CUMBERLAND
RESOURCES LTD.

MEADOWBANK GOLD PROJECT

BASELINE TRADITIONAL KNOWLEDGE REPORT

JANUARY 2005

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DESCRIPTION OF SUPPORTING DOCUMENTATION

Cumberland Resources Ltd. (Cumberland) is proposing to develop a mine on the Meadowbank property. The property is located in the Kivalliq region approximately 70 km north of the Hamlet of Baker Lake on Inuit-owned surface lands. Cumberland has been actively exploring the Meadowbank area since 1995. Engineering, environmental baseline studies, and community consultations have paralleled these exploration programs and have been integrated to form the basis of current project design.

The Meadowbank project is subject to the environmental review and related licensing and permitting processes established by Part 5 of the Nunavut Land Claims Agreement. To complete an environmental impact assessment (EIA) for the Meadowbank Gold project, Cumberland followed the steps listed below:

1. Determined the VECs (air quality, noise, water quality, surface water quantity and distribution, permafrost, fish populations, fish habitat, ungulates, predatory mammals, small mammals, raptors, waterbirds, and other breeding birds) and VSECs (employment, training and business opportunities; traditional ways of life; individual and community wellness; infrastructure and social services; and sites of heritage significance) based on discussions with stakeholders, public meetings, traditional knowledge, and the experience of other mines in the north.

2. Conducted baseline studies for each VEC and compared / contrasted the results with the information gained through traditional knowledge studies (see Column 1 on the following page for a list of baseline reports).

3. Used the baseline and traditional knowledge studies to determine the key potential project interactions and impacts for each VEC (see Column 2 for a list of EIA reports).

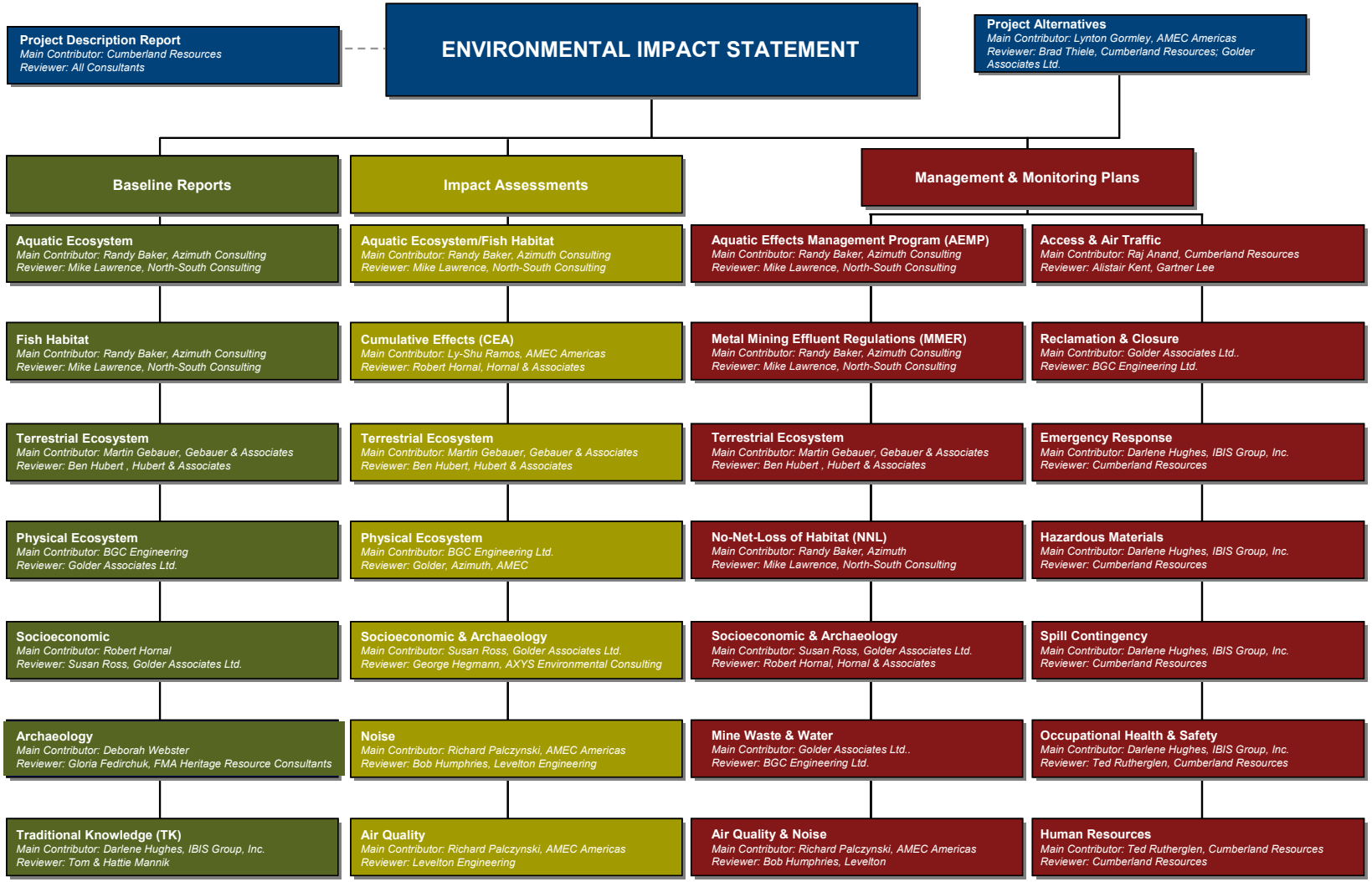
4. Developed preliminary mitigation strategies for key potential interactions and proposed contingency plans to mitigate unforeseen impacts by applying the precautionary principle (see Column 3 for a list of management plans).

5. Developed long-term monitoring programs to identify residual effects and areas in which mitigation measures are non-compliant and require further refinement. These mitigation and monitoring procedures will be integrated into all stages of project development and will assist in identifying how natural changes in the environment can be distinguished from project-related impacts (monitoring plans are also included in Column 3).

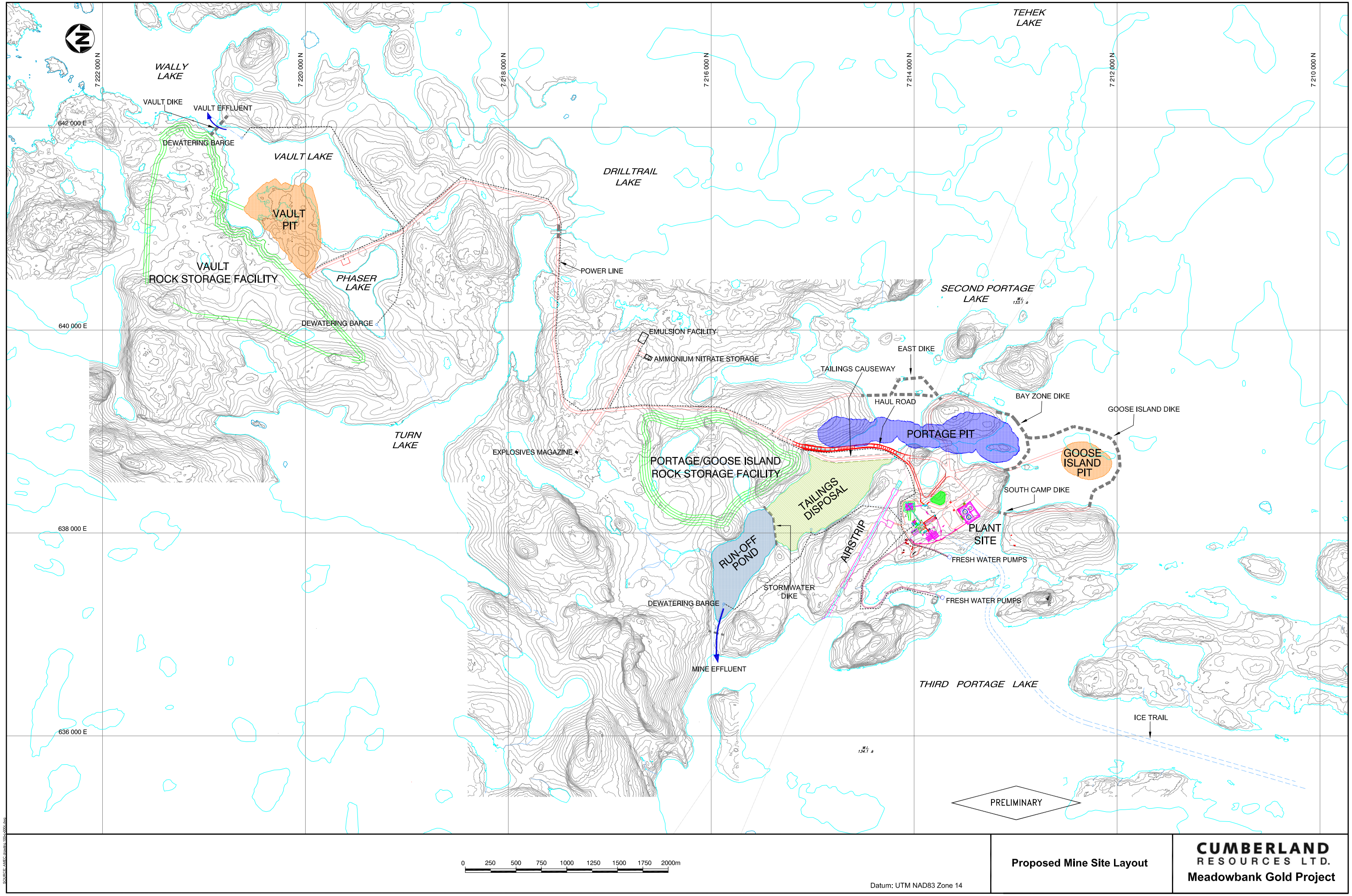
6. Produce and submit an EIS report to NIRB.

As shown on the following page, this report is part of the documentation series that has been produced during this six-stage EIA process**.**

EIA DOCUMENTATION ORGANIZATION CHART



PROJECT LOCATION MAP


7 222 000 N
7 220 000 N
7 218 000 N
7 216 000 N
7 214 000 N
7 212 000 N
7 210 000 N
642 000 E
640 000 E
638 000 E
636 000 E
WALLY LAKE
TEHEK LAKE
VAULT DIKE
VAULT EFFLUENT
DEWATERING BARGE
VAULT LAKE
DRILLTRAIL LAKE
VAULT PIT
VAULT ROCK STORAGE FACILITY
PHASER LAKE
POWER LINE
SECOND PORTAGE LAKE
DEWATERING BARGE
EMULSION FACILITY
AMMONIUM NITRATE STORAGE
EAST DIKE
TAILINGS CAUSEWAY
HAUL ROAD
BAY ZONE DIKE
GOOSE ISLAND DIKE
PORTAGE PIT
GOOSE ISLAND PIT
TURN LAKE
EXPLOSIVES MAGAZINE
PORTAGE/GOOSE ISLAND ROCK STORAGE FACILITY
TAILINGS DISPOSAL
SOUTH CAMP DIKE
PLANT SITE
AIRSTRIP
FRESH WATER PUMPS
RUN-OFF POND
STORMWATER DIKE
FRESH WATER PUMPS
DEWATERING BARGE
MINE EFFLUENT
THIRD PORTAGE LAKE
ICE TRAIL
PRELIMINARY
0 250 500 750 1000 1250 1500 1750 2000m
Datum: UTM NAD83 Zone 14
Proposed Mine Site Layout
CUMBERLAND RESOURCES LTD.
Meadowbank Gold Project

SECTION 1 • INTRODUCTION

1.1 QUJANNAMIIK

Cumberland Resources Ltd. addresses the Elders and people of Baker Lake for generously contributing their time and knowledge to this project. The knowledge you have provided has increased our understanding of the Meadowbank area, making possible a more efficient project design as well as more effective environmental protection and management efforts. We thank you for your cooperation and look forward to continuing our mutually beneficial relationship throughout all stages of project design and development.

1.2 CUMBERLAND'S COMMITMENT

The Environmental Assessment Guidelines of the Nunavut Impact Review Board (NIRB), as they relate to proposed mine developments, stipulate that traditional knowledge (TK) be documented, considered, and integrated into all aspects of the project. In accordance with these requirements, Cumberland has carried out traditional use studies and pledged that TK will not only be given due consideration but will also be incorporated throughout the planning, construction, and operational phases of the project.

From speaking with the Elders and hearing their stories, Cumberland has developed a deeper appreciation of how significant the Meadowbank area is to those who have been its guardians since time immemorial; subsistence harvesting activities are at the heart of Inuit culture and sustain Inuit society in its traditional way of life (NPC, 2002). Cumberland will do its utmost to develop the Meadowbank mine in an environmentally responsible manner that proves beneficial to all parties involved and meets the needs of the present without compromising those of future generations.

Cumberland recognizes the cultural differences between an Inuk and a Kabloona, perhaps the most significant being the close ties to the land that characterize the Inuit people. Cumberland is committed to continuing to bridge such differences between Western and Inuit culture and systems of knowledge by integrating the information provided by the Inuit Elders and local residents.

1.3 PURPOSE OF THIS DOCUMENT

Cumberland is proposing the development of the Meadowbank Gold project located approximately 70 km north of the Hamlet of Baker Lake (Qamani'tuaq) on Inuit-owned surface lands, in the southern Kivalliq region of Nunavut. The only inland Inuit community in Canada, Baker Lake has a population of approximately 1,500 people, 94% of whom are Inuit (Statistics Canada, 2002).

The proposed mine site will include, in addition to mining and processing facilities, on-site infrastructure including accommodation for 250 people, an airstrip, and permanent on-site access roads.

This Traditional Knowledge Report (TKR) is part of a documentation series being produced to allow a formal Environmental Impact Assessment (EIA) of the project by the regulatory authorities to take

place. Other documents in the series include the formal Environmental Impact Statement (EIS), as well as baseline studies, management plans, and environmental impact reports. Both out of respect for the traditional rights of the Inuit, as well as to discover the mutual benefits of blending science and technology with traditional knowledge during project development and design, Cumberland has gathered much information about TK and conducted numerous interviews over a period of several years with local Elders and other community members. The purpose of this report is to identify and document the extent and nature of traditional knowledge in order to understand the interaction between ecological systems and predict potential impacts of the proposed development. The bulk of this information is presented in this document.

SECTION 2 • DEFINITION OF TRADITIONAL KNOWLEDGE

There are many definitions of traditional knowledge, some of which address only one aspect of the larger concept. To further complicate matters, TK can also be referred to as "indigenous knowledge," "indigenous ecological knowledge," "traditional environmental knowledge" (or "TEK"), "traditional ecological knowledge" (also "TEK"), and "local knowledge." The trouble in defining TK lies in its very nature: it is more than a simple compilation of facts, and it is certainly not static. It is a complex and sophisticated system of knowledge drawing on centuries of wisdom and experience that is continually growing and evolving.

The Dene Cultural Institute defines TK as the following:

> *"Traditional environmental knowledge (TEK) is a body of knowledge and beliefs transmitted through oral tradition and first-hand observation. It includes a system of classification, a set of empirical observations about the local environment, and a system of self-management that governs resource use. Ecological aspects are closely tied to social and spiritual aspects of the knowledge system. The quantity and quality of TEK varies among community members, depending on gender, age, social status, intellectual capability, and profession (hunter, spiritual leader, healer, etc.). With its roots firmly in the past, TEK is both cumulative and dynamic, building upon the experience of earlier generations and adapting to the new technological and socio-economic changes of the present."*

On a more global scale, the Director General of UNESCO (Mayor, 1994) defines TK as:

> *"… a way of life. Traditional knowledge is a process of acquiring and passing on knowledge and understanding. It contains information collected over time. It is values, stories, language, and social relations. It is experience-based relationship with family, animals, places, spirits, and the land. It is a world view. The indigenous peoples of the world possess an immense knowledge of their environments, based on centuries of living close to nature. Living in and from the richness and variety of complex ecosystems, they have an understanding of the properties of plants and animals, the functioning of ecosystems and the techniques for using and managing them that is particular and often detailed. In rural communities in developing countries, locally occurring species are relied on for many — sometimes all — foods, medicines, fuel, building materials and other products. Equally, people's knowledge and perceptions of the environment, and their relationships with it, are often important elements of cultural identity."*

Cumberland accepts both of these definitions as accurate and has used them to provide the context in which to understand and interpret the traditional knowledge provided by the peoples of the Meadowbank area.

SECTION 3 • SCIENTIFIC STUDY VS. TRADITIONAL KNOWLEDGE

> *"I am making the assumption here that we have succeeded, at least in principle, in finding acceptance that indigenous knowledge has value, and that it can be used in conjunction with information derived from Western science to provide a basis for improved problem-solving and decision-making. Simply, I think that we would be taking a step backwards if we fell into the debate again of what indigenous knowledge is and does it or does it not have value."* – Mary Simon, Canada's ambassador for Circumpolar Affairs and ambassador to the Kingdom of Denmark

It might first appear that traditional knowledge and Western science are polarized perspectives—indigenous knowledge is intensely local and timeless, holistic and integrative, while scientific baseline studies rely on research and provide data that are short term and gathered by those who live elsewhere—but traditional knowledge and scientific study are actually complementary pursuits. As the aggregate experience of many generations, traditional knowledge is a powerful tool, especially used in its original context to support and fill in the gaps left open by scientific study.

> *"Inuit qaujimajatuqangit is an important source of information and understanding that can enhance and bolster scientific knowledge. The perspective of Inuit Qaujimajatuqangit is often very different from that of the scientific community, but both have a great deal to offer."*
> – Nunavut Planning Commission 2002:25

Inuit themselves keenly perceive the dichotomy between traditional and scientific knowledge and express the need to draw information from both sources. For instance, in the course of the Dogrib study on traditional knowledge concerning the relationship between caribou migration patterns and the state of caribou habitat, the Elders indicated that they felt that scientific studies alone do not provide enough information to properly manage wildlife, and that traditional knowledge is an important part of such management.

The requirement that holders of scientific and traditional knowledge cooperate and compare information provided a deeper and more holistic understanding of certain research questions such as the one underlying the Tuktu and Nogak project. One study comprising the project was based on information from Inuit Elders to examine Bathurst caribou and their calving. In parallel, the Bathurst Caribou Calving Grounds study used scientific methods to research factors affecting where caribou calve, and the Bathurst Caribou Seasonal Movement study provided information on the core calving area from year to year. These three studies produced complementary information on shifts in the core calving area over time: scientists and Elders agreed that climate change is becoming a factor in these shifts.

Similarly, in addressing concerns over climate change, the International Institute for Sustainable Development recognized in its 2001 report that "knowledge of active harvesters clearly contributes to current science-based knowledge of wildlife and climate change; it is spatially and temporally extensive and can help "piece together" the number and condition of animals over time." (Ashford, 2001).

In the process of gathering both scientific and traditional knowledge, Cumberland found that this complimentary relationship indeed exists. For example, when the effort to understand caribou migration patterns through the collection of baseline wildlife information was initially returning confusing results, Cumberland was able to consult with the Hunters and Trappers Organization (HTO) in Baker Lake, whose vast and generational knowledge provided answers to some of the scientists' questions. In effect, exploration research and the traditional knowledge gathered to date have not conflicted in any way. Some aspects of project design have been altered as a result of meetings with the Elders; for instance, Cumberland intended to build fences around certain mine components to help protect the local fauna, but since the Elders opposed this idea and expressed the opinion that the caribou should not be inhibited in any way, no fences will be built. This process is reflective of how decisions about project design were made together, to the benefit of all concerned.

For more examples of how traditional knowledge helped shape project design, see Section 6, or consult the "Project Alternatives Report," which is included in this documentation series under separate cover.

SECTION 4 • SOURCES OF TRADITIONAL KNOWLEDGE

Cumberland consulted a variety of sources to learn about traditional knowledge, the land, and the peoples of the Meadowbank and Baker Lake areas. These sources are listed below and discussed in more detail in the following sections.

- interviews
- public consultation
- arctic studies
- mining projects
- published material
- government regulations
- relevant websites.

4.1 INTERVIEWS

Cumberland actively began pursuing an understanding of traditional use and traditional ecological areas within and around the Meadowbank project area in 1998. This information was gathered by way of interviews soliciting oral history data with eight local Inuit Elders from the Meadowbank area in association with the staff at the Inuit Heritage Centre in Baker Lake. An archaeologist (Deborah Webster) and heritage consultant (Hattie Mannik) provided information on the local artifacts and traditional uses, both past and present, in the Meadowbank area.

A list of archaeological sites is provided in Section 5.3.1. For a more complete discussion, see Cumberland's "Baseline Archaeological Report" (2005), which is included in this documentation series under separate cover.

A discussion of the information gathered by Hattie Mannik during her interviews with the local Elders, as well as her selected methodology, is provided below.

4.1.1 Interview Process — Phase 1

Phase 1 of the interview process began in 1998. Deciding who should be interviewed was an important task, especially when keeping in mind that all demographic and gender groups should be adequately represented. Men and women reach equivalent levels of wisdom and understanding in traditional ways, but often there are important gender differences in the knowledge content and in the assumptions for its use. For example, the traditional knowledge held by men is critically important, because they spend more time on the land, hunting and interacting intimately with animals in their native habitat; however, women, who are often the primary harvesters of medicinal plants, seed stocks, and small game—and thus keepers of the knowledge about certain areas of biodiversity—may be best able to identify environmental indicators of ecological health.

Cumberland therefore based its interview phase of TK study on the following set of assumptions:

- Holders of traditional knowledge range from highly skilled and experienced Elders to hunters and trappers, gatherers of herbs, and practitioners of many kinds, all of whom are accurate interpreters of nature.
- All local Inuit people hold at least some traditional knowledge.
- Typically the most accomplished disseminators of traditional knowledge are the older people in the community; and those Elders who are most helpful in imparting traditional knowledge are those who still practice traditional skills on a daily basis.
- Some Elders are wiser than others; and some are more able than others to recollect events, places, and people from decades ago.

