-related traffic is not expected to delay or disrupt access or travel routes for land users. Changes to wildlife and wildlife habitat (Volume 4, Chapter 9): • Disturbance to wildlife resulting in reduced availability/abundance of wildlife for harvesters. Intermittent disruption of movement for caribou due to traffic on the AWR. Residual effects to wildlife are rated as not significant. No large mammal mortality due to vehicle collisions is expected. Changes to the sensory environment: • Change in visual character due to presence of roads within range of frequented land use areas, resulting in potential change the experience of nature; the topography of gentle rolling hills anticipated to minimize views of the Project unless within close proximity.	X	X	-	X	X	-
	Air Transport (Doris and Boston Airstrips)	Changes to the sensory environment: • Noise from use of aircraft /helicopters resulting in potential change the experience of nature; residual effects of air craft noise during operations are rated as not significant (Volume 4, Chapter 3); to date, area is not avoided by harvesters active in the land use RSA due to sensory disturbances.	-	-	X	-	-	X

Phase	Project Components and Activities	Anticipated Changes to the Environment	Commercial Land and Resource Use			Traditional Activities and Knowledge		
			Change in access	Change in harvesting success/practices	Change in Experience of Nature	Change in access	Change in harvesting success/practices	Change in Experience of Nature
Reclamation and Closure	Roberts Bay cargo dock and marine transport activity	Changes to the physical environment (Volume 3): • Presence of infrastructure and decommissioning activities is not expected to delay or disrupt access or travel routes for land users. • Marine traffic during open water season is not anticipated to disrupt access for land users. Changes to wildlife and wildlife habitat (Volume 4, Chapter 9 and Volume 5, Chapter 11): • Habitat loss and disturbance to terrestrial and marine wildlife resulting in resulting in reduced availability/abundance of wildlife for harvesters. The residual effects are not significant. No change in marine mammal movement in the study area due to marine transport. • Potential avoidance of frequented harvesting area due to perceived effects to wildlife. Changes to fish and fish habitat (Volume 5, Chapter 10): • No significant residual effects to marine fish are anticipated due to as best management practices and mitigation measures are anticipated to minimize impacts of underwater noise and management of contact water, effluent and dust. • Potential avoidance of frequented fishing area due to perceived effects to fish; Roberts Bay has not been identified as an important fishing area Changes to the sensory environment: • Change in visual character due to Project infrastructure, resulting in changes in experience of nature; coastal topography anticipated to minimize views of the Project unless within close proximity. • Sensory disturbance from noise (e.g., decommissioning/removal of infrastructure); the residual effect of noise is rated as not significant (Volume 4, Chapter 3).	X	X	X	X	X	X
	Mine, process plant, wind turbines, tailings and camp facility closure (as applicable to Doris, Madrid North and South, Boston)	Changes to the physical environment (Volume 3): • Presence of infrastructure is not expected to delay or disrupt access or travel routes for land users. Changes to wildlife and wildlife habitat (Volume 4, Chapter 9): • Habitat loss and disturbance for wildlife, and disruption of movement for caribou, resulting in reduced availability/abundance of wildlife for harvesters. Residual effects to wildlife are not significant. • No residual effects of hunting pressure from increased access or presence of workers. • Potential avoidance of frequented harvesting area due to perceived effects from water discharge into the environment or potential effects to wildlife; to date, area is not avoided by harvesters active in the land use RSA due to perceived environmental effects. Change to freshwater fish and fish habitat (Volume 5, Chapter 6): • Loss or alteration of fish habitat or change to water quality may result in changes to fishing activities; no significant residual effects are anticipated for freshwater fish. Changes to the sensory environment: • Presence of workers resulting in potential changes in the experience of nature/perceptions of safety on the land. • Sensory disturbance from general noise associated with decommissioning of infrastructure; the residual effect of noise is not significant (Volume 4, Chapter 3). • Change in visual character due to presence of infrastructure within range of land use areas; a topography of gentle rolling hills anticipated to minimize views of the Project unless within close proximity.	X	X	X	X	X	X
	Local site roads and road transport	Changes to the physical environment (Volume 3): • Presence of infrastructure and Project-related traffic on site roads is not expected to delay or disrupt access or travel routes for land users. Changes to wildlife and wildlife habitat (Volume 3, Chapter 9): • Disturbance to wildlife resulting in reduced availability/abundance of wildlife for harvesters. Intermittent disruption of movement for caribou due to traffic on the AWR. Residual effects to wildlife are rated as not significant. No large mammal mortality due to vehicle collisions is expected. Changes to the sensory environment: • Change in visual character due to presence of roads within range of frequented land use areas, resulting in potential change the experience of nature; a topography of rolling hills anticipated to minimize views of the Project unless within close proximity.	X	X	X	X	X	X
	Air Transport (Doris and Boston Airstrips)	Changes to the sensory environment: • Noise from use of aircraft and helicopters resulting in potential change the experience of nature; residual effects of aircraft noise during operations are rated as not significant (Volume 4, Chapter 3); to date, area is not avoided by harvesters active in the land use RSA due to sensory disturbances.	-	-	X	-	-	X

Notes:
'X'= interaction
'-' = no interaction

Hunting will not be permitted by Hope Bay Project employees while on site for safety reasons, during any phase of the Project. The Madrid-Boston Project is not providing access to new hunting areas as the Project area is currently accessible by snow-machine. During the caribou workshops, a concern was raised that the Project may result in increased harvesting pressure for caribou because Project employees might inform hunters in Cambridge Bay when caribou are in the area, potentially leading to increased harvesting pressure and/or additional people hunting in the area. Caribou sightings would be limited to areas within visual range of the PDA and Project infrastructure, and in areas restricted by the 'no hunting' policy. Additionally, community research indicated that travel between Cambridge Bay and the Project area takes a minimum of three hours by snow machine (Appendix V6-3B), after which caribou may be in a different location, although tracks may remain visible for harvesters to follow. Overall, the Project is not expected to cause an increase in wildlife mortality due to facilitation of hunter access.

During Construction and Operation, there is potential for the Project to attract grizzly bear and wolverine. In the case of attraction to the site, TMAC will follow established procedures for close grizzly bear proximity to a worksite and if an animal becomes a safety concern, TMAC will consult with a conservation officer for advice. Therefore, the wildlife assessment does not consider attraction to the site to be a significant effect (Volume 4, Chapter 9).

During all phases of the Project, there is potential for commercial harvesters to avoid use of the area due to perceive environmental risks; however, based on current levels of use of the area by hunters, there is no evidence of avoidance due to environmental concerns. The continued use of that area throughout Construction and Operation of the Doris Project is an indication that harvesters have not changed harvesting practices or avoiding the Hope Bay Project area. No information has been provided during community-based research or consultation regarding peoples' tolerance thresholds and risk perception.

Wildlife viewing activities and photography tours offered by tourism operators also relies on the presence of wildlife. There is no evidence that wildlife viewing activities occur within the land use RSA. As potential effects to wildlife are local in scale, it is not anticipated that wildlife viewing success at a regional level would be altered due to the Project during any phase.

Overall, effects to wildlife are limited to the local scale. Although caribou movement may be affected due to the AWR during Construction and Operation, overall wildlife are expected to continue to use the land use RSA and LSA, and as such, commercial land use activities will not experience a reduction in harvesting success/harvesting practice as a result of the Project.

Change in Experience of Nature

There is potential for change in the quality of experience of nature for commercial harvesters, sport hunters and recreational/tourism users active in areas where Project components and activities are anticipated to cause noise and visual effects.

There is potential for noise disturbance while traveling within proximity of the Project (e.g., Doris, Madrid North and South and Boston mine sites, quarries, Roberts Bay cargo dock, and along transportation corridors); noise effects may occur from construction until closure. Aircraft and helicopter noise at Boston (once operational) may occur intermittently during schedule flights throughout Construction, Operation and Reclamation/Closure; noise from aircrafts and helicopters using the existing Doris site (e.g., to transport employees for the Madrid-Boston Project) may also result in sensory disturbances. The residual noise effect of general construction and operation noise and for aircraft noise is rated as not significant (Volume 4, Chapter 3). Land users may perceive a change in the soundscape/sensory environment, should they be within proximity of the Project.

Project infrastructure will change the visual aesthetic of the existing landscape in areas that may be visible to land users. New infrastructure includes the Boston and Madrid sites (e.g., processing plant and accommodations, wind turbines), the AWR between Madrid and Boston (including 53 km of road and quarries used to construct and maintain the road), expansion and raising of the Doris TIA, and infrastructure at Roberts Bay (e.g., cargo dock, tank farm). Due to the undulating topography of the area, views of the Project are obstructed by natural landforms, and as such, a change in visual aesthetics is not anticipated for commercial land users unless they are within close proximity of the PDA.

It is not anticipated that wildlife will change their movement patterns at a regional level or that loss of habitat or disturbance will reduce the presence of wildlife in the land use RSA (Volume 4, Chapter 9). Therefore, no change in opportunities for viewing wildlife (e.g. for eco-lodges and associated outdoor recreation activities) are anticipated.

4.5.2.2 Potential Effects on Traditional Activities and Knowledge

Potential Effects on Hunting and Trapping

Overview of Traditional Activities and Knowledge - Hunting and Trapping

Local land users hunt and trap throughout the land use LSA and RSA; trapping is not common. The NTKP report highlights frequented hunting areas within the land use RSA, as well as routes used to travel through the area to reach hunting locations between Kent Peninsula and Hope Bay (Banci and Spicker 2016). Species of focus include caribou, muskox, wolverine, grey wolf, fox, and to a lesser extent, seals and grizzly and polar bears.

In 2011, approximately 20 to 25 hunters were reported to be active in the Project area, and in recent years is it estimated that more people are active in this area. Local land users often travel between Cambridge Bay and the Bathurst Inlet area (Omingmaktok and Kingaok) for hunting and fishing, passing through the land use RSA. Hunters who visit the Doris Site have indicated that they use the area to hunt furbearers for furs, and do not typically hunt caribou in this area. The September 2016 caribou workshop identified caribou hunting areas (summer and winter) in and around Kent Peninsula, Elu Inlet and Melville Sound (including near Roberts Bay; Appendix V2-2A). Opportunistic hunting for migratory birds, geese, swans and eider ducks occurs in the spring and summer, particularly in the area west of the Doris project site and throughout the RSA. Wildlife harvesting is permissible throughout the year, although local land users indicate that most hunting occurs December through April /May, while the area is accessible by snow machine. In accordance with the *Mines Health and Safety Act* (1994), no hunting is allowed within two (2) km of the Project site for safety reasons. The NTKP report (Banci and Spicker 2016) indicates that local land users have reported seeing fewer caribou and bird species in recent years throughout the Kitikmeot region.

Change in Access to Land and Resources

Accessing land and resources within the land use RSA involves navigating natural features including lakes, mountains and streams. Construction and operation activities may cause minor or temporary delays in certain locations on the Hope Bay Belt, but Project-related activities that may affect access will be avoidable at the local scale. Construction activities will be sequential, thereby reducing the extent of construction activities during any given time period in locations on the Hope Bay Belt.

At Roberts Bay, construction and operations may reduce access to shoreline areas for hunting or to access hunting areas, particularly while travelling to or from Kent Peninsula. Local land users may use alternate routes to or from Kent Peninsula to avoid Roberts Bay during construction, although overall access throughout the coastal area will be possible during all seasons. Roberts Bay and the bay

immediately to the west of Roberts Bay are frequently used by land users. Marine transportation activities will occur during open water season (August to mid-October); since most hunting in the area is reported to occur in winter and early spring, marine transportation does not overlap temporally with hunting and no impact to access the areas is anticipated due to marine transportation activities. Overall, access to the coastal area during all seasons will be possible.

