GAHCHO KUÉ PROJECT

ENVIRONMENTAL IMPACT STATEMENT

SECTION 6

ASSESSMENT APPROACH AND METHODS

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6.1 INTRODUCTION

6.1.1 Context

This section immediately precedes the key lines of inquiry (KLOIs) and subjects of note (SONs) for the biophysical and socio-economic components of this environmental impact statement (EIS). It outlines, in general, the overall approach to impact assessment and significance determination that will be used in the following sections. Details that are specific to each KLOI and SON will be provided in their respective sections and sub-sections. To limit repetition, descriptions of assessment methods are provided in detail once and are summarized in other KLOIs and SONs.

The approach and methods described below are applied to information from the Project Description (Section 3) and the existing environment (baseline conditions), where applicable. The approach considers how each key element of the Project Description may interact with the existing environment and result in an effect on one or more of the biophysical and socio-economic components of the environment. For many biological and socio-economic components, information from traditional knowledge was used to help assess effects.

6.1.2 Purpose and Scope

The purpose of the following sections is to meet the *Terms of Reference for the Gahcho Kué Environmental Impact Statement* (Terms of Reference) (Gahcho Kué Panel 2007), and describe the general environmental assessment (EA) approach and methods used in the EIS for the Gahcho Kué Project (Project).

The assessment approach presented here is based on well-accepted principles of ecological and socio-economic systems (e.g., resilience, persistence, and sustainability), and EA best practice. Several elements of the approach can be consistently applied to all biophysical and human (socio-economic) components addressed in the KLOIs and SONs. Elements of the assessment approach that can be applied across all components include:

- definition of valued components (VCs);
- approach to identifying pathways that link the Project to potential effects on VCs; and

- approach to determining spatial and temporal boundaries for the effects analysis and impact classification.

Alternately, certain elements of the assessment approach may have to be modified for some components. The methods for classifying residual impacts (e.g., direction, magnitude, and duration), and predicting environmental significance can differ between biophysical and socio-economic components. For example, the direction of a socio-economic impact is more difficult to determine. A socio-economic effect (e.g., employment) may be both positive (e.g., more income) and negative (e.g., fewer traditional activities); however, a project-related effect to a biophysical component is typically negative. Therefore, differences in the overall approach and methods between biophysical and socio-economic components are identified in this section, and details are provided in the socio-economic KLOIs and SONs of the EIS.

6.1.3 Content

The sections following Section 6.1 present approaches and methods for assessing effects and determining environmental significance of the Project on the biophysical and socio-economic environments.

Section 6.2: Terms of Reference – gives a high level description of the structure of this environmental assessment compared to other assessments in the Northwest Territories (NWT).

Section 6.3: Valued Components – provides definitions of valued components and valued component endpoints, which determine the effects that will be classified.

Section 6.4: Spatial and Temporal Boundaries – links component-specific characteristics with the appropriate spatial and temporal scales for effects analyses, and gives definitions for broad spatial and temporal boundaries.

Section 6.5: Pathway Analysis – provides the definition of pathways (i.e., interactions between the Project and the environment), mitigation design features, policies, and practices, and the approach and methods for determining no linkage, secondary (minor), and primary pathways.

Section 6.6: Effects Analysis – gives general approach to analyzing residual (after mitigation) Project-specific and cumulative effects.

Section 6.7: Impact Assessment Methods – introduces and provides generic definitions for residual impact criteria based on the Terms of Reference, and presents an overview of the approach and method used to classify residual impacts and predict environmental significance.

Section 6.8: Uncertainty – introduces uncertainty and how it will be addressed when predicting residual effects and environmental significance, and designing adaptive management, monitoring and follow-up programs.

Section 6.9: Monitoring and Follow-Up – explains how monitoring and follow-up programs are used to verify the accuracy of impact predictions, to reduce uncertainty and unexpected effects, and to determine the effectiveness of mitigation.

6.2 TERMS OF REFERENCE

The structure and organization of this EIS is similar to that defined by the terms of reference for recent EAs for the Taltson Hydroelectric Expansion Project (MVEIRB 2008) and the NICO Cobalt-Gold-Bismuth-Copper Project (MVEIRB 2009) in the NWT. However, previous environmental assessments in the NWT typically organized issues into biophysical and socio-economic components, and then analyzed and assessed effects in separate sections of the EA report (e.g., sections on water quality, hydrology, soils, noise, wildlife, heritage resources, and traditional land use). This discipline-based format is also commonly used in many other jurisdictions. Linkages and cross-referencing among component sections are common with this type of report structure.

The new EIS approach evolved from the issue scoping process for the Project conducted by the Mackenzie Valley Environmental Impact Review Board (MVEIRB), which included technical workshops in Yellowknife and community workshops. The *Reasons for Decision and Report of Environmental Assessment for the De Beers Gahcho Kué Diamond Mine, Kennady Lake, Northwest Territories* (Report of Environmental Assessment) organized the issues into three categories (MVEIRB 2006):

- **Key lines of inquiry** are topics of greatest concern that require the most rigorous analysis and detail in the EIS.
- **Subjects of note** have less priority than Key Lines of Inquiry, but require serious consideration and a substantive analysis.
- **Remaining issues** require a sufficient analysis to demonstrate whether the issues are likely to be the cause of significant impacts. All issues are important and no issue can be excluded.

The EIS for this Project differs in that the organization of the issues and the way they are addressed has been specified by the Gahcho Kué Panel. This panel set out fundamental principles that govern the EIS. In particular, a response to each KLOI and SON must be a comprehensive, stand-alone analysis that requires only minimal cross referencing with other parts of the EIS. To meet the Terms of Reference, the EIS is organized by KLOI and SON (Table 6.2-1). A KLOI or SON may include a number of environmental components that were not combined in previous assessments (e.g., one KLOI includes a combination of biophysical and socio-economic effects). A SON may also consist of a topic not usually isolated in previous assessments.

Table 6.2-1 Location of Key Lines of Inquiry and Subjects of Note in the Environmental Impact Statement

Key Line of Inquiry	Location in EIS	Subject of Note	Location in EIS
Caribou	Section 7	Impacts on Great Slave Lake	Section 11.2
Water Quality and Fish in Kennady Lake	Section 8	Alternative Energy Sources	Section 11.3
Downstream Water Effects	Section 9	Air Quality	Section 11.4
Long-term Biophysical Effects and Closure Issues	Section 10	Mine Rock and Processed Kimberlite Storage	Section 11.5
Long-term Social, Cultural and Economic Effects	Section 12.6	Permafrost, Groundwater, and Hydrogeology	Section 11.6
Family and Community Cohesion	Section 12.6	Vegetation	Section 11.7
Social Disparity	Section 12.6	Traffic and Road Issues	Section 11.8
		Waste Management and Wildlife	Section 11.9
		Carnivore Mortality	Section 11.10
		Other Ungulates	Section 11.11
		Species at Risk and Birds	Section 11.12
		Climate Change Impacts	Section 11.13
		Employment, Training and Economic Development	Section 12.7
		Impacts on Tourism and Wilderness Character	Section 12.7
		Demands on Infrastructure	Section 12.7
		Culture, Heritage, and Archaeology	Section 12.7
		Aboriginal Rights and Community Engagement	Section 4 and Section 12.7
		Proposed National Park	Section 12.7

Each biophysical KLOI is presented as an independent section in the EIS, while socio-economic KLOIs and all SONs are organized into subsections. Biophysical

KLOIs and SONs are presented in Sections 7 to 10, and 11, respectively; socio-economic KLOIs and SONs are presented in Section 12 (Table 6.2-1). The order that biophysical SONs are presented in the EIS is primarily based on the bottom-up structure in natural systems (i.e., physical and chemical components → plants → animals → people), and an attempt to limit the amount of cross-referencing.