Based on these assumptions, it was decided to interview only Elders during Phase 1 and to allow Hattie Mannik, a respected member of the community who had recently conducted a series of interviews with Elders for her book, to select the appropriate interview candidates, as she was in a position to know which Elders were still practicing traditional skills; which Elders were from the Meadowbank area; and which individuals would be more able to recall the events of his or her youth. Hattie made the final selection (shown in Table 4.1) and determined an appropriate interview protocol that would be conducive to gathering information at the convenience and ease of the selected candidates, allowing them to speak in their own homes and in their own language.

Interview tools

Hattie brought to each interview a tape recorder, extra tapes and batteries, a map and markers (for drawing on a 1:50,000 map of the area), as well as the question sheet. Hattie did not take notes at the time of the interviews, but would let the Elders speak freely, pointing out locations and landmarks on the map as needed. Some Elders found the maps too small, but none had trouble understanding them.

Methodology

There are four cultural groups whose origins can be traced to the area north of Baker Lake: Illuiliqmiut, Kihlirnirmiut, Ukkuhiksalingmiut, and Hanningayuqmiut.

Table 4.1 lists the Elders who were interviewed who used to live on the land near the Meadowbank property and around the area proposed for winter road access. The initials following their names will be used to reference quotes from their interviews used in various sections of the report.

Most of candidates Hattie selected were men because, in her own words, the men “travelled more and can read maps,” whereas the women talk more about “what they do around the camp area” (H. Mannik, pers. comm., 2004). All selected candidates agreed to be interviewed; none declined.

Table 4.1: List of Elders Interviewed in 1998

Date	Time	Elder
October 23, 1998.	9:30 a.m.	Jacob Ikinilik (JI)
	1:30 p.m.	Josiah Nuilaalik (JN)
October 24, 1998.	9:30 a.m.	Norman Singaqti (NS)
	1:30 p.m.	Silas Kalluk (SK)
October 25, 1998.	9:30 a.m.	Samson Quinangnaq (SQ)
October 26, 1998.	9:30 a.m.	Salome Nanauq (SN)
October 27, 1998.	9:30 a.m.	Simon Tookoome (ST)
	1:30 p.m.	Janet Uqayuituq (JU)

The interviews were conducted according to the following protocol:

Location – The interviews were conducted, at the candidate's discretion, at either his or Hattie Mannik's house. No third parties were present during the interviews so as to minimize possible distractions. In one instance, family members of the candidate were home at the time of the interview, so Hattie requested that the interview be moved into an adjoining room where they could close the door and concentrate.

Questionnaire – A questionnaire was drawn up by Hattie Mannik and revised by Deborah Webster (see Figure 4.1). Hattie asked the questions in Inuktitut, sometimes rephrasing the questions if the Elders did not understand. The interview would last for an hour or more. A combination of open-ended questions (to provide for wide-ranging answers) and closed questions (to solicit specific information as required) was used. The specific questions are not identical for every interview; in order to allow the Elders to tell their stories in their way and to encourage the free flow of ideas, Hattie sometimes improvised questions in reaction to what she was hearing. In a general sense, however, the same themes were covered in all interviews, namely: traditional food sources; caribou migration routes; localization of camp sites, cache sites, fishing spots, and archeological sites (tent rings, graves, spiritual places), nomenclature of geographical features, and identity of other people or groups living in the area at the same time.

Questionnaire

The Phase 1 interview questions are listed in Figure 4.1. Communication was maintained between the Cumberland and the Elders' Committee throughout the life of the project, and Cumberland received updates on how the interviews were going, and the kind of information that Elders were providing.

When the interview process was concluded, Hattie listened to the tapes and manually transcribed the interviews into Inuktitut. She then typed the transcribed version onto a computer and translated it into English from a printed version. It took six days to transcribe one 60 minute tape (approximately one interview) into Inuktitut, type the Inuktitut version into a computer, and translate it into English. Both the Inuktitut and English versions were sent to Cumberland.

Figure 4.1: List of Questions Used as Guidelines During the 1998 Phase 1 Interviews with Elders

1. Did you ever live in the area around Meadowbank or this area where there is a proposed winter road?
2. If so, please indicate on the map where you lived and why you lived there.
3. Did you ever live in the area between Baker Lake and Hudson Bay?
4. If so, please indicate on the map where you lived and why you lived there.
5. Who else camped with you?
6. Tell me about other families who also camped around that area.
7. Did your ancestors live in that area?
8. What time of year did you live in this area?
9. Where else did you live and why?
10. Tell me about your main food sources.
11. What was the route for migrating caribou?
12. Where did you cache meat for the winter?
13. Show me on the map where you cached meat.
14. Where did you fish?
15. Show me on the map where you fished.
16. Can you tell me about the archaeological sites between Baker Lake and Meadowbank? Between Baker Lake and Hudson Bay?
17. What can you tell me about graves in the area?
18. What can you tell me about sites of spiritual significance or special sites in the area?
19. Is there anything I missed that you would like to add?
20. For what reason or reasons did your family move to the settlement of Baker Lake?
21. I have no more questions. Thank you for your time.

At the Cumberland office, the analysis process included several steps. The first involved examining the data that had been collected by rereading the Elders' stories several times in concert with Hattie's book, Inuit Nunamiut: Inland Inuit, a compilation of transcriptions from interviews with 26 Elders conducted in 1989-1990 in Baker Lake. Once the stories had been reviewed, significant recurring themes were discussed and key statements were drawn from every Elder's story

The information from the map was transferred onto smaller scale maps and digitized using GIS. The information from interviews and stories was rechecked by reviewing video-tapes; it was then summarized and input to MapInfo for use.

4.1.2 Interview Process — Phase 2

Cumberland recognizes that all people hold at least some traditional knowledge, and that having the desire to express oneself about potential changes to the community and their potential effect on traditional lifestyle and land use is not exclusive to the Elders. In consideration of this belief, Cumberland is presently conducting a second set of interviews to specifically target a variety of age groups within the community as well as several women.

Hattie was again selected as the ideal person to select candidates and conduct the interviews. This phase of interviews is still in process. Initial results are expected in the summer of 2004.

Interview tools

The same tools used for Phase 1 are also being used for the Phase 2 interviews: a tape recorder, extra tapes and batteries, a map and markers (for drawing on a 1:50,000 map of the area), and the question sheet.

Methodology

The following is a list of the individuals who have been interviewed to date in Phase 2. The initials following their names will be used to reference quotes from their interviews in various sections of this report.

- Kenny Avaala (KA)
- Alex Igluryuak (AI)
- Willie Ikinilik (WI)
- Tom Mannik (TM)
- Philippa Martee (PM)
- Winnie Owingayak (WO)
- Norman Attungala (NA)
- Jacob Ikinilik (JI)
- Hattie Mannik (HM)
- Travis Mannik (TrM)
- James Tiriganiaq (JT)

The protocol according to which the interviews are being conducted is as follows:

The interviews are being conducted at either the house of Hattie Mannik or the interviewee. Again, third-party involvement is minimized to avoid possible distractions.

Questionnaire

A questionnaire was drawn up by Cumberland and submitted to Hattie Mannik (see Figure 4.2). The questions being asked the candidates are quite different from the first set, in that the focus is less about past land use and lifestyle, and more about how people are feeling about the project in general, their involvement with it, their understanding of the events taking place, and their feelings toward Cumberland. The questions are being asked in Inuktitut and then transcribed into English.

Figure 4.2: List of Questions Used as Guidelines During the 2004 Phase 2 Interviews with Elders

1. In what ways do you feel this mine will benefit your community?
2. (a) What negative effects do you think this mine will have on your community? (b) Can you suggest ways that Cumberland can lessen these potential effects?
3. How will mine development affect young people in the community?
4. Cumberland has an office in Baker Lake. Is there a particular service this office should provide the community?
5. What can Cumberland do to help maintain the traditional lifestyle of its Inuit employees?
6. (a) Can you suggest ways to improve non-Inuit awareness of traditional knowledge and practices? (b) What do you think non-Inuit should know when they work and live in camps with Inuit men and women?
7. How do you feel about Inuit women working at the mine?
8. Are you worried about the effect mine development will have on the land and water?
9. Are you worried about the effect mine development will have on fish?
10. Can you suggest ways to ensure protection of wildlife at the project site?
11. What kinds of input and participation would you like to have in planning and monitoring the project?
12. Are there any aspects of the project that you need further explanation about or have concerns about?
13. Any other comments/concerns?

During this second round of interviews with community members, when the interviewees were asked how the mine would benefit their community, they overwhelmingly alluded to the necessity of providing young people with job opportunities.

Recurring concerns regarding the Meadowbank project centered on four main issues:

- the need for specific and timely information regarding job opportunities, especially on how potential applicants should proceed and to whom they should address their questions
- disturbance to water and land ecosystems through digging, drilling, lake draining, fish relocation, cyanide pollution, and waste material (AI, TM, WI, PM, JT)
- handling of spills, waste, and dangerous goods
- increased drug and alcohol problems as a result of greater cash flow in the community.

The questions eliciting suggestions on various issues resulted in the following proposals:

- careful monitoring of incoming cargo to prevent drug and alcohol problems (PM, HM)

- provision of country food for workers at the camp (HM, TM) and allowing them to hunt for it (PM)

- in answer to the question about knowledge non-Inuit should have when they work with Inuit at the camp, many people alluded to a need for increased sensitivity to Inuit culture, especially on a linguistic/narrative level - for instance, non-Inuit should realize that many Inuit are offended by swearing (HM, TM), be sensitive to the fact that Inuit tend to be less talkative than non-Inuit and not always interested in spontaneous conversation or jokes (HM, NA).

Community members would like to see more Inuit working at Cumberland's Baker Lake office (JI, WI) and expressed a desire for constant, up-to-date information on mining activity and possible negative effects on the environment.

The interviewees recognized the efforts made to gather traditional and community knowledge on the Inuit way of life and recommended such dialogue be pursued. They stressed that Inuit should be listened to and their archeological sites respected (TrM).

Generalized support was expressed for women wishing to work at the mine site. Although there were some apprehensions about their safety and one interviewee wondered how a woman would bond with her children if she worked away from home, no one expressed any doubts as to a woman's ability to fill a variety of different roles and all were very positive about the opportunities the project afforded women.

4.2 PUBLIC CONSULTATION

Cumberland and its consultants have made considerable and sustained efforts to involve local residents, community organizations and leaders, government regulators, and local experts in all phases of the project since 1995 when project exploration began. The primary purpose of this interaction with the community was to provide information about the project and solicit feedback from the public about issues and concerns arising from the proposed development. . Examples of the forms community involvement exercises took include site visits, public meetings, technical meetings, written correspondence, liaison officers on site, and telephone conversations.

Cumberland has contacted local and regional residents, organizations, resource users, and governmental entities regarding the proposed project to allow each group the opportunity to express its unique concerns and to create constructive dialogue between all parties. This has provided a framework for addressing future opportunities and concerns.

Over a dozen public meetings have been held with the community since 1996. The focus of the meetings was the exchange of information and to address concerns about the project, to promote public awareness, and demonstrate to the general public and relevant governmental bodies the potential benefit of the proposed mine for the local community. Question and answer sessions afforded the participants the opportunity to raise issues based on their knowledge of the area or to offer their opinion on various matters. Cumberland is committed to incorporating this knowledge into the design and management of their project to mitigate the environmental and cultural impact of their mineral development projects.

Traditional information has been collected during site visits by Elders to the camp, as well as through various public meetings and open houses. Elders were always welcome at the gatherings and all questions and concerns were recognized.

In addition, a liaison office has been established in Baker Laker to ensure that the community is fully informed of all project developments.

A brief overview of Cumberland's involvement in the community is outlined in Table 4.2.

4.2.1 Information Materials

Maps, slides, posters, handouts, and computer-assisted presentations have contributed to public familiarity with the mine site, proposed project, and surrounding environment (an example is provided in Figure 4.3). Cumberland will continue to provide information to the public during all upcoming phases of project planning and operations.

4.2.2 Public Response to the Project

> *"Most local residents want to see the mineral industry developed and there is a general consensus to work towards making the mineral industry a vigorous sector of the local economy."* – Nunavut Planning Commission 2002:26

Based on Cumberland's contacts to date, support for the project is strong. For example, Cumberland held three meeting in Baker Lake in May of 2002 and at all three, community members (including Elders, youth, business people and members of the HTO) reiterated support for Cumberland's exploration plans, revised mine plans, proposed airstrip, and environmental studies. The main issues of discussion centered on the employment opportunities provided by the project and the potential environmental impacts. Specifically, Baker Lake residents want the mine to be developed providing that they receive economic benefits and contract support services, that any negative impacts to the VECs and VSECs (see Sections 1.10.1 and 1.10.2, respectively) be mitigated, and that appropriate monitoring programs be implemented.

> *"Any mining company [who] knows what they are doing, who are trying to employ people with no jobs, as for myself, I support them...If the company is to be open, and will need drivers of some sort, they should train Inuit before hiring. Some companies hire only non-Inuit; that's okay but I would be happy to see more Inuit hired for jobs. That way, I support mining more."*
> – Jacob Ikinilik, hamlet representative and business owner, at a public meeting, May 1998, Baker Lake.

Table 4.2: Meetings with the Community

Year	Description
1995	Cumberland first made contact to obtain licenses and permits for exploration work.
1996	Cumberland met with 14 members of the Baker Lake Prospectors Association (BLPA) on April 1st. During discussions concerning employment, the members of the BLPA inquired whether jobs would be available at the drill sites or in equipment supply. Cumberland's representative replied that employment opportunities did exist at the sites and that two Baker Lake residents were currently working on site. He added that he would encourage contractors to hire locally. Furthermore, he offered support for the BLPA's activities in the form of hand lenses, geology maps, hammers and picks, as well as assistance with the identification of samples resulting from exploration by the prospectors. The meeting closed after discussions regarding individual prospectors' properties and the cost of a preliminary drill program. On April 2nd, Cumberland held two meetings with the community. The first was with 19 students at Arctic College to discuss employment opportunities in mining and geology and training opportunities in environmental science. Information was also presented concerning a proposed environmental program and Cumberland's activities at the Meadowbank project. The second meeting was held at the community centre in Baker Lake with 20 adult members of the community and 30 children from the local public school. A slide presentation on the activities of Cumberland in Meadowbank was followed by a discussion of the phases of mining exploration, the risks involved, the likelihood of finding deposits, and the roles and characteristics of junior and major mining companies. Community members asked questions regarding prospecting, mineral exploration, and costs related to permitting, licensing, and drilling.
1997	On March 24, the Igloo Hotel in Baker Lake was the site of a public meeting with 22 members of the community. Information on the current and projected activities of Cumberland in the Meadowbank project was presented through a slide show and posters displayed in a hallway. Questions by local residents concerned dates of operation of the mine and employment opportunities for the Baker Lake community. From April 19, 1997 to March 25, 1998, approximately 40 Nunavummiut signed the guest book at Meadowland Camp. On August 11th and 12th, Jacob Ikinilik, Elder and member of the HTO, toured the project site. Having lived in the area with his family before leaving in 1962, Mr. Ikinilik was able to provide information regarding traditional use and potential archaeological sites. He identified two grave sites and stated, at landing strip, that his people rarely hunted in the area. He indicated he was pleased regarding the number of local people employed at the exploration camp.
1998	Two meetings were held at both the HTO/KIA office and at Hamlet Chambers on May 1st to provide project development and environmental studies updates and to identify the primary concerns of the Inuit residing near the Meadowbank property. Mine development, wildlife protection, employment and job training, and the financial needs of the local community were the primary topics of discussion. A mock-up of the proposed airstrip was presented. All of these meetings were well attended. Attendees included: Cumberland officials; Nunavut Environmental Ltd.; Mayor, David Tagoona; KIA director Edwin Evo; and the HTO representative, Harold Etegoyuk A year-end summary report was submitted to the following: Hamlet of Baker Lake; CLARC (Baker Lake); HTO (Baker Lake); KIA (Rankin Inlet); KIA (Baker Lake) NWB (Gjoa Haven); NIRB (Cambridge Bay); and NTI (Cambridge Bay). A traditional study consisting of interviews with eight local Inuit Elders (men and women) was undertaken in October to determine traditional use and traditional ecological areas within and

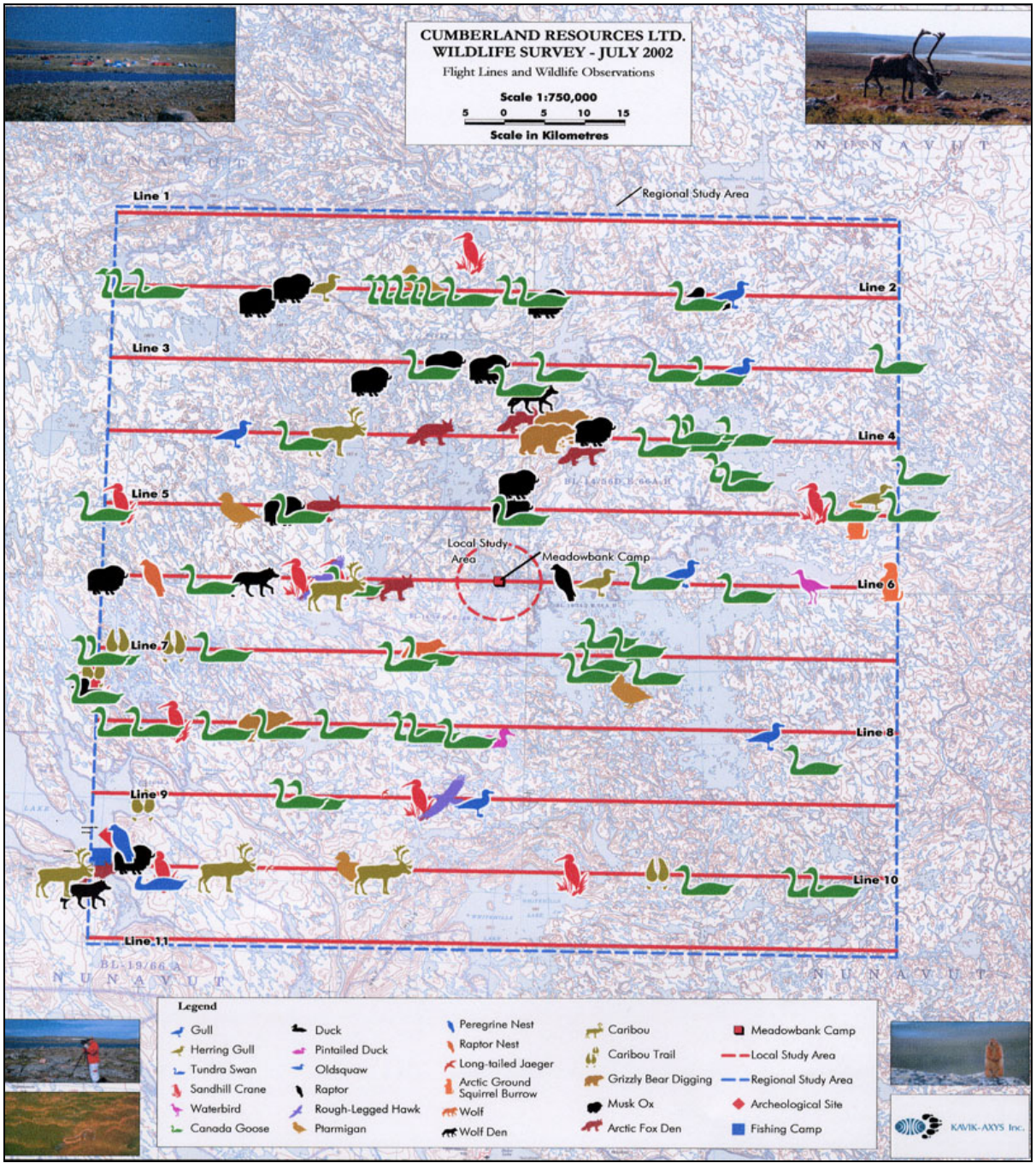
Table 4.2 – Continued

Year	Description
	around the Meadowbank project development boundary.
1999	Two meetings were held in Baker Lake. The first was convened in the Hamlet Chamber on April 12th. Participants included the mayor, William Noah; various council members; HTO representatives; the director of the KIA, Edwin Evo; and members of the general public. Affairs focused on overview activities for 1998 and 1999, a review of local expenditures, as well as projected construction, transportation, processing, and employment issues related to the mine. The second was held in the Igloo Hotel and included Nunavut's MLAs. A field trip to the mine site followed and was attended by Premier Paul Okalik and Ministers Jack Anawak, Peter Kilabuk, and Kelvin Ng. The objectives of the meetings were to present the current status of the mine site and encourage public interaction. Discussions centered on concern for local employment and the protection of caribou and fish. There was general agreement among the local Inuit to proceed with mine development providing there are environmental and social protection measures in place and providing there will be significant economic gain by the community. A year-end summary report was submitted to the following: Hamlet of Baker Lake; CLARC (Baker Lake); HTO (Baker Lake); KIA (Rankin Inlet); KIA (Baker Lake); NWB (Gjoa Haven); NIRB (Cambridge Bay); and NTI (Cambridge Bay).
2000	After the prefeasibility study report showed that more resources or a better gold price were required to economically develop the mine, only a minimal amount of exploration work was conducted in 2000. A public meeting was held and summary reports were submitted to the following: Hamlet of Baker Lake; CLARC (Baker Lake); HTO (Baker Lake); KIA (Rankin Inlet); KIA (Baker Lake); NWB (Gjoa Haven); NIRB (Cambridge Bay); and NTI (Cambridge Bay).
2001	A public meeting was held on April 20th for members of the general public and HTO, the Elders, Hamlet Councilors, Mayor, and Glen McLean, MLA for Baker Lake. A year-end summary report was submitted to the Hamlet of Baker Lake; CLARC (Baker Lake); HTO (Baker Lake); KIA (Rankin Inlet); KIA (Baker Lake); NWB (Gjoa Haven); NIRB (Cambridge Bay); and NTI (Cambridge Bay).
2002	Favourable economic conditions made 2002 a busy year: an active program of exploration, drilling, and environmental baseline monitoring was pursued, and several site visits and meetings were held. On May 2nd, a meeting was held with 23 Elders of Baker Lake at the Elders Centre, during which Cumberland presented a translated slide show of its 2001 activities and 2002 plans, and reviewed the past five years of environmental studies and plans for the 2002 Environmental Program. The following day, Cumberland made two similar presentations at the Nunamiut Lodge, attended by representatives from the HTO, CLARC, KIA (Baker Lake), and the general public including prospectors. The presentation included a detailed description of the proposed new camp, the primary airstrip construction, and locations. There was a 30 to 45 minute question period following both meetings. Site visits to camp by David Aksawnee (HTO Chairman), Phillip Putumiraqtuq (HTO Secretary/Treasurer), Josiah Nuilalik (Elder), Norman Attungala (Elder), Joe Niego (Wildlife Officer/Mayor) and Jacob Ikinilik (Elder) were organized. A meeting was held with the Baker Lake HTO on September 19th to discuss findings of the wildlife and fisheries studies, and to collect local knowledge from the HTO members. The meeting was well attended by both HTO members and Cumberland officials. The hunters and trappers expressed concern regarding the impact of noise on wildlife, notably caribou.