Infrastructure construction and expansion of the PDA at Doris, Boston and Madrid sites and the AWR are not expected to result in delays or restricted access to commonly-used harvesting areas within the land use LSA and RSA. Construction activities may cause minor or temporary delays in certain locations on the Hope Bay Belt, but any construction activity would be avoidable at the local scale. Further, construction activities will be sequential at Roberts Bay, Madrid, on the AWR and at Boston, thereby reducing the extent of construction activities during any given time period in locations on the Hope Bay Belt. During operations, TMAC anticipates approximately 60 round trips between Boston and Doris, and road maintenance on the AWR will occur weekly to monthly (depending on levels of traffic and snow). This level of traffic activity is not expected to delay access to harvesting areas due to the infrequent passes of vehicles on the road. Areas which are no longer needed to carry out Madrid-Boston Project activities will be progressively reclaimed and it is not expected that land user will experience any change access following decommissioning of the site.

There is potential for temporary and site-specific interaction between the Madrid-Boston Project and access to land use areas; however, Project components are not expected to result in a change in effort to access harvesting areas for local land users. Overall, the Project is not expected to reduce or delay access or result in a change in effort to access hunting and trapping areas throughout Construction, Operation, and Reclamation and Closure.

Change in Harvesting Success / Harvesting Practice

Hunting activities are closely interconnected to the presence of wildlife in an area. Local land users hunt in areas where wildlife may be affected by the Project, including areas within and adjacent to the mine sites, AWR, mine access roads, and airstrips. During Construction and Operation, there is potential for intermittent disruption of caribou movement due to Project-traffic on the road, but it is not expected to change caribou movement in the land use RSA. As there is a 'no hunting' policy within 2 km of the Project, change in caribou movement within range of the road does not affect harvesting practices, as no hunting will occur in proximity to the road. No other residual effects on wildlife have been identified (Volume 4, Chapter 9), because Project components will remove a limited amount of habitat available to wildlife regionally (e.g., negligible loss of high value winter and annual range habitat for caribou), sensory disturbances are not anticipated to result in a change in the movement or migration patterns for wildlife, no increased predation is expected, and traffic controls are expected to limit any wildlife-vehicle collisions for larger mammals.

The Project is not providing new access to new hunting areas as the area is currently accessible by snow-machine. Hunting will not be permitted by Hope Bay Project employees while on site for safety reasons, during any phase of the Project. During the caribou workshops, a concern was raised that the Project may result in increased harvesting pressure for caribou because Project employees might inform hunters in Cambridge Bay when caribou are in the area, potentially leading to increased harvesting pressure and/or additional people hunting in the area. Caribou sightings would be limited to areas within visual range of the PDA and Project infrastructure, and in areas restricted by the 'no hunting' policy. Additionally, community research indicated that travel between Cambridge Bay and the Project area takes a minimum of three hours by snow machine (Appendix V6-3B), during which time caribou change location, although tracks may remain visible for harvesters to follow.Therefore, no change in wildlife availability due to hunting pressure is anticipated. Vehicle and marine traffic

controls will be in place such that no vehicle or vessel collisions are anticipated to result in large mammal mortality (Volume 4, Chapter 9; Volume 5, Chapter 11). Overall, the Madrid-Boston Project is not expected to cause an increase in wildlife mortality.

During Construction and Operation, there is potential for the Project to attract grizzly bear and wolverine. In the case of attraction to the site, TMAC will follow established procedures for close grizzly bear proximity to a worksite and if an animal becomes a safety concern, TMAC will consult with a GN Conservation Officer for advice. Therefore, the wildlife assessment does not consider attraction to the site to be a significant effect (Volume 4, Chapter 9).

During all phases of the Project, local hunters and trappers may avoid harvesting in areas that interact with localized Project activities due to perceived environmental effects (e.g., due to water discharge into the environment). However, current level of activity within the land use RSA and LSA, including reported increase in use in recent years, indicates that the area is not being avoided and the Doris Project is not resulting in change to hunting success/harvesting practices. During the 2017 community research, no comments were made regarding perceived environment effects resulting from the existing Doris operation or the proposed Project. No information about peoples' tolerance thresholds and risk perception has been provided and no 'area of avoidance' has been quantified.

Land use activities are pathways for transferring traditional knowledge. Inuit culture involves active participation in subsistence activities by current knowledge holders and youth, demonstrated through the IQ principle of *Pilnimmaksarniq*, translated as, 'the passing on of knowledge and skills through observation, doing, and practice'. As the Project components and activities are not anticipated to result in changes to harvesting practices, it is expected that there will be ongoing opportunities for knowledge transfer regarding hunting and trapping in this area.

Overall, effects to wildlife are limited to the local scale. Although caribou movement may be affected intermittently due to traffic on the AWR during Construction and Operation, overall wildlife are expected to continue to use the land use RSA and LSA, and as such, it is not anticipated that the Madrid-Boston Project will change local land users' harvesting success/harvesting practice.

Change in Experience of Nature

There is potential for change in the quality of experience while hunting and trapping in areas where Project components and activities cause noise and visual effects, or as a result of changes to other sensory perceptions.

Noise disturbance may occur during Construction, Operation and Reclamation and Closure phases at the Doris, Madrid and Boston mine sites and along transportation corridors. Aircrafts noise near Doris and Boston airstrips may result in noise effects. No significant residual effects for construction and operations noise have been identified (Volume 4, Chapter 3). However, harvesters may experience a change in the natural soundscape (e.g., sounds of wind, water, wildlife) that could affect their experience of nature in the land use LSA, particularly during winter months when sound travels faster and farther in cold temperatures (as noted by participants of the caribou workshops, Appendices V2-2A to V2-2C).

Project infrastructure may be visible to land users, resulting in a change in the visual quality of the natural landscape. New infrastructure includes the Boston and Madrid site facilities and camp, wind turbines, AWR between Madrid and Boston, expansion of the Doris TIA, and cargo dock infrastructure at Roberts Bay. Due to the topography of the area that includes coastal ridges, cliffs, and rock outcroppings, and rolling hills, overall, land users will not experience a change in the visual landscape unless they are within close proximity to Project infrastructure.

The Project will result in increased numbers of people (i.e. workers) in the area. This increased human presence may affect harvesters' experience of nature. There is limited perceptual data regarding experience of nature, visual footprints or natural soundscape which may shape the experience of nature within the land use RSA, and during consultation, no issues were raised related to changes in feelings or perceptions of land use were identified. Based on current levels of land use activities in areas near the Doris Project, it is not expected that the presence of infrastructure or workers has resulted in a negative change in the experience of nature for local land users.

Potential Effects on Fishing

Overview of Traditional Activities and Knowledge

Local land users have noted that fishing in the area is often opportunistic, while undertaking other land use activities. Fishing is conducted in winter, spring and summer. Species that are harvested include whitefish, trout, cod, as well as Arctic char in the fall and throughout the winter. Important fishing areas are marked with fish markers. The NTKP report (Banci and Spicker 2016) and land use workshops identified prominent fishing areas within the land use LSA and RSA. There are three frequented fishing areas within the land use RSA and LSA that were noted: a lake near Melville sound (referred to as Naoyak or Tahikyoaknahik)[10], Roberts Lake (adjacent to Doris) and Aimaokatalok (near the Boston site). During the first caribou workshop (Appendix V2-2A), a grayling fishing site was identified on the west side of the Aimaokatalok; this site was confirmed by Elders during the site visit to Boston during the third caribou workshop (Appendix V2-2C).

Change in Access to Land and Resources

Accessing land and resources within the land use RSA involves navigating natural features including lakes, mountains and streams. Construction and operation activities may cause minor or temporary delays in certain locations on the Hope Bay Belt, but Project-related activities will be avoidable at the local scale.

During Construction and Operation, no change in access to Roberts Lake (near Doris) for fishing is anticipated due to the presence of infrastructure along the coastline at Roberts Bay, vehicle traffic between Roberts Bay and Doris, infrastructure development at Doris (e.g., raising the TIA), and operations of the Doris mine. Similarly, access to Aimaokatalok, and specifically the grayling fishing area on the western shore of Aimaokatalok, will not be affected due to the development of the Boston mine site and associated infrastructure, vehicle traffic and regular road maintenance along the AWR. Areas which are no longer needed to carry out Madrid-Boston Project activities will be progressively reclaimed during Construction and Operation, and once decommissioned it is not expected that land users will experience any change or delay in access to fishing areas.

There will be no disruption of access to the fishing locations on the western side of the land use RSA. Based on the travel route identified in the NTKP report (Banci and Spicker 2016), travel to this area is via the Elu Inlet and across to Kent Peninsula, and does not overlap with the PDA or land use LSA.

Overall, the Project is not expected to reduce or delay access or result in a change in effort to access areas used for fishing throughout Construction, Operation, and Reclamation and Closure.

[10] The Inuit name of the lake close to Melville Sound has not been confirmed.

Change in Harvesting Success / Harvesting Practice

Water for domestic and industrial use will be drawn from Doris, Windy, and Aimaokatalok lakes and is anticipated to occur during all phases of the Project. Water withdrawal from lakes has the potential to affect fish habitat (Volume 5, Chapter 6). Due to the large size of Aimaokatalok and minimal draw from the lake, the Project is not expected to result in water drawdown at Aimaokatalok (Volume 5, Chapter 6).

All discharge from mining operations will comply with water quality guidelines set by the Canadian Council of Ministers of the Environment (CCME). Therefore, there will be no adverse effects to water quality and no indirect effects of water quality on fish (Volume 5, Chapter 6).

TMAC's Conceptual Marine Fisheries Offsetting Approach for Phase 2 (Appendix V5-10F) addresses potential effects to fish and fish habitat and overall no change in the abundance or availability of fish is anticipated.

There is, however, potential that local users may perceive environmental effects of the Project, including due to water discharge activities, and local land users may avoid fishing at Doris Lake, Roberts Lake and Aimaokatalok. Avoidance of a frequented harvesting area may affect harvesting practice; however, as fishing in this area is generally opportunistic, it is not expected that levels of subsistence fishing would be affected (i.e., most fishing happens within the vicinity of communities and camps). There is continued use of the seasonal camp near Roberts Lake (within the LSA) for hunting and fishing, and consultation did not identify evidence of avoidance of the area; however, land users noted minimal use of the camp due to proximity to Doris. Information relating to reduced use of Roberts Lake has not been provided but it may be associated with sensory disturbance (e.g., aircraft noise at the Doris site during takeoff and landing, or increased presence of people in the area resulting in a change in the experience of nature). No concerns have been raised regarding effects of the Project to fish or fish habitat at Roberts Lake. There is no information about tolerance thresholds and risk perception, and therefore, an 'area of avoidance' has not been quantified.

Inuit culture involves active participation in subsistence activities by current knowledge holders and youth, demonstrated through the IQ principle of *Pilnimmaksarniq*'. Potential change to fishing practices may affect land use knowledge transfer; however, as there is ongoing use of the land use RSA for harvesting and fishing, and because the Project is shorter than one generation it is likely that land use knowledge transfer related to fishing in the area will continue.

Overall, using a conservative approach, there is potential for a change in fishing practice due to avoidance, but the magnitude of the change is anticipated to be low in consideration that it relates to one of many fishing locations in the area and because it is based on potential for perceived effects as the Project is not anticipated to result in residual effects to fish or fish habitat.

Change in Experience of Nature

There is potential for change in the quality of experience of nature while fishing in areas where Project components and activities are anticipated to cause noise and visual effects, or as a result of other sensory changes associated with the Project.

During Construction, Operation, and Reclamation and Closure, there is potential for aircraft noise at Boston's landing strip to be heard by land users fishing at Aimaokatalok. The noise effects assessment considered two fishing locations/receptor sites within 500 metres of the Boston-Madrid road (i.e., receptor sites R_H-F2 and R_H-H1 in Volume 4, Chapter 3), and determined that noise levels are not anticipated in these locations to be above 70 dBA (Volume 4, Chapter 3). The noise assessment considered two aircraft noise scenarios: option 1 included a mix of smaller aircrafts (Dash 8 and

737 jets), while option 2 considered only smaller aircraft, and required an increased number of flights (Volume 4, Chapter 3). Regardless of the options, no significant residual effects were identified for aircraft noise (Volume 4, Chapter 3). Notwithstanding, land users may still perceive a change in the soundscape (e.g., sounds of wind, water, wildlife).