The KLOIs and SONs include all of the biophysical, cultural, and socio-economic issues presented in the Report of Environmental Assessment (MVEIRB 2006), and the Terms of Reference provided by the Panel (Gahcho Kué Panel 2007). The De Beers Canada Inc. (De Beers) community and regulatory engagement process (Section 4) provided further documentation that all issues have been addressed.

6.3 VALUED COMPONENTS

6.3.1 Identification of Valued Components

Valued components represent physical, biological, cultural, social, and economic properties that society considers to be important. Valued components were selected to focus the EIS on the key issues that were raised through the concerns of communities, individuals, government, and other stakeholders, and identified in the Report of Environmental Assessment (MVEIRB 2006). The Gahcho Kué Panel used these issues and VCs to provide the basis for each KLOI and SON in the Terms of Reference (Gahcho Kué Panel 2007), which was the principal method for selecting VCs in the EIS.

The inter-relationships between components of the biophysical and socio-economic (human) environments provide the structure of a social-ecological system (Walker et al. 2004; Folke 2006). Examples of physical properties include mineral and non-mineral geological deposits, air and water quality, soil and sediment quality, and habitat. Aquatic and terrestrial animal and plant populations represent biological properties that can be considered VCs. Traditional and non-traditional uses of water, plants, and animals can be VCs for the cultural, social, and economic environments.

These physical and biological VCs capture many of the specific issues identified in the KLOIs and SONs. For example, local and downstream effects from the dewatering of Kennady Lake are captured in the pathways (Project-environmental interactions) associated with changes to water quality and quantity, sedimentation and erosion potential, fish habitat and populations, and wildlife that are dependent on riparian areas. Equally important is the integration of these changes with the land use, culture, and economics of communities that are directly or indirectly connected to the region surrounding Kennady Lake.

In nature, biophysical and socio-economic components can be found at the beginning, middle, or end of pathways, or analogously, at the bottom, middle, or top trophic level of food chains. For example, benthic invertebrates and plankton are at the bottom of the food chain (towards the beginning of the pathway) in an aquatic ecosystem, while lake trout is the top predator in some systems (end of the pathway) not fished by humans. Cultural and socio-economic components typically enter at the middle and top levels of pathways. For example, people hunt caribou that occur in the middle of the food chain, and fish for pike, which occur at the top of food chains. Exceptions include the drinking of water, and harvesting berries and medicinal plants that occur at the lower trophic level of food chains.

6.3.2 Assessment Endpoints and Measurement Endpoints

Valued component assessment endpoints are general statements about what is being protected for future human generations (i.e., assessment endpoints incorporate sustainability). For example, protection of water quality, persistence of wildlife populations, and continued opportunities for traditional use of these resources may be assessment endpoints for surface water, wildlife, and traditional use. Identification of assessment endpoints for VCs in the EIS was determined primarily from the outcome of the community, public, and regulatory engagement process (MVEIRB 2006).

Measurement endpoints are defined as quantifiable (i.e., measurable) expressions of changes to assessment endpoints (e.g., changes to chemical concentrations, rates, habitat quantity and quality, and number of organisms). For example, measurement endpoints for predicting effects to air quality may include changes in concentrations of particulate matter (dust) and nitrogen oxides. Effects to long-term social, cultural, and economic values are predicted through analysis of measurement endpoints such as employment, education, training, and capacity for traditional land use. Measurement endpoints also provide the primary factors for discussions concerning the uncertainty of impacts to VCs, and subsequently, are the key variables for study in monitoring and follow-up programs.

The overall significance of Project impacts on VCs is predicted by linking residual changes in measurement endpoints to impacts on the associated assessment endpoint. For example, changes to habitat quantity and quality are used to assess the significance of effects from the Project on the abundance and distribution of caribou, which influence the persistence of the population (assessment endpoint; see Table 6.3-1 for example). Effects to caribou abundance and distribution are then used to predict impacts on the accessibility and availability of the population for traditional and non-traditional use of caribou (also an assessment endpoint).

Table 6.3-1 Example of Valued Component, Assessment and Measurement Endpoints Associated with the Key Line of Inquiry for Caribou

Key Line of Inquiry	Valued Component	Assessment Endpoints	Measurement Endpoints
Caribou	Caribou	• Persistence of Caribou Populations • Continued Opportunity for Traditional and Non-traditional Land Use of Caribou	• Habitat quantity and fragmentation • Habitat quality • Movement and behaviour • Survival and reproduction • Access to caribou • Availability of caribou • Human health

Measurement endpoints for VCs of the socio-economic and cultural environment include employment, income, training, quality and capacity of community infrastructure, family and community cohesion, tourism potential and wilderness character, and heritage resources. These measurement endpoints can be considered as subsets of VCs such as employment and business opportunities, beneficial and adverse socio-economic properties, social attributes, and cultural attributes. For most socio-economic VCs, the significance of effects from the Project is determined for one assessment endpoint that reflects the collective issues among the KLOIs and SONs in the EIS (i.e., persistence of long-term social, cultural, and economic sustainability).

Some biophysical components of the environment are strictly considered as measurement endpoints for VCs, and do not have independent assessment endpoints. Examples include:

- geology, soils, and permafrost;
- groundwater;
- surface water flows and levels;
- lake bed sediments;
- benthic invertebrates;
- plankton; and
- wildlife habitat quantity and quality.

These measurement endpoints represent pathways to effects on VCs and the associated assessment endpoint. For example, changes in lake bed sediments and the abundance and distribution of benthic invertebrates and plankton influence the persistence of lake productivity and desired fish populations. Similarly, groundwater interacts with surface water and can change soil quality, which influences the persistence of plant populations and communities.

Consequently, not every biophysical component or SON in the EIS is carried through to the residual impact classification and determination of significance. Again, this is because the evaluation of significance is completed on VC assessment endpoints, which represent the protection and sustainability of a valued resource for future human generations. This approach is consistent with Terms of Reference (Gahcho Kué Panel 2007), and focuses the assessment of impacts and determination of significance on VCs.