Table 4.2 – Continued

Year	Description
	A year-end summary report was submitted to the Hamlet of Baker Lake; CLARC; HTO (Baker Lake); KIA (Rankin Inlet); KIA (Baker Lake); NWB (Gjoa Haven); NIRB (Cambridge Bay); and NTI (Cambridge Bay).
2003	An impact workshop was held with community organizations at the Nunamiut Hotel from March 24th to 26th. A dozen coloured plans and drawings showing mine layout and environmental study areas were displayed on the walls. Students, Elders, and members of the HTO and KIA were amongst the attendees who expressed concerns, voiced opinions and asked questions regarding potential impacts of the development project on air and water quality, fish and wildlife, local youth (in terms of the possible presence of drugs and/or alcohol at the camp), and on employment and job training. Hand-outs in both English and Inuktitut were distributed. In the course of a community visit to Baker Lake between September 30 and October 2, 2003., Nineteen community members were interviewed, including the mayor and deputy mayor, the mental health nurse, an RCMP constable, the high school principal, a social worker, the economic development officer, a representative from Arctic College and one from Baker Lake Housing Authority, as well as several concerned citizens. Issues centered around training, employment, and concerns regarding the possible negative effects of additional money flowing into the community as a result of the mine (alcohol and drug abuse, gambling, unwise budgeting). Support for the Meadowbank project was overwhelming (95%), providing it delivers jobs for the community. Some concern regarding lack of information, particularly employment opportunities, was expressed. A series of meetings were held on Apr 24th and 25thin Baker Lake. On April 25th a well-attended public meeting was held at the Recreation Centre with over 150 people in attendance. A translator provided by Cumberland ensured that everything was translated into Inuktitut. Two separate meetings were held the following day with the elders of the community as well as student at the High School respectively. In June 2003, representatives from HTO, CLARC and various regulators from territorial and federal governments were flown into camp and were given tours of the site. *Local Employment:* The local number of employees varied throughout the season, but generally 8 to 20 Inuk would work in the camp at any given time. There were a total of 36 local employees that were hired by Cumberland Resources in 2003. Duties ranged from cook's helpers to geological and survey technicians to environmental technicians to heavy equipment operators and construction labourers and tradesmen.
2004	A community Liaison Office was opened in Bake Lake in early 2004. Michael Haqpi was hired as Community Liaison Officer.

Figure 4.3: Wildlife Symbol Observation Map



4.3 ARCTIC STUDIES

4.3.1 The Inuit Land Use Occupancy Project (ILUOP)

This study was undertaken in 1974 by Milton Freeman Research Ltd. for DIAND. The 1976 published reports are based on interviews with 101 trappers and hunters. The project also involved the compilation of maps showing the extent of land use by Baker Lake hunters and trappers.

4.3.2 The Effects of Exploration & Development in the Baker Lake Area, Volumes 1 & 2

This 1978 research project was undertaken by Interdisciplinary Systems Ltd. for the Department of Indian Affairs and Northern Development (DIAND). The two-volume report is based on interviews with 43 randomly selected Baker Lake heads of household. The study gathered information on the extent and seasonality of land use by Baker Lake hunters, trappers, and domestic fishermen, as well as the relative importance of particular areas within the study area for these three harvesting activities. Fifteen maps were compiled, outlining land use by the Inuit (fox trapping, domestic and commercial fishing, goose hunting); wildlife habitats and behaviour (caribou migration routes, calving areas, winter use areas, fox habitats, fish and waterfowl habitats); critical areas for fish and waterfowl, and caribou; and finally, recent and proposed land use.

4.3.3 Naonayaotit Traditional Knowledge Study

In 1995, the Kuglutuk Angoniatit Association (KAA), with funding from BHP, Canadian Heritage Parks Canada, Department of Resources, Wildlife and Economic Development, and Lytton Minerals Ltd, initiated a regional undertaking to gather traditional knowledge on Inuit land use, water use, fish and wildlife from the West Kitikmeot. This Naonayaotit Traditional Knowledge Study (NTKS) was sponsored by the Kitikmeot Hunters' and Trappers' Association and used questionnaires to collect information from community members. Data from the interviews with Elders and hunters from Kugluktuk, Cambridge Bay, Kingauk, and Umingmaktok are not yet available and issues surrounding use, access, ownership of the data remain unresolved. However, the Tuktu and Nogak study (see Section 4.3.5) is founded on the NTKS and so the traditional knowledge relating to caribou could be considered by Cumberland. It is hoped that once solutions are agreed upon, the NTKS will be of greater use to the baseline and impact assessment data relevant to Cumberland's Meadowbank project.

4.3.4 Jericho Project on Traditional Knowledge Use

This research project was undertaken by Tahera Corporation with the goal of gathering "that which has always been known by Inuit, that is, knowledge gained through experience." Comments from Elders at community meetings and Jericho project site visits, West Kitikmeot/Slave Studies (WKSS) reports, and the Naonayaotit Traditional Knowledge Study database constituted the information on which the study was based. Elders from Cambridge bay, Kuglutuk, Umingmaktok, and Bathurst Inlet were, on two occasions (in 1996 and 1999), invited to share any relevant information on valued ecosystem components. Tahera Corporation also carried out extensive community consultation from 1996 in all communities of the West Kitikmeot region that would be affected by the project (Kugluktuk, Cambridge Bay, Umingmaktok, and Bathurst Inlet), as well as with the communities of Gjoa Haven,

Taloyoak, and Pelly Bay. Town hall meetings were the main consultation and information dissemination sites.

4.3.5 Tuktu & Nogak Project: A Caribou Chronicle

This three-year study began in 1997 and involved interviews with 37 Inuit Elders and hunters in Umingmaktuk, Bathurst Inlet (Kinguak), Brown Sound, Cambridge Bay, and Kugluktuk. Traditional knowledge in the following areas was collected: traditional harvesting and uses of caribou, historical and current distribution and movements of caribou, caribou behaviour, predators, important habitats, and calving ground features. From a mine management standpoint, key findings were that caribou are able to distinguish which food sources are rich in nutrients and that they prefer lush tundra, that they adapt their forage to the different seasons, and that they will alter their migration patterns following overgrazing. Migration paths also seem to be changing in response to climate warming: caribou appear to be attracted to areas where vegetation appears earliest and they avoid "water bodies experiencing early spring freshet." The Elders agreed that it is important to respect caribou, and to learn to "think like a caribou" as part of showing respect. More information from this study will be discussed in the section on caribou.

4.3.6 Dogrib Traditional Knowledge: Relationship between Caribou Migration Patterns & the State of Caribou Habitat

Carried out from 1996 to 2000 by the Dogrib Treaty 11 Council, the Dogrib Traditional Knowledge Study solicited the traditional knowledge of Dogrib Elders concerning caribou habitat, food, behaviour, and movement, as well as the relationship between the Dogrib and the caribou, including uses by the people. The Dogrib Caribou Study points out that Elders felt "that there did not appear to be a correlation between harvesting and mining activities." They did, however, express concern that caribou habituate to human activities and thus caribou could be exposed to contamination from tailings and other sources. This points to the need to manage access at mine sites so as to prevent, to the extent practical, any exposure to contamination. Dogrib Elders also pointed out that caribou rely on smell to find food and were concerned that the smell of petroleum products stored at mines may cause them to change their migration routes. At least in the case of the Lupin Mine, where caribou routinely migrate through the site where bulk petroleum is stored, this does not appear to be a deterrent. Findings from this study will be discussed in the section on caribou.

4.3.7 Traditional Ecological Knowledge Research in the Kache Tue Study Region

Undertaken by the Lutselk'e Dene First Nation and Brenda Parlee, this 1998-2001 project recorded traditional knowledge of Chipewyan Elders from Lutselk'e on the ecology of the Kache Tue study region, an area north from the shores of the East Arm of Great Slave Lake to just south of MacKay and Clinton Colden lakes. Kache Tue is a sub-region of a larger area called Katthinyne, an area of great diversity and abundance, the traditional territory of the Lutselk'e Dene. The information collected includes traditional land use, significant cultural/spiritual sites and Chipewyan terminology. Key species, their habitat, and the effects of resource development on them were the main focus. One important objective was to use traditional knowledge to establish indicators of ecosystem health as a tool for future cumulative effects monitoring.

An Elders Committee and Steering Committee directed the course of the research, with the Elders being the main source of information. Researchers worked with Elders to understand the meaning of their stories and to document them in written form and with maps. Workshops were audio/video recorded, and a Geographic Information System (GIS) was developed so the information would be easy to find and understand. Community researchers were trained in research methods and associated skills. Training included: the use of audio/video equipment, Chipewyan literacy and terminology, translating and transcribing, data management, and GIS mapping.

The project made use of trips on the land as a way to stimulate participants' memory recall. Terminology for place names, wildlife, and vegetation was collected and verified, along with knowledge about wildlife behaviour and the habitat of the various species of migratory birds, fish, caribou, and fur-bearers. Results of this phase of the project provided preliminary indicators for the health of these species which were refined and then analyzed in the context of indicators of community health collected during a previous study, Traditional Knowledge of Community Health. This analysis found that ecological health is inextricably linked with community health, reflecting the close ties between the people and the land.

A four-part ecosystem classification was also developed with Elders, whereby landscapes were divided into four main types described in detail in terms of their features and uses. Elders also reviewed ecological changes; they catalogued the natural changes normally expected through the seasons, and also "unnatural" changes due to development, climatic change, declining water levels and increasing fires.

4.3.8 Traditional Knowledge in the Nâ Yaghe Kué region: An Assessment of the Snap Lake Project

This study took place during a four-month period in 2001 and comprised two main components: the gathering of Dene oral histories, knowledge, and experiences in the region, and the environmental assessment of the De Beers Snap Lake Diamond project by the Dene Elders. Previously documented stories were reviewed, home visit interviews were conducted, and stories were gathered during on-the-land workshops in order to compile traditional knowledge of the Dene Elders. The environmental assessment of the project by the Elders involved a mine site visit and aerial survey, and a four-day workshop at the mine site that included extensive visits and explanations in reaction to the Elders' questions. Following the workshop, the Elders predicted possible impacts of the mine on the valued features in the region and began to develop specific recommendations for monitoring and mitigating impacts. They also emphasized that their involvement in the project should be ongoing; through regular assessments of the mine and the study region, they can formulate recommendations on how to mitigate any negative impacts should they arise, or even prevent them from happening.

Among the most important lessons learned from the Elders was the importance of always displaying respect for the land, as an expression of profound gratitude to the Creator for the land, water, and wildlife the people know so well. To disrespect the land is to disrespect the Creator, an act that would inevitably lead to the demise of the Denesôåine culture. This belief only reinforces the intimate link between the integrity of the land and the health and lifestyle of the people.

4.3.9 Inuit Nunamiut: Inland Inuit by Hattie Mannik (1996)

This book is collection of 26 interviews conducted with Elders from Baker Lake in 1989 and 1990 by Hattie Mannik, a local researcher and heritage consultant. Intent on gathering traditional knowledge from inland Inuit, she visited the Qilautimiut (Baker Lake Elders Group) and recorded interviews with anyone willing to participate. Several pointed out areas on a map to explain where they had once travelled, camped, and hunted. The map accompanying her book illustrates an area stretching from Armark Lake in the northwest to Franklin Lake in the northeast, and Kamilukuak Lake in the southwest to Kaminak Lake in the southeast. Baker Lake is roughly in the middle of the map along the eastern border. Ms. Mannik states as the reason for writing the book: "...because of my parents, who struggled to keep me and my sisters and brothers alive during the starvation in the early 1950s, and other Elders who had camped along the river long ago, and because of the traditional way they once lived, which most of them can't really be relived. Secondly for the younger generation and my children who are forgetting the life and language of long ago among the Inuit."

The following list names the Elders who participated in the study and were interviewed by Hattie Mannik during 1989-1990. The initials following their names will be used to reference excerpts from the book in the pertinent sections of this report.

- Winnie Tayak Putumiraqtuq (WTP)
- Nancy Nanayuq Mannik (NM)
- Jimmy Taipanaak (JT)
- Olive Mammak Innakatsik (OMI)
- Silas Kalluk (SK)
- Victoria Arqnaaluk Nagyugalik (VAN)
- Samson Quinangnaq (SQ)
- John Makitgaq (JM)
- Betty Inukpaaluk Peryouar (BIP)
- Titus Seeteetnaaq (TS)
- Basil Tuluqtuq (BT)
- Fanny Arnatqiq Arngnasungaaq (FAA)
- George Tataniq (GT)
- Silas Putumiraqtuq (SP)
- David Mannik (DM)
- Marian Tulluq Angohalluq (MTA)
- Janet Kigusiuq Uqayuituq (JKU)
- Moses Nagyugalik (MN)
- Veronica Tamaliq Angotituaq (VTA)
- Magdalina Naalungiaq Makitgaq (MNM)
- Violet Auupiq Twyee (VAT)
- Barnabas Peryouar (BP)
- Pauli Arnaryuinaq (PA)
- Julie Hanguhaaq Tuluqtuq (JHT)
- Barnabas Arngnasungaaq (BA)
- Elizabeth Tunnuq (ET)

The stories in the book reflect the various life experiences of each Elder. Many of the stories are nostalgic, detailed accounts about living on the land and provide valuable insight into the traditional way of life. Major recurring themes discussed in the book are learning how to survive on the land, hardship and times of starvation; hunting and trapping; and preparation, consumption, preservation, and caching of traditional food. Other themes touched upon include parenting, marriage, shamans, and contact with White people.

4.4 GOVERNMENT REGULATIONS

There is a growing appreciation of TK worldwide in the form of international law, fiscal and policy support in many countries, and an increasing interest in understanding the natural, cultural, and spiritual world of indigenous peoples. Development projects are beginning to include traditional knowledge during both planning and implementation phases, whether indigenous peoples are directly or indirectly affected.

4.4.1 Guideline for the Incorporation of Traditional Knowledge into Environmental Assessment

In March 1997, the Canadian International Development Agency (CIDA) and Environment Canada (EC) cooperated to establish a policy paper on decision-making entitled Guideline for the Incorporation of Traditional Knowledge into Environmental Assessment. This ground-breaking methodology is already being used by a number of groups both in Canada and internationally. In drafting its own guidelines, the Canadian Environmental Assessment Agency (CEAA) borrowed heavily from the CIDA/EC document. Cumberland's review of both these reports help to guide the work presented in this report.

4.4.2 ILO Convention 169 Concerning Indigenous & Tribal Peoples in Independent Countries

This is perhaps the single most important document defining the rights, recognizing the aspirations, and calling attention to the many contributions, of indigenous peoples. The convention recalls the terms of the United Nations Universal Declaration of Human Rights, The International Covenant on Economic, Social and Cultural Rights, the International Covenant on Civil and Political Rights, and the many international instruments on the prevention of discrimination. It revises the 1957 Indigenous and Tribal Populations Convention (107). Several sections of the Convention are directly applicable to the acquisition of indigenous knowledge and the inclusion of indigenous peoples in the development process:

Article 13.1: "In applying the provisions of this Part of the Convention governments shall respect the special importance for the cultures and spiritual values of the peoples concerned of their relationship with the lands or territories, or both as applicable, which they occupy or otherwise use, and in particular the collective aspects of this relationship."

Article 13.1 recognizes "…the spiritual, cultural and collective character of our relation to our lands and territories, which is important to the subject of intellectual property and the protection of traditional knowledge."

Article 15.1: "The rights of the peoples concerned to the natural resources pertaining to their lands shall be specially safeguarded. These rights include the right of these peoples to participate in the use, management and conservation of these resources. This Article recognizes the right of indigenous peoples to a voice when access to natural resources on their lands and territories is at issue."

4.5 RELEVANT WEBSITES

www.wkss.nt.ca. The West Kitikmeot/Slave Study, a partnership of aboriginal and environmental organizations, government and industry ensures that the effects of development on the environment, wildlife and people of the WKSS area are minimal and that northern people get the maximum benefits.

www.tapirisat.ca Website of the Inuit Tapiriit Kanatami, Canada's national Inuit organization.

www.avataq.qc.ca. The Avataq Cultural Institute has been organizing Inuit Elders Conferences since 1981 to provide a forum for the exchange of concerns, hopes, and beliefs regarding the preservation of their culture, language, and heritage. One of the Institute's publications (Tumivut) publishes oral history interviews given by Inuit Elders.

www.inuit.org. The Inuit Circumpolar Conference website provides numerous links to sites on indigenous culture. Economic development as it relates to the Inuit and the protection of Inuit intellectual property rights.

www.arctic-caribou.com. A website with links to articles on a variety of topics related to the caribou, including harvest counts, management groups, and mining and caribou.

www.fss.ulaval.ca/etudes-inuit-studies. The website of this bi-annual scholarly journal devoted to the study of Inuit societies, either traditional or contemporary, in the general perspective of social sciences and humanities (ethnology, politics, archaeology, linguistics, history, etc).

www.pooka.nunanet.com/%7Eresearch/ The website of the Nunavut Research Institute based out of Nunavut Arctic College and providing leadership in developing, facilitating and promoting traditional knowledge, science, research and technology as a resource for the well being of people in Nunavut.

SECTION 5 • TRADITIONAL KNOWLEDGE STUDY RESULTS

5.1 TRADITIONAL LAND USE

According to the Elders of Baker Lake, the area between Baker Lake and the Meadowbank site was most commonly used as part of a transportation corridor between Baker Lake and the Back River, their traditional winter hunting and fishing area. While hunting and fishing activities were, and still are, conducted near the property, these activities seem to be of an opportunistic nature while enroute to somewhere else. The Inuit also stop to camp at various lake sites—including the Portage lakes—but these sites are not annually used. More permanent camp sites utilized by both current residents and their ancestors are further north. One interviewee commented that the region beyond and before the Meadowbank Property is a winter hunting ground (ST).

The winter road corridor was likely a traditionally-used transportation corridor, and was identified as the main route between the Baker Lake and Back River areas. This explains the number of traditional use areas that were identified along this corridor. The traditional winter transportation route passed directly through Third Portage Lake (Apuqtinnaatuq).

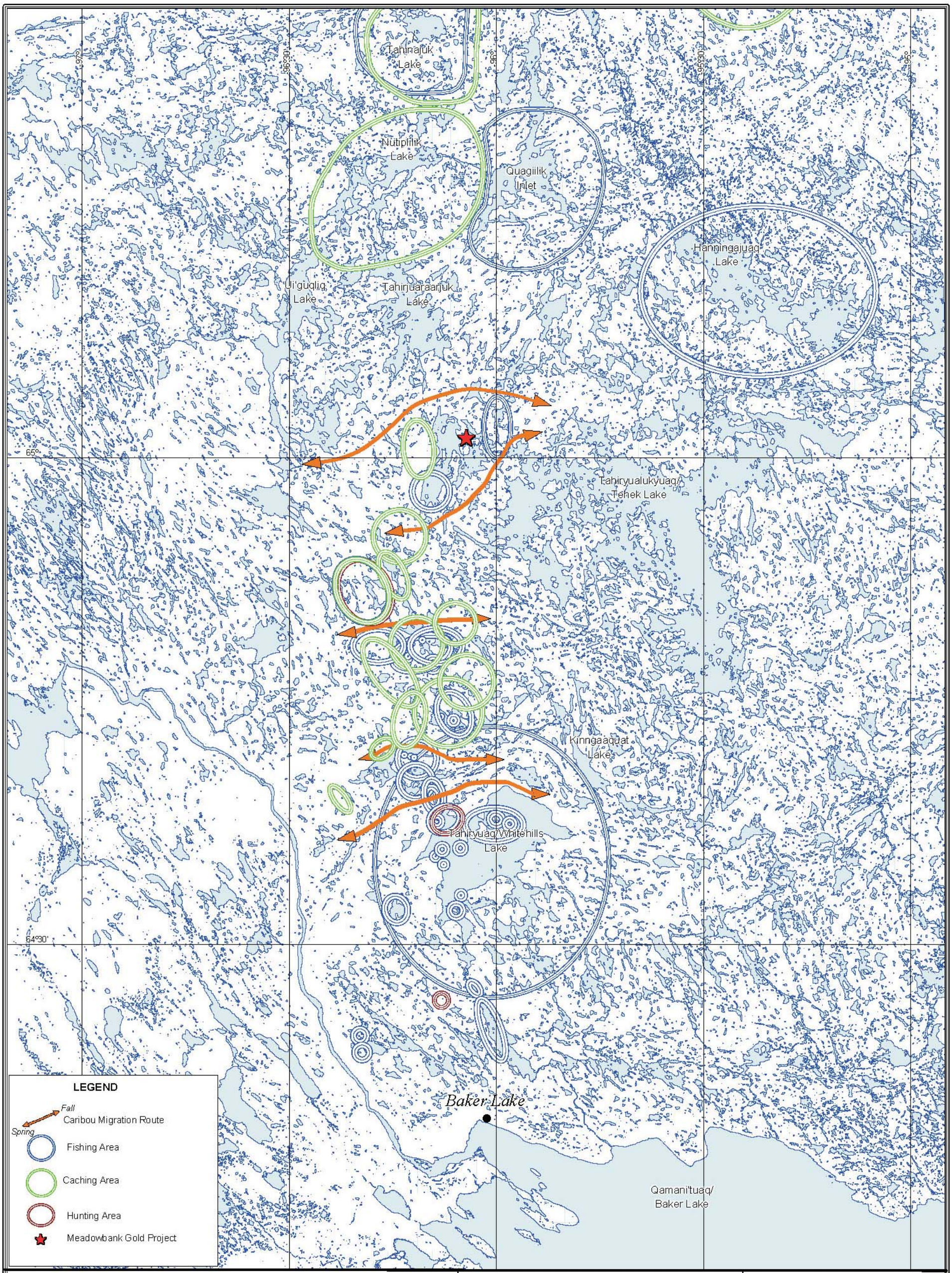
Tehek and the Portage lakes were traditionally used extensively for fishing, fox trapping, caribou hunting, and food caching, all of which are still practiced today (see Figure 5.1). This area is also reported by the Elders to be very spiritual, and grave sites exist along the shore of Second Portage Lake. In fact, there are many grave sites located randomly throughout the area between Baker Lake and the Meadowbank study site (see Figure 5.2).