Project infrastructure may result in a change to the visual aesthetic of the existing landscape. It is not possible to see the Doris Site from Roberts Lake; therefore, it is not expected that construction of operation of existing and approved infrastructure, as well as proposed Madrid-Boston infrastructure will result in visual effects for land users fishing at Roberts Lake. Fishing at Aimaokatalok may be affected by some views of the AWR and Boston site infrastructure (e.g., processing plant, wind turbines), although views will likely be obstructed due to the topography of the area. Overall, visual impacts are expected for land users within close proximity of the Project.

The presence of workers during Construction, Operation, and Reclamation and Closure will result in increased presence of people on the land and has potential to change the experience of nature for land users. Consultation has not identified issues related to changes in the experience of nature due to the presence of workers, and no perceptual data has been provided related to land use experience.

Potential Effects on Cultural Sites and Routes

Overview of Traditional Activities and Knowledge - Cultural Sites and Routes

There are two cabins and two camps within the land use RSA. One of the camps, located adjacent to Roberts Lake (within the LSA), is used seasonally by harvesters hunting and fishing, primarily in the spring and summer. Baseline information indicates that it is used minimally, in part due to its proximity to the existing Doris Project. The land use RSA is used for travel between Kingaok, Omingmaktok, and Cambridge Bay. No ceremonial or spiritual sites have been identified in the RSA. The heritage assessment identified remnants of old camp sites, hunting sites and *inuksuit* within the vicinity of Aimaokatalok, Roberts Bay and Hope Bay (Volume 6, Chapter 2). There are placenames throughout the RSA. Placenames are an important feature of Inuit oral knowledge and support navigation and orientation on the land; however, there is no evidence of cultural activities at these sites.

This assessment does not consider potential 'change in harvesting success/harvesting practice' as this effect is not applicable to cultural land use sites.

Change in Access

Travel throughout the land use RSA involves navigating natural features including lakes, mountains and streams. Construction and Operation activities may cause minor or temporary delays in certain locations on the Hope Bay Belt, but Project-related activities that may affect access will be avoidable at the local scale. Access to the camps at Roberts Lake and Ida Bay may be temporarily delayed due to construction of Madrid-Boston Project components, depending on the travel route; access to the cabins on the western boundary of the land use RSA will not be affected as the travel route to these cabins is via the Elu Inlet and across to Kent Peninsula, and travel does not overlap with the PDA or land use LSA.

Navigation or orientation using placenames sites may be altered as a result of Project infrastructure, depending on the land use route; however, in consideration of the topography of the area, Project is not anticipated to impede access to or via these areas.

Change in Experience of Nature

Land users may have a reduced quality of experience of nature at seasonal camps or while travelling on preferred routes where Project components and activities are anticipated to cause noise and visual effects.

Currently, use of the seasonal camp at Roberts Lake is minimal in part due its proximity to the Doris Project; limited use may reflect perceived or real change in the experience of nature at this location. Throughout Construction, Operation, and Reclamation and Closure, aircraft noise from the Doris airstrip may be heard at this camp, although general construction and operation noise will is not likely to be audible. The noise assessment determined that at Roberts Lake, aircraft noise is not likely to exceed 70 dBA (Volume 4, Chapter 3). The noise effects assessment considered two aircraft noise scenarios: option 1 included a mix of smaller aircrafts (Dash 8 and 737 jets), while option 2 considered only smaller options but included more flights. Option 2 generates lower noise levels overall and did not anticipate noise levels above 70 dBA at Roberts Lake (Volume 4, Chapter 3). The residual effect of aircraft noise (regardless of the flight options) is rated as not significant (Volume 4, Chapter 3). Land users may experience a change in the natural soundscape (e.g., sounds of wind, water, wildlife).

There are no cultural sites within visual range of Project components. Project infrastructure (e.g., raised TIA, wind turbine, surface site infrastructure) may change the visual aesthetic of the existing landscape along travel routes. Project components at Roberts Bay may be visible to land users travelling through this area, and similarly new infrastructure at Madrid and Boston and the AWR may be visible to land users travelling within close proximity of these sites.

The presence of workers during Construction, Operation, and Reclamation and Closure will result in increased presence of people at the Project sites, and has potential to change land users experience of nature while travelling within proximity to Project infrastructure and or activities. Limited perceptual data is available regarding experience of nature, particularly in areas with the land use RSA.

4.5.3 Mitigation and Adaptive Management

Mitigation and management measures have been identified through a review of best management practices from similar mining projects in the Arctic, comments from community members during scoping meetings and community meetings, input provided by the KIA with respect to the Doris Project, the caribou workshops (Appendices V2-2A to V2-2D), scientific literature and professional experience.

TMAC has several functional environmental management plans that were developed and approved under its NIRB Project Certificate No. 003, and, Type A Water Licence for the previous phases of the Hope Bay Belt development. TMAC will update these plans as required for the Project.

Mitigation measures and adaptive management strategies will be in place for the VECs and VSECs that serve to minimize potential effects of the Project on land and resource uses. These measures will reduce potential for change in the availability, accessibility and quality of the environment and resources upon which commercial and local land users depend. Therefore, mitigation measures for air quality, noise, soils, vegetation, water quality and flow, fish and fish habitat, and wildlife and wildlife habitat also serve to mitigate potential effects on land use VSECs.

The consideration of TK in the development of mitigation measures for VECs and VSECs is described throughout the EIS including:

- Air Quality Management Plan (Annex V8-2) describes planned air quality mitigation measures and planned monitoring activities;

- Hope Bay Project Wildlife Mitigation and Monitoring Plan (Annex V8-3) describes planned monitoring of adverse effects on wildlife or wildlife habitat;
- Hope Bay Project Aquatic Effects Monitoring Plan (Type A Water Licence Application, Package 4-18) describes measures planned to manage effects to aquatic life and water quality objectives;
- Hope Bay Heritage Resource Protection Plan (Annex V8-6) describes measures planned to manage protection of heritage resources associated with the Hope Bay Project.
- Conceptual Marine Fisheries Offsetting Approach for Phase 2 (Appendix V5-10F) describes measures planned to manage potential effects to CRA fisheries resulting from the Project.
- Hope Bay Project, Boston Conceptual Closure and Reclamation Plan, November 2017 (Type A Water Licence Application, Package 4-19), describes measures planned to manage site reclamation, options of final closure and reclamation, as well as consideration of potential future uses.

4.5.3.1 Mitigation by Project Design

Reducing potential effects by avoidance is, where practicable, is the most effective mitigation measure to reduce the potential for serious damage or harm. Design mitigation to reduce the effects of the Madrid-Boston Project include:

- design infrastructure to minimize the PDA to reduce habitat loss for wildlife (both for terrestrial and marine species);
- locate infrastructure close to deposits to keep activities confined to specific areas, and to confine noise-generating activities;
- design infrastructure to avoid, where possible, identified wildlife sensitive areas and wetlands;
- construct roads, where safety permits, without continuous berms to minimize bank heights of roads to allow for the easier passage of people and wildlife; and
- use and maintain wildlife-proof waste management facilities and buildings.

4.5.3.2 Best Management Practices

A number of best management practice and site policies will be in place, which contribute towards reducing impacts for land use VSECs. These include:

- orientation for all personnel in their responsibilities to protect wildlife and their habitat;
- a no feeding or harassing of wildlife policy;
- a no littering policy;
- a no firearms policy for all Project staff and contractors while on site;
- a speed limit on all Project roads for safety reasons with the result of reducing dust generation and manage potential vehicle collisions with wildlife;
- giving wildlife the right of way on all roads at all times; and
- operating helicopters and fixed-wing aircraft at minimum elevation or using horizontal offsets (where safety permits and at the discretion of the pilot) to avoid disturbing wildlife and sensitive wildlife habitats such as bird colonies.

The Hope Bay Project Wildlife Mitigation and Monitoring Plan (Annex V8-3) and the effects assessment for terrestrial wildlife and wildlife habitat (Volume 4, Chapter 9) more fully describe the best management practices being implemented to avoid or mitigate potential effects on wildlife.

4.5.3.3 Proposed Monitoring Plans and Adaptive Management

Proposed monitoring and adaptive management plans are described for VECs and VSECs, including noise (Volume 4, Chapter 3), soil and landforms (Volume 4, Chapter 7), terrestrial wildlife and wildlife habitat (Volume 4, Chapter 9), aquatic environment (Volume 5, Chapters 6, 10 and 11), and heritage resource (Volume 6, Chapter 2). Volume 8 presents information on environmental monitoring plans for the Project. Input and IQ provided during the NIRB review process, through the review of the TK report (Banci and Spicker 2016), consultation with the KIA, HTOs and during community meetings, have been incorporated into monitoring programs. Volume 8, Section 1.3.3 summarizes how TK is considered in TMAC's Environmental Management System.

Through the series of three caribou workshops (Appendices V2-2A to V2-2D), a number of measures were identified and incorporated into mitigation and monitoring design. For example, TMAC will expand the existing camera monitoring program to include the AWR and Boston site, to monitor Project effects. Workshop participants indicated that cameras are to be placed at the crossing locations and important sites identified by workshop participants. Additionally, as part of the monitoring program, workshop participants confirmed the need for visual surveys of the area before blasting activities, to ensure both humans and wildlife are at safe distances.

Through the ongoing implementation of TMAC's Inuit Environmental Advisory Committee (discussed in Section 4.5.3.1), Elders and harvesters will remain engaged in the Project and wildlife monitoring activities; as needed, monitoring measures and adaptive management will be implemented to address potential effects of the Project.

Monitoring results and annual monitoring reports for the Project will be submitted to NIRB and provided to the KIA and government departments for review and comment. Reports will also available for public review. Through this review and engagement, additional IQ information may be brought forward and considered. All monitoring plans are living documents and may be revised based on input received, including IQ.

4.5.3.4 Mitigation Measures for Specific Potential Effects to Land Use VSECs

TMAC has established an Inuit Impact Benefit and Agreement (IIBA) with the KIA for the Hope Bay Project. The IIBA details access to Project facilities and roads, which facilitates the continued use of areas outside of the Hope Bay Project site for land use activates. As reported in the baseline, TMAC allows local harvesters to visit the site. In these cases, a safety induction is provided for all visitors.

The IIBA also establishes an Inuit Environmental Advisory Committee and detailed roles and responsibilities for members of this committee are described.

TMAC has developed a Hope Bay Project Community Involvement Plan (Annex V8-5) which provides a framework for engaging positively and effectively with community members in a manner that emphasizes respect, integrity and demonstrates a willingness to learn from experience and embrace necessary change.

In response to concerns about the Project workforce notifying hunters in Cambridge Bay regarding the presence of caribou, as raised during the caribou workshops, the KIA indicated that it would work with TMAC to communicate and discourage hunting adjacent to Project infrastructure for safety reasons.

Collaboration and communication regarding safety measures may contribute towards reducing increased harvesting in the Project area.

4.5.4 Characterization of Potential Effects

Project residual effects are the effects that remain after mitigation and management measures are taken into consideration. If the implementation of mitigation measures eliminates a potential effect and no residual effect is identified for land use VSECs, the effect is eliminated from further analyses. If the proposed implementation controls and mitigation measures are not sufficient to eliminate an effect, a residual effect is identified and carried forward for additional characterization and a significance determination. Residual effects of the Project can occur directly or indirectly. Direct effects result from specific Project/environment interactions between Project activities and components, and land use VSECs. Indirect effects are the result of direct effects on the environment that lead to secondary or collateral effects on land use VSECs.