There are four SONs that will not be classified for residual impacts or evaluated for environmental significance:

- Alternative Energy Sources;
- Permafrost, Groundwater, and Hydrogeology;
- Mine Rock and Processed Kimberlite; and
- Aboriginal Rights and Community Engagement.

These SONs contain VCs that are analyzed and assessed for effects in other KLOIs and SONs. For example, the effects to caribou from mine rock and processed kimberlite are analyzed in the KLOI for Caribou. A detailed summary of the analysis and assessment of effects will be provided in the SON for Mine Rock and Processed Kimberlite to meet the Terms of Reference (MVEIRB 2007). Similarly, the aquatic KLOIs provide comprehensive analyses and assessment of effects from permafrost, groundwater, and hydrogeology, and a detailed summary will be provided in the SON for Permafrost, Groundwater, and Hydrogeology. Aboriginal rights and community engagement are addressed in Section 4 and Section 12 (Socio-economic Environment, where applicable).

6.4 SPATIAL AND TEMPORAL BOUNDARIES

6.4.1 Spatial Scales and Boundaries

The Terms of Reference (MVEIRB) state that the geographic scope of the study must be appropriate for the potential impact being assessed. In other words, baseline studies and effects analyses should be completed on spatial scales relevant to each VC. Accordingly, the EIS uses a range of study areas for describing baseline conditions and predicting effects from the Project on VCs. This section provides a number of examples to demonstrate the importance of spatial scales and the use of different study area boundaries for VCs in the EIS.

Individuals, populations, species, and communities function within the environment at different spatial (and temporal) scales. In addition, the response of physical, chemical, and biological processes to changes in the environment can occur across a number of spatial scales at the same time (Holling 1992; Levin 1992). As a result, the scale of the investigation will determine the range of patterns and processes that can be observed and predicted with certainty (Wiens 1989; Harris et al. 1996).

Patterns of animal movement and behaviour demonstrate the importance of spatial scale among species. For example, an average daily walk to find food for a caribou or wolverine is typically greater than the area travelled each day by a ground squirrel. Thus, large animals typically include many habitat types and patches within their daily home range while the home range of small animals may include only one or a few patches of habitat (Sinclair 1992).

Effects from a point source disturbance such as a mining project on the biophysical environment are typically stronger at the local scale (i.e., stronger near the mine). Larger scale changes on the environment that occur farther from the mine are more likely to result from other ecological factors and human activities. For example, effects from a mine on environmental components with limited movement (e.g., soil and vegetation) will likely be limited to local changes from mining and associated infrastructure. Some indirect changes to vegetation from dust deposition and air emissions may occur, but the effect may be limited to the local scale of the mine.

Similarly, for species with small home ranges (e.g., songbirds and water birds), any effects from the Project on a local breeding population will likely not be transferred to other populations in the region. Depending on the species, an increase in distance among local populations can decrease the ability to successfully disperse between local populations, and result in populations that fluctuate independently of each other (Schlosser 1995; Steen et al. 1996; Sutcliffe et al. 1996; Ranta et al. 1997; Bjørnstad et al. 1999). In other words, changes in the number of individuals within local populations over time are more related to local factors that influence reproduction and survival rates than the movement of individuals between populations. Thus, effects from the Project on a local population are not expected to influence more distant populations in the region.

For animals with more extensive distributions, such as wildlife species with large home ranges, effects from the Project have a higher likelihood of combining with effects from other human developments and activities. Larger animals (e.g., caribou and wolf) that may be influenced by the Project will likely encounter other human activities and developments in their daily and seasonal ranges. Consequently, effects from the Project could combine with influences from other developments in the individual's home range. In addition, the home ranges of several individuals may be affected, which results in cumulative effects to the population.

For the EIS, spatial boundaries are typically established at the local, regional, and beyond regional scales. The spatial boundaries of the local study areas were designed to measure baseline environmental conditions and then predict direct effects from the Project footprint and activities on the VCs and associated measurement endpoints. Examples of local Project effects include loss of fish habitat from Kennady Lake, physical disturbance to vegetation, soil admixing, and mortality of individual animals. Local study areas were also defined to assess small-scale indirect effects from Project activities on VCs such as changes to soil and vegetation from dust and fuel emissions.

The boundaries for regional study areas were designed to quantify baseline conditions at a scale that was large enough to assess the maximum predicted geographic extent (i.e., zone of influence) of direct and indirect effects from the Project on VCs and measurement endpoints. Project-related effects at the regional scale include potential changes to downstream water quality and quantity, vegetation communities, wildlife habitat quality, wildlife and fish, and people that use these ecosystem services. Cumulative effects are typically assessed at a regional spatial scale and, where relevant, may consider influences that extend beyond the regional study area.

Effects that occur beyond the regional scale concern wildlife populations with large home ranges such as caribou, grizzly bear, wolverine, and wolf. Individuals within these populations travel large distances during their daily and seasonal movements and can be affected by the Project, and one or more additional projects. For these species, the spatial boundary was defined by the range of the population. Similarly, cumulative effects from multiple developments influence traditional and non-traditional land use practices, and socio-economic properties beyond the regional scale. The rationale for the spatial boundaries is provided in the introductions to each KLOI and SON.

6.4.2 Temporal Boundaries

Spatial and temporal scales are tightly correlated because processes that operate on large spatial scales typically occur at slower rates and have longer time lags (Wiens 1989; Chapin et al. 2004; Folke et al. 2004). Examples of large spatial scale processes that occur at slow rates include changes in the distribution and amount of permafrost, quality and quantity of lichens on caribou seasonal ranges, and the northern and southern extents of the boreal forest. Alternately, processes that occur at faster rates such as daily fluctuations in reactive phosphorus concentrations in water, plant transpiration rates, and animal behaviour typically occur within more localized areas.

The approach used to determine the temporal boundaries of effects from natural and human-related disturbances on VCs is similar to the approach used to define spatial boundaries. In the EIS, temporal boundaries are linked to two concepts:

- the development phases of the Project (i.e., construction, operation, and closure); and
- the predicted duration of effects from the Project on a VC, which may extend beyond closure.

Thus, the temporal boundary for a VC is defined as the amount of time between the start and end of a relevant project activity or stressor (which is related to development phases), plus the duration required for the effect to be reversed. After removal of the stressor, reversibility is the likelihood and time required for a VC or system to return to a state that is similar to the state of systems of the same type, area, and time that are not affected by the Project.

Reversibility does not imply returning to environmental conditions prior to development of the Project. Ecological and socio-economic systems continually evolve through time (Chapin et al. 2004; Folke 2006). Subsequently, the physical, biological, social, and economic properties of social-ecological system at closure likely will be different than the current observed patterns, independent of Project effects. Return or recovery to pre-Project conditions may not be possible or even desirable. Ecological systems are complex, non-equilibrium systems and the assumption that ecosystems can be managed in order to preserve or return to some pre-stressed state is false (Landis and McLaughlin 2000; Sandberg and Landis 2001). The state of ecological and socio-economic systems at and beyond Project closure may be equally functional with the desired structure, but likely will not be the same as before development.