The proposed winter road is also part of a traditional transportation corridor that passes directly through Third Portage Lake. Many important historical locations are found along this route.

No permanent outpost camps or commercial tourist facilities exist in the vicinity of the proposed mine site, and no known traditional use areas occur within the footprint of the proposed development area. All traditional use areas outside of the project will be protected by future management plans developed between Cumberland and Inuit Elders, Heritage associations, and the local government. Every effort will be made to ensure that traditional sites are not disturbed or altered.

The Baker Lake Elders identified a number of areas traditionally used within the boundary of the Meadowbank mine project. During the interviews, identified use areas were given a unique alpha-numerical identifier that included a number and the initials of the information source. Analysis of this information led to the preparation of two detailed maps (Figures 5.1 and 5.2) outlining traditional land use within the mine development study boundary. This knowledge of traditional use patterns for activities related to fishing, hunting, caching, camping, and burial, or areas of spiritual significance will be integrated into Cumberland's land use management plans.

While Figures 5.1 and 5.2 offer a visual summary of those use areas identified by the Baker Lake Elders during the interviews and indicate which fall within the general corridor of the winter road and the mine site, the following descriptions present the same information verbally.

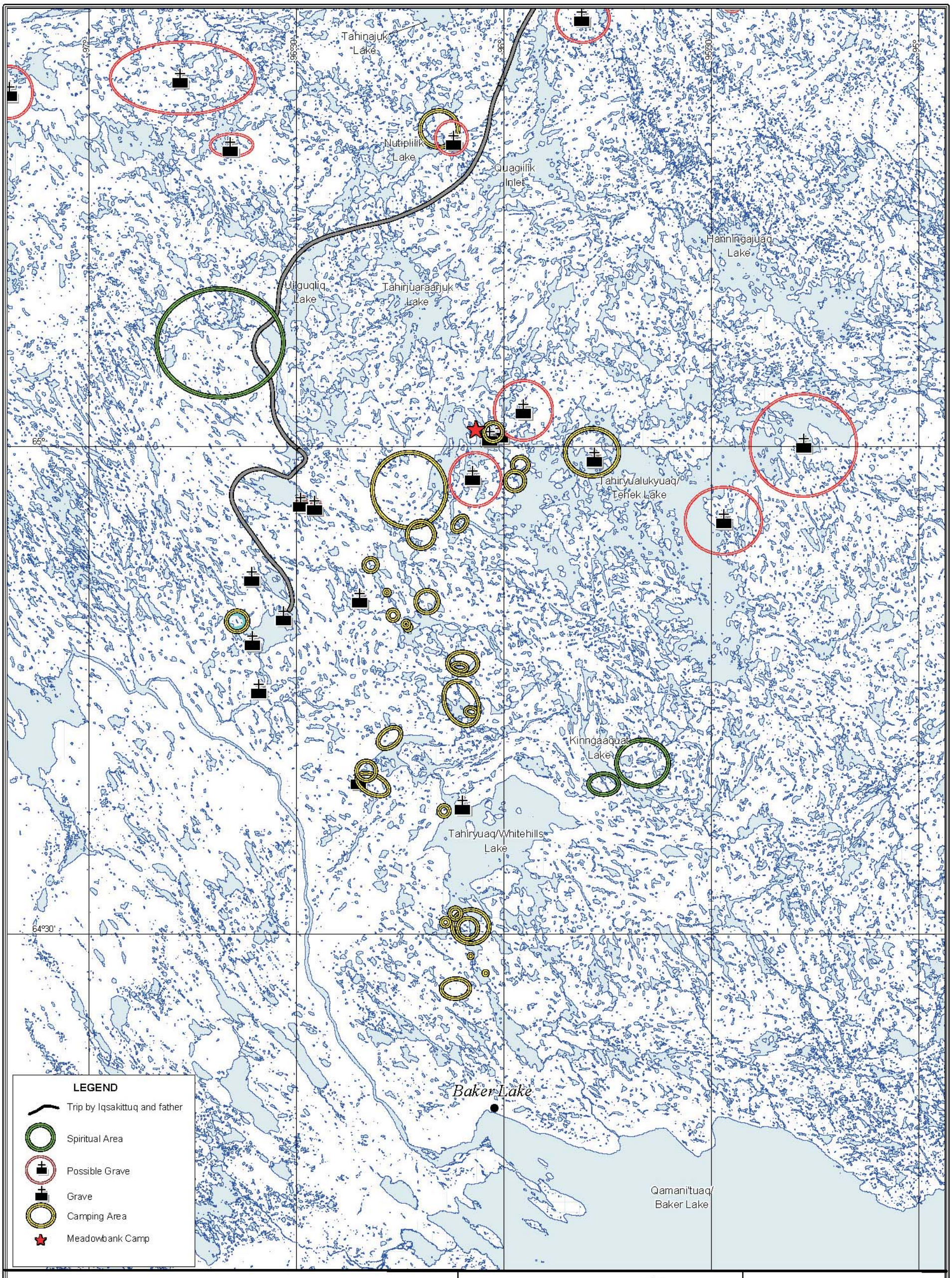


Traditional Land Use - Fishing, Hunting, Caching and Caribou Migration

CUMBERLAND RESOURCES LTD.

Meadowbank Gold Project

Figure 5.1



Traditional Land Use - Graves, Spiritual Areas & Camps

CUMBERLAND RESOURCES LTD.
Meadowbank Gold Project

Figure 5.2

Apuqtinnaaqtuq Lake (Portage Lakes System)

Various fishing areas were identified around Third Portage Lake (Apuqtinnaaqtuq). One interviewee noted that this was a regular fishing lake (JI), and another noted that big fish could be caught here in the winter (JN). Caribou hunting also occurred, although one interviewee commented that hunting was not always successful in this area (SK). It has also been used for fox trapping. Caribou movement was noted both immediately north and immediately south of the Portage lakes system.

Spring, summer, and winter camping occurred here, and a camping area was delineated near Second Portage Lake. One interviewee's son was born nearby (SK). A food caching area was noted immediately west of Third Portage Lake; caching apparently occurs in this area today (JI). Grave sites along the shore of Second Portage Lake have already been identified by Baker Lake Elders (1997).

One interviewee noted that there was some spiritual significance to this area (SQ). During a return trip to Baker Lake, he and his brother camped overnight at Third Portage Lake (Apuqtinnaaqtuq). Samson left his brother, who was feeling ill, in order to chase some caribou. When he returned to their camp, his brother had gotten worse. His mother would have explained that this area was haunted. "Apuqtinnaaqtuq is like a haunted place. I think it's really like that." (SQ). This interviewee felt it was important that they tell others about these things, even if they are not their own people.

Tahiryualukyuaq Lake (Tehek Lake)

Fishing areas are located all around the arm of Tehek Lake (Tahiryualukyuaq), near Second Portage Lake and nearby islands. Large fish can be caught here in the spring (SK). Caribou hunting also occurred here (SQ). Caribou movement has been observed between Tehek Lake and the Portage lakes, and one interviewee noted that this area will need to be protected (ST). Caribou have also been observed to the north in groups heading eastwards.

Camping and fishing areas were identified along the northwest shores and inlets approaching the mine site. There may be some graves in this area as one interviewee recalled that some people died here one year (SQ).

Qablunaakuluk Lake

This is a winter fishing area. Hunting has also been done here. Beyond the northern arm of the lake, there is a child's grave site near a hunting ground and summer camping area (JN).

Qamanauga'tuaq Lake

This area is used for fishing.

Qamanauga'naaq Lake

A spring camping area was identified, as well as some specific fall fishing areas.

Iqaluli'naaq Lake

This area is used for fishing.

Tahiryuaq (Whitehills Lake)

There are many uses in and around Whitehills Lake (Tahiryuaq), and many potential archeological sites of importance. This lake has been highly used for spring and summer fishing, and still is today. A DIAND report on use areas around Baker Lake identified Whitehills Lake as both a domestic and commercial fishing area (IDS, 1978).

The south end of the lake that connects to Qamanauga'naaq is used every year for fishing, particularly in the spring. There are specific fishing sites identified along the shore of the lake in this area, and around the lake's small islands (possible island names include Tangmaaqturliq, Uluituaq, Qikigta'tuaq [JN]). Early spring hunting also occurs in this area. Multiple spring, summer, and winter camping sites were identified. At least two grave sites, one possibly a child's, are thought to be located at the south end of this lake as well. There is also a grave located north of Halfway Hills (Kinngaryuit) and south of Hanningayukuluk, where nothing can be changed or taken (SQ, JI). There is a place of spiritual significance located along the southwest shore.

The north end of the lake is an early spring fishing and hunting area. Spring and summer fishing occurs in the narrows between Whitehills and Hanningayukuluk, and a camp area is located along the western shore nearby. At least five graves are located in this area, including two at the south end of the narrows, and a child's grave at the north end of the narrows.

Along the eastern side of the lake, a food caching area is found, as is a place of spiritual significance. Another spiritual area, where it is difficult to sleep, is located at the south end of the lake (SK).

Caribou move along the north side of Whitehills Lake, and also travel from the north between the lake and Halfway Hills.

Hanningayukuluk Lake

Fishing areas were identified throughout this lake, and hunting was identified to the southwest. Camping and food caching areas were noted along the northern shorelines, and further to the north beyond the lake. Along the western arm of the lake, there is a winter camp area, an associated food caching area further to the southwest, and a spring/summer camp area where there is possible grave site. Food caching also occurs to the north. Another possible grave site is located to the north of the lake. Caribou move north and south of Hanningayukuluk.

Amaruliaruhiq Lake

This area has been used for fishing and camping. The whole lake and surrounding area was identified as a food caching area. To the north of Amaruliaruhiq, there is a smaller lake (name untranslated) where there are camping areas and a possible grave site (NS). The area surrounding

this smaller lake was also identified as a food caching area. Caribou have been observed to the south.

Qilluralaaq Lake

There is a possible grave site in this area and large caching areas to the north and south.

Amarulik Lake

Numerous fishing sites were identified in many arms of this lake. Food caching occurred throughout the lake area, and specifically at the northeast and southwest ends. A camping area was identified to the north of the lake. Winter and spring camps are concentrated along the northwest arm, where there is a larger caching area also associated with Kavihililik Lake. There are tent rings in this area (SQ). Caribou move along the north side of the lake, and have been observed travelling from the east at caching time (JN). Wolves may be found here.

Kavihililik Lake

This area is used for fishing and caribou hunting. Good whitefish have been caught in this lake (SK, ST). This whole area was identified as a camping area (fall and spring), and specific camp sites were noted at the north end of the lake and along the eastern shoreline. There are tent rings and possibly inuksuits in the area (ST, JI). This lake and surrounding land is part of a larger food caching area. Five, possibly six, grave sites were identified nearby.

Qamanauga'tuaq Lake

This whole area was used for food caching. A camping area was identified to the northeast of the main lake arm. A large food caching area, encompassing this camp, is identified to the north.

Traditional use areas that fall outside the development area were also described and noted.

Nalluaryuk

This use area is located to the west of the winter road corridor, near the mouth of the Thelon River. Winter fishing areas, in association with Qablunaakuluk area to the north, were identified. Spring fishing occurs at the west end of the lake, where there is a camping area with tent rings (SQ). The grave site of one interviewee's nephew may be located at the east end of the lake, in closer proximity to the road corridor (NS).

Tahiryuuaq Qamanaugaa

This use area is located to the east of the study boundary. It was identified as a fishing and hunting area.

Inugguga'yualik Lake

This use area is located to the west of the study boundary, and is located along the Meadowbank River. Many uses were identified in this areas, including fishing. A large caching area was noted both around this lake and to the south. Camping areas were identified along the north shores of the lake, and occurred throughout this area. One interviewee's ancestors camped in this area during the summer months (JN). Possible grave sites on the lake's largest island, and along its southern shores were identified (5 possible graves).

Caribou move immediately south of this lake, and have been observed moving northwest when they are shedding (July) and southwards when the skin on their antlers is shed (October) (SK).

5.2 VALUED ECOSYSTEM COMPONENTS

VECs (valued ecosystem components) are defined as those environmental attributes or components identified as a result of an ecological and social scoping exercise, which were determined on the basis of perceived public concerns related to social, cultural, economic and aesthetic values. They also reflect scientific concerns of the professional community as expressed through social scoping procedures (i.e., hearings, questionnaires, interviews, workshops, media reports, etc.), and through technical studies. For the Meadowbank project, VECs were primarily identified in consultation with regulatory and governmental authorities, as well as through discussions with members of the local community. Each VEC is of ecological importance, and is intimately connected with one or more of the other components.

5.2.1 Caribou

All the interviews conducted by Hattie Mannik attest to the enduring importance of the caribou for the Inuit: a major source of food, clothing, and tools, the animal was, for countless generations, the very lifeblood of the people. All of the interviewees identified caribou as the primary, and fish as the secondary, food source (SQ, SK). Traditionally, the Inuit of the Baker Lake area were almost entirely dependent on caribou for subsistence, and moved with them from season to season. Caribou hunting was probably even more important to them than to Inuit of other settlements where alternate sources of country food—seals, walruses, whales, and geese—are not as scarce or even absent. It was not until the 1950s that the community along the shores of Baker Lake was permanently established.

> *"Because we were not living around the coast, we survived with only caribou and fish in the area west of Back River."* – (VAT)

Although alternate food sources are available, caribou remain of very high value to the people of Baker Lake. With the exception of two brief periods during which travel is virtually impossible (spring break-up, usually in June, and fall freeze-up, usually in October), caribou hunting is a year-round activity for residents of Baker Lake, and it is the most wide-ranging harvest activity practiced by residents of the area. T. Welland (ILUOP, 1976) reported that caribou meat was the single most important food source for Baker Lake Inuit and when supply was not adequate in the immediate area, hunters travelled distances of up to 320 km to hunt.

> *"We also used caribou intestines, because every part of a caribou is used, except the gall bladders."* – (WTP)

Indeed, studies pointing to the role of caribou as the most vital component of the subsistence economy of the Baker Lake Inuit abound. The 1974 Inuit Land Use Occupancy Project (ILUOP), based on interviews with trappers and hunters, led to the compilation of maps showing the extent of land use by Baker Lake hunters and trappers during three periods, the most recent being between 1956 and 1974. These two decades also represent the most settlement-based harvesting period. Of the 101 Baker Lake hunters who participated in the project, 99 indicated that they had hunted caribou during this period; the other 2 indicated that they had hunted caribou during the earlier periods. Moreover, the data indicates that caribou where hunted over 98% of the study area.

Four years later, during the 1978 DIAND interviews, 91% of the heads of households indicated that they had hunted caribou during the past few years; the remainder stated that although they had not hunted during the past few years, they had done so before 1974. Maps compiled on the basis of the interview data show that at least 80% of the study area was being used by the 43 heads of households surveyed.

While caribou hunting has traditionally been the primary land-use activity for Inuit in this region, it was still clearly identified as the community's primary concern in the 1978 study. Twenty years later, in the course of Hattie Mattik's 1998 interviews, all of the interviewees identified caribou as the primary food source that sustains their community, and fish as the secondary food source (SQ, SK). A number of interviewees indicated that there was less fish available in this region (SQ).

Caribou Populations

The barren-ground caribou that inhabit most of the area are traditionally divided into two populations named after the lakes near their main calving grounds: Beverly and Kaminuriak. These two populations are believed to account for essentially all caribou meat obtained by Baker Lake residents. Table 5.1 provides a sample of population estimates from 1978. Besides human error inherent in the difficult task of first distinguishing, then counting, animals almost constantly on the move, factors that account for the wide fluctuations in demographic estimates include: (a) variable ranges of the populations; (b) shifting population sizes due to variables such as the temporary coalescing of bands into larger groups and the fact that some males, yearlings, and non-pregnant females do not accompany the groups to the calving grounds; (c) the possible interchange between the populations and between the herds within them; (d) the timing of the counts (pre- or post- calving, choice of season, for instance).

Table 5.1: Population Estimates for Barren Ground Caribou, Baker Lake Region

Beverly Group	Kaminuriak Group
159,000 (1967)	120,000 (1950)
167,000 (1974)	40,000 (winter, 1957-58)
124,000 (1974)	63,000 (1968)
	61,500 (winter, 1974-75)
	42,000 (adults, 1976)

Source: IDS: 1978, p. 90-91

Barren-ground caribou roam throughout the greater part of the area, and the region is the site of all major caribou activities, for at least some members of the herds (spring and fall migrations, calving, post-calving aggregations, summer foraging, rut, and wintering). These activities were the basis for the identification of caribou critical areas: major migration corridors to calving grounds, calving grounds, areas where post-calving aggregations and movements occur, and important water crossings (IDS, Map 14).

The "Baseline Terrestrial Report" included in this EIS documentation series presents a more detailed perspective, based on more recent (1999, 2002 and 2003) observations. The report documents findings for the Regional Study Area (RSA), a 100 km x 100 km (10,000 km^2) region centered on the field camp (also the site of the future plant site), and the local study area (LSA), 91 km^2 that includes two sites: a 5 km radius area centered on the field camp and a 2 km radius area centered on the Vault gold deposit, located adjacent to the northeast border of the first site.

Results from the baseline surveys indicate that caribou are present in the Meadowbank area in all four seasons, but are observed in greatest abundance in the fall and in lowest abundance in the summer. Wildlife logbook entries also support this finding with higher numbers reported in spring and fall than in summer. The approximate density of caribou (caribou per km^2) within the RSA was estimated as 0.30 in spring (i.e., an estimated 3,000 animals in the RSA, based on numbers per survey kilometre and a survey corridor width of 600 m; over 95% of these were young males or yearlings), 0.01 in summer (100 animals in RSA), 1.69 in fall (16,900; 54% of these were females, 33% calves, and 13% males) and 0.75 in winter (7,500). These seasonal abundance patterns correspond to migration from post-calving areas to winter habitat (M. Campbell, Nunavut Department of Sustainable Development, pers. comm., 2002), and suggest that the Meadowbank area does not represent critical habitat during spring migration, calving, or post-calving (summer) periods. Incidental observations by camp personnel also support this assertion. Few or no caribou have been recorded during June when calving would be expected to occur, but there have been large groups of caribou observed in the Meadowbank area in the fall (e.g., 2000-3000 individuals were observed 1 km north of the field camp in October 2002).

Hunting & Migration Patterns

With respect to caribou hunting patterns, the area near the mine site was considered of low usage (1% to 32% of hunters reporting use of the area) for caribou hunting in 1978. However, the area within 50 km north of Baker Lake, including Whitehills Lake, was considered of moderate hunting usage (33% to 66% of hunters reporting use of the area), while the area within 10 km north of Baker Lake, all along the Inlet, was considered high hunting usage for caribou (67% to 100% of hunters reporting use of the area).

This study did not identify any critical areas for caribou protection within the Meadowbank property (the camp itself) or the winter road corridor (IDS, Map 14), but did recognize that non-critical areas

could still be damaged by development. Furthermore, it is important to note that caribou follow different migration routes in different years and to ensure that mitigation processes are applicable not only to the study area, but to their entire range. In relation to the Meadowbank Gold project then, general concerns exist surrounding the development of roads or other facilities, intensive human activity, habitat destruction, and low-flying aircraft, all of which could adversely affect the movements of caribou. To mitigate such potential impact, restrictions have been imposed on the proposed location and design of facilities. Also, to the extent practicable, aircraft altitude could be regulated, and the timing of human activities could be carefully coordinated with those of the caribou. Caribou seem especially sensitive to disturbances at water crossings.

Subsequent data from the 1999-2003 baseline wildlife survey corroborate these findings. In terms of caribou habitat suitability , the studies rated the Meadowbank area as high in winter, moderate to high in spring and fall, and low to moderate in summer. These habitat suitability rankings are for life requisites other than calving (e.g., foraging), because the Meadowbank area is not within any calving grounds. They also noted that there is evidence that Arctic tundra caribou make frequent and unpredictable winter range shifts (Ferguson et al, 1998; Buckland et al, 2000; Ferguson et al, 2001), thus, the importance of the Meadowbank area as winter range may vary over the long term.

In 1978, hunting occurred year round, but winter hunting was most intense. A decade earlier, most harvesting took place in the summer and fall. This observation reflected an increase in wintering caribou near Baker Lake, possibly due to climate change. Interviewees also noted wintering caribou in the Baker Lake region in 1998. One interviewee said that caribou linger north of the Meadowbank Property in the winter, move towards the northwest in early spring, become herds, roam back and forth in summer, then move southwards in October (ST).

In the context of Hattie Mannik's 1998 interviews, Inuit Elders from Baker Lake described the travel route of the caribou in this region. A wildlife study completed for Cumberland noted that the Meadowbank property lies in an overlap zone which may be used at various times by members of at least four different caribou populations. The comments received from interviewees likely reflect this overlap:

> *"In the spring, the caribou come from the southeast and head towards the northwest, but return another way during summer."* – (SQ)
>
> *"The caribou come from the east and head towards Inuggugayualik and Amarulik at caching time."* – (JN)
>
> *"They sometimes come from the north during spring, when their skins are good for clothing."* – (SQ)
>
> *"In the spring, the caribou head towards the south, in the summer some remain close to Baker Lake, and in October they herd towards the south."* – (ST)
>
> *"In the fall, they move towards the northwest, and in the spring they migrate towards the east."* – (NS)

> *"Caribou come from the west and move towards the eastern coast to calve. When they have shedded (July) they are moving towards the north or northwest, and when the skin on the antlers had shedded (September/October) they are moving southwards."* – (SK)

A number of interviewees commented that the caribou do not have a single route, but that they change their route in different areas and in different years (SK, SQ, JI). One Elder felt that this may be due to increased noise levels (ST). However, they also noted that if a caribou had recently been observed in one place, they would wait there because they knew it would return (SK).