4.5.4.1 Commercial Land and Resource Use

Change in Access to Land and Resources

Potential Madrid-Boston Project Effect

It is not anticipated that the Madrid-Boston Project will delay access or change the effort to reach hunting areas for guided or HTO-led hunting activities. TMAC's commitment to allow land users to cross roads and navigate around infrastructure allows for ongoing and broad use of the land use RSA, and it is unlikely that hunters will detect a change in hunting access or routes. TMAC allows hunters to stay at the Hope Bay site; therefore, travel to and through the site is currently possible and there is regular yet occasional use of the area during hunting trips.

No change in access routes is anticipated for the Elu Inlet Lodge, which that operates outdoor recreation and wildlife viewing activities broadly in the land use area.

Therefore, in consideration of the mitigation measures, **the Madrid-Boston Project will not result in a residual effect to access for commercial hunters, Elu Inlet Lodge, or other commercial land users, and no further assessment is undertaken**.

Potential Hope Bay Project Effect

The footprint of Madrid-Boston Project and the existing Doris Project is largely the same. It is anticipated that mitigation measures will, therefore, minimize or avoid changes in access for commercial users and no residual effect is identified and no further assessment is undertaken.

Change in Harvesting Success / Harvesting Practice

Potential Madrid-Boston Project Effect

Guided and HTOs-led hunts may occur in areas affected by localized changes to wildlife due to habitat loss and disturbance. With the implementation of mitigation measures, no significant residual effects on wildlife have been identified within the wildlife RSA (Volume 4, Chapter 9) and, therefore, harvesters are not anticipated to experience a detectible change in wildlife availability or abundance. Therefore, no detectible reduction in harvest success is anticipated while harvesting in the land use RSA.

No hunting will be permitted by Project employees or contractors while on site and firearms are restricted from being brought to site. Therefore, Project personnel will not be harvesting wildlife on the Hope Bay Belt, and no increase in pressure on harvested resources is anticipated as a result of the Project.

It is possible that guided/HTO-led hunters and their clients may avoid the area due to perceptions of the Project, but any avoidance is not anticipated to meaningfully change harvest levels or harvesting practices. Hunters continue to use the area within the vicinity of the existing Doris Site.

Data gaps regarding harvest success rates and preferred hunting areas in the Kitikmeot region prevent quantification of Project effects on guided/HTO-led hunts. However, overall as targeted wildlife (e.g., caribou, furbearers) are anticipated to continue using the area, **no residual effect of changes in harvesting success/ harvesting practices on the commercial land users is predicted, and no further assessment is undertaken**.

Potential Hope Bay Project Effect

In consideration of the overlap of Madrid-Boston and the Existing and Approved Projects, and ongoing use of the area for hunting, no residual effect for guided and HTO-led hunting success/practice is anticipated, and no further assessment is undertaken.

Change in Experience of Nature

Potential Madrid-Boston Project Effect

Noise and infrastructure associated with the Project may reduce the quality of experience of nature for guided and HTO-led hunting and recreational outdoor use. Residual noise effects during Construction, Operation, and Reclamation and Closure will be greatest within close proximity of the Project footprint; however, no significant residual effects have been identified for noise (Volume 4, Chapter 3). The Project introduces infrastructure that may change the visual aesthetic of the existing landscape (e.g., wind turbines, surface site infrastructure), but only in close proximity of infrastructure and not within the RSA itself. Localized changes to wildlife are not expected to reduce the experience of wildlife viewing in the RSA and, therefore, no residual effect on the experience of nature for recreational users is anticipated.

Overall, **no residual effects are anticipated for the experience of nature for commercial land users as a result of the Project, and no further assessment is undertaken**.

Potential Hope Bay Project Effect

The Madrid-Boston Project and Existing and Approved Projects' noise and visual effects will be largely interconnected and are anticipated only within close proximity to the site. There is ongoing use of the area with the existing Doris Site and no concerns have been raised regarding changes to the experience of nature. Therefore, no residual effect is anticipated for the experience of nature while undertaking commercial activities within the land use RSA, and no further assessment is undertaken.

4.5.4.2 Traditional Activities and Knowledge – Hunting and Trapping

Change in Access to Land and Resources

Potential Madrid-Boston Project Effect

The Project is not anticipated to reduce access or change the effort to reach hunting and trapping areas for land users. In general, access to land and resources in the land use RSA involves navigating natural features including lakes, mountains and streams. TMAC allows land users to cross roads and

navigate around infrastructure and, therefore, broad use of the land use RSA will not be impeded, and it is unlikely that hunters will detect a change in hunting/trapping access. TMAC allows local harvesters to stay on site; therefore, travel to and through the site is currently possible and there is regular yet occasional use of the area while hunting/trapping. In consideration of the mitigation measures, **the Madrid-Boston Project will not result in a residual effect to access for local land users, and no further assessment is undertaken**.

Potential Hope Bay Project Effect

The footprint of Madrid-Boston Project and the existing Doris Project is largely the same. It is anticipated that mitigation measures will, therefore, minimize or avoid changes in access for local land users and no residual effect is identified, and no further assessment is undertaken.

Change in Harvesting Success / Harvesting Practice

Potential Madrid-Boston Project Effect

Local land users may hunt and trap in areas that may be affected by localized changes to wildlife; however, with the implementation of mitigation measures, no significant residual effects on wildlife have been identified within the wildlife RSA (Volume 4, Chapter 9). Therefore, no detectible change in wildlife availability for hunters is anticipated and harvesting success/harvesting practices are not unlikely to change within the land use RSA.

No hunting will be permitted by Project employees or contractors while on site and firearms are restricted from being brought to site. There is potential for employees at the mine to notify harvesters regarding the presence of caribou; caribou sightings would be limited to areas within visual range of the PDA and Project infrastructure, and in areas restricted by the 'no hunting' policy. Additionally, a hunter based in Cambridge Bay will require a minimum of three hours by snow machine to reach the land use RSA, and during this time, caribou may have left the Project area. Therefore, neither Project personnel not be harvesting wildlife on the Hope Bay Belt, and notification of caribou presence by Project personnel will not result in increased hunting pressure, such that harvesting success is negatively affected. No new access is being created by the Project; therefore, it is not expected that there will be an increased presence of hunters.

It is possible that harvesters may avoid the immediate Project area due to perceptions of the Project; however, overall harvesting success within the land use RSA is not anticipated to change in a detectible way. Currently, harvesters continue to hunt in areas near the existing Doris Site, and there is no evidence that avoidance has affected hunting practices. Data gaps regarding harvest success rates and specific hunting sites prevent quantification of Project effects on hunting success, but overall, **no residual effect to harvesting success/harvesting practice for local land users is anticipated, and no further assessment is undertaken**.

Potential Hope Bay Project Effect

In consideration of the overlap of Madrid-Boston and the Existing and Approved Projects, and results of the assessment of effects on wildlife, the Hope Bay Project is not anticipated to result in residual effects for the success/practice for local harvesters, and no further assessment is undertaken.

Change in Experience of Nature

Potential Madrid-Boston Project Effect

There is potential for reduced quality of experience of nature while hunting in areas where the Project causes noise or changes to the visual aesthetic of the landscape. Residual noise effects during

Construction, Operation, and Reclamation and Closure will be greatest within close proximity of the Project footprint (Volume 4, Chapter 3). Project infrastructure may change the visual aesthetic of the existing landscape within close proximity of these sites; however, the general topography of the area is anticipated to reduce visual impacts. An increased level of human presence (due to workers at the site) may reduce the quality of experience of nature, although there is no perceptual data regarding experience of nature while hunting within the RSA and no concerns were raised during consultation related to effects of presence of workers on the land.

Visual and noise effects are anticipated within close proximity of the Project, but overall **no residual effect is anticipated for the quality of experience of nature while hunting and no further assessment is undertaken**.

Potential Hope Bay Project Effect

The Madrid-Boston and Existing and Approved Projects' noise and visual effects will be interconnected and are anticipated within close proximity of infrastructure. There is ongoing use of the area within range of the existing Doris Site and no concerns have been raised by local land users regarding changes to the experience of nature. Therefore, there is no potential for residual effect to the experience of nature while hunting and trapping and no further assessment is undertaken.

4.5.4.3 Traditional Activities and Knowledge - Fishing

Change in Access to Land and Resources

Potential Madrid-Boston Project Effect

Construction and Operation activities may cause minor or temporary delays in certain locations on the Hope Bay Belt, but overall, no changes in access to frequented fishing areas at Roberts Lake or Aimaokatalok are anticipated. Overall, **no residual effect is identified for access to fishing areas and resources for local land users and no further assessment is undertaken**.

Potential Hope Bay Project Effect

Baseline information indicates that there is ongoing access to Roberts Lake for fishing purposes by local land users. Existing and permitted exploration activities at Boston have not resulted in a change in access to Aimaokatalok for fishing and no concerns related to fishing access have been raised during consultation. Therefore, the Madrid-Boston Project and Existing and Approved Projects in combination are not anticipated to result in a residual effect on access to fishing areas and resources.

Change in Harvesting Success / Harvesting Practice

Potential Madrid-Boston Project Effect

Land users have indicated that the area, particularly Aimaokatalok, is used opportunistically for fishing and harvest levels are not reliant on fishing in these locations. With the implementation of mitigation measures, the Madrid-Boston Project is not anticipated to result in changes to the abundance or availability of fish at frequented harvesting areas, namely Roberts Lake or Aimaokatalok (Volume 5, Chapter 6). However, local land users may avoid using these fishing areas due to perceptions about environmental effects of the Project. For example, baseline information that indicates that fishing at Roberts Lake is minimal in part due to its proximity to Doris. The Boston mine will include a process plant and wastewater treatment plant with disposal of flotation tailings to the Boston TMA and the detoxified leached tailings in the underground mine at Boston. Potable water and industrial water will be sourced from Aimaokatalok, and following treatment, water meeting CCME guidelines will be discharged to Aimaokatalok. There are data gaps regarding fishing success rates at specific fishing sites

which prevent quantification of Project effects on fishing success. During consultation, potential effects to fishing were not raised. However, applying a precautionary approach that considers potential avoidance of the area resulting in changes to fishing practices, the **Madrid-Boston Project may result in a residual effect of change in harvesting success/ harvesting practice for fishing, and further assessment is undertaken**.

Project Hope Bay Potential Effect

In consideration of the overlap of the Existing and Approved Projects and Madrid-Boston Project components and activities, and considering minimal use of Roberts Lake due to its proximity to Doris, it is expected that the Hope Bay Project may result in residual effects of change in harvesting success/ harvesting practice for fishing, and further assessment is undertaken.

Change in Experience of Nature

Potential Madrid-Boston Project Effect

There is potential that Project related noise, visual or other sensory changes may reduce quality of experience of nature for local land users while fishing. While fishing at Aimaokatalok, users may hear general construction and operational noise, and aircraft noise at Boston, although the noise assessment (Volume 4, Chapter 3) does not predict any significant residual effects of noise for human receptors. Land users may experience a change in the natural soundscape (e.g., sounds of wind, water, wildlife). There is also potential for aircraft noise from the Doris airstrip and related flights while fishing at Roberts Lake, and similarly, for helicopter noise from the Boston site and aircraft noise at the winter ice strip on Aimaokatalok. Due to the topography of the area, it is not anticipated that Project infrastructure will change the visual aesthetic of the existing landscape for land users at Aimaokatalok (e.g., local land users fishing grayling on the western shoreline of Aimaokatalok), unless within close proximity of the Project components. No concerns have been raised regarding potential sensory changes for land users while fishing in frequented areas. **No residual effect to the experience of nature while fishing is determined for the Madrid-Boston Project**.

Potential Hope Bay Project Effect

The noise and visual effects of the Madrid-Boston Project and the Existing and Approved Projects will be interconnected and are anticipated within close proximity of the Project, and land users will not discern between the two Projects. No residual effect to the experience of nature while fishing is identified and no further assessment is undertaken.