Construction, operation, and initial long-term closure phases for the Project are anticipated to occur over 2 years, 11 years, and 8 years, respectively. The first year of construction is primarily composed of Project design. For VCs such as air quality, the duration of the effects from the Project will likely cease at the end of closure. In contrast, effects to soils, vegetation, wildlife, traditional land use, and socio-economics will likely continue past closure. The disturbance of an archaeological site is an example of an irreversible or permanent effect. Thus, for most of the VCs in the KLOI and SON (including socio-economics), the temporal boundary includes all phases of development, and the predicted duration until effects are reversed.

The temporal boundaries for KLOI for aquatic VCs are different in that they are defined by the Terms of Reference, and the development phases of the Project. For example, the temporal boundary for effects to Water Quality and Fish in Kennady Lake is associated with lake dewatering, which occurs during construction and part of operation. Similarly, the timeframe for Downstream Water Effects is also associated with the Project schedule for lake dewatering; however, the duration of effects may extend beyond operation. The temporal scale for Long-term Biophysical Effects and Closure Issues considers all phases of development, and the duration of effects to VCs. For all biological and human VCs, the duration of effects is presented in the context of the life history of species (e.g., number of life spans, number of generations [Section 6.7.2]).

6.5 PATHWAY ANALYSIS

Pathway analysis identifies and assesses the linkages (or interactions) between Project components or activities, and the corresponding potential residual effects to VCs (e.g., water quantity, soil, wildlife, and socio-economics). Potential pathways through which the Project could affect VCs were identified from a number of sources including:

- review of the Project Description and scoping of potential effects by the environmental assessment and Project engineering team;
- consideration of potential effects identified for the other diamond mines in the NWT; and
- the Terms of Reference (Gahcho Kué Panel 2007) and the Report of Environmental Assessment (MVEIRB 2006).

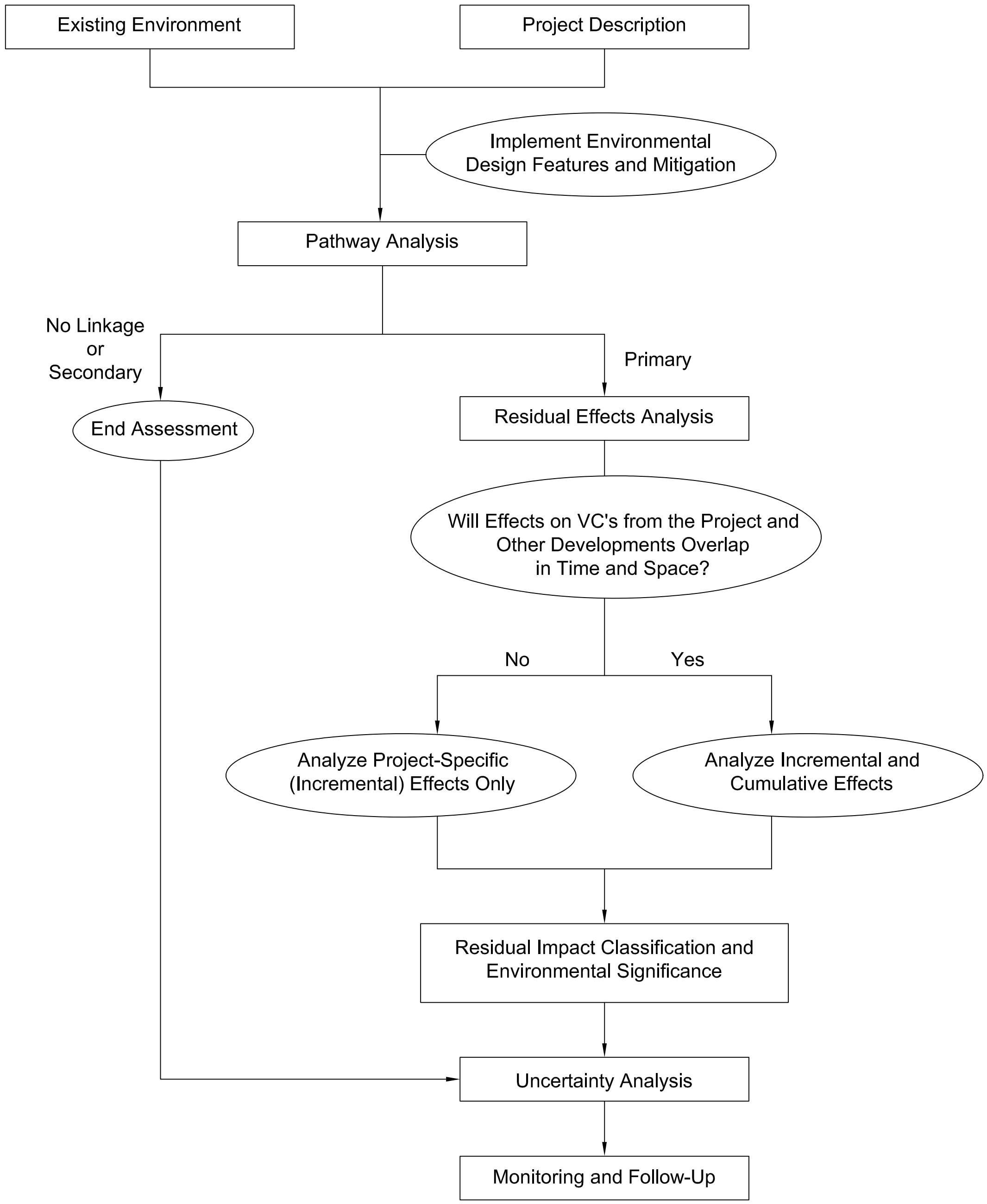
The first part of the analysis is to produce a list of all potential effects pathways for the Project. Each pathway is initially considered to have a linkage to potential effects on VCs. This step is followed by the development of environmental design features and mitigation that can be incorporated into the Project to remove a pathway or limit (mitigate) the effects to VCs. Environmental design features include engineering design elements, environmental best practices, management policies and procedures, and social programs. Environmental design features were developed through an iterative process between the Project's engineering and environmental teams to avoid or mitigate effects.

Knowledge of the environmental design features and mitigation is then applied to each of the pathways to determine the expected amount of Project-related changes to the environment and the associated residual effects (i.e., effects after mitigation) on VCs. Changes to the environment can alter physical measurement endpoints (e.g., water and soil chemistry, and amount of habitat) and biological measurement endpoints such as animal behaviour, movement, and survival (Table 6.3-1). For an effect to occur, there has to be a source (Project component or activity) that results in a measurable change to the environment (pathway) and a correspondent effect on a VC.