Caribou travel north to their calving grounds in the spring when the weather is warm and the snow is slushy, and back to their winter feeding grounds south of the treeline in the fall at the same time as freeze up. The herds encounter rivers and lakes in their migration, and great caribou crossings, often in the same spot year after year (dictated by natural features such as narrows or a calm section of a river) which then become prime harvesting sites for the Inuit. At least some caribou are known to winter throughout the study area.

Harvesting

The 1978 interviews indicated a caribou harvest amounting to 1,329 for 40 heads of household. By multiplying this number of caribou harvested by sampled households by the ratio of the estimated population of hunter-families (760) to the population of sampled households (246), DIAND rounded off the annual caribou harvest by Baker Lake Inuit in 1976 to 1977 at 4,100. Analysis of interview data revealed that about 64% of this harvest occurred in winter, 9% in spring, 17% in summer, and 10% in the fall. The consumption of caribou meat was estimated to represent close to 70% of the total value of the wildlife harvest (caribou, fox, fish, and wildfowl) by the Inuit. (IDS, iv)

Other Sources & Elders' Concerns

Information conveyed by the Elders in the Tuktu and Nogak projects about traditional harvesting and uses of caribou, historical and current distribution and movements of caribou, caribou behaviour and predators, important habitats, and features of calving grounds is of a general nature and therefore relevant to this study. On the food preferences of caribou, they stated:

- caribou prefer areas where the tundra is lush and green
- caribou know which foods are rich in nutrients
- they eat grasses and birch and willow in summer; in fall and winter they eat lichen
- migration routes change when the caribou have eaten most of the lush vegetation in an area.

According to the Elders, migrating caribou follow a leader, which is generally a cow without a calf. During migration, caribou avoid areas of deep, soft snow. They select calving grounds that are rich in food, free of most ice and snow, and far from predators.

In a similar manner, the information shared by the Elders who participated in the Dogrib Treaty 11 Study is relevant to Cumberland's commitment relating to traditional knowledge. The Elders stated that they have a close and respectful relationship with the caribou. The caribou show respect by

travelling to the Dogrib from their calving grounds, which the Dogrib view as the home of the caribou. When the Dogrib harvest the caribou, the animal's spirit is reborn and the population will remain strong. The Dogrib demonstrate respect by only taking what is needed, using all parts of the animal, discarding unused parts respectfully and having and sharing knowledge of the caribou.

The first part of the study recorded oral narratives about places where caribou are found, and about caribou behaviour. The researchers reported that the Dogrib believe that it is human behaviour that is the most important factor affecting caribou migration. The Elders did not claim to be able to predict where caribou will go or how they may react in a new situation, such as mines and associated development activities. They have observed that caribou become used to loud noise from aircraft, and that caribou will stand on land cleared for development, perhaps because there is no cover for predators. They are concerned that caribou would become so accustomed to mining activities that they may roll in contaminated tailings instead of their usual mud as a means of insect avoidance. They are also concerned that caribou in grazing mode may change their movement patterns to avoid noise or other distractions associated with mines.

Elders emphasized the importance of smell to the caribou, and explained that caribou follow the smell of the most lush vegetation and don't go where fires have been because they can't smell their food, but instead smell burnt vegetation. They stated that migration is dependent on the state of the habitat, and that caribou always go to the best vegetation available in any given year; some Elders worry that caribou may alter their migration routes due to the smell of oil and gas from developments, which may overpower the smell of the food source that normally helps guide the animals to the best range.

Caribou's keen sense of smell and the key role it plays in its survival was alluded to by a Baker Lake interviewee worried about the potential for pollution from the mine: "Even when a place seems really clean, the smell of fuel and diesel is going to be around for a number of years, especially the fuel. And the land will be soaked with fuel so the land will smell even though the area looks clean. I would like [Cumberland] to be careful not to spill too much fuel." (ST)

Hunting and trapping activity in the Meadowbank area is limited (ISL, 1978), primarily because of its distance from Baker Lake, and because of the relatively low abundance of target species. However, important traditional caribou hunting areas do occur throughout the region according to the Baker Lake Hunters' and Trappers' Organization (HTO) (see Cumberland's "Baseline Terrestrial Ecosystem Report") and the Beverly and Kaminuriak barren-ground caribou that inhabit most of the area are believed to account for essentially all caribou meat obtained by Baker Lake residents, hence the crucial importance of protecting these populations from serious, development-related conflicts. Four types of areas have been identified as critical for sustaining these populations; they relate to major caribou life-history phases: spring migration routes, calving grounds, post-calving ranges, and main water-crossing sites. (Map 14, IDS). Immediate and long-term serious effects on the caribou populations and distribution, arising from development, must be considered in the following areas:

- two broad migration corridors used by calving herds of the Beverly and Kaminuriak populations enroute to calving grounds
- the calving grounds of both populations

- two broad zones where post-calving reaggregations of both populations are thought to occur
- several river and lake crossing sites traditionally used by the two population during annual movements.

Major concerns refer to the potential for general disturbance/harassment and diversion or blockage of movements in these areas. Inuit insist on the importance of maintaining the integrity of the calving grounds to ensure the viability of the herds. The Dogrib Treaty 11 Council emphasized the fact that caribou habituate to human activities makes them vulnerable to expose and/or contamination from tailings and other byproducts of mineral activity.

5.2.2 Air

As part of the EIA, an air quality impact assessment will be carried out for the proposed Meadowbank Gold property in line with Canadian and Nunavut permitting requirements. The work plan will include the preparation of a site plan, a description of activities carried out on site, a description of meteorological date and methodology, the development of an emission inventory, the assessment of background concentrations, dispersion modeling, and the calculation of site-specific emission limits. A noise impact assessment will also be carried out to determine the potential noise impact for each phase of the project, evaluate mitigation measures, and assess the impact of the proposed changes to ambient noise levels on humans and wildlife. Lastly, mitigation measures will be proposed.

Concerns related to air quality referred to human activities that were perceived to compromise the quality of the air. More specifically, increased wind-blown dust and sand caused by motorized equipment and increased human activity in the area was perceived to be an eye and lung irritant, especially for older people. Altered air quality was also attributed to emissions from fuel burning vehicles. Climate change was also implicated in the deterioration of air quality: forest fires that were judged to be increasingly frequent due to the "drying of the tundra," created irritating smoke even though they originated much further south, below the treeline.

Nunavummiut are concerned about noise-generating activities and their impact on the environment, especially certain wildlife species. Although caribou were pointed out as being more accustomed to noise than other species, females about to have their young are very sensitive. Fish, on the other hand, continue to be easily spooked by even low levels of noise. Noise from motorized vehicles is also perceived as being detrimental to the hearing of the people who are exposed to it on a daily basis.

5.2.3 Climate Change

Climate change has been called the most significant environmental issue the world has ever faced. Scientists are now projecting with some level of confidence that the warming of our earth's climate will be much greater in our polar regions. In effect, the Canadian Arctic, where a slight variation in temperature can generate both local and widespread effects, is defined by climate. The Nunavummiut who live in this harsh climate are keen observers of the natural environment on which they depend for food. Their detailed and often exquisite knowledge of animal behaviour and biology, particularly of harvested species, and ecological relationships constitutes a complex set of indicators that illustrate the state and health of the natural environment and the impacts of climate change in the North. The

Inuit's first-hand experience of the rhythms, cycles, and subtle changes to the environment makes them excellent interpreters of climate and climate change.

Given the dramatic changes observed by the Inuvialuit of Sachs Harbour on Banks Island, the International Institute for Sustainable Development (IISD) and the Hunters and Trappers Committee of Sachs harbour initiated a two-year project in 1999 to document the problem of Arctic climate change. The approach combined participatory workshops, interviews, community meetings, and fieldwork in an effort to record and understand the local knowledge of climate change. Key observations related to delayed freeze-up; earlier spring thaw; smaller multi-year sea-ice and thinner, broken-up winter sea ice; frequent severe storms in the fall; melting permafrost in summer, leading to large-scale slumping of the coastline and the shores of inland lakes, and shifting foundations of buildings in Sachs Harbour; and, new species of birds, fish and insects.

In response to similar concerns about the long-term impacts of climate change, Nunavut Tunngavik Incorporated (NTI), the Inuit organization mandated to implement the 1993 Nunavut Land Claims Agreement, hosted a two-day workshop in Cambridge Bay in March 2001 to collect knowledge about climate change from Elders and hunters from 15 Nunavut communities. The Elders met with members of NTI, Nunavut's three Regional Inuit Associations, the Nunavut Planning Commission, the Nunavut Impact Review Board, and the federal and territorial governments to recount their experiences with short- and long-term weather and seasonal patterns in Nunavut, and how these are affecting the lifestyle of Inuit. The participants noted widespread environmental change in Nunavut as a result of altering climate and weather. These observations included melting permafrost, retreating glaciers and ice sheets on Baffin Island, new species of birds in summer, longer ice-free seasons in Hudson Bay, shorter snowmobile travel seasons over sea-ice, more pronounced wind storms, and strengthening sun. Elders joked about the need for Inuit hunters to use stronger sunscreen lotion, which suggests growing problems with UVB radiation. The workshop concluded that Inuit must prepare themselves for climate change and the social and economic developments that will surely follow, particularly the use of the Northwest Passage by general cargo vessels.

Such comments and observations echo those revealed by Hattie Mannik's interviewees and participants at Cumberland's public consultation meetings. The most common observations made regarding climate change refer to:

- earlier spring break-ups, longer summers, and shorter winters
- thinning ice
- decreased snowfall
- increased diversity and abundance of flora
- shifts in caribou migrations
- changes in the habitat and range of caribou, grizzly and polar bears
- increased unpredictability and variability of the weather.

To the extent practicable, these well-documented observations of climate change will be incorporated in the development, monitoring, and mitigation plans of the proposed development.

The participating Elders from the Tuktu and Nogak Study likewise expressed their views on the effects of climate change. They have noticed a warmer climate in the 1990s with an earlier spring and later fall. In particular shore leads have been opening earlier, the ice is thinner, water levels have dropped, and the vegetation is larger and more lush. The caribou have shifted their migration to these areas of larger, lush vegetation, and this has been a positive effect for the caribou. The earlier melting of ice in rivers, lakes and the coast has also resulted in changes to migration routes, and caribou now seem to be avoiding rivers as the rushing water filled with large chunks of ice is dangerous for them. Elders also believe that earlier melting is resulting in caribou falling through thin ice where it used to be thick, and that the incidence of drowning is increasing. They also noted that there seem to be more freeze-thaw cycles, which leave vegetation coated in ice and much less accessible to caribou for food.

5.2.4 Permafrost

Permafrost is defined as ground that remains at or below 0°C for at least two years (Permafrost Subcommittee, 1988). Permafrost does not necessarily contain ice; rather, its definition is based solely on temperature criteria of the mineral or organic parent material. It is a significant feature of the Meadowbank area, which is located well within the zone of continuous permafrost to depths on the order of 550 m depending on proximity to lakes. With an annual average air temperature of -11.1°C, over 90% of the area is expected to be underlain by continuous permafrost, lake induced taliks (areas of unfrozen ground where water depth is greater than about 2.0 to 2.5 m) and thaw bulbs being the exceptions.

Permafrost in this area is considered stable and has temperatures colder than -5°C (Trenhaile, 1990). The permafrost generally has a low ice content, estimated at between 0% and 10% (ESWG, 1995). Depth of the permafrost in the Meadowbank area is estimated to be between 400 and 500 m based on thermistor data from the Meadowbank area. To date, 22 thermistor cables have been installed at various locations around the site (for instance, at the proposed Plant site, at several of the abutment areas of the proposed dewatering dykes and tailings dykes, at various deposit sites) since 1996; they characterize and monitor the thermal conditions and permafrost at the project site. The data collected from the thermistors installed at the site in 1996 and 1997 indicate there are no significant variations in the permafrost thermal regime to the depths recorded by these installations over the period of seven years for which data have been collected. Based on this information the permafrost thermal regime at the site appears to be in close to a steady state.

The active layer depth in the project areas currently ranges from about 1.3 m in areas of shallow overburden and away from the influence of lakes, up to 4.0 m adjacent to lakes, and up to 6.5 m beneath the stream connection Third Portage and Second Portage lakes. Third Portage and Second Portage lakes will have taliks extending through the permafrost. Much of Vault Lake freezes to the lake bottom; consequently the talik beneath Vault Lake is considered to be isolated.

Studies by Smith (2001) indicate a warming trend in the mean annual ground temperatures at Baker Lake, accompanied by an increase in the thaw depth. Under climate warming scenarios, the active layer is expected to increase in thickness therefore data should continue to be collected at the Meadowbank site. As an inland community, Baker Lake is not subject to the type of large-scale coastline slumping resulting from climate change and experienced in areas such as Sachs Harbour.

5.2.5 Water

Water is the most important element of life, as it ties all of life together. Indeed, it is upon the water that all other valued features in the region depend. Consequently, water quality must be strictly maintained and interpreted not only in terms of human consumption but as an integral component of the ecosystem.

> *"I used to travel around here when I was younger. We are mostly concerned about the water. Water is important for everything. I heard on the news that water down south is contaminated. This region is the last resource of clean water. We must make sure that it stays good and clean."*

> *"This water is important because of all the fish and drinking water. Everywhere you go through all these lakes there are lots of fish - whitefish, grayling, loche, pike and lake trout."* – Elders in Snap Lake project area expressing their opinion of potential impact of the De Beers diamond mine.

The Meadowbank project is located close to the divide between the Back River basin, which flows north into the Arctic Ocean, and the Thelon River basin, which flows east into Hudson Bay. The principal Meadowbank deposits that are proposed for development are located within the Thelon Basin, in the drainages of Third Portage Lake and Second Portage Lake, which drain easterly into Tehek Lake. Tehek Lake in turn empties into the Tehert River, a tributary of the Quoich River, which flows into Chesterfield Inlet, an arm of Hudson Bay.

These lakes and waterways serve as important flyways and staging areas for many types of migratory birds as they travel to their nesting grounds in the north and their winter feeding ground in the south. They are also the habitat of freshwater fish, one of the staples of the traditional diet of Baker Lake residents and an important food source for their dogs, and an ecosystem supporting aquatic plants. Changes in these vital environments, such as temperature, water and sediment quality, and biota, can all affect fish communities and aquatic organisms.

The 1998 interviewees expressed some concern that lakes would be polluted by mining activities. One interviewee noted that he would not want to see fishing lakes polluted (ST), and another commented that the road following the lakes would be acceptable as long as there was no drilling done in the areas (SQ).

At a March 2003 impact meeting, in Baker Lake, Cumberland's representative stated that "monitoring since 1995 for water quality indicates no detrimental effects." During the second round of interviews in 2004, community members continued to express their concern about water quality as it relates to the use of cyanide during mining (AI, JI, HM, TM, TrM) and to fish habitat (WI, JT).

> *"The only concern I have is the chemical cyanide that is going to be used to wash minerals; it will be difficult to keep it from getting spilled on land and water which might cause damage or pollute the land or water."* – (TM)

> *"I also know that we have the most precious fresh water, knowing it will not be affected right away, but when these cyanide chemicals are going to be draining into lakes and rivers, so when that happens the fresh water will not be good to drink, and dirty, that it will not be a*

pleasant thing to look at. I also know that once the pollution goes, it will not be only in one spot." – (HM)

5.2.6 Mammals

Many species of fur-bearing mammals were traditionally harvested by the Inuit and constituted a crucial raw material for clothing as well as an important trade item. Though trapping activity in the area has decreased in intensity, fur-bearing animals continue to play an important role as essential elements of the Inuit way of life and its practice helps perpetuate the traditional knowledge of their land-based culture. In addition, the identity of the trapper remains a vital archetype in Inuit culture.

Trappers are active on the land throughout the year. However, activity slows down considerably during spring break-up and fall freeze-up, as well as during the period of most intense cold and darkness (late December to early February), when travel is restricted and people largely confined to the hamlet.

More specifically, hunting and trapping activity in the Meadowbank area is limited (ISL, 1978), primarily because of its distance from Baker Lake, and because of the relatively low abundance of target species.

In a 1975 survey of 30 households, Stager (1977:149) reported that 44% of households trapped, but that 76% of these usually set less that 15 traps. A few years later, the data collected through DIAND's 1978 interviews indicated that fox trappers were using, at the time, at least 45% of the study area (IDS, iii). The majority of adult males in Baker Lake were, to some extent, involved in fox trapping, and that most were casual trappers harvesting only a few foxes close to the hamlet. Of the 43 heads of households interviewed, 29 had trapped since the mid-1970s; the others had trapped prior to 1974. Arctic foxes account for over 99% of foxes harvested; coloured (red) foxes make up the remainder. The area north of Baker Lake to Tehak Lake was identified as being of low use for fox trapping, although traplines and trapping areas did occur in the vicinity of the mine site. The arctic fox harvest for 1978, based on an analysis of the NWT Government Fish and Wildlife Service fur records, was estimated to be 790.

Most foxes are harvested in December and later in the winter (March-April) from outlying areas. Trappers who travel to outlying areas often add fishing and hunting to their activities and use fish or caribou offal for bait. ILUOP maps indicate that fox trapping occurred over about 60% of the area from 1956 to 1974 and over approximately 50% of the study area in 1978. The area used by the highest number of trappers was around the west end of Baker Lake and towards Pitz Lake. To a large extent, this area was used by casual trappers who generally harvested less that 10 foxes per years. Outlying areas to the north and east along the north shore of Baker Lake and toward Whitehills Lake and to the south, along Kazan River, were relatively well used by trappers. It is important to note that it is possible that a substantial portion of the fox harvest may originate from outlying areas used by very few trappers; the number of trappers reporting use of an area is thus not necessarily an accurate measure of the relative importance of fox trapping for that area.

Some 1998 interviewees indicated that foxes were hunted (SQ, ST). Certain species, such as wolves, polar bears, grizzly bears, wolverines, and seals, are taken in an incidental manner in the course of caribou hunting or fox trapping; they are not considered specific targets of harvesting by the Inuit in

the area. For instance, two interviewees stated that wolves and other animals were hunted irregularly, only when people were hungry (ST, JI). Another alluded to the difficulty of harvesting wolves: "It was the beginning of spring, and at times my brother would catch wolves, but most of the time the wolves were hard to get close to..." (SP) One interviewee noted that they never used to catch bears or musk ox because they were never seen (JI).

Permanent residents of the area and highly mobile, arctic fox move over a wide-ranging area most of the year except during the denning period. Although no critical areas were identified for arctic fox, dens and denning habitats must be avoided. Given that much of the region offers an abundance of suitable denning habitat, this should not pose a problem to development.

According to the 1978 DIAND study, foxes, wolves, some polar bears, grizzly bears, wolverines, and seals have been taken in this area. This study identifies the area north of Baker Lake to Tehak Lake of low use for fox trapping, although traplines and trapping areas did occur in the vicinity of the mine site.

Table 5.2 shows the average annual game and fur harvests for Baker Lake for 1969-1977.

Country food is very important to the local economy. In 1975, the harvest of country food included 2,600 caribou, 325,000 lb of fish, 150 geese, and 50 rabbits (Beak, 1989). This would have supplied a per capita amount of about 430 lb of caribou and 270 lb of fish (assuming much of the fish was used for dog food) (Beak, 1989). The food would have represented about 38% of the annual need for the hamlet (Beak, 1989).

Table 5.2: Average Annual Game & Fur Harvests for Baker Lake

Mammal	Number
Caribou	1,584.0
Geese	67.5
Ducks	16.1
Ptarmigan	625.0
Arctic fox	790.0
Coloured (red) fox	46.0
Wolves	29.1

Source: NWT Government Records for 1969-1977

In a 1989 social survey, it was reported that 86% of the families had harvested caribou in the previous season, with an average harvest of 18 caribou per family (Beak, 1989). The survey also reported that 73% of these families relied on fish, 41% on birds, and 37% on furbearers as a source of food (Beak, 1989).

In 1993, 50% of the residents over the age of 15 hunted and fished, 20% made crafts, and 4% trapped (GNWT Bureau of Statistics, 1994).

Joe Neigo of the Department of Sustainable Development in Baker Lake reported that a large family of seven or more persons might harvest 30 caribou a year (Pers. Comm., 2003). The land-based economy of hunting, fishing, and trapping, although important to the local economy, is not reported by Statistics Canada

Muskox

While the Muskox is listed as secure in Nunavut (Government of Nunavut, 2001), the species is sensitive to disturbance and over-hunting and has only recently begun to re-establish populations in parts of Nunavut (Campbell and Setterington, 2001). Baker Lake residents suggest that the muskox

herd has increased since the 1960s, and may have moved into the Meadowbank area from the Thelon Wildlife Sanctuary.

Results from the baseline surveys indicate that Muskoxen are present in the Meadowbank area in small numbers throughout the year. Muskoxen were recorded at densities similar to caribou in all seasons (see 5.2.1). Ground surveys were conducted in summer and fall 2002 and in winter 2003. Between 300 and 400 animals are estimated to be present within the RSA in any given season.

Muskoxen feed on grasses and sedges in the winter (Nellemann and Reynolds, 1997; Gunn and Sutherland, 1997). They are known to move to higher windswept terrain in the winter where forage is more accessible (Banfield, 1974; Nellemann and Reynolds, 1997). In northeastern Alaska, muskoxen showed a preference for rugged terrain in the late winter as less snow made access to forage easier (Nellemann and Reynolds, 1997). In contrast, on Victoria Island in the High Arctic, muskoxen pellet sign was most strongly associated with lowland vegetation in the winter (Schaeffer et al ,1996). The impact of snow load on forage accessibility is unlikely to be a significant concern in the Meadowbank area during a typical winter. Muskox winter habitat use in the Meadowbank area is likely intermediate between that observed in Alaska and that observed in the High Arctic.