4.5.4.4 Traditional Activities and Knowledge – Cultural Land Use Sites

Change in Access to Land and Resources

Potential Madrid-Boston Project Effect

The Project is not expected to change access or increase the effort to access the one camp within the LSA and will not disrupt access to the two cabins within the land use RSA or the seasonal camp at Ida Bay. It is not expected that land users will detect a change in travel routes, including use of navigational/orientation placenames, within the land use RSA, as TMAC has committed to allow land users to cross roads and navigate around infrastructure. Overall, **there is no residual effect related to changes in access of cultural sites or travel routes and no further assessment is undertaken**.

Potential Hope Bay Project Effect

Existing Project infrastructure has not restricted access to the cultural sites and travel routes within the land use RSA. The Project Development Area for the Madrid-Boston Project and the Existing and

Approved Projects overlap and are not anticipated to result in residual effect to access cultural sites and travel routes.

Change in Experience of Nature

Potential Madrid-Boston Project Effect

There is potential for change in the quality of experience of nature while using cultural sites primarily due to noise effects. For seasonal users of the camp at Roberts Lake or during travel to this site, it is unlikely that general construction and operations noise will affect the experience of nature; however, low levels of noise aircraft noise may be intermittently audible. The noise assessment (Volume 4, Chapter 3) concludes that residual noise effects are rated as not significant. There are no other cultural sites within the land use LSA that may be affected by noise. Land users may still experience a change in the soundscape (e.g., sounds of wind, water, wildlife). There are no cultural sites within visual proximity of the Project and the topography of the area is such that the Project components will not be visible unless within close proximity to the site. Madrid-Boston Project may be visible to land users while using travel routes or near navigational placenames. Effects are limited in geographic extent and overall, **the Madrid-Boston Project does not result in a residual effect to experience of nature for cultural sites and travel routes**.

Potential Hope Bay Project Effect

There is evidence of ongoing use of a seasonal camp within the LSA and no concerns have been raised related to noise or other sensory disturbance at this site. Therefore, no residual effects of the Hope Bay Project are anticipated for changes to the quality of experience of nature at cultural sites.

4.5.5 Characterization of Residual Effects

4.5.5.1 Definitions for Characterization of Residual Effects

In order to determine the significance of Project residual effect, each potential negative residual effect is characterized by a number of attributes consistent with those defined in of the EIS Guidelines (NIRB; Section 7.14, Significance Determination for the Hope Bay Project). A definition for each attribute and the contribution that it has on significance determination is provided in Table 4.5-4.

For the determination of significance, each attribute is characterized. The characterizations and criteria for the characterizations are provided in Table 4.5-5. Each of the criteria contributes to the determination of significance.

4.5.5.2 Determining the Significance of Residual Effects

Section 7.4 of the EIS Guidelines (NIRB) provided guidance, attributes, and criteria for the determination of significance for residual effects (NIRB 2012a). Also, the Canadian Environmental Assessment Agency's *Determining Whether a Project is Likely to Cause Significant Adverse Environmental Effects (CEA Agency 1992)* also guided the evaluation of significance for identified residual effects. The significance of residual effects is based on comparing the predicted state of the environment with and without the Project, including a judgment as to the importance of the changes identified.

Table 4.5-4. Attributes to Evaluate Significance of Potential Residual Effects

Attribute	Definition and Rationale	Impact on Significance Determination
Direction	The ultimate long-term trend of a potential residual effect - positive, neutral, or negative.	Positive, neutral, and negative potential effects on land use VSECs are assessed, but only negative residual effects are characterized and assessed for significance.
Magnitude	The degree of change in a measurable parameter or variable relative to existing conditions. This attribute may also consider complexity - the number of interactions (Project phases and activities) contributing to a specific effect.	The higher the magnitude, the higher the potential significance.
Equity	The dispersal of potential residual effects across different social groups or segments of society.	A high degree of equity indicates a relatively even dispersal of the residual effect. The lower the equity, the higher the potential significance.
Duration	The length of time over which the residual effect occurs.	The longer the length of time of an interaction, the higher the potential significance.
Frequency	The number of times during the Project or a Project phase that an interaction or environmental/ socio-economic effect can be expected to occur.	Greater the number times of occurrence (higher the frequency), the higher the potential significance.
Geographic Extent	The geographic area over which the interaction will occur.	The larger the geographical area, the higher the potential significance.
Reversibility	The likelihood an effect will be reversed once the Project activity or component is ceased or has been removed. This includes active management for recovery or restoration.	The lower the likelihood a residual effect will be reversed, the higher the potential significance.

Table 4.5-5. Criteria for Residual Effects for Land Use Attributes

Attribute	Characterization	Criteria
Direction	Positive	Beneficial
	Variable	Both beneficial and undesirable
	Negative	Undesirable
Magnitude	Negligible	No change on the exposed indicator/VSEC
	Low	Differing from the average value for the existing environment to a small degree, but within the range of natural variation and well below a guideline or threshold value
	Moderate	Differing from the average value for the existing environment and approaching the limits of natural variation, but below or equal to a guideline or threshold value
	High	Differing from the existing environment and exceeding guideline or threshold values so that there will be a detectable change beyond the range of natural variation (i.e., change of state from the existing conditions)
Equity	Equitable	Even distribution of potential residual effects across different social groups or segments of society
	Neutral	Potential residual effects are unevenly distributed but do not pertain to any particular social group or segment of society
	Inequitable	Uneven distribution of potential residual effects occurring to particular social groups or segments of society, including vulnerable groups

Attribute	Characterization	Criteria
Duration	Short	Up to 2 years
	Medium	Greater than 2 years and up to 25 years (5 years Construction phase, 18 years Operation phase, 2 years Closure phase, and 4 years Post-Closure phase)
	Long	Beyond the life of the Project
Frequency	Infrequent	Occurring only occasionally
	Intermittent	Occurring during specific points or under specific conditions during the Project
	Continuous	Continuously occurring throughout the Project life
Geographic Extent	Project footprint	Confined to the Project footprint
	Local Study Area	Beyond the Project footprint and within the Local Study Area
	Regional Study Area	Beyond the Local Study Area and within the Regional Study Area
	Beyond Regional	Beyond the Regional Study Area
Reversibility	Reversible	Effect reverses within an acceptable time frame with no intervention
	Reversible with effort	Active intervention (effort) is required to bring the effect to an acceptable level
	Irreversible	Effect will not be reversed

Probability of Occurrence or Certainty

Prior to the determination of the significance for negative residual effects, the probability of the occurrence or certainty of the effect is evaluated. For each negative residual effect, the probability of occurrence is categorized as unlikely, moderate or likely. Table 4.5-6 presents the definitions applied to these categories.

Table 4.5-6. Definition of Probability of Occurrence and Confidence for Assessment of Residual Effects

Attribute	Characterization	Criteria
Probability of occurrence or certainty	Unlikely	Some potential exists for the effect to occur; however, current conditions and knowledge of environmental trends indicate the effect is unlikely to occur.
	Moderate	Current conditions and environmental trends indicate there is a moderate probability for the effect to occur.
	Likely	Current conditions and environmental trends indicate the effect is likely to occur.
Confidence	High	Baseline data are comprehensive; predictions are based on quantitative predictive model; effect relationship is well understood.
	Medium	Baseline data are comprehensive; predictions are based on qualitative logic models; effect relationship is generally understood, however, there are assumptions based on other similar systems to fill knowledge gaps.
	Low	Baseline data are limited; predictions are based on qualitative data; effect relationship is poorly understood.

Determination of Significance

A residual effect occurs where the proposed mitigation measures are not sufficient to eliminate the potential effect. As defined in the EIS Guidelines (NIRB), effect significance *"is based on comparing the predicted state of the environment with and without the Project and expressing a judgment as to the importance of the changes identified."*

The overall significance of an effect is derived from the experience and professional judgment of the environmental practitioners who prepare the assessment, considering the rankings of the contributing attributes of significance. While substantially based on professional judgment, the following are general rules applied in determining significance:

- If the magnitude of the negative effect is low or negligible, then the predicted effect is 'not significant'. If the magnitude of the negative effect is moderate or high, then the predicted effect is likely 'significant', particularly if the effect is also rated inequitable, long-term or irreversible.
- If the geographic extent of the effect is confined to the PDA or LSA, then the predicted effect is likely to be 'not significant', unless the magnitude for this effect is rated as moderate or high (as it pertains to detectible change from baseline conditions for land users within a concentrated area) or the equity is rated inequitable (as it pertains to uneven distribution of potential residual effects receptors within a concentrated area).
- If the duration of the effect is short to medium term (e.g., Construction to Reclamation and Closure; approximately 22 years) then the effect prediction is likely to be 'not significant,' as the effect is approximately one generation and knowledge transfer can occur. If the effect is rated to be long-term, beyond the life of the Project and more than one generation, the effect is likely to be 'significant'.
- If the effect has a moderate to high reversibility, the predicted effect is likely to be 'not significant.' An effect that is irreversible, particularly as it related to loss of knowledge of preferred or frequented land use areas resulting in diminished transfer of traditional knowledge, is likely to be 'significant'.

Overall, the finding of a **Not Significant** effect is applicable where the residual effect is not anticipated to result in a discernable change in an overall land use practice with adverse consequences for the lifestyle or well-being of land users. A **Significant** effect finding pertains to any residual effects that results in a consequential changes to the overall land use practice to the detriment of land users' lifestyle or well-being.

Confidence

The knowledge or analysis that supports the prediction of a potential residual effect—in particular with respect to limitations in overall understanding of the environment and/or the ability to foresee future events or conditions—determines the confidence in the determination of significance. In general, the lower the confidence, the more conservative the approach to prediction of significance must be. The level of confidence in the prediction of a significant or non-significant potential residual effect qualifies the determination, based on the quality of the data and analysis and their extrapolation to the predicted residual effects. "Low" is assigned where there is a low degree of confidence in the inputs, "medium" when there is moderate confidence and "high" when there is a high degree of confidence in the inputs. Where rigorous baseline data were collected and scientific analysis performed, the degree of confidence will generally be high. Table 4.5-6 provides descriptions of the confidence criteria.

Residual effects identified in the Project-related effects assessment are carried forward to assess the potential for cumulative interactions with the residual effects of other projects or human activities and to assess the potential for transboundary impacts should the effects linked directly to the activities of the Project inside the Nunavut Settlement Area (NSA), which occurs across provincial, territorial, international boundaries or may occur outside of the NSA.

4.5.5.3 Characterization of Residual Effect for Land Use VSECs

A residual effect occurs where the proposed mitigation measures are not sufficient to eliminate the potential effect. After the application of mitigation measures, one residual effect was identified for Traditional Activities and Knowledge, related to change in fishing success/fishing practices. No residual effects were identified for the Commercial Land and Resource Use VSEC.

The following section characterizes the residual effect to fishing success/fishing practice for local land users.

Fishing – Change in Harvesting Success/Harvesting Practice

Characterization of Madrid-Boston Project Potential Residual Effect

With the implementation of mitigation measures including TMAC's Conceptual Marine Fisheries Offsetting Approach for Phase 2 (Appendix V5-10F), the Project is not anticipated to result in significant residual effects to fish habitat or fish. However, land users may reduce opportunistic fishing activities at Aimaokatalok due to its proximity with Madrid-Boston Project components and activities, and because this lake is within the receiving environment of the Project. While no residual effects are anticipated to environmental components, land users may perceive effects. Land users have indicated that generally, subsistence fishing occurs at waterbodies close to camps or communities; therefore, avoidance of fishing within the Land Use RSA is not anticipated to result in a detectible change to overall fish harvest levels (i.e., no residual effect to fishing success). However, harvest practices may at one frequented harvesting location (Aimaokatalok) may be **negatively** affected due to possible avoidance of the area. The magnitude of the effect is considered to be **low**, as it pertains to a change at one fishing area within close proximity of other frequented harvesting areas, which is used opportunistically, and there is no change to the diversity of fish species available with the land use RSA for harvesters. The effect to fishing sites is limited to one area within the **LSA,** namely Aimaokatalok**.** Avoidance of fishing at Aimaokatalok is likely to be **continuous,** and the duration of the effect is considered to be **medium**, until Reclamation and Closure of the Project, although perceptions may remain following closure of the Project. The causal nature of the effect, namely perceived environmental effects of the Project, is considered to be **reversible with effort**. The effect does not pertain to any particular social group, and is **neutral.**

Probability is rated as **moderate to unlikely** that the Madrid-Boston Project will affect fishing practice, and there is evidence that fishing at Roberts Lake, near the existing Doris Site, has experienced reduced use. However, no concerns or discussion during consultation regarding changes to fishing practices.