Project activity → change in environment → effect on VC

Pathway analysis is a screening step that is used to determine the existence and magnitude of linkages from the initial list of potential effects pathways for the Project. This screening step is largely a qualitative assessment, and is intended to focus the effects analysis on pathways that require a more comprehensive assessment of effects on VCs (Figure 6.5-1). Pathways are determined to be primary, secondary (minor), or as having no linkage using scientific and traditional knowledge, logic, and experience with similar developments and environmental design features. Each potential pathway is assessed and described as follows:

- no linkage – pathway is removed by environmental design features and mitigation so that the Project results in no detectable environmental change and, therefore, no residual effects to a VC relative to baseline or guideline values (e.g., air, soil, or water quality guideline);
- secondary - pathway could result in a measurable and minor environmental change, but would have a negligible residual effect on a VC relative to baseline or guideline values (e.g., an increase in a water quality parameter that is small compared to the range of baseline values and is well within the water quality guideline for that parameter); or
- primary - pathway is likely to result in a measurable environmental change that could contribute to residual effects on a VC relative to baseline or guideline values.



GAHCHO KUÉ PROJECT

Flow Diagram for the Assessment Approach

PROJECTION: N/A		DATUM: N/A	DE BEERS CANADA
SCALE: NOT TO SCALE			
FILE No: P-Other-016-CAD			DATE: December 7, 2010
JOB No: 10-1365-1004	REVISION No: 0		Figure 6.5-1
OFFICE: GOLD - SAS	DRAWN: AJL	CHECK: JV	

Primary pathways require further effects analysis and impact classification to determine the environmental significance of Project effects on VCs (Figure 6.5-1). Pathways with no linkage to a VC or that are considered minor (secondary) are not analyzed further or classified in the EIS because environmental design features and mitigation will remove the pathway (no linkage) or residual effects to the VC can be determined to be negligible through a simple qualitative evaluation of the pathway. Pathways determined to have no linkage to a VC or those that are considered secondary are not predicted to result in environmentally significant effects on VCs.

All primary pathways are assessed in the EIS. However, primary pathways for one VC may end up being secondary or having no linkage to other VCs. For example, local changes to surface water levels may be a primary pathway for effects on aquatic vegetation, but may be considered a minor pathway for effects on the abundance and distribution of wildlife populations with a larger home range. Accordingly, when local changes in surface water levels are classified as a primary pathway then they are further assessed in the EIS; when the pathway is determined to be secondary, then it is not assessed further.

6.6 EFFECTS ANALYSIS

6.6.1 Project-Specific Effects

In the EIS, the effects analysis considers all primary pathways that likely result in measurable environmental changes and residual effects to VCs (i.e., after implementing environmental design features and mitigation). Thus, the analysis is based on residual Project-specific (incremental) effects that are predicted to be primary in the pathway analysis (Figure 6.5-1). Residual effects to VCs are analyzed using measurement endpoints and expressed as effects statements (e.g., Effects to Water Quality, Effects to the Abundance and Distribution of Caribou, and Effects to Plant Populations and Communities). Effects statements may have more than one primary pathway that link a Project activity with a change in the environment and an effect on a VC. For example, the pathways for effects to fish and fish habitat include alteration of local flows and drainage areas, and water quality. Incremental effects from the Project to the abundance and distribution of wildlife populations may include changes in habitat quantity and quality, and survival and reproduction.

Residual effects to social, economic, and cultural VCs include positive and negative changes to employment, training, education, family income, traditional land use, family and community cohesion, and long-term social, cultural, and economic sustainability. Some of these measurement endpoints can be analyzed quantitatively (e.g., number of jobs created and estimated income levels). Other endpoints such as community cohesion and traditional land use are more difficult to quantify, and involve information from public engagement, literature, examples from similar projects under similar conditions, and experienced opinion. The effects analysis considers the interactions among the unique and common attributes, challenges, and opportunities related to social, cultural, and economic measurement endpoints. A key aspect of the effects analysis is to predict the influence from the Project on the development and sustainability of socio-economic conditions in the defined study area.

Residual effects to traditional and non-traditional land use practices (e.g., hunting, fishing, plant and berry gathering) is assessed through the analysis of VCs that are directly associated with these assessment endpoints. For example, analysis of Project-specific effects to plant populations and communities is used to determine the associated influence on the land to sustain listed species and traditional use plants. Analysis of changes to caribou abundance and distribution is used to assess the effect of the Project on the continued opportunity for harvesting caribou. Therefore, effects to assessment endpoints for traditional and non-traditional land use are analyzed and assessed within KLOIs and SONs that contain the applicable biophysical or socio-economic VC.

A detailed description of the spatial and temporal boundaries, and methods used to analyze residual effects from the Project is provided for each VC. The analyses are quantitative, where possible, and include data from field studies, scientific literature, government publications, effects monitoring reports, and personal communications. To limit the degree of technical information in the main text, specific details on modelling and statistical techniques, assumptions, analyses, and data sources are provided in appendices. Available traditional knowledge and community information are incorporated into the analysis and results. Due to the amount and type of data available, some analyses are qualitative and include professional judgement or experienced opinion.

Following the effects analysis, a summary of residual effects is provided for each KLOI and SON. Results from the effects analyses were used to describe the magnitude, duration, and geographic (spatial) extent of the predicted residual changes to VCs. In the EIS, a strong effort is made to express the expected changes quantitatively or numerically, and in technical and non-technical terms. For example, the magnitude (intensity) of the effect may be expressed in absolute or percentage values above baseline (existing) conditions or a guideline value. The duration of the effect is described in years relative to the phases of development of the Project (Section 6.4.2), and the geographic extent of effects is expressed in area (hectares) or distance (metres or kilometres) from the

Project. In addition, the direction, likelihood, frequency, reversibility, and ecological context of effects also are described.

Expressions such as “short-term” duration or “moderate” magnitude will not be used in the summary of residual effects. These expressions will be reserved for the classification of impacts, where definitions of these expressions are provided.

6.6.2 Approach to Cumulative Effects

6.6.2.1 Definition and Application

Cumulative effects represent the sum of all natural and human-induced influences on the physical, biological, social, cultural, and economic components of the environment through time and across space. Some changes may be human-related, such as increasing mineral development or implementing new policy, and some changes may be associated with natural phenomena such as extreme rainfall events, and periodic harsh and mild winters. It is the goal of the cumulative effects assessment to estimate the contribution of these types of effects, in addition to Project effects, to the amount of change in the VCs.

Not every VC requires an analysis of cumulative effects. The key is to determine if the effects from the Project and one or more additional developments/activities overlap (or interact) with the temporal and spatial distribution of the VC (Section 6.4). For some VCs, Project-specific effects are important and there is little or no potential for cumulative effects because there is little or no temporal and spatial overlap with other projects (e.g., components of the aquatic environment). For other VCs that are distributed or travel over large areas and can be influenced by a number of developments (e.g., caribou), the analysis of cumulative effects can be necessary and important. Examples include wildlife, traditional and non-traditional land use, and socio-economics.

In this EIS, cumulative effects are identified, analyzed, and assessed in the section on the VC where applicable, and follow the approach used for the Project-specific effects analysis (Section 6.6.1), and impact classification and determination of significance (Section 6.7). To meet the requirements in the Terms of Reference (Gahcho Kué Panel 2007), the EIS provides a summary of cumulative effects for all VCs (i.e., for components influenced and not influenced by cumulative effects).