In the summer, these animals feed on willow and sedges as they are greening up (Nellemann and Reynolds, 1997; Gunn and Sutherland, 1997). Gunn and Sutherland (1997) found that single bulls and bachelor groups used the immediate vicinity of waterbodies more often than any other age or sex class. Small waterbodies, are relatively common in the Meadowbank area; the fringes of these waterbodies may support Muskox forage such as sedges.

During the fall, the majority of observations of muskoxen in the Meadowbank area were associated with heath tundra, and to a lesser extent, lichen-rock habitat. There was also a single observation associated with esker habitat.

Information on spring and fall habitat use by muskoxen in the eastern Arctic was not found. Habitat use in these seasons is presumed to be similar to that of other seasons, that is, wetter habitat types that support abundant sedges and grasses are preferred.

The Meadowbank study area are ranked the same for muskox habitat suitability – low to moderate in spring, fall, and winter, and moderate in summer.

Grizzly Bear

The grizzly bear is designated as sensitive in Nunavut (Government of Nunavut, 2001). There is no demographic data for grizzly bears in Kivalliq.

Grizzly bears are distributed across most of mainland Nunavut except for the northeast (including Boothia and Melville Peninsulas) and the coastal fringe south of Chesterfield Inlet (McLoughlin, 2001). They are also found on some of the larger islands. Population density decreases from west to east, but traditional knowledge suggests that the grizzly bear's range is expanding east (McLoughlin, 2001). Information on the ecology of the grizzly bears in Kivalliq is extremely limited (McLoughlin, 2001).

Baseline surveys indicated limited use of the Meadowbank area by grizzly bears. The only observation was a sow and two cubs observed in spring of 1999. Evidence of bears digging out arctic ground squirrels was noted in a few locations in the RSA; however, no grizzly bear dens were identified in the study area. These data are consistent with what would be expected for grizzly bears in the north, given that this is a wide-ranging species that occurs at low densities (e.g., 3.5-individuals/1,000 km^2 in the west Kitikmeot-NWT border area [McLoughlin, 2001]).

Research by Gau et al (2002) in the central Canadian Arctic indicated that caribou are a very important food for barren-ground grizzly bears, particularly during spring and fall migration when caribou were plentiful in the study area. The relatively low abundance of caribou in the spring and summer in the Meadowbank area suggests that the area may not be particularly high value for grizzly bears at this time of the year. In the fall, when caribou are more abundant, the Meadowbank area may have higher value for grizzly bears. Otherwise, any bears in the area may be relying more on plant matter and arctic ground squirrels than on caribou. Arctic ground squirrels frequently occurred as a food item in all active seasons in the central Canadian Arctic (Gau et al, 2002). No observations of grizzly bear habitat use in the Meadowbank area were collected during the baseline surveys.

The Meadowbank study area is ranked the same for grizzly bear habitat suitability—low to moderate in spring, summer, and winter, and moderate in fall. Females with cubs may find the area of higher value than any other sex, age, and reproductive classes because of the potential for avoidance of adult males.

Wolf

The wolf is listed as sensitive in Nunavut (Government of Nunavut, 2001). Wolf populations are stable or increasing within their range, except in northern Alberta and some parts of the NWT (Hayes and Gunson, 1995). Baker Lake residents have indicated that the wolf harvest in the Meadowbank area has increased in recent years; however, regional population numbers and trends remain poorly understood.

Woves are distributed throughout the NWT and Nunavut (Banfield, 1974). Their patterns of distribution, densities, territory boundaries, and dispersal movements are influenced by interactions between packs, and by prey abundance and distribution (Fuller and Keith, 1980; Ballard et al, 1987). Densities in northern Canada have been recorded as low as one wolf per 944 km2 (van Zyll de Jong and Carbyn, 1998).

The annual ranges of arctic wolves are much larger than those of wolves that rely on resident rather than migratory (i.e., barren-ground caribou) prey (Walton et al, 2001).

Wolves apparently reproduce in the area as two young pups were observed with two adults during the fall 2002 RSA survey. Incidental observations of wolves have been made regularly close to camp during most months of camp operation. Wolves tend to be observed farther from camp than foxes.

Caribou are essential to the existence of wolves in the Arctic. In the Thelon River area, caribou was the main prey species in the spring and summer (Kuyt ,1972). Other prey items (i.e., muskoxen, ermine, wolverine, wolf, fox, arctic hare, arctic ground squirrel, lemmings, voles, geese, ptarmigan,

fish, and insects) were taken only rarely during that period (Kuyt, 1972). In winter in the same area, wolves appeared to feed almost exclusively on caribou (Kuyt ,1972).

During the fall, the majority of observations of wolves in the Meadowbank area were associated with lichen-rock habitat, although a few observations were also recorded in transitional and heath tundra habitats.

In the Meadowbank area, caribou is the only ungulate that occurs in sufficient numbers to support wolves; therefore, prey (i.e., caribou) availability, rather than habitat availability, is most likely to be the determining factor regarding the suitability of the Meadowbank area for wolves. For this reason, wolf habitat suitability in the three study areas reflects caribou abundance patterns—moderate in winter and spring, very low in summer, and high in fall. The apparently limited denning habitat in the area also accounts for the very low ranking for wolf summer habitat suitability.

Wolverine

The wolverine is listed as sensitive in Nunavut (Government of Nunavut, 2001). Wolverine is an important furbearing species for residents of Baker Lake, and the maintenance of a healthy population of the species is important for local trappers.

Wolverines are solitary animals that occur at densities that are generally low relative to other carnivores (Banci, 1994). Trapping data indicate that wolverine populations have decreased in many regions of the NWT in the last 20 years (Banci, 1994; Peterson, 1997); however, population estimates for the NWT (including Nunavut) suggest there is a stable (or increasing), sparsely distributed population of more than 3000 animals (Dauphiné, 1989; NWTRWED, 2001a). Wolverines are less abundant in the eastern Canadian Arctic than in the west and central Canadian Arctic (Dauphiné, 1989).

Records of wolverine sightings or their sign were infrequent in the Meadowbank area. Camp personnel observed a lone wolverine south of camp in April 2002, and wolverines have been seen in the Aberdeen area in groups of five or six during March and April. Similar to grizzly bears, the limited evidence for wolverine in the area is not surprising given their wide-ranging movements and characteristically low population density.

Food availability is the fundamental factor influencing movement patterns and home range selection by wolverines, although the habitat use patterns of adult males are also influenced by breeding activities (Banci, 1994). During the winter, wolverine distribution is determined by the distribution of ungulates because wolverines rely on the availability of ungulate carrion (Banci, 1987). Wolverine productivity is therefore closely tied to the status of caribou and wolf populations (Dauphiné, 1989; Mulders, 1999).

No observations of wolverine habitat use are available for the Meadowbank area. Given the link between wolverines and caribou, with respect to food availability, wolverine habitat suitability in the RSA is ranked according to caribou abundance—moderate in spring and winter, low in summer, and high in fall. The lower coverage of potentially important wolverine habitat (e.g., lichen-rock community associations) in the project area and winter road corridor reduces wolverine habitat suitability in these study areas to low to moderate in winter and spring, very low in summer, and moderate in fall.

Arctic Fox

The arctic fox is considered secure in Nunavut (Government of Nunavut, 2001). Population numbers show dramatic fluctuations with peaks approximately every four years, following lemming population peaks (Novak et al, 1987). The population size in Nunavut is unknown.

Arctic foxes are widely distributed throughout the tundra regions of northern Canada (NWTRWED, 2001b). The natural southern limit of their distribution is the treeline, but some foxes venture into the boreal forest, especially when their food supply becomes limited on the tundra (NWTRWED, 2001b). Arctic foxes are known to make long distance movements on land or across the sea ice (Eberhardt and Hanson, 1978; NWTRWED, 2001b).

Arctic foxes were observed infrequently during the baseline surveys in the project area (5 or fewer observations). No foxes were recorded during the winter survey. Camp personnel, however, have regularly observed arctic foxes close to camp and in and around camp buildings during most months of operation, including winter. There were no observations of arctic foxes during the RSA baseline aerial surveys. The apparent low abundance of foxes in the Meadowbank area may be due to poor survey detectability, or to the population being in the low phase of their population cycle at the time of the baseline surveys. Six fox dens were positively identified in the RSA, although numerous canid dens of unknown species have been recorded there.

Arctic foxes are dependent on dens for rearing their young (Smits et al, 1989). Den sites in central Kivillaq typically occurred on sandy, well-vegetated gentle slopes (Macpherson, 1969). Areas where eskers or moraines overlooked broad valleys or river flats appeared to have the most den sites (Macpherson, 1969). No observations of arctic fox habitat use are available for the Meadowbank area. Similar to the large carnivores, prey (e.g., small mammals) availability is a significant factor in determining habitat suitability for the arctic fox. Extrapolating the moderate to high suitability of the LSA for lemmings and voles to the RSA/winter road corridor, and considering the potentially limited availability of denning sites, arctic fox habitat suitability in the study area is likely moderate in all seasons.

Ermine

The ermine is considered to be secure in Nunavut (Government of Nunavut, 2001). It is considered an important species for local trappers.

The ermine is circumboreal in distribution, and is found throughout the Canadian Arctic (King, 1983). Ermine populations fluctuate in relation to changes in prey abundance (King, 1983). Data on the ecology and demography of the arctic ermine are very limited.

There is some evidence of the presence of ermine in the Meadowbank area. Tracks were recorded in spring 1999 in the project area, and camp personnel have observed an ermine around camp twice in mid-May 2002. In June 2003, an ermine was observed during surveys for breeding birds. Despite relatively few sightings, it is likely that ermine are relatively common in the Meadowbank area.

In cold climates, ermine hunt under the snow, and their diet may be almost entirely lemmings and voles (King, 1983). In the winter, ermine will occupy the nests of their prey (Reid and Krebs, 1996).

No observations of ermine habitat use are available for the Meadowbank area. Given the relatively small annual range of the ermine, habitat suitability was assessed for the LSA only. Ermine distribution is closely related to that of lemmings and voles. For this reason, ermine habitat suitability is ranked from moderate to high in all seasons.

Arctic Hare

The arctic hare is considered to be secure in Nunavut (Government of Nunavut, 2001). The species is widely distributed north of the treeline in Canada (Best and Henry, 1994; Atlantic Canada CDC, 2003). Hares in the southern part of their range may move into the boreal forest in the winter (Best and Henry, 1994). Likely predators of the arctic hare in the Meadowbank area are raptors, arctic foxes, wolves, and wolverines.

Arctic hares were recorded in relatively small numbers in the spring, summer, and fall in the project area (2-25 observations). They were, however, the most frequently observed mammal species, after caribou, in the project area in the fall. The apparent greater abundance of hares in the fall relative to the other seasons is likely the result of increased detectability (i.e., white hares are visible against dark vegetation) rather than an indication of high productivity. Camp personnel frequently observed hares in camp throughout the operating period.

During the fall, the majority of observations of arctic hares in the Meadowbank area were associated with lichen-rock habitat and, to a lesser extent, heath tundra. Given the relatively small annual range of the arctic hare, habitat suitability was assessed for the project area only, where it was ranked as high in all seasons.

Arctic Ground Squirrel

The arctic ground squirrel is considered to be secure in Nunavut (Government of Nunavut, 2001). Arctic ground squirrels are found throughout the northern boreal forest and Arctic tundra (Hubbs and Boonstra, 1997); however, information on the abundance and distribution of this species in the Arctic is scarce. The main predator of the arctic ground squirrel in the Meadowbank area is likely the grizzly bear, which is easily capable of excavating squirrel colonies.

Arctic ground squirrels were recorded in relatively small numbers in the spring, summer, and fall in the project area (4-15 observations). They were, however, the most frequently observed mammal species in the summer. Camp personnel recorded no observations of arctic ground squirrels until mid-May, when a few individuals were reported in and around camp. Ground squirrels were observed regularly during June 2003 breeding bird surveys. Arctic ground squirrel burrows were observed occasionally during off-transect aerial surveys along three eskers in the RSA.

During the fall, all observations of arctic ground squirrels in the Meadowbank area were associated with either heath tundra or eskers. Burrows noted during baseline surveys were typically concentrated in areas with sandy substrates suitable for digging, such as eskers or grassy slopes. Given the relatively small annual range of the arctic ground squirrel, habitat suitability was assessed for the project area only, where it was ranked as moderate in all seasons.

Collared Lemming

The status of the Collared lemming in Nunavut is undetermined (Government of Nunavut, 2001).

Although the collared lemming has not yet been confirmed in the Meadowbank area, it is highly probable that it occurs there. Likely predators of this lemming in the Meadowbank area are rough-legged hawk, arctic fox, and ermine. Grizzly bears, arctic ground squirrels, and snowy owls may also prey on this species (Reid et al, 1995).

Northern Red-Backed Vole

The status of the northern red-backed vole in Nunavut is undetermined (Government of Nunavut, 2001).

The northern red-backed vole is found throughout much of northern Canada. It has been recorded incidentally six times in the Meadowbank area, and is expected to be common throughout the area.

Likely predators of this vole in the Meadowbank area are rough-legged hawk, arctic fox, and ermine. As with the collared lemming, grizzly bears, arctic ground squirrels, and snowy owls may also prey on this species.

Northern red-backed voles occur in all tundra habitats except those that are exclusively sedges and grasses (Martell and Pearson, 1978). Given the relatively small annual range of the northern red-backed vole, habitat suitability was assessed for the project area only, where it is apparent that suitable habitat for this generalist small mammal exists throughout and habitat suitability is ranked as high in all seasons.

5.2.7 Fish

Like caribou, fish are more important to the people of Baker Lake than to Inuit in coastal areas who can rely on seals for food. Although it is limited during freeze-up and break-up, domestic fishing by Baker Lake residents is a year-round activity and occurs over much of the area.

Approximately 80% of the individuals from Baker Lake who contributed to the compilation of the ILUOP maps in 1974 pointed out fishing areas. It is likely that a few more fished while they were hunting or trapping.

One year later, Stager (1977:155) reported in his survey of 30 households that 25 of them practiced domestic fishing (84% fished in the spring, 63% in the summer, 63 in the fall, and 75% in the winter). He also concluded that domestic fishing was a wide-ranging activity that was practiced throughout the study area and yielded, for the period, 346,900 lbs (157,400 kg) of fish.

The importance of fishing was once again underscored in DIAND's 1978 study. Indeed, at least one member of almost all families in Baker Lake fished for food. Of the 43 heads of households interviewed, 41 reported that they were involved in domestic fishing to some extent every year and many said that their wives and children also fished. The study concluded that Whitehills Lake was of moderate to low fishing use, and Tehak Lake was considered of low use (mostly in association with

hunting). Around the Baker Lake shoreline, fishing use was moderate, and high usage occurred near the mouth of the Thelon River. The rest of the Inlet was considered low usage. At that time, lake trout accounted for approximately half of the domestic harvest, with arctic char and lake whitefish accounting for most of the remainder. Key fish species used by Inuit in this region include lake trout, arctic char, lake whitefish, and lake cisco (IDS, 1978). Domestic fish harvest being difficult to estimate, DIAND chose to focus on fish consumption instead. Interview data led to the conclusion that approximately 20% of the meat diet of Baker Lake residents was made up of fish. Using meat consumption data compiled for other communities as guidelines, DIAND concluded that the total fish consumption by humans would reach 140,000 lbs (65,000 kg) for Baker Lake's 1978 population of 785.

Tehak Lake, Whitehills Lake, and Baker Lake/Inlet were available for commercial fishing during the early 1970s (for closed Rankin Inlet cannery).

Fishing continues to be an important food harvesting activity in summer, during which casting is the predominant method, and the Thelon and Kazan Rivers, as well as Baker Lake, are the most widely used areas. Baker Lake is also the scene of net fishing in the summer. In effect, longer days and warmer weather make travel more comfortable in the spring and families often camp at the mouths of rivers along Baker Lake to fish during this season. Jigging is the preferred fishing method, and is most often practiced during weekend spring trips to Whitehills, Pitz, and Gull lakes.

The intensity of fishing gradually diminishes in the fall, but never disappears altogether. Whitehills and Amarulik lakes are important winter fishing areas. Hunters and trappers in outlying areas continue to fish for food and bait, relying on jigging and nets.

Slow fish growth rates in the area are a result of the low productivity of the waters in the area (due to low water temperatures and limited dissolved solids). On the other hand, the fish live longer and mature later than those at more southern latitudes. While the standing crop of fish in unexploited waters is often large, local populations are readily susceptible to overharvest. Of the fourteen species of fish found in the area, only four (lake trout, arctic char, lake whitefish, and lake cisco) were subject to commercial or domestic harvest in 1978. Approximately half of the domestic fish harvest seems to be made up of lake trout; arctic char and whitefish account for the remainder of the harvest. Lake cisco and grayling are caught only incidentally.

Easily dried and conveniently cached, fish were traditionally relied upon as food source both for the dogs and the people and, according to many of Hattie Mannik's 1998 interviewees, saved the lives of many people during the starvation period in the early 1950s when cached meat was gone (SK) or when caribou were scarce: "I grew up with only fish. Sometimes [my father would] catch caribou in winter, but there were hardly any caribou so he always tried to fish." (WTP). Another interviewee commented that not a lot of regular fishing was done north of Baker Lake (JN), but most of the Elders commented that people still fish in the lakes. The whitefish in Kavihililik Lake was the only specific fish noted by interviewees (SK).

The Elders interviewed by Hattie Mannik discussed the methods used to capture fish, the types of fish in the area, and the lakes and rivers where they were caught.

> *"In the winter we would fish using hooks and fish spears and fish baits...Those spears were also used for fishing in weirs."* – (JT)

In response to Hattie's question as to what his main source of food was, all interviewees spoke of fish. This Elder's response is typical: "Fish, when we have bullets for the 22 rifle, we would kill ptarmigan and when there are no caribou, we had ptarmigan, fish." (JN)

DIAND's 1978 study identified four critical areas where fish populations were believed to be vulnerable to either direct or indirect impact from development activities. Land-use controls should focus on the following areas:

- Baker Lake, the main fishing area for residents, and its tributary rivers
- Pitz, Schultz, and Whitehills lakes, three large and often-used lakes
- smaller lakes where lake trout overwinter
- Quoich River, an important source of arctic char in the area.

Concerns regarding impact to fish populations centre on siltation resulting from clearing, grading, trenching, backfilling, erosion, and drainage; toxic spills related to mine development and operation; accumulation of toxic substances originating from the effluent of tailings ponds; habitat loss as a consequence of removal of river or lakeshore substrate for use as borrow material; blockage of flow and dewatering from limited sources; and overharvest occurring near large construction sites or camps.

> *"Most of these lakes that are near the proposed route are [precious], but they are marked so it's okay, and [should] be protected because of the fish."* – (ST)

When the community members were asked, during the 2004 interviews, if they were worried about the effect mine development would have on the land and water, the overwhelming majority expressed concern for the fish populations in the area and the effects of cyanide pollution and displacement of the fish.

> *"The only worries I have are the ones I mentioned earlier, such as cyanide chemicals. I will want them to keep an eye on those. As for the fish that will be relocated to another lake, I wondered how that is going to be safe for the fish."* – (JI)

> *"The fish die very easily, so there will be some problems there. Even just a small little bit gas or oil, or just some dirty cloths or anything is going to cause the fish to die."* – (JT)

As part of Cumberland 's baseline report series on wildlife, fish and fish habitat were studied in 1999, 2002, and 2003. Fish habitats were described and the spatial distribution and relative abundance of fish habitat types within Second Portage, Third Portage and Vault Lake (project lakes) were quantitatively mapped to quantify the potential adverse effect of the Meadowbank project on fish habitat. The absolute and relative amounts of habitat potentially affected by the Meadowbank project as currently proposed by Cumberland can be determined from information generated by the aerial photographs and drop camera video imagery presented in the fish habitat study. It is very difficult,

however, to predict what the impact of habitat loss and alteration on fish population abundance will be in these lakes. The prediction of impacts will be based on answers to the following questions:

- Is the amount of affected habitat consequential relative to the total amount of non-affected habitat available elsewhere?
- Is critical habitat lost within affected areas that is not available or does not exist in non-affected areas?
- Are presence and abundance of specific habitat types actually a limiting factor to the production of fish in the study lakes?

These questions will be addressed within the EIA by comparing the area and relative proportions of high, moderate, and low value habitat affected or impaired by construction and operation of the mine, as well as the post-closure scenario for Meadowbank, relative to baseline. Answers to these questions are required to address the DFO no net habitat loss principal in order to determine the extent of mitigation/compensation plans necessary as the project moves through the regulatory approvals phase.

The project area lakes appear to have abundant and diverse habitats that are typical of Arctic lakes and provide adequate habitat and physical conditions to support all life history stages of fall spawning fish populations.

5.2.8 Vegetation

The Inuit's detailed understanding of vegetation, accumulated over generations spent traveling the land, encompasses not only knowledge of specific plants, but also their interconection with wildlife and the environment as a whole. Crucial and highly respected sources of food for animals, plants are also valued for the purposes they serve for humans, notably as food, as essential elements for a variety of tools, and as the basis for traditional medicine.

A major theme of discussions relating to plants is the importance of certain plants used by wildlife species, more specifically the lichen which constitutes an important part of the caribou's diet. Berries, eaten fresh or used to make jams, were commonly mentioned as a source of sustenance. Non-dietary uses of plants were also mentioned: fire building (moss), wicks (Arctic cotton), and bedding (willows and heather).

> *"Whenever, we ran out of tea, we used to collect dried berry leaves... we used to go out to pick cloud berries."* – (BIP)

> *"Using the lighting stick and board, one person would press the stick down on the wooden board while the other one turned the string wrapped around the stick, and when it started to smoke they could make a fire. The brown moss was used as a match and the white cotton like plants were used as wicks, placed on the hollow rocks."* – (JT)

The proposed mining, construction, and roadwork activities require consideration of plant community regeneration. The 2004 interviewees expressed concerns as to the vegetation's capacity to regenerate itself following the drilling, digging, and dumping activities.