In consideration of the low magnitude rating and limited geographic extent (LSA), within range of other frequented fishing areas, the residual effect to fishing practice is determined to be **Not Significant.**

The confidence rating is **low,** as there is no data regarding perceptions about fishing in areas adjacent to the Madrid-Boston Project and no information about current harvest levels in this area.

Characterization of Hope Bay Project Potential Residual Effect

The Hope Bay Project is anticipated to result in a change to fishing practice. Baseline information indicates that use of the seasonal camp at Roberts Lake for fishing has reduced, in part due to its proximity to the Doris Site. The characterization of the effect on fishing success is **negative**, **low** in magnitude, **continuous,** extended across the **LSA, medium** in duration (throughout the life of the Project), **neutral** in equity and **reversible (with effort).**

A change in harvesting success due to avoidance of the area is **moderate** due to the Hope Bay Project.

In consideration of the low magnitude of effects at the frequented harvesting area, the residual effect is considered **Not Significant**.

There is a **low** confidence rating, as there is limited baseline data for harvesting levels in this area and no known thresholds of peoples' tolerance thresholds and risk perception. The assessment is largely based on anticipated predictions of avoidance.

4.5.6 Summary of Residual Effects on Land Use VSECs

Tables 4.5-7 and 4.5-8 provide a summary of the characterization of the residual effects on the Land Use VSECs for the Madrid-Boston Project and Hope Bay Project.

4.6 CUMULATIVE EFFECTS ASSESSMENT

The potential for cumulative effects arises when potential residual effects of the Madrid-Boston Project add to or otherwise interact with the same VECs or VSECs that are affected by the residual effects of other past, existing or reasonably foreseeable projects or activities.

4.6.1 Methodology Overview

4.6.1.1 Approach to Cumulative Effects Assessment

Similar to the project-related effects assessment methodology described previously in this section, the CEA is comprised of the following activities and generally follows the methodology as described in the Cumulative Effects Assessment Practitioners' Guide (Hegmann et al. 1999):

1. Identify the potential for Madrid-Boston Project -related residual effects to interact with residual effects from the Existing and Approved Projects within the Hope Bay Greenstone Belt (i.e., the Doris Project, the Hope Bay Regional Exploration Project, the Madrid Advanced Exploration Program, and the Boston Advanced Exploration Project) and other human activities and projects within specified assessment boundaries. Key potential residual effects associated with past, existing, and reasonably foreseeable future projects were identified using publicly available information or, where data was unavailable, professional judgment was used (based on previous experience in similar geographical locations) to approximate expected environmental conditions.
2. Identify and predict potential cumulative effects that may occur and implement additional mitigation measures to minimize the potential for cumulative effects.
3. Identify cumulative residual effects after the implementation of mitigation measures.
4. Determine the significance of any cumulative residual effects. A key task in the CEA is to understand the contribution of the Madrid-Boston Project to the overall cumulative effect on VEC/VSEC – specifically, the amount of the cumulative residual effect can be apportioned to the Madrid-Boston Project as compared to the Doris Project, the Existing and Approved Exploration Projects within the Hope Bay Greenstone Belt, and other projects and activities.

Volume 2, Chapter 4, provides a full description of the CEA methodology, and a graphic overview of the process is presented in Figure 4.4-1 of Volume 2, Chapter 4.

Table 4.5-7. Summary of Residual Effects and Overall Significance Rating for Land Use VSECs - Madrid-Boston Project

Residual Effect	Attribute Characteristic							Overall Significance Rating		
	Direction (*positive, variable, negative*)	**Magnitude** (*negligible, low, moderate, high*)	**Duration** (*short, medium, long*)	**Equity** *(equitable, neutral, inequitable)*	**Frequency** (*infrequent, intermittent, continuous*)	**Geographic Extent** (PDA, *LSA, RSA, beyond regional*)	**Reversibility** (*reversible, reversible with effort, irreversible*)	**Probability** (*unlikely, moderate, likely*)	**Significance** *(not significant, significant)*	**Confidence** (*low, medium, high*)
Traditional Activities and Knowledge - Fishing										
Change in Harvesting Success/ Harvesting Practice	Negative	Low	Medium	Neutral	Continuous	LSA	Reversible with effort	Unlikely to Moderate	Not Significant	Low

Table 4.5-8. Summary of Residual Effects and Overall Significance Rating for Land Use VSECs - Hope Bay Project

Residual Effect	Attribute Characteristic							Overall Significance Rating		
	Direction (*positive, variable, negative*)	**Magnitude** (negligible, *low, moderate, high*)	**Duration** (*short, medium, long*)	**Equity** *(equitable, neutral, inequitable)*	**Frequency** (*infrequent, intermittent, continuous*)	**Geographic Extent** (PDA, *LSA, RSA, beyond regional*)	**Reversibility** (*reversible, reversible with effort, irreversible*)	**Probability** (*unlikely, moderate, likely*)	**Significance** *(not significant, significant)*	**Confidence** (*low, medium, high*)
Traditional Activities and Knowledge - Fishing										
Change in Harvesting Success/ Harvesting Practice	Negative	Low	Medium	Neutral	Continuous	LSA	Reversible with effort	Moderate	Not Significant	Low

For each valued component, the analysis narrowed the scope of the CEA to focus only on those projects and activities where there is an anticipated cumulative interaction with the residual effects from Madrid-Boston Project and the Existing and Approved Projects within the Hope Bay Greenstone Belt. A description of each cumulative residual effect is provided, parcelling out the contributions of the Madrid-Boston Project, the Doris Project, the Existing and Approved Exploration Projects at Hope Bay, and other projects and activities to the total cumulative effect (see Table 4.6-1).

4.6.1.2 Types of Cumulative Effects

For the assessment of potential cumulative effects to land use, the primary cause-effect pathway is:

- **Nibbling loss**: the gradual disturbance and loss of land and habitat (e.g., loss or alteration of waterbodies for a new mine development). In this case, it refers to possible alienation of land users from using frequented harvesting areas due to perceived environmental effects.

Interacting projects and activities may combine to create additive or synergistic effects. An additive effect increases the effect in a linear way. A synergistic effect may result in an effect greater than the sum of the two actions.

4.6.1.3 Assessment Boundaries

The CEA considers the spatial and temporal extent of Project-related residual effects on the land use VSECs combined with the anticipated residual effects from other projects and activities to assist with analyzing the potential for a cumulative effect to occur. The spatial and temporal boundaries for the CEA may be larger/longer to account for the full extent of cumulative influences.

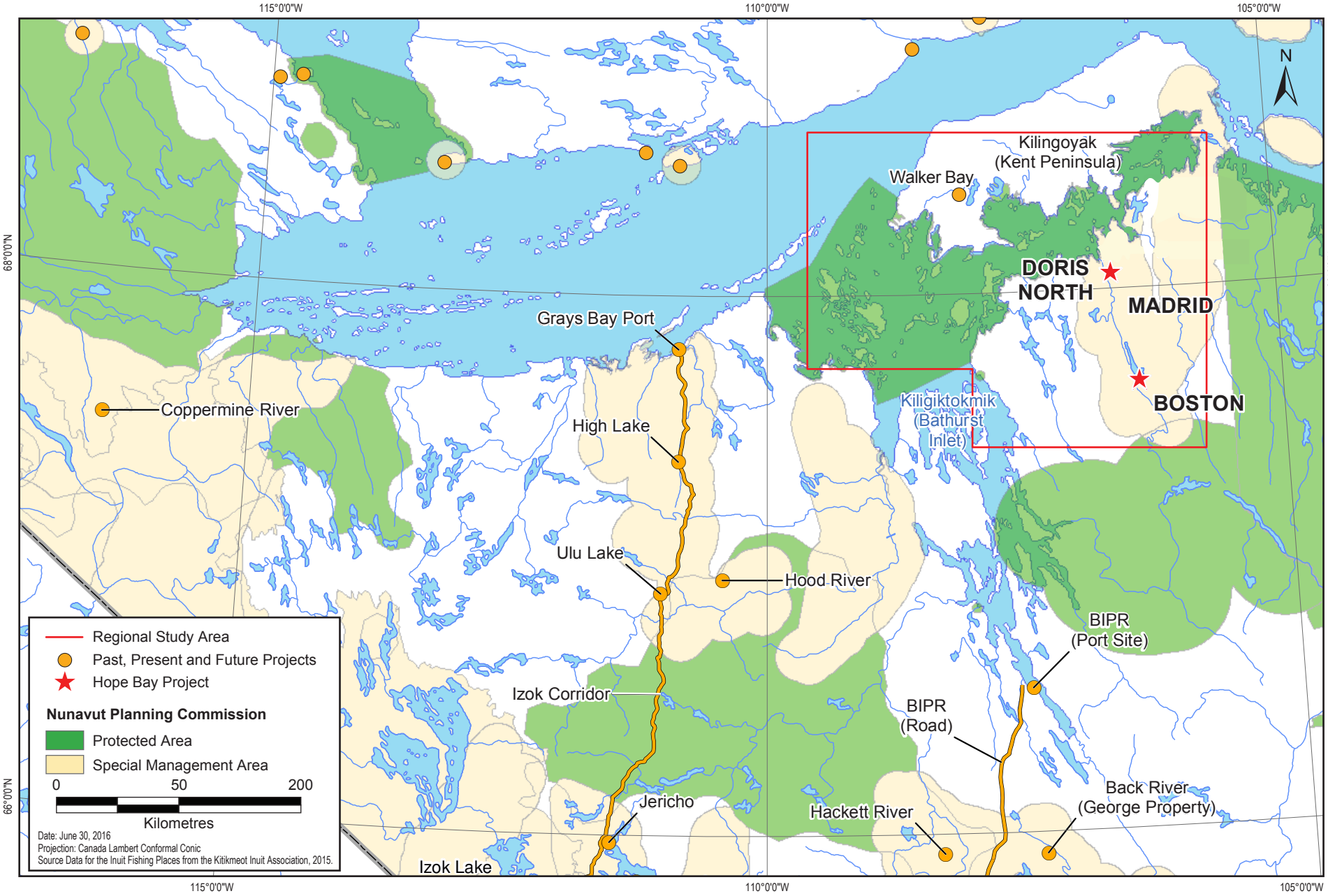
Spatial Boundaries

The spatial boundaries for the CEA comprises the regional study area described in Figure 1 of the NTKP report (Banci and Spicker 2016, page 10) which accounts for a range of land and water-use areas and activities undertaken by local land users. This area was defined by KIA consultants during the development of the NTKP report and encompasses broad scale TK information including animal migration patterns, regional land use activities and travel routes (historic and current). This study area broadly captures local land use (and commercial land use) areas, particularly related to hunting activities, including sport hunting and hunts led by the Burnside and Omingmaktok HTO, and recreational activities based in Kingaok.

Baseline information indicates that the majority of land users have moved from smaller communities of Kingaok and Omingmaktok and are residents of Cambridge Bay. The CEA study area considers harvesting activities that are within travelled distance of one or two days from Cambridge Bay, as well as areas surrounding harvesting areas in the vicinity of Kingaok and Omingmaktok.