6.6.2.2 Assessment Cases

For VCs that require cumulative effects analysis, the concept of assessment cases is applied to the associated spatial boundary (effects study area) to estimate the incremental and cumulative effects from the Project (Table 6.6-1). The approach incorporates the temporal boundary for analyzing the effects from previous, existing, and reasonably foreseeable developments before, during, and after the anticipated life of the Project.

Table 6.6-1 Contents of Each Assessment Case

Baseline Case	Application Case	Future Case
Previous and existing projects[a] prior to the Gahcho Kué Project	Baseline Case plus the Gahcho Kué Project	Application Case plus reasonably foreseeable projects

[a] Includes approved projects.

The baseline case represents a range of conditions over time within the effects study area prior to application of the Project, and not a single point in time (as do the application and future cases). Environmental conditions on the landscape prior to mineral and other development activity (e.g., forestry, oil and gas, and transportation), which represent reference conditions, are considered part of the baseline case. Baseline conditions also include all previous and existing developments (i.e., 2010 baseline conditions) in the VC effects study area prior to application of the Project. Data on the location and type of developments were obtained from the following sources:

- Mackenzie Valley Land and Water Board (MVLWB): permitted and licensed activities within the NWT;
- Indian and Northern Affairs Canada (INAC): permitted and licensed activities within the NWT;
- INAC: contaminated sites database;
- company websites; and
- knowledge of the area and project status.

Analyzing the temporal changes to the landscape is fundamental to predicting the cumulative effects from development on VCs that move over large areas such as caribou and traditional land users.

Baseline conditions represent the historical and current environmental selection pressures that have shaped the observed patterns in VCs. Environmental selection pressures include both natural (e.g., weather, changes in gene frequencies, predation, and competition) and human-related factors (e.g., mineral development, forestry, and sport hunting/fishing). Depending on which selection pressures are currently driving changes to the VC and system, baseline conditions typically fluctuate within a range of variation through time and space. The fluctuations are generated by variation in natural factors (natural variation) and variation associated with human influences. Relative to ecological time and space, baseline conditions are in a constant state of change due to the pushing and pulling of environmental selection pressures. Thus, baseline conditions can be thought of as a distribution of probability values, and the location of the value (e.g., middle or ends of the distribution) is dependent on which environmental factors are currently playing a key role in the trajectory of the VC and system.

The temporal boundary of the application case begins with the anticipated first year of construction of the Project, and continues until the predicted effects are reversed (Section 6.4.2). For several VCs, the temporal extent of some effects likely will be longer than the lifespan of the Project because the effects will not be reversed until beyond closure. For other VCs, the effects may be determined to be irreversible within the temporal boundary of assessment. Such effects may be permanent, or the duration of the effect may not be known, except that it is expected to be extremely long (possibly more than 100 years past closure).

The future case includes the predicted duration of residual effects from the Project, plus other previous, existing, and reasonably foreseeable projects and activities. Thus, the minimum temporal boundary for the application and future case is the expected lifespan of the Project, which like the baseline case, includes a range of conditions over time. The difference between the application and future case is that the application case considers the incremental effect from the Project in isolation of potential future land use activities.

Reasonably foreseeable projects included in the future case were projects or activities that:

- are currently undergoing regulatory review;
- have been officially announced by a proponent;
- may be induced by the Project; and
- have the potential to change the Project or the impact predictions.

For the purposes of this assessment, it is assumed that each of the reasonably foreseeable future projects are carried forward to full development, and their effects have both spatial and temporal overlap with effects from the Project. Using these criteria, the following proposed projects have been selected as a suite of major developments that may occur in the foreseeable future:

- the Yellowknife Gold Project;
- the Nechalacho Project;
- the Damoti Lake Gold Project;
- the NICO Project;
- the Taltson Hydroelectric Expansion Project; and
- the East Arm National Park.

Analyses of the effects for the baseline and application cases are largely quantitative. Alternately, effects analyses for the future case are more qualitative due the large degree and number of uncertainties. There are uncertainties associated with the timing, rate, type, and location of developments in the study areas for each VC. There are also uncertainties in the direction, magnitude, and spatial extent of future fluctuations in ecological, cultural, and socio-economic variables, independent of Project effects.

6.7 IMPACT ASSESSMENT METHODS

6.7.1 Application of Residual Impact Classification

In the EIS, the term “effect” used in the effects analyses and residual effects summary (Section 6.6.1) is regarded as an “impact” in the residual impact classification. An effect represents an unclassified change in a VC. The term “impact” is only used during the classification process. Therefore, in the residual impact classification, all residual effects are discussed and classified in terms of impacts to VCs.

Quantitative and qualitative descriptions of the direction, magnitude, geographic extent, and duration of changes to measurement endpoints for all VCs with primary pathways are provided in the residual effects summary for each KLOI and SON (as described in Section 6.6.1). Frequency and likelihood of effects also are described where applicable. However, the classification of residual impacts from associated pathways and the determination of environmental significance are only completed for those VCs that have assessment endpoints. This is because assessment endpoints represent the key properties of the VC that should be protected for its use by future human generations (i.e., assessment endpoints consider sustainability; Section 6.5). Results from the residual impact classification are then used to determine the environmental significance from the Project on assessment endpoints.

6.7.2 Residual Impact Criteria and Definitions

The purpose of the residual impact classification is to describe the residual incremental and cumulative (if applicable) effects from the Project on VCs using a scale of common words (rather than numbers and units). The use of common words or criteria is a requirement in the Terms of Reference for the Project (MVEIRB 2007). Criteria include:

- direction;
- magnitude;
- geographic extent;
- duration;
- frequency;
- likelihood;
- reversibility; and
- ecological context.

Generic definitions for each of the residual impact criteria are provided below.

Direction: Direction indicates whether the impact on the environment is negative (i.e., less favourable), positive (i.e., beneficial), or neutral (i.e., no change). While the main focus of the impact assessment is to predict whether the development is likely to cause significant adverse impacts on the environment or cause public concern, the positive changes associated with the Project are also reported. Neutral changes are not assessed.

Magnitude: Magnitude is a measure of the intensity of an impact, or the degree of change caused by the Project relative to baseline conditions or a guideline value. Magnitude is classified as negligible, low, moderate, and high. For each VC, the scale of magnitude is defined (i.e., the meaning of the terms negligible, low, moderate, and high is defined). Magnitude can relate to relative (percentage) or absolute changes that are above or below baseline, guidelines, or threshold values. Where possible, magnitude is reported in absolute and in relative terms.

Geographical extent: Geographic extent refers to the area affected, and is categorized as local, regional, and beyond regional. Local-scale impacts mostly represent changes that are directly related to the Project footprint and activities, but may also include small-scale indirect effects. Changes at the regional scale are largely associated with indirect impacts from the Project, and represent the maximum predicted spatial extent of direct and indirect effects from the Project (zone of influence). Impacts beyond the regional scale are mostly associated with VCs that have large spatial distributions and are influenced by cumulative effects such as caribou. Cumulative effects generally occur at the regional or beyond regional scales.