> *"... but the growth of vegetation is going to be very slow, that's the concern I have."* – (TM)

> *"As for the land, if something is dumped on it, the vegetation will grow very slowly or not grow at all."* – (WO)

Baseline vegetation surveys by Cumberland in 1999, 2002 and 2003 revealed that the most common vegetated Ecological Land Classification (ELC) units in the Meadowbank area are heath tundra community and lichen-rock community associations. The heath tundra community unit is dominated by bog blueberry, lingonberry, white arctic heather, Labrador tea, bearberry, and crowberry, and is typically found on morainal deposits on gently sloping uplands with low to medium moisture and nutrient regimes. The lichen-rock community unit is found on gentle slopes with low moisture and nutrient regimes, and thin or absent soils associated with boulder fields or bedrock outcrops. Water was another very common ELC unit in the area and two of the wetter ELC units, sedge community and birch seep community, were also relatively common. Eskers and their typical ridge top ELC units (e.g., avens community) were uncommon.

5.2.9 Birds

Birds are recognized as an integral part of the natural cycle and are commonly depicted in stories and legends. The vast numbers of migratory birds that pass through during spring break-up, when the caribou have moved north to their calving grounds and the rotting ice makes fishing hazardous and difficult, provide an alternate and important food source during this brief period.

More than 160 species of birds have been recorded within the mainland region of Nunavut (Richards et al, 2002). Bird species observed in greater numbers than any other species during the baseline surveys were snow goose, Canada goose, Lapland longspur, and horned lark. Other commonly observed breeding bird species were American pipit, snow bunting, savannah sparrow, semipalmated sandpiper, sandhill crane, and rock ptarmigan. Snow bunting, sandhill crane, Canada goose, and snow goose were most common during the migratory period. Raptors, including all three species of jaegers, were recorded occasionally during baseline surveys. For the purposes of this traditional knowledge report, two representative categories of the bird community in the Meadowbank proposed project area were studied: waterfowl and ptarmigan.

Waterfowl

Twenty-eight species of waterfowl have been recorded within the mainland region of Nunavut. These include five species of geese, two species of swans, and 21 species of ducks (Richards et al, 2002). Twenty species have been recorded as breeding on the mainland and one other species is suspected to be breeding (Richards et al, 2002).

The Canadian Wildlife Service identified two key habitat sites for migratory birds in the region. The first site is on the Thelon River and includes the area from Eyeberry Lake to Aberdeen Lake, plus a

portion of the Dubawnt River. This site provides habitat for summer moulting Canada geese, breeding greater white-fronted geese and snow geese, and breeding and moulting tundra swans (Alexander et al,1991). The second site, the Middle Quoich River, which includes the Tehert River and the east end of Tehek Lake (which is within the RSA), was identified as important summer moulting ground for Canada geese (Alexander et al, 1991).

During baseline surveys, 10 waterfowl species were recorded: tundra swan, greater white-fronted goose, snow goose, Ross' goose (listed as sensitive by the Canadian Endangered Species Conservation Council (2001) and the Government of Nunavut), brant goose, Canada goose, mallard, northern pintail (listed as sensitive by the Government of Nunavut (2003)), long-tailed duck, and red-breasted merganser. No evidence of reproduction was documented during any of the baseline surveys, although it likely occurred in the area.

Geese

Summer and fall aerial surveys conducted in the RSA indicated that, in terms of relative abundance, the snow goose was the most common waterfowl key wildlife species, followed by the Canada goose, and greater white-fronted goose. The snow goose was also the most frequently observed waterfowl key wildlife species during the fall survey, whereas the Canada goose was most common during the summer survey. Both snow goose and Canada goose were regularly reported by camp personnel during the migratory periods.

Greater White-fronted Goose

The greater white-fronted goose is listed as secure in Nunavut (Government of Nunavut, 2001). Population estimates were not found for Nunavut, but in the Northwest Territories, its numbers are estimated at 10,000 (NWTRWED, 2000). Greater white-fronted geese that occur in the project area belong to the mid-continent population, which is believed to be increasing (Ely and Dzubin, 1994; Canadian Wildlife Service Waterfowl Committee, 2000).

Within the general area of the proposed Meadowbank project, the greater white-fronted goose was recorded only during fall aerial surveys in the RSA.

Snow Goose

In Nunavut, the snow goose is listed as secure (Government of Nunavut, 2001). Although estimates of its numbers in Nunavut were not found, its population in the Northwest Territories is considered to be 1.4 million (NWTRWED, 2000).

The snow goose was the most common key waterfowl species recorded during aerial surveys in the RSA. Greater numbers were recorded in the fall than in the spring, and no observations were made during the summer survey. Snow geese were recorded on several occasions by camp personnel during the spring and fall migratory period.

During the fall, observations of both greater white-fronted geese and snow geese in the Meadowbank area were associated primarily with aquatic habitats, although heath tundra sites were also used.

Results of previous aerial surveys for waterfowl that were conducted as part of the Polar Gas development suggested that the Meadowbank region did not provide significant habitat for waterfowl (Allen and Hogg, 1978). Additionally, no Important Bird Areas (IBAs) have been identified for this region (M. Setterington, pers. comm., 2002). Although studies indicate that the project area provides abundant habitat for breeding and staging waterfowl, suitable foraging habitat is likely limited because the wetlands in these areas are considered to be relatively unproductive.

Canada Goose

The Canada goose is listed as secure in Nunavut (Government of Nunavut, 2001). Population estimates were not found for Nunavut, but in the Northwest Territories, the species is expected to number around 300,000, although numbers of tundra nesting geese are increasing (NWTRWED, 2000).

Small flocks of Canada geese were observed during the summer in the Meadowbank area in 2002. During the fall, observations of Canada geese in the Meadowbank area were associated primarily with aquatic habitats, although heath tundra and lichen-rock sites were also used.

Results of previous aerial surveys for waterfowl that were conducted as part of the Polar Gas development suggested that the Meadowbank region did not provide significant habitat for waterfowl (Allen and Hogg, 1978). The Canadian Wildlife Service, however, identified the Middle Quoich River area, which includes the eastern portion of Tehek Lake, as a key habitat site for moulting Canada geese (Alexander et al, 1991).

In 1974, only 3 of the 101 Baker Lake residents who corroborated in the ILUOP map compilation effort identified goose hunting areas. Four years later, the DIAND interviews reinforced the notion that Baker Lake residents do not appear to favour goose hunting. Nesting goose populations in the area were relatively low and hunters tended to remain in the proximity of the hamlet when they harvested wildfowl. Slightly more than half of the 43 heads of households interviewed they had recently hunted geese. Only three of these reported taking more than 10 geese in the year preceding the interviews.

Goose were harvested when the birds are nesting in June and July. The hunting took place primarily in three areas: along the western shore of Baker Lake (with the area around Fish Camp being the most popular), extending inland to eastern Pitz Lake; around the mouth of Kazan River; and around the mouth of Prince River. Interviews by DIAND in 1978 indicate a goose harvest amounting to 115 for 18 heads of household.

Given that the goose hunting areas identified coincide with well-used domestic fishing areas, goose hunting probably occurs in association with late spring and early summer fishing. Residents also collect eggs and hunts ducks in these areas. In terms of harvesting, the most significant species of waterfowl that breed and/or moult in the area are Canada, lesser snow, and white-fronted geese. Old Squaw are the most common ducks. While several species of waterfowl occur extensively throughout the area, extremely large aggregations are unknown.

> *"We used the skin of geese, plucking the feathers first and removing the skin from the rest, and also we used the feet of geese to store either fish oil or caribou fat."* – (WTP)

"When the geese are moulting and can't fly any more, and the water is calm and smooth, we would go looking for geese. We'd paddle along the shore in our qayaqs, looking for where there's an inlet or cove, searching for geese. When geese see a qayaq they start diving, and some start running up on land, and when some start running up on land we'd start going up on land too, and chase the geese. Sometimes we'd catch geese in a trap." – (SP)

"They would pile rocks in a circular pattern, high enough so that the geese couldn't jump over the rocks when it was finished. There was an entrance made where the geese would go in, and we called the trap qatgiq.... Some of the geese don't lay eggs, but when people knew where the nesting places were they would also gather the eggs for food." – (SK)

"There weren't so many Canada geese and gulls in my younger years " – (MN)

"I don't remember anyone catching geese or hunting geese." – (SQ)

"We used to try and catch all kinds of ducks and geese, like Old Squaw and Common Eider, and we'd also take their eggs for food." – (BIP)

Ptarmigan

The rock ptarmigan and willow ptarmigan breed in the mainland region of Nunavut, whereas the white-tailed ptarmigan (Lagopus leucurus) is considered to be of rare or accidental occurrence (Richards et al, 2002). The rock ptarmigan has been commonly recorded in the RSA; the willow ptarmigan has not been recorded but is expected to occur in areas with suitable habitat.

The rock ptarmigan is federally listed as sensitive by the Canadian Endangered Species Conservation Council (2001). It is also assigned a sensitive status in Nunavut (Government of Nunavut, 2001). The rock ptarmigan population declined by 86% from 1987 to 1996 in the central part of its range, near Hope Bay, Nunavut, but the reason for the decline is unknown (Calef and Hubert, 2002). Population trends for the species since 1996 are also unknown (NWTRWED, 2000). The willow ptarmigan is listed as secure in Nunavut (Government of Nunavut, 2001). Its population is probably stable (NWTRWED, 2000).

During the fall, observations of ptarmigan in the Meadowbank area were associated most often with lichen-rock habitats, followed by heath tundra, sedge, and esker communities. In summer, rock ptarmigan were most frequently observed in heath tundra and lichen rock with boulder areas. Results of baseline studies suggest that habitat suitability for ptarmigan in the Meadowbank Area could be high because there is an abundance of tundra habitat associated with eskers and rocky areas, or with moist, shrubby habitats.

Ptarmigan as a group were selected as a key wildlife resource for this review because they are an important prey item for carnivores and for raptors such as gyrfalcons. They are also hunted by Baker Lake residents (ISL, 1978). In the fall, many Baker Lake resident hunt ptarmigan, although to varying degrees. In 1978, 27 of 43 heads of households indicated that they had taken ptarmigan the year before; another 6 had hunted the bird since 1970. Wives and children were often cited as participating in the hunt, which usually occurred close to the hamlet. Blueberry Hill, Fish Camp, and the Thelon and Kazan River mouths were mentioned as ptarmigan hunting areas. However, the birds' range is

extensive and they may be harvested throughout the area, Caribou hunters or fishermen will often take them when they spot them in outlying areas.

Interviews by DIAND in 1978 indicate a ptarmigan harvest amounting to 715 for 30 heads of household.

Estimates for the 1978 wildfowl harvest, based on interview data, totaled 400 geese and 2,800 ptarmigan. Of the several species that nest and moult in the area, the most common are geese (Canada, lesser snow, and white-fronted), and Old Squaw ducks.

Although caribou and fish have provided most food needs to the Inuit in this region, sometimes other wildlife has also been hunted. Ptarmigan is sometimes hunted in the fall (ST, JI) but no other bird species is hunted with much regularity. According to the 1978 DIAND study, other wildlife fowl species hunted in this region include Canada Geese, eiders, loons, and snow geese. However, no large aggregations of waterfowl were found between Baker Lake and Tehak Lake. Most wildfowl hunting occurs close to Baker Lake.

> *"... and when there were no caribou, we had ptarmigan, fish."* – (JN)

The south shore of Baker Lake and an area around and northeast of Pitz Lake were identified as critical areas for snow goose nesting and moulting, as well as for goose hunting by Baker Lake residents. Likewise, the island areas between Beverly and Aberdeen lakes were identified as a critical area for a population of Canada geese, estimated at 10,000 in 1978. Concerns over these critical waterfowl areas relate to destruction or excessive disturbance of nesting and moulting habitat through human and industrial activities, including low aircraft overflights and fuel and chemical spills. Restrictions on the location of facilities, regulation of aircraft altitudes, timing of activities, and contingency plans for containment and cleanup of spills are strategies proposed to address these concerns.

Although waterfowl account for a relatively minor part of the country food harvested by Baker Lake residents, it is essential that their populations be protected. Two concentrated nesting and moulting areas have been identified as critical for sustaining:

- the north shore of Baker Lake and an area around and northeast of Pitz Lake which support the nesting and moulting waterfowl of several species

- the islands area between Beverly and Aberdeen lakes which supports the moult of several thousand none-breeding, large-race Canada geese.

Concerns are related to the effects of noise (from compressor stations and aircraft) on the nesting, moulting, and staging of the highly sensitive snow geese; the impact of repeated disturbance on fat storage (possibly resulting in reduced migratory success), on decreased nesting success; and on oil contamination (possibly leading to decreased insulative value of feathers, toxicity through ingestion, reduced egg laying and lower hatching success). Intensive monitoring of the behavioural responses of the wildlife to the industrial activities is recommended.

5.3 VALUED SOCIOECONOMIC COMPONENTS

Following is a list of the valued socioeconomic components (VSECs) in the project area as identified by the scientific and traditional knowledge gathered to date. Each is of important cultural or economic significance and is intimately connected with one or more of the other components, as well as with valued ecosystem components.

- archaeological sites (graves, spiritual areas, birth islands, tent rings, artifacts, camping areas)
- employment opportunities and training (demographic data, economic data, mineral resources, education and training)
- young people.

5.3.1 Archaeological Sites

In 1999, Webster Heritage Consulting undertook archaeological investigations at the Meadowbank site and along the proposed winter road route (see Figure 5.3). The objective of the archeological study was to inventory archaeological sites within the project area and to assess the potential impact of the various component parts of the Meadowbank project on the archaeological resources.

Semi-subterranean houses were located at one site in Area B and were constructed of heavy quartzite slabs. Caribou bones and bullet-making material were associated with the site. Qarmait were located at two sites in Area B and were roofed with skins supported by wooden poles. Six hearths or fireplaces were located at four sites in Areas A and B outside of tent rings. Some were built in the shelter of a boulder. Markers were observed at six sites in Areas A, B, and C and were constructed of one or more stones placed usually on a boulder to indicate an important place. Caches, found both open and closed, were used to conceal and preserve provisions and/or tools.

Caribou meat was often stored there in the fall. One stone fox trap, a tower trap or ublihaut, was observed in Area B. Lithic scatter in the form of quartzite flakes were located at three sites in Area B. Eight sites in Areas A and B had unidentified features.

While over 16 graves sites were reported to be in Area B and over three in Area A, only six were identified in the survey; five were bearing crosses and the names of the deceased. None of the graves had the traditional white quartzite stone at the north or south end to indicate the sex of the individual buried at the site. At a public meeting in May 1998 in Baker Lake, Jacob Ikinilik, hamlet representative and business owner, stated that he knows of two graves and would like no one touching them or any mining done around the grave area.

Various artifacts were observed at the sites, which included tin cans, net floats, sled cross slat, glass bottles, and a metal scraper blade with two holes drilled at one end in which to secure a handle.

As a follow-up to this fieldwork, one Baker Lake Elder, Silas Kalluk, was interviewed to help date a particular site.

Figure 5.3: Archeological Survey Area & Locations

For more detailed information on archaeological sites, see the "Baseline Archaeological Report" (2005), which is part of this documentation series.

5.3.2 Employment Opportunities & Training

Kivalliq communities in general are expressing concern over a stagnant economy, growing unemployment, increasing dependency on government programs, and limited opportunities for development. Unemployment in the region is among the highest in Canada, and the government provides over 80% of the revenue requirements through employment or social assistance. Apart from government employment, the next largest revenue generator is tourism, although this represents a small portion of the economy. The cost of living is high and there is minimal opportunity for employment. Fortunately, the residences of Baker Lake can still rely on country foods to supply a large portion of their household resources. Few people graduate high school (in 2001, only 50% of those over the age of 20 had completed grade 12); fewer still have college or university diplomas.

Demographic Data

Nunavut Territory has the highest birth rate in the country. Between 1998 and 2003, the average annual birth rate was 26.1 per 1,000 compared with the average Canadian rate of 10.9 per 1,000 persons (Statistics Canada, 2003b). A 17% increase in the population of Nunavut is expected over the next decade because of the continued high birth rate. For the Kivalliq region, population growth rates between 1991 and 1996 averaged 18%.

These general demographic trends are reflected in the Baker Lake community. The population of Baker Lake was 1,507 in 2001, a 9% increase from 1,385 residents in 1996. Between 1991 and 1996, the population grew by 17%. The population is young, with 39% being 14 years of age or younger. The median age of the population is 22 years. Indeed, Baker Lake has a young population, most of whom where born after the relocation of the people from the land into an urban community. This settlement has resulted in a partial loss of traditional lifestyle and a need for more jobs. The young generation has inherited a strong respect for both the land and the wage society but is caught halfway in between. Their lack of training, education, and opportunities has resulted in a regional crisis for the Inuit. For more information, see the "Baseline Socioeconomic Report," which is included as part of this documentation series under separate cover.

Economic Data

The Kivalliq economy is mixed and has three primary elements: the wage economy (the government sector employed 55% of the labour force in 2001; the service industry, 30%; manufacturing and construction, 10%; and mineral exploration. 5%), government transfer payments, and subsistence harvesting. . In 2001, the transfer payments from the federal government equalled about $21,000 per resident of Nunavut (Howatt, 2002). The significance of this sum can better be appreciated when one considers that, for the same year, the average income for all wage earners was $25,116. Many households combine cash from wage employment and government transfer payments with subsistence harvesting.

Unemployment rate in Kivalliq Region in 2001 was 18.6%. The high unemployment rates reflect the limited employment opportunities in the region and the low levels of education of the residents. Jobs in government or government-related jobs such as teaching and health services represent most of the jobs available in the region; however, these jobs require a skill set and level of education that a large percentage of the Inuit population does not possess. The Conference Board of Canada notes that people with a Grade 12 education or better have an employment rate of 75% compared to an employment rate of only 30% for those with Grade 8 or less. The participation rate in senior secondary schooling is increasing, but there are still very few Nunavummiut teachers and only one Nunavummiut nurse. The majority of skilled positions are held by non-Inuit from southern Canada (Vail and Clinton, 2001).

Once again, the reality in Baker Lake reflects these regional trends. The Baker Lake economy is composed of three elements: a wage economy (dominated by employment in the government sector), government transfer payments, and subsistence harvesting. In 2001, the total experienced labour force in Baker Lake was 525. Thirty-three percent were employed in other services (including government) and 25% were employed in health and education (government). The wholesale and retail sector employed 15% of the population, the business, finance, and real estate sector employed 11%, and manufacturing and construction employed 10%. Five percent of residents were employed in the resource sector. In 2001, the participation rate in Baker Lake was 65%, the employment rate was 48.6%, and the unemployment rate was 26.1%.

All three elements—the wage economy, government transfer payments, and subsistence harvesting—play an important role and contribute to the regional economy at different levels and at different times, depending on factors such as seasonal harvesting activities and the availability of wage employment (NPC, 2002).

Consultants have estimated that in dollar terms, about 80% of the regional economy is based on wages, 5% on government transfer payments, and 15% on subsistence harvesting.

Mineral Resources

> *"A significant growth in wage employment will depend on mineral development, parallel growth in the service sector, and the further development of regional infrastructure. The NPC therefore encourages further mineral exploration and the growth of a healthy mining industry in the Keewatin."* – Keewatin Regional Land Use Plan, 2000.

The mineral exploration sector is important to the economy of Nunavut. In all of Nunavut, Natural Resources Canada reported that. in 2002, $75.9 million (or 13.2% of the country's total exploration dollars) was spent in Nunavut (NRCan, 2003). NRCan estimates that up to $82.4 million may be spent in Nunavut in 2003.

In 2001, mineral exploration represented 7% of Nunavut's GDP (GN Department of Sustainable Development [DSD], 2002b). Of these mineral expenditures, an estimated $16.3 million was spent in the Kivalliq Region in 2000, $8.1 million in 2001, and $13.0 million in 2002 (Riveros, Pers. Comm., 2003). With the discovery of gold at Meadowbank, Meliadine, and in the Committee Bay area, the presence of diamonds near Rankin Inlet, and the discovery of base metal deposits in the southern

Kivalliq Region, it is anticipated that expenditures on mineral exploration will exceed these figures over the next few years.

About 20% of the money spent on exploration stays in the territory to pay the salaries of exploration employees from Nunavut, as well as to purchase fuel, lumber, groceries, equipment, and accommodations, and to expedite contracts (Howatt, 2002b). Rankin Inlet, Arviat, and Baker Lake are the largest communities in the region and, as the primary staging points for exploration projects, offer expediting services (GN DSD, 2002a).

> *"...the population of Keewatin will increase by 60% between 2000 and 2020. It is unlikely that all of these young people will be accommodated in the regional job market over this period. While the new territory of Nunavut is bringing with it training and jobs for Inuit, many people continue to look to the private sector for opportunities. A small number can expect to find seasonal work in the tourism sector. Others will look to the mining industry for important training and exploration work."* – Keewatin Regional Land Use Plan, 2000.

Elders were asked about the kinds of jobs that were good for the people and how unemployment affected people in the past. What was clear in the responses of the Elders was that people in the past "worked" very hard to survive and that work was organized according to family members; everyone had an important role in keeping the family healthy. There were few wage or income earning activities; however, trading furs, dry meat, dry fish, hides, and crafts or wood for goods was common.

With the advent of income earning employment, some of these trends are being reversed as greater self-respect and overall community wellness improve. The enthusiasm and positive experience of a young woman who worked for the Ekati diamond mine provides hope for unemployed Baker Lake residents:

> *"This mine is going to help us socially. It will give us money to travel south and see the world. I have bought a house now. The mine has helped me to set higher social standards. I am going back to school. My self-esteem is higher...I like the feeling of independence. Working here, I have become more confident."* – ("Is Mining Sustainable?" The Perspective from ALL Nations Services, Marc G. Stevenson, Native Journal, May 1998)

Similarly, Cumberland's Meadowbank Gold project has contributed to the economy of the region and Baker Lake. Since 1995, Cumberland has spent $23 million on exploring the Meadowbank site; of this amount, 21% or almost $5 million has been spent in the Kivalliq Region. Included in the $5 million are wages to local employees and expenditures for expediting and transportation. The number of local persons employed by the project increased from 3 in 1995 to 24 in 2002, with wages increasing from $25,000 to $200,874 during the same period. Annual expenditures in the region for expediting goods, transportation, fuel, equipment, and other supplies ranged from less than $200,000 in 1995 to almost $1.5 million in 2002.