The CEA spatial boundary is larger than the land use RSA defined in Section 4.4.2, and covers 18,751 km^2 (Figure 4.6-1). The area incorporates land use areas that may overlap with past, existing and foreseeable future projects (listed in Volume 2, Section 4.4.4.), and as such, it is an appropriate spatial boundary for the CEA.

Figure 4.6-1
Cumulative Effects Assessment Study Area



Temporal Boundaries

The temporal boundary for the CEA includes past, present and reasonably foreseeable projects, defined as follows:

- **Past**: no longer operational projects and activities. The year 2001 was selected as the past temporal boundary for data analysis, representing a time when rigorous environmental baseline studies and activities first occurred in the CEA study areas.
- **Present**: active and inactive projects and activities.
- **Future**: projects and activities that will proceed, and reasonably foreseeable projects and activities that are likely to occur. These projects are restricted to those that have been publicly announced with a defined project execution period and with sufficient project details for assessment; and/or those that are currently undergoing an environmental assessment, and/or those that are in a permitting process.

Past, existing and reasonably foreseeable future projects are described in the CEA methodology (Volume 2, Section 4.4.4), and the temporal overlap of these projects in relation to the Madrid-Boston Project is presented in Figure 4.4-3 of Volume 2, Chapter 4.

As described in Section 4.5.2.1, there were no residual effects to the Commercial Land and Resource Use VSEC. Therefore, in accordance with the CEA methodology, there is no potential for cumulative interactions between the Commercial Land and Resource Use and any past, present or reasonably foreseeable future projects and, therefore, no cumulative effects assessment was undertaken for this VSEC.

The Traditional Activities and Knowledge VSEC is considered in the CEA, specifically relating to the one negative residual effect of the Madrid-Boston Project and the complete Hope Bay Project (i.e., change in harvesting success/harvesting practice for fishing), which has potential to interact cumulatively with other projects and developments. No other residual effect to the Traditional Activities and Knowledge VSEC was identified for the Madrid-Boston Project or Hope Bay Project that could interact cumulatively with residual effects of other past, existing or reasonably foreseeable future projects or activities. As such, no cumulative effects assessment was undertaken for:

- Traditional Activities and Knowledge VSEC – Hunting and Trapping (Change in Access, Change in Harvesting Success/Harvesting Practice or Change in Experience in Nature)
- Traditional Activities and Knowledge VSEC – Cultural Land Use and Sites (Change in Access or Change in Experience in Nature)
- Traditional Activities and Knowledge VSEC – Fishing (Change in Access or Change in Experience in Nature)

Based on available information regarding fishing locations, the assessment did not identify residual effects of the Madrid-Boston Project to change fishing success within the marine environment. This is because potential Project-related residual effects on fishing success are anticipated for land users fishing only at inland lakes and, to a lesser extent, inland rivers. Additionally, fishing activities have been identified as land use activities undertaken in the spring and fall, while shipping will occur during summer months. Consequently, no residual effects for fishing success within the marine environment could interact cumulatively with shipping activities in the marine environment.

4.6.2 Potential Interactions of Madrid-Boston Residual Effects with Other Projects

The mining industry is the main source of industrial activity in Nunavut, which is being explored for uranium, diamonds, gold and precious metals, base metals, iron, coal, and gemstones. In addition to major mining development projects, other land use activities are also present in the territory and, as required under Section 7.11 of the EIS guidelines (NIRB), were considered for potential interactions with the Madrid-Boston (see Volume 2, Section 4.4.4 for more detail). The identified mining, exploration and land used activities that may potentially interact with selected VECs or VSECs are summarized in the CEA methodology (Volume 2, Section 4.4.4).

There is potential for a cumulative interaction between the residual effect of the Madrid-Boston Project to change in harvesting success/harvesting practice for fishing, with other projects and developments.

Baseline information indicated that local land users fish within the land use RSA and LSA; fishing is generally undertaken opportunistically while involved in other land use activities. Fishing occurs at inland lakes and rivers within the land use RSA and LSA, specifically at:

- a small lake at the edge of Melville Sound (known as Naoyak or Tahikyoaknahik; Banci and Spicker 2016) used for ice fishing in the fall and spring (within the RSA);
- Roberts Lake (within the land use LSA);
- grayling fishing on the western shoreline of Aimaokatalok (within the land use LSA); and
- larger lakes and rivers (not spatially identified).

Figure 4.6-2 identifies the location of frequented fishing (Figure 21 of the NTKP report; Banci and Spicker 2016) within the CEA study area, in relation to past, current and reasonably foreseeable future projects, which may interact cumulatively with the Project's residual effect on fishing. Projects and activities included in the CEA include TMAC's Existing and Approved Project's within the Hope Bay Greenbelt:

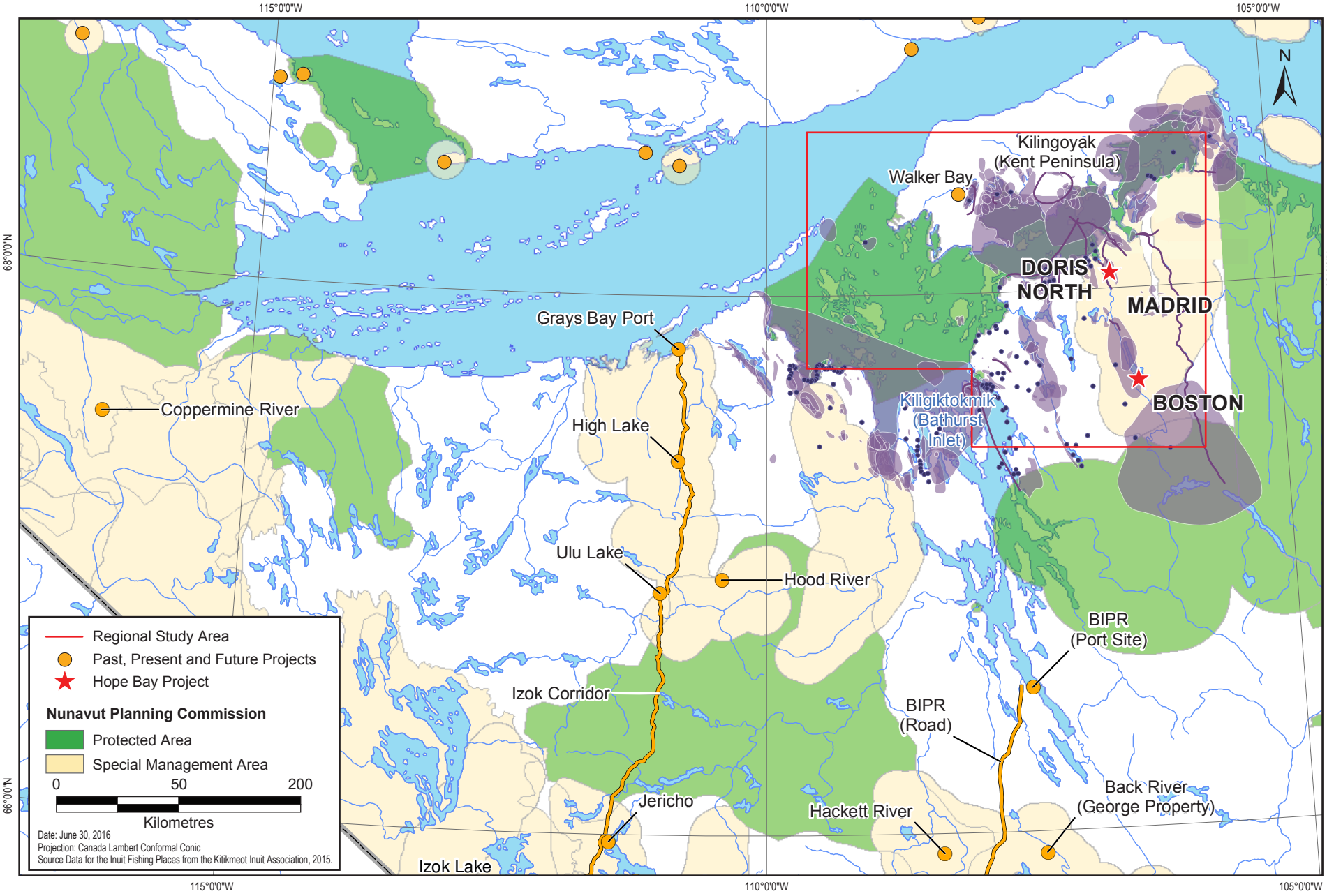
- the proposed Madrid-Boston Project (described in Section 4.4.1.1);
- the Doris Project operations (described in Section 4.4.1.1); and
- Existing and Approved Exploration Projects within the Hope Bay Greenstone Belt (described in Section 4.4.1.1).

The Walker Bay Research Station, established in 1989 and located on the west end of the Kent Peninsula, overlaps spatially and temporally with the Boston-Madrid Project. The Walker Bay Research Station is comprised of five prospector tents, and is heated by propane and powered by sun and wind. No other past, present or reasonably foreseeable future project overlap spatially or temporally with the Madrid-Boston potential residual effect to harvesting success/harvesting practice (fishing).

Based on available information, there is no potential for residual effects of the Project on fishing success to interact cumulatively with projects in NWT (e.g., Gahcho Kué). This is because there is no pathway for loss or disturbance to waterbodies, fish and fish habitat in NWT to interact cumulatively with the Project, within the region fished by land users.

Figure 4.6-2

Cumulative Effects Assessment
Study Area and Fishing Locations



Potential Cumulative Effects

The following considers interactions of other past, present and reasonably foreseeable future project components and activities that have potential to result in a cumulative residual effect to the Traditional Activities and Knowledge VSEC (harvesting success/harvesting practice -fishing) There is potential for Madrid-Boston Project-related residual effects to interact with residual effects from the Existing and Approved Projects within the Hope Bay Greenstone Belt (i.e., the Doris Project, the Hope Bay Regional Exploration Project, the Madrid Advanced Exploration Program, and the Boston Advanced Exploration Project). No other past, present or reasonably foreseeable future project overlap spatially or temporally with the Madrid-Boston potential residual effect to harvesting success/harvesting practice (fishing).

Table 4.6-1 describes the contributions of the Madrid-Boston Project, the Doris Project, the Existing and Approved Exploration Projects at Hope Bay, and other projects and activities to the total cumulative effect to Traditional Activities and Knowledge – harvesting success/harvesting practice (fishing).

Table 4.6-1. Contributions of Projects and Activities to Cumulative Residual Effects to Traditional Activities and Knowledge –Fishing

Cumulative Residual Effect: Reduced fishing practice due to avoidance of frequented fishing areas by local land users	
Project or Activity	**Description of Contribution to Cumulative Residual Effect**
Madrid-Boston Project	As described in Section 4.5.5, there is potential for local land users to avoid fishing at Aimaokatalok as a result of perceived effects associated with the Madrid-Boston Project (e.g., avoidance due to perceived effects associated with water discharge into Aimaokatalok). Fishing is undertaken opportunistically in this area, and changes to fishing at Aimaokatalok are not anticipated to result in overall change to harvest levels, and as such, are not expected to reduce overall harvesting success. During consultation and community-based research, no concerns were raised regarding potential or perceived effects of the Madrid Boston Project on fishing in the area. Notwithstanding, a conservative approach is applied to consider potential avoidance of the area for fishing.
Doris Project	Baseline information indicates that use of the seasonal camp at Roberts Lake for fishing has reduced, in part due to its proximity to the Doris Site; this may be attributed to sensory disturbance (e.g., aircraft noise) as no concerns have been raised regarding effects or perceived effects to fish at Roberts Lake. There are data gaps regarding fishing success rates at specific fishing sites which prevent quantification of potential cumulative effects of the Doris Project on fishing. A conservative approach has been applied to consider potential perceived effects or potential sensory disturbance while fishing at Roberts Lake due to the Doris Project, which may act cumulatively with the subsequent development of the Madrid-Boston Project and the continued use of the Doris site.
Existing and Approved Exploration Projects within the Hope Bay Greenstone Belt	Existing and Approved Exploration Projects within the Hope Bay Greenstone Belt include the Boston Advanced Exploration project, near Aimaokatalok (described in Section 4.4.1). This exploration camp includes a 120-person camp, surface infrastructure, and mine works for exploration; potable water and industrial water are sourced from Aimaokatalok and treated sewage and greywater is discharged to the tundra. No concerns have been raised to date regarding effects to grayling fishing at Aimaokatalok due to the Boston Advanced Exploration components or activities. Notwithstanding, exploration activities and project components have potential to add to residual effects of the Madrid-Boston Project components at the Boston site. This is because land users are unlikely to discern between the Madrid-Boston Project and the Boston Advanced Exploration components and activities; however, they will identify change because of the increase in built infrastructure and activity associated with the Madrid-Boston Project. As an example there will be an increase in workforce numbers, and as such, additional water intake from Aimaokatalok and increased treated water discharge into the lake. This could result contribute towards perceived effects to fish and fish habitat, and result in avoidance of fishing in this area.