Using aquatics as an example, local is the Kennady Lake watershed, regional is the watershed from Kennady Lake to Aylmer Lake, and beyond regional is the Lockhart River watershed. In using this criterion, local intensities will be considered as well (i.e., where an impact may affect various areas to differing degrees, separate analyses would be provided). For example, downstream impacts would be separated into several geographic areas of high, medium, and low magnitude.

Duration: Duration is defined as the amount of time (usually in years) from the beginning of an impact to when the impact on a VC is reversed, and is expressed relative to Project phases (Section 6.4.2). Both the duration of individual events (e.g., waste water discharges) and the overall time frame during which the impact may occur (e.g., phases of a Project during construction, operation, and closure) are considered.

For those VCs in which the duration of the impact extends past closure (i.e., long-term impacts), the estimated duration is discussed in the context of life spans (e.g., fish and wildlife) or generation times (i.e., humans), and reversibility. Some impacts may be reversible soon after the effect has ceased, while other impacts may take longer to be reversed. By definition, impacts that are short-term, medium-term, or long-term in duration are reversible.

In some cases, available scientific information and professional judgement may predict that the impact is irreversible. Alternately, the duration of the impact may not be known, except that it is expected to be extremely long (say more than 100 years), and any number of factors could cause the VC and system to never return to a state that is unaffected by the Project. In other words, science and logic predict that the likelihood of reversibility is so low that the impact is irreversible (i.e., permanent).

Reversibility: After removal of the stressor, reversibility is the likelihood and time required for a VC or system to return to a state that is similar to the state of systems of the same type, region and time period that are not affected by the Project. Each discipline defines what constitutes a system and what the “same” type is (e.g., lake, stream). This term usually has only one alternative: reversible or irreversible. The time frame is provided for reversibility (i.e., duration) if an effect is reversible. Permanent impacts are considered irreversible. In terms of the socio-economic environment, the manageability of impacts is considered rather than their reversibility. Where appropriate, the evaluation identifies the resources that may be used to facilitate recovery.

Frequency: Frequency refers to how often an impact will occur and is expressed as isolated (confined to a discrete period), periodic (occurs intermittently, but repeatedly over the assessment period), or continuous (occurs continuously over the assessment period). Frequency is explained more fully by identifying when it occurs (e.g., once at the beginning of the Project). If the frequency is periodic, then the length of time between occurrences, and the seasonality of occurrences (if present) is discussed.

Likelihood: Likelihood is the probability of an impact occurring and is described in parallel with uncertainty. Four categories are used: unlikely (impact is expected to occur less than once in 100 years); possible (impact is expected to occur at least once in 100 years); likely (impact is expected to occur at least once in 10 years); and highly likely (impact has 100% chance of occurring within a year).

Ecological context: The nature of effect refers to the type of the impact (e.g., loss of habitat) as well as the nature of the affected valued component (e.g., caribou).

For criteria such as frequency and likelihood, the scales can be applied consistently across all biophysical and socio-economic VCs (e.g., isolated, periodic, or continuous frequency). In contrast, the scale of classifications for direction, magnitude, geographic extent, and duration are dependent on each VC. To provide transparency in the EIS, the definitions for these scales are ecologically, socially or logically based on the VC, and provided in each KLOI and SON. Although professional judgement is inevitable in some cases, a strong effort is made to classify impacts using scientific principles and supporting evidence.

6.7.3 Residual Impact Classification and Resilience

As explained in Section 6.6.1, effects statements are used to focus the analysis of effects to VCs that are associated with one or more primary pathways. A residual effects summary is provided for each KLOI and SON, and presents a numerical or qualitative description of magnitude, geographic extent, duration, and frequency of residual effects from each pathway. From the summary of residual effects, each pathway that is linked to an assessment endpoint is classified using categorical scales for each impact criterion (e.g., low magnitude, regional geographic extent, long-term duration, high likelihood).

The classification of residual impacts on primary pathways provides the foundation for determining environmental significance from the Project on assessment endpoints. Magnitude, geographic extent, and duration are the principal criteria used to predict significance (FEARO 1994). Other criteria, such as frequency, ecological context, and likelihood are used as modifiers (where applicable) in the determination of significance.

Frequency may or may not modify duration, depending on the magnitude of the impact. Because the EIS assesses impacts to key VCs of concern, the ecological context is high, by definition. However, ecological context may be used to modify the environmental significance if the societal value is associated with traditional land use.

Likelihood will also act as a modifier that can influence environmental significance. Environmental impact assessment considers impacts that are likely or highly likely to occur; however, within the definition of likelihood there can be a range of probabilities that impacts will occur. In special circumstances, the environmental significance may be lowered if an impact is considered to have a very low likelihood of occurring, and increased for impacts with a very high likelihood of occurring.

Duration of impacts, which includes reversibility, is a function of ecological resilience, and these ecological principles are applied to the evaluation of significance. Although difficult to measure, resilience is the capacity of the system to absorb disturbance, and reorganize and retain the same structure, function, and feedback responses (i.e., properties of the social-ecological system) (Holling 1973; Walker et al. 2004; Folke 2006). Resilience includes resistance, capability to adapt to change, and how close the system is to a threshold before shifting states (i.e., precariousness). Highly resistant systems require stronger disturbances over a longer duration and larger geographic area to change the system's current path or trajectory, even if it is close to a threshold. In contrast, a similar system with lower resistance would be less resilient to a weaker disturbance, and may generate a change in state or a regime shift with a subsequent impact on the ecosystem and society (Folke et al. 2004; Walker et al. 2004).

The adaptive capability of a system is related to the evolutionary history and adaptations accumulated by communities, species, and populations while experiencing a range of disturbances and fluctuations through space and time (Holling 1973; Gunderson 2000). If the frequency, duration, geographic extent, and/or intensity (magnitude) of a disturbance are beyond that historically encountered by the system, and outside the adaptive capability of a species, then the likelihood of a regime shift increases. Regime shifts and changes in state of the population or ecosystem can be reversible or irreversible.

Reversibility is a function of resilience. Due to the complex relationships among biophysical components and unpredictable events, the recovery of the system following disturbance can result in the same or an altered state (Gunderson 2000; Folke 2006). In other words, the exact nature of ecosystem properties and services, and human uses may be different following recovery from the disturbance. In some cases, the shift in ecological properties and services may not be reversible and will have a consequence to socio-economics and land use (Gunderson 2000; Scheffer and Carpenter 2003; Folke et al. 2004; Carpenter and Brock 2006).