Cumberland can increase the capacity of Baker Lake to direct its own economic, social, and political development by negotiating impact benefit and co-management agreements with the community. By offering educational support and training programs to Inuit employees, Cumberland can provide them with an array of marketable skills that will be transferable to other mines or alternate working environments once the mine has shut down.

"This Meadowbank project is going to teach about communication or getting jobs to local communities, or giving jobs to unemployed people. It is going to be one of the leaders, connected to Baker Lake, so we are pleased about it." – (NA)

"I think it (the Meadowbank mine) is going to benefit the community by having local people get jobs up there, especially when we have hardly any jobs here in Baker Lake." – (TrM)

In 1995, Cumberland made a commitment to the Hamlet of Baker Lake to provide employment, training and business opportunities related to the exploration program at the Company's Meadowbank gold project. As the Meadowbank project has grown, so has Cumberland's commitment to the residents of the Hamlet of Baker Lake and the Kivalliq region of Nunavut. On-site employment of local persons has grown from initially 5% to as much as 30% in positions such as environmental technicians, heavy equipment operators, geophysical assistants, cooks, and camp assistants. Cumberland has contributed to the growth of the local economy and estimates that approximately 20% of its exploration expenditures have flowed through the region from 1995 to 2002.

At an April 1999 Meadowbank project meeting between the HTO and CLARC councils and representatives of Cumberland and Nunavut Environmental Ltd, a review of local expenditures indicated that the total amount of money flowing to Baker Lake as a result of the camp activities in 1998 was almost $1 million. From 1995-1999, the direct accumulated expenditures on exploration alone totalled $10 million, approximately 20% of which went to Baker Lake. Cumberland also stated that approximately 200 people were to be employed on site and that was in their best interest is to employ as many locals as possible to save money, train locals for work, such as local miners and operators, mill operators.

The development of the Meadowbank project will present many new opportunities for the Hamlet of Baker Lake and the Kivalliq region of Nunavut, including training, employment, and the legacy of improved transportation infrastructure. As always, the development process will continue to be sensitive to the needs of the local Inuit community, the surrounding environment, and the economics of the project.

Education & Training

In 2001, 725 Baker Lake residents were between the ages 20 and 64. Of those residents, 50% (divided almost evenly between male and female) had not graduated high school; 21% had graduated from high school and/or had some post-secondary education (51% male, 44% female); 10% had a trades certificate or diploma (64% male, 37% female); 13% had a college certificate or diploma (48% male, 50% female); and of the 5% who had graduated university, there were fewer males than females.

Nunavut Arctic College (NAC) has a new learning centre in Baker Lake. During the 2002/2003 term, the college offered courses in Adult Basic Education, Government Computer Training, Inuktitut, and Introduction to Carpentry (NAC, 2003). The college estimated that 40 residents would be taking the courses (NAC, 2003).

In the past few years, the college has also offered training courses in Baker Lake specifically geared towards the mining sector (NAC, 2003). The courses included a 24-week Pre-employment Job Entry

course in 2000/2001 and a 14-week Introduction to Mining course in 2001 (NAC, 2003). For a complete list of course offerings for the 2002/2003 academic year, see Table 2.7.

NAC is also currently offering a pre-trades course to train Kivalliq residents for future employment opportunities within the mineral sector. Fifteen students are enrolled (Utatanaq, Pers. Comm., 2003) .

Cumberland sponsored training and employment orientation information sessions in the community for ten days in September 2003 (Goodings, Pers. Comm., 2003). The sessions were offered to groups of senior high school students and to local residents at Nunavut Arctic College (Kelly, Pers. Comm., 2003).

A comparison of 1996 and 2001 figures for education suggest that the average level of education in Kivalliq is increasing. Both males and females have improved their level of schooling over the past five years. More students are completing grades nine, ten, and eleven, even if they do not graduate. The total number of high school graduates in Nunavut doubled between 1997 and 2000.

There are fewer than 80 journeyed tradespersons in the Kivalliq communities; finding skilled labour is therefore a major problem for small businesses in Nunavut (NNSL, 2003a). The Department of Sustainable Development supports the mineral industry with several training programs, for example, a pilot Mineral Exploration Field Assistant course and a one-week introductory Prospecting Course in various communities.

In addition, between 2000 and 2003, Arctic College offered mine training courses in Arviat, Baker Lake, and Rankin Inlet (NAC, 2003). The courses included Pre-employment Job Entry, Introduction to Mining, Introductory Carpentry, and Office Administration (NAC, 2003).

In January 2003, NAC proposed to provide training courses for Kivalliq residents to help them take advantage of future employment opportunities within the mineral sector (NAC, 2003). The proposal suggested that a series of short-term general preparatory courses be delivered in several phases, followed by skill-specific training courses (NAC, 2003). The courses proposed included: Pre-employment Job Entry, Introduction to Mining, Trades Preparation, Introduction to Trades, Introductory Carpentry, Office Administration, Class 5 Drivers Training, Class 3 Drivers Training with Airbrakes, WHMIS, and First Aid CPR (NAC, 2003). Optional courses included: Welding, Heavy Equipment with 3rd Class Driver's License and Airbrakes, Mineral Exploration Field Assistance, and Security Officer Training (NAC, 2003). The training would be scheduled over three years and would cost $1,440,600.00 (NAC, 2003). It would comprise 2,250 training days for 450 students at a cost of approximately $3,200 per person (NAC, 2003).

The proposal notes that the skills required for the mineral industry are highly transferable and would prepare community members for other types of employment. For example, graduates from Class 3 Airbrakes, heavy equipment operation, and administration could work for hamlets and airports, and as tradespersons. Administration courses would also prepare residents to work for housing associations and other government departments. All of the courses would be relevant for work in the private sector in local freight and expediting businesses, mineral exploration, gravel hauling, and construction (NAC, 2003).

It was announced in September 2003 that the college, in partnership with Kivalliq Partners in Development, was beginning to offer some of the proposed courses (Lippa, 2003a).

Between 1995 and 2002, residents from Baker Lake worked at the Meadowbank exploration project for Cumberland as core splitters, drillers' helpers, mechanics, carpenters, and cook assistants (Goodings, Pers. Comm., 2003). These workers earned a total of $200,874 in 2002, $38,204 in 2001,and $45,152 in 2000. Baker Lake MLA Glen McLean has been encouraging the Nunavut government to be proactive in developing a trained local workforce before the Meadowbank project goes into production (Greer, 2003a).

Therefore, average earnings in Kivalliq increased about 9% from 1996 to 2001. In that same period, the number of people in the labour force increased by 36%.

At an impact meeting in March 2003, discussions centred on job opportunities. Cumberland anticipated hiring 60 northerners/locals by year 3 of operations. "Training and entry level positions were discussed, for perhaps eight positions. We discussed basic entry requirements such as reading, writing and arithmetic to meet the demands of the workplace to read notices, signs, operation instructions, complete time cards and equipment report sheets. Also, people should get drivers' licenses, WHMIS, workplace safety and first aid, etc. A positive progressive response to training is required to promote people out of those entry level positions to make room for more new trainees... Arctic College has time and duty to get interested locals of all ages ready with educational and upgrade programs and have indicated to CBD that such education is forthcoming."

5.3.3 Young People

Youth participation in the mining project was a recurring aspect of community health that was discussed by Elders during this traditional knowledge study. When the Elders were asked how parents used to involve youth in the community, they talked about how youth used to learn the skills and knowledge necessary for survival by watching their parents and by listening to their Elders. Recognizing that times have changed, the Elders now allude to the importance of salaried jobs for young people and the positive effect they have, both in terms of economic opportunity and self-image.

In addition to the interviews, Elders were afforded the opportunity to express their opinions and concerns during public meetings. At such occasions, they invariably linked the mine development project to job opportunities and training for Baker Lake youth. For instance, approximately 80% of the Elders present at the two day public meetings in May 2002 spoke or made comments; all of these voiced support for the Meadowbank project and the opportunities it represented to the youth of their community.

During the second round of interviews with community members in April 2004, when the interviewees were asked how the mine would benefit their community, they overwhelmingly alluded to the provision of job opportunities for young people.

> *"Seeing them (young people) while they work at the mine site, they seem to be more happy in their lives, which I have noticed before. Some of them really want to learn to do a good job, and when they learn what they should be doing, you don't always have to tell them to have the job done. When they keep coming back to work, learn more about the job, in that way they help a*

> *lot and are very useful, and it makes life easier. Knowing them younger than you, seeing them working well and them as an Inuk, it makes me feel proud of them."* – (TM)

Elders also, however, added cautionary notes as to the presence of drugs or alcohol in the camp or in the hamlet: "For safety especially of the youth we need and want protection from drugs and alcohol in the industrial environment and in town. we want tests (routine checks, etc.) to ensure no drugs or alcohol are used at all in camp. we want zero tolerance and security to be on top of it." In effect, the heightened cash flow in the community resulting from mining activity was often linked to increased drug and alcohol use and suggestions were made to monitor incoming cargo to prevent such problems.

SECTION 6 • TRADITIONAL KNOWLEDGE & PROJECT DESIGN

One of the most effective ways of preserving traditional knowledge is to embody it in the decisions about projects that affect the communities. In this way, the knowledge and understanding of the local culture automatically become a part of the process of planning and implementation of the development project. In many projects, the course of the activities and the critical decisions about what happens next is significantly influenced by the information that is collected, how that information is made available to others, how it is interpreted and finally how it is communicated to both the decision-makers and the stakeholders.

As discussed in Section 2, numerous mine elements have been planned based on community input, including those listed in Table 6.1.

Table 6.1: Concerns Expressed by the Community & Mitigation Strategies Proposed by Cumberland

Concern	Mitigation
Compromised air quality due to dust arising from activity on road and construction site	Suppression of dust by water and/or ca/Mg CL addition to bind particles on road/yard surface
Compromised air quality attributable to blasting of lake bottoms	Impact minimized by blast controls
Surface water (quantity) : preventing seepage from dykes	Use of impermeable membranes within the dykes; grout may also be used
Surface water (quality): seepage from tail ponds	Used of membranes, low permeability structures, design concepts (such as frozen on-land designs), sub-aqueous storage of only materials or acceptable traits, and covering of dump with acceptable water depths; monitoring even after closure
Pollution resulting from use of chemicals	Reduce pollution at source through proper handling, controlled releases and effluent treatment requirements and mitigate impacts of pollution
Fate of fish in water bodies to be emptied	Transferred out before
Fate of fish caught in the course of fisheries and wildlife studies	Should be turned over to HTO for distribution to Elders and/or dog owners
Elder observed good spawning grounds in 2nd Portage observed under rocks	Cumberland will enhance the two easterly channels between 2nd and 3rd Portage for improved fish movement; main migration route between 2nd Portage and Tehek Lake remains unaffected
Stopping distance for a loaded truck is 200 feet or more, possibly resulting in damage to wildlife on road	"Deer whistles" on trucks to chase game off road; limit Speeds in poor visibility conditions
Caribou on gravel runways (like to lay down on them)	Scare them off with loud noises, "bangers", or whistles
Disposal of waste steel and tires	Back hauled
Establishment of a liaison office between Cumberland & Baker Lake	A liaison office was set up in Baker Lake
Stomach contents of aquatic and land animals indicate they will eat virtually anything	It will be imperative to not leave any garbage lying around and to keep all work areas clean
Locals prefer "country food" in the camp	Will try to accommodate this desire, keeping in mind

Table 6.1 – Continued

	the need to comply with health regulations relating to food preparation
Fences are ineffective and undesirable; caribou must travel uninhibited	No fence will be built
For safety especially of the youth, no drugs or alcohol in the industrial environment and in town	A monitoring system will be established to ensure zero tolerance
Protection and preservation of archaeological sites (human bones, tent rings) for inspection/evaluation.	Cumberland is already committed to the protection and preservation of all archaeological sites
Need for larger print and translated material in Cumberland documentation	Cumberland is committed to providing translations for all important project-related documentation
Constant, timely, and detailed information on jobs available and job application process	See the "Human Resources Management Plan" for details
Hunting should not be allowed	A Policy Manual will be widely distributed to all employees outlining Cumberland's approach and enforcement of site policies, such as alcohol and drug use, hunting, firearms possession, etc. An employee orientation program will be implemented that will inform employees of Cumberland's policies regarding such activities as hunting, etc.

SECTION 7 • TRADITIONAL KNOWLEDGE & SUSTAINABILITY

> *"Traditional knowledge about the environment assumes a responsibility to respect living things and to live in harmony with them. Thus, it is an easy partner for sustainable project planning, and has the advantage of long and intimate experience with the local area."* – Alan R. Emery

Such harmony, as an ongoing, evolving equilibrium and interdependence between various elements, is one of the guiding principles of traditional Inuit way of life. The wisdom derived from this philosophy can be used to advantage when planning for sustainability. In effect, much like traditional knowledge, sustainable mineral development means adopting an ecosystem, life-cycle approach whereby economic, environmental and social aspirations are considered in both inter- and intragenerational perspectives. It means development that is economically viable, financially profitable, environmentally sensitive and socially responsible.

There are many factors that can affect the success of a project. Long-term cycles can be the critically important factors in determining ultimate effects of introduced stresses and changes. Gradual changes may have an accumulating effect, such as changes in water quality that are not toxic, or "harmful," but that may alter the underlying trace minerals. Indirect effects from these subtle changes might include a loss of herbivorous animals on which the community depends, because of the changed plant community. Apparently, minor introduced changes in policy or practices may seem to be beneficial, but have subtle intergenerational effects. In cumulative effect, these small changes can ultimately be harmful. The people best equipped to discover these subtle potential changes are often the holders of traditional knowledge of the area.

Definitions of sustainable development are many and varied. While the actual wording of different definitions varies, the basic themes are constant in all. All definitions are concerned with effectively integrating social, economic, and environmental factors in decision-making. These principle components of sustainable development (SD) emerged at the United Nations Conference on the Human Environment, Stockholm, 1972, whose themes were:

- the interdependence of human beings and the natural environment
- the links between economic and social development and environmental protection
- the need for a global vision and common principles.

In developing these themes, The World Commission on Environment and Development, (Brundtland Commission) 1987 defined sustainable development simply as:

> *"Development that meets the needs of the present without compromising the ability of future generations to meet their own needs. In more detail, the commission said, sustainable development is a process of change in which exploitation of resources, the direction of investments, the orientation of technological development, and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspirations."*

In Canada, the concept of sustainable development is being integrated into federal government policies, programs, and legislation. More specifically and in relation to the mining industry, the Minerals and Metals Policy of the Government of Canada: Partnerships for Sustainable Development recognizes that the continued use of Canada's mineral resource endowment must proceed within a sustainable development framework.

> *"Sustainable development is about how we meet the needs of people today, without compromising the ability of future generations to meet their needs. It is not an end point, but rather an approach to decision making. It recognizes that social, economic and environmental issues are interconnected, and that decisions must incorporate each of these aspects if they are to be good in the long term. It is an approach that will help us to achieve a healthy environment, a prosperous economy, and a vibrant and just society for current and future generations."* – Environment Canada Sustainable Development Strategy

Sustainable development is central to Cumberland's mandate and essential to the future of the natural resources sector. Cumberland is committed to respecting such a framework and believes it can be strengthened by drawing on the timeless, holistic knowledge of the Inuit of Baker Lake. Indeed, the best way to ensure that the use of mineral resources will protect the environment and promote healthy communities now and for future generations is by combining good science and traditional knowledge. Inuit realize the importance of respecting the land that provides resources—mineral and otherwise—for use by present and future generations.

> *"... the development of the economy is dependent on the land, and the continuing good health of the natural environment that has sustained our people for thousands of years. Sustainable Development also means development that includes all our people, that draws on the talents and on the collective wisdom we have inherited from our ancestors. When these three elements are in balance, the protection of our land, economic development and the full participation of our people, then I believe economic development can be sustainable."* – The Minister of Sustainable Development for Nunavut, Olayuk Akesuk

Initiatives that promote the goal of sustainable mineral development include the provision of support needed for people to pursue sustainable livelihoods both in the traditional and wage economy. In this respect, Cumberland:

- coordinates and supports community capacity building through local training initiatives including transportation of dangerous goods and first aid
- has made financial contributions to the local heritage centre and elders organization in Baker Lake
- has, over a five-year term, directed approximately 25% of its exploration expenditures through local communities in Nunavut. In some cases, this has increased unit costs; however, Cumberland has made a corporate commitment to supporting local businesses and economies.

Other strategies that encourage sustainable and responsible mining developments are community participation and information disclosure. Cumberland maintains an average 20% local or Inuit work

force during its exploration programs and has demonstrated its commitment to community consultation

Cumberland has made significant attempts to keep the community of Baker Lake abreast of its exploration activities via community forums and public meetings on a regular basis. Furthermore, it has informed the communities of production designs and plans for future mining and has voluntarily distributed results of traditional knowledge studies.

The safe use of minerals and metals, life-cycle assessments, product stewardship, the mitigation of environmental impacts of development, and a commitment to mine decommissioning and site reclamation are amongst other commitments Cumberland has made to sustainable resource development.

Cumberland's efforts to gather and document traditional knowledge are a testament to its commitment to undertake the full consideration of economic viability, social implications, and cultural and environmental values in decision-making and policy and program development. Cumberland respects the traditional values of the Inuit and recognizes that decision making based on the best available scientific, traditional, and local knowledge is not only essential on a pragmatic level, but is the foundation for the promotion of a healthy community interaction. Indeed, sustainable development cannot be viewed as a disconnected initiative, but as a collective goal, to be reached through the integration of traditional knowledge in all planning and implementation phases of the project. Achieving sustainable development requires the continued and full consideration of the economic, environmental, cultural and social impacts of decisions on the sustainability of both the project and the Baker Lake community.

SECTION 8 • REFERENCES

Allen, D.L. and H. Hogg 1978. Bird Studies in the Keewatin District. Canadian Wildlife Service, Fisheries and Environment Canada.

“Baker Lake, NWT, A Background Report of its Social and Economic Development” (Stager and Kabloona, for Polar Gas, 1977).

Banfield, A.W.F. 1974. The Relationship of Caribou Migration Behaviour to Pipeline Construction. pp. 797-804 in V. Geist and F. Walther, eds. The Behaviour of Ungulates and its Relation to Management. International Union for the Conservation of Nature and Natural Resources New Series No. 24. Morges, Switzerland. 940pp.

Dogrib Traditional Knowledge: Relationship between Caribou Migration Patterns and the State of Caribou Habitat 1996 to 2000 by the Dogrib Treaty 11 Council

“Effects of Exploration and Development in the Baker Lake Area, Volumes 1 and 2” (Interdisciplinary Systems, for Department of Indian Affairs and Northern Development, 1978). Traditional uses in and around the Meadowbank Property area are discussed in this report.

"Giving Traditional Ecological Knowledge Its Rightful Place in Environmental Impact Assessment" John Sallenave

Gunn, A., et. al. 1997. Caribou Migration Patterns and the State of Their Habitat. Annual Report to WKSS.

Gunn, A., J. Dragon, S. Papik, Panayi, M. Svoboda, M. Sutherland, and M. D'Entremont. 1998. Summer Behaviour of Bathurst Caribou at Mine Sites and Response of Caribou to Fencing and Plastic Deflector (July 1997). Final Report to WKSS.

Howatt, T., 2002a. Population explosion in Nunavut’s capital. News/North Opportunities North, June 2002, pD8

Integrating Indigenous Knowledge in Project Planning and Implementation by Alan R. Emery February, 2000 A Partnership Publication of the The International Labour Organization, The World Bank, The Canadian International Development Agency, and KIVU Nature Inc.

Interdisciplinary Systems Ltd, 1978. Effects of Exploration & Development in the Baker Lake Area. Volumes 1 and 2, Unpublished report prepared for the Department of Indian Affairs and Northern Development, 309 pp.

Interviews for the Inuit Heritage Centre exhibit “Cultural Groups of Baker Lake” (Roy Avaala and Lucy Evo, 1997-1998). Interviews were conducted with some of the same Elders as this project for a museum exhibit.

“Inuit Nunamiut: Inland Inuit” (Hattie Mannik, 1996).

"Inuit Observations on Climate Change - Final Report" Graham Ashford and Jennifer Castleden, International Institute for Sustainable Development, June 2001.

Jericho Project on Traditional Knowledge Use Tahera Corporation 1996 and 1999

"Kaggavik Uranium Project, Environmental Assessment – Archaeology" (Beak Consultants, for Urangesellschaft Canada Ltd., 1990). Documentation of archaeology surveys done around Baker Lake, including some parts of Chesterfield Inlet.

Macpherson, A.H. 1969. The Dynamics of Canadian Arctic Fox Populations. Canadian Wildlife Services. Rep. Ser. No. 8. 52 pp.

Naonayaotit Traditional Knowledge Study 1995, the Kuglutuk Angoniatit Association and BHP

"Recollections of Twelve Elders, Part 1 and 2" (Joe Mautaritnaaq, 199x). Interviews of some Baker Lake Elders.

Smith, S.L., M. M. Burgess and F. Mark Nixon, 2001. Active Layer and Permafrost Temperatures in the Mackenzie Delta, at Alert and Baker Lake in 1998; in Chapter I:6 of The State of the Arctic Cryosphere During the Extreme Warm Summer of 1998: documenting cryospheric variability in the Canadian Arctic, CCAF Summer 1998 Project Team, CCAF Final Report.

Stager J.K. 1997 Baker Lake, N.W.T. : A Background Report of its Social and Economic Development. Polar Gas Project. Toronto, Ontario. 203 pp.

The Effects of Exploration and Development in the Baker Lake Area Interdisciplinary Systems Led. for the Department of Indian Affairs and Northern Development (DIAND) 1978.

W.W.H. Gunn, W.J. Richardson, R.E. Schweinsburg and T.D. Wright, eds. 1973 Studies on Snow Geese and Waterfowl in the Northwest Territories, Yukon Territory and Alaska Arctic Gas Biol. Rep. Serv. Vol 27. Canadian Arctic Gas Study Limited. Calgary, Alberta. 85 pp.