Cumulative Residual Effect: Reduced fishing practice due to avoidance of frequented fishing areas by local land users	
Project or Activity	**Description of Contribution to Cumulative Residual Effect**
Existing and Approved Exploration Projects within the Hope Bay Greenstone Belt *(cont'd)*	There is potential for sensory disturbance to local land users fishing in the vicinity of exploration activities associated with the Boston Advanced Exploration. For example, occasional helicopter noise may change the experience of nature while fishing. Based on available information, fishing at Aimaokatalok occurs opportunistically while undertaking other land use activities (i.e., hunting in winter months). As such, is not likely that helicopter noise during summer months due to exploration activities will result in a change in the experience of nature while fishing for users of Aimaokatalok – rather, any such effect will be largely attributable to the Boston-Madrid Project (e.g., aircraft use of the airstrip and vehicle traffic). Notwithstanding, applying a conservative approach, it is expected that land users may avoid fishing opportunistically at Aimaokatalok due to the Boston Advanced Exploration (in addition to the Madrid-Boston Project).
Past Projects or Activities	None
Other Existing Projects or Activities	The Walker Bay Research Station is a facility used for ecological studies, in support of long-term environmental baseline studies and monitoring. The study area borders the August River that flows into Walker Bay. The facility is comprised of five prospector tents; the camp can hold six persons for 2 to 3 months or up to 10 to 12 for shorter periods. Based on the NTKP (Banci and Spicker 2016; Figure 21), fishing occurs to the west and southwest of the Walker Bay Research Station, including at two named locations (i.e., Aghagak and Kikaktok). No information has been provided regarding concerns for avoidance of fishing as a result of the Walker Bay Research Station. Based on limited human presence at the station, the nature of the activities undertaken at this location (i.e., research), and the distance between the research station and opportunistic fishing activities near the Madrid-Boston Project, it is not expected that the Walker Bay Research Station will result in increased avoidance of fishing at Aimaokatalok (i.e., the Walker Bay Research Station is not expected to interact cumulatively with the Madrid-Boston Project's residual effect to fishing at Aimaokatalok).
Reasonably Foreseeable Future Projects or Activities	None
Description of Total Cumulative Residual Effect	There is potential for a negative effect to local land users' fishing practices at Roberts Lake and Aimaokatalok as a result of the Madrid-Boston and other Existing and Approved Projects on the Hope Bay Greenstone Belt. There is potential for perceived effects to fish and fish habitat as a result of treated water discharge to Aimaokatalok due to activities and components at the Boston site; potential sensory disturbance may result in continued or additional avoidance of fishing at Roberts Lake, caused by components and activities occurring at the Doris site.

Measures to mitigate effects to land use are as described previously in Section 4.5.3, and include ongoing environmental management and monitoring programs of potential residual cumulative effects to environmental components that may, in turn, affect land users. As it specifically applies to land use, monitoring and mitigation measures focus largely on regular and ongoing consultation, and include:

- the ongoing Inuit Environmental Advisory Committee, established under the IIBA; and
- Implementation of a Community Involvement Plan (Annex V8-5).

4.6.3 Characterization of Potential Cumulative Residual Effect

The characterizations and criteria for the characterizations are provided in Table 4.5-5. Each of the criteria contributes to the determination of significance.

As summarized in Table 4.6-2, there is potential a cumulative residual effect to Traditional Activities and Knowledge VSEC for fishing practices. Following the implementation of monitoring and mitigation measures, avoidance of fishing at Aimaokatalok and Roberts Lake is determined to be a **negative** residual cumulative effect. The magnitude of the cumulative effect is considered to be **low**, as it pertains to a change at two fishing areas used opportunistically, and within close proximity of other frequented harvesting areas, and there is no change to the diversity of fish species available with the land use RSA for harvesters. The effect to fishing sites is limited to two areas within the **LSA,** namely Aimaokatalok and Roberts Lake**.** Avoidance of fishing at Aimaokatalok and Roberts Lake is likely to be **continuous,** and the duration of the effect is considered to be **medium**, throughout the life of the projects. The causal nature of the effect, namely perceived environmental effects, is considered to be **reversible with effort**. The effect does not pertain to any particular social group, and is **neutral.**

Probability is rated as **moderate,** as there is evidence that fishing at Roberts Lake, near the existing Doris Site, has experienced reduced use.

In consideration of the low magnitude rating and limited geographic extent (LSA), within range of other frequented fishing areas, the cumulative residual effect is determined to be **Not Significant.**

There is a **low** confidence rating, as there is limited baseline data for harvesting levels in this area and no known thresholds of peoples' tolerance thresholds and risk perception. The assessment is largely based on anticipated predictions of avoidance.

Conclusion

One residual cumulative effect was identified for the Traditional Activity and Knowledge VSEC, relating to **change in harvesting practice for fishing** due to avoidance of Aimaokatalok near the Boston site, and avoidance of Roberts Lake near the Doris Project. This residual cumulative effect is rated as **Not Significant.**

4.7 TRANSBOUNDARY EFFECTS

The EIS Guidelines (NIRB) define transboundary effects as those effects linked directly to the activities of the Project inside the Nunavut Settlement Area (NSA), which occur across provincial, territorial, international boundaries or may occur outside of the NSA (NIRB 2012a). Transboundary effects of the Madrid-Boston Project have the potential to act cumulatively with other projects and activities outside the NSA.

4.7.1 Methodology Overview

The following systematic process was used to determine which VECs or VSECs would be included in the transboundary effects assessment:

- Identify any potential residual adverse effects of the Madrid-Boston Project and the complete Hope Bay Project on a VSEC, after mitigation measures are applied, that may result in transboundary effects.
- Determine whether the residual effects of the Project may operate cumulatively in a transboundary context with the environmental effects of projects or activities located in other jurisdictions. Assess whether the Project will interact cumulatively in a meaningful way (i.e., is "likely" to heighten effects).
- Describe mitigation measures, where feasible, that may be applied where measurable effects are described.

4.7.2 Potential Transboundary Effects

The land use VSECs and effects examined in the transboundary assessment of the Madrid-Boston and Hope Bay Projects were selected based on the potential interaction with the residual effects of the Project and informed through consultation, available TK information, review of projects in the region and professional expertise. Transboundary effects of the Project have the potential to act cumulatively with other projects and activities outside the land use RSA. Based on this information and in consideration of other potential transboundary effects in the EIS, potential transboundary effects for the land use VSEC focuses on caribou, and specifically potential change in harvesting success/ harvesting practice of caribou.

The wildlife effects assessment (Volume 4, Chapter 9) identifies potential transboundary effects to caribou due to caribou movements across jurisdictional boundaries. TMAC identified transboundary communities and groups that potentially depend on caribou for livelihood and subsistence activities and, therefore, have potential to experience effects of the Project. Given the importance of caribou for land users in the Kitikmeot region, and more broadly in the Northwest Territories, a transboundary effect of the Project on caribou has potential to affect the caribou harvesters.

The caribou CEA (Volume 4, Chapter 9) concludes that Madrid-Boston Project and TMAC's Existing and Approved Projects have potential cumulative effects due to habitat loss and disturbance for the Dolphin and Union, and Beverly/Anika, caribou herds. This determination is relevant to the assessment of transboundary effects of land users who depend on these herds.

- For habitat loss, the caribou CEA identified a not-significant residual cumulative effect as the affected area and proportion of this area within the seasonal and annual herd range is small, and extremely unlikely to result in measurable herd-level population changes. The effect is expected to be local and, therefore, not transboundary.
- Disturbance of other projects and activities (namely two proposed mines within the caribou CEA boundary: Izok Corridor Project and the Hope Bay Greenstone Belt) is anticipated to be not significant. The effect is expected to be regional, but limited to 'zones of influence' surrounding the two projects. Potential effects are regional; however, the disturbances are not anticipated to result in changes to herd ranges. Therefore, cumulative effects to disturbance of caribou are not anticipated to be transboundary.

Overall, the results of the wildlife effects assessment finds that cumulative effects to caribou are not significant and no change in the abundance and distribution of wildlife regionally is expected (Volume 4, Chapter 9). Therefore, as no transboundary effects are anticipated for caribou population or distribution, it is unlikely that harvesters outside the Kitikmeot region will experience a change in harvesting activities as a result of the Project.

Section 4.6 of this chapter indicates that no cumulative effects are identified for changes in access to land use areas or to change in experience of nature for any land use activity. Therefore, it is not anticipated that land users outside of the Kitikmeot region are likely to experience transboundary effects on land use access or changes in experience of nature while undertaking land use activities.

Overall, no transboundary effects are identified for land use VSECs.

4.8 IMPACT STATEMENT

This assessment considered potential effects to the environment from the Madrid-Boston Project that may result in effects on Commercial Land and Resource Use, and Traditional Activities and Knowledge VSECs. Commercial land uses include guided and HTO-led hunting and the tourism industry/outdoor recreation. Land uses include hunting, trapping, fishing and use of cultural sites and travel routes.

Potential effects for land and resource use include:

- change in access to land and resource use areas
- changes in harvesting success/harvesting practice; and
- change in experience of nature.

Mitigation measures were identified through a review of best management practices from similar mining projects in the Arctic, comments from community members during scoping meetings, formal review by the KIA, workshops pertaining to caribou held with knowledge holders, community-based research including interviews and focus groups with HTO representatives, scientific literature and professional experience. Mitigation measures to address potential effects on VECs and VSECs were considered with respect to avoiding or minimizing changes to the environment and resources that land users rely on. Mitigation measures described to address effects to air quality (Volume 4, Chapter 2), noise (Volume 4, Chapter 3), soil and landforms (Volume 3, Chapter 7), terrestrial wildlife and wildlife habitat (Volume 4, Chapter 9), aquatic environment (Volume 5, Chapter 6, 10 and 11), and heritage resource (Volume 6, Chapter 2) are all relevant to reducing potential effects to Commercial Land and Resource Use and Traditional Activities and Knowledge VSECs.

Additionally, there are specific measures to mitigate effects to land and resource use. These include:

- minimizing the PDA to reduce habitat loss for wildlife;
- facilitating access to facilities and roads, as described in the IIBA;
- establishing an Inuit Environmental Advisory Committee; and
- implementing a Community Involvement Plan.

After the application of mitigation measures, the assessment identified one residual effect for the Traditional Activities and Knowledge VSECs; no residual effects were identified for the Commercial Land and Resource use VSEC.

For the Traditional Activities and Knowledge VSEC, one residual effect was identified relating to **change in harvesting success/harvesting practice for fishing.** There is potential for a residual effect to fishing practices due to avoidance of Aimaokatalok, a frequented harvesting area, associated with perceived environmental effects. This residual effect is determined to be **Not Significant**.

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