Human development and natural disturbances erode the resilience of existing ecosystems by stressing and disrupting the relationships among species and their environment. Through the implementation of management and policy, humans also can increase or maintain resilience by making the system more resistant, moving the system away from threshold boundaries, and/or moving the boundary further away from the system (Folke et al. 2004; Walker et al. 2004). People have the ability to exert change across several spatial and temporal scales and levels of organization in the system, although some more strongly and quickly than others. Through the actions of adaptive management, mitigation, and changes to land use practices, humans have the ability to modify resilience in a positive way, and potentially decrease environmental significance. These concepts are considered while evaluating the significance of impacts on VCs.

6.7.4 Determination of Significance

The evaluation of significance for biophysical VCs considers the entire set of primary pathways that influence a particular assessment endpoint, but significance is not explicitly assigned to each pathway. Rather, the relative contribution of each pathway is used to determine the significance of the Project on assessment endpoints, which represents a weight of evidence approach. For example, a pathway with a high magnitude, large geographic extent, and long-term duration would be given more weight in determining significance relative to pathways with smaller scale effects. The relative impact from each pathway is discussed; however, pathways that are predicted to have the greatest influence on changes to assessment endpoints would also be assumed to contribute the most to the determination of environmental significance.

Alternately, the determination of significance for the socio-economic environment is completed on a subset of VCs (e.g., quality of life, employment, income, education, and community services), and typically, each VC is directly associated with an individual pathway. Each pathway can result in different levels of effects on individuals, communities, and the region. Consequently, it is more practical to independently classify and predict the significance of the impact from each pathway on a socio-economic VC than to classify the entire combined set of pathways. However, after evaluating the significance of each pathway, the overall significance of the Project on the assessment endpoint for the socio-economic environment is provided.

Environmental significance is used to identify predicted impacts that have sufficient magnitude, duration, and geographic extent to cause fundamental changes to a VC. Significance is determined by the risk to the persistence and function of populations (i.e., population level effects) within aquatic and terrestrial ecosystems, or the socio-economic system. It is difficult to provide generalized definitions for environmental significance that are universally applicable to each VC assessment endpoint. Consequently, specific definitions are provided for each assessment endpoint in each KLOI or SON.

Some of the key factors considered in the determination of environmental significance include:

- Results from the residual impact classification of primary pathways are used to evaluate the significance of impacts from the Project on the assessment endpoint of VCs.
- Magnitude, geographic extent, and duration (which includes reversibility) of the impact are the principal criteria, with frequency and likelihood as modifiers.
- Professional judgment, experienced opinion, and ecological principles, such as resilience, are used to predict the duration and associated reversibility of impacts.

The following is an example of definitions for assessing the significance of impacts on the persistence of the wildlife VCs, and the associated continued opportunity for traditional and non-traditional use of wildlife.

Not significant – impacts are measurable at the individual level, and strong enough to be detectable at the population level, but are not likely to decrease resilience and increase the risk to population persistence.

Significant – impacts are measurable at the population level and likely to decrease resilience and increase the risk to population persistence. A number of high magnitude and irreversible impacts at the population level would likely be significant.

These lower and upper bounds on the determination of significance are relatively straightforward to apply. It is the area between these bounds where ecological principles and professional judgment are applied to determine significance.

Classification of socio-economic residual effects and determination of significance generally follows the methods used for biophysical VCs; however, there are some differences in the selection and definitions of impact criteria. For socio-economic VCs, direction, magnitude, geographic extent, and duration are the criteria used to classify impacts and evaluate the significance of changes to assessment endpoints. The assessment of significance considers the scale of these criteria (e.g., low magnitude, regional geographic extent, and long-term duration) and professional opinion, which is based on the context of the communities involved, and the informed value and judgements of interested and affected organizations and specialists. The level of significance also assesses the efficacy of the proposed environmental design features (i.e., policies, practices, and investments) and benefit enhancement programs to limit negative impacts and foster positive impacts on the continued persistence of long-term sustainable social, cultural, and economic features of the environment.

6.8 UNCERTAINTY

For each KLOI and SON, a discussion of uncertainty is provided as required in the Terms of Reference (MVEIRB 2007) as most assessments of impacts embody some degree of uncertainty. The purpose of the uncertainty sections of the EIS is to identify the key sources of uncertainty and discuss how uncertainty is addressed to increase the level of confidence that effects will not be worse than predicted. Confidence in effects analyses can be related to many elements, including the following:

- adequacy of baseline data for understanding existing conditions and future changes unrelated to the Project (e.g., extent of future developments, climate change, catastrophic events);

- model inputs (e.g., change in chemical concentrations in water over time and space);
- understanding of Project-related impacts on complex ecosystems that contain interactions across different scales of time and space (e.g., how and why the Project will influence wildlife); and
- knowledge of the effectiveness of the environmental design features for reducing or removing impacts (e.g., environmental performance of the mine rock management area).

Uncertainty in these elements can result in uncertainty in the prediction of environmental significance. Where possible, a strong attempt is made to reduce uncertainty in the EIS to increase the level of confidence in impact predictions, as shown in the following examples:

- using the results from several models and analyses to help reduce bias and increase precision in predictions;
- using data from effects monitoring programs at existing mines and the literature as inputs for models rather than strictly hypothetical or theoretical values; and
- implementing a conservative approach when information is limited so that impacts are typically overestimated.

Where appropriate, uncertainty may also be addressed by additional mitigation, which would be implemented as required.

6.9 MONITORING AND FOLLOW-UP

In the EIS, monitoring programs are proposed to deal with the uncertainties associated with the impact predictions and environmental design features and mitigation. In general, monitoring is used to test (verify) impact predictions and determine the effectiveness of environmental design features (mitigation). Monitoring is also used to identify unanticipated effects and implement adaptive management. To meet the Terms of Reference, each KLOI and SON will distinguish between the following types of monitoring that may be applied during the development of the Project.

- Compliance inspection: monitoring the activities, procedures, and programs undertaken to confirm the implementation of approved design standards, mitigation, and conditions of approval and company commitments.

- Environmental monitoring: monitoring to track conditions or issues during the development lifespan, and subsequent implementation of adaptive management.
- Follow-up: programs designed to test the accuracy of impact predictions, reduce uncertainty, determine the effectiveness of environmental design features, and provide appropriate feedback to operations for modifying or adopting new mitigation designs, policies, and practices. Results from these programs can be used to increase the certainty of impact predictions in future environmental assessments.

These programs form part of the environmental management system for the Project. If monitoring or follow-up detects effects that are different from predicted effects, or the need for improved or modified design features, then adaptive management will be implemented. This may include increased monitoring, changes in monitoring plans, or additional mitigation.

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6.11 ACRONYMS AND ABBREVIATIONS

De Beers	De Beers Canada Inc.
EA	environmental assessment
EIS	environmental impact statement
KLOI	key line of inquiry
NWT	Northwest Territories
Report of Environmental Assessment	Reasons for Decision and Report of Environmental Assessment for the De Beers Gahcho Kué Diamond Mine
SON	species of note
Terms of Reference	*Terms of Reference for the Gahcho Kué Environmental Impact Statement*
VC	valued component