

10.0 CUMULATIVE EFFECTS

Cumulative effects represent the sum of all natural and human-induced influences on the cultural, physical, biological, and economic components of the environment within a period of space and time. Cumulative effects are changes to the environment that “are likely to result from the project in combination with other projects or activities that have been or will be carried out” (Government of Canada 2003). The effects assessment for the YGP identified a range of local effects on the various cultural, physical, biological and economic components (Sections 6.0 and 7.0). The next step is to determine if these potential local and regional effects would combine with the effects from other current and reasonably foreseeable projects and activities in the Slave Geologic Province (SGP). At the same time, the influence of natural changes in environmental conditions is considered. Thus, the goal is to determine the chance and strength of potential incremental cumulative impacts from the YGP on cultural, physical, biological and economic components of the environment.

The project’s contribution to cumulative effects is assessed based on its effects on a valued component (VC) that is also affected by other land uses. A VC may be a valued ecosystem component (VEC) or valued social component (VSC). Communities, roads, other developments, and hunting are examples of other land uses. Overall cumulative effects are effects of all land uses on a VC, including effects caused by the project.

An assessment of cumulative effects provides a more complete understanding of what might happen to VCs beyond the influence of the project alone. This is useful for regulatory decision-makers, and land and resource managers as they and proponents review and plan possible future development. Thus, an assessment of cumulative effects provides a glimpse into environmental and socio-economic conditions now and how they may change in the future. This contributes to a better understanding of what might or might not happen if the project proceeds.

The MVEIRB Terms of Reference noted that, during the scoping sessions, concerns were identified in relation to:

- The effect of the developer’s planned use of the historic Discovery Mine airstrip.
- Cumulative biophysical effects from the proposed development on water quality in the Yellowknife River system, including any downstream effects from the Tailings Impoundment Area or Waste Rock Storage Facilities.
- Cumulative effects on fish and other aquatic organisms.
- Cumulative social, economic and cultural effects with emphasis on:
 1. practice of traditional language and traditional economy, time spent on the land, and other activities essential to the maintenance of aboriginal culture;
 2. heritage resources in the historic Discovery mine area; and
 3. long-distance commuting and effects on families and local small communities.

- Cumulative effects on wildlife, with particular attention to the Bathurst Caribou.
- Cumulative effects on hunting, fishing, trapping and other activities for traditional harvesters from potentially-affected communities.
- Plans for the monitoring of cumulative effects and the adaptive management of the proposed project's contribution to regional cumulative effects.

Typically, cumulative effects assessments address effects that:

- Extend over a larger area.
- Are of longer term duration.
- Act in conjunction with other projects/activities on the same VCs.
- Are reasonably probable, considering possible future projects/activities and effects.

For the YGP, the assessment of cumulative effects involved the application of four basic considerations (CEAA 1999):

- There must be an environmental, social or cultural residual effect related to the project.
- The effect must be demonstrated to operate cumulatively, additively or synergistically with effects from other projects or activities.
- The other projects or activities exist or are likely to be carried out and are not hypothetical.
- The cumulative effect is likely to result.

For a number of components the chance that cumulative effects from the YGP would occur is negligible or non-existent. This is largely because the geographical extent of identified residual effects associated with the YGP does not overlap the geographical extent of identified residual effects from other projects and activities. Sections 6.0 and 7.0 provide in-depth discussions of potential effects to the biophysical and human environment, respectively. As discussed in those sections, potential residual effects to VCs determined to extend beyond the LSA and having the potential to add to effects from other land uses were considered. Any potential residual effects confined to the LSA and not adding to effects from other projects and land uses are not considered cumulative effects and therefore, are not assessed in the YGP DAR.

Based on stakeholder concerns as conveyed in the MVEIRB Terms of Reference, the following cumulative effects assessment was carried out.

10.1 SPATIAL BOUNDARIES

The Review Board determined that the minimum geographical scope of the effects assessment (Section 6.0 and 7.0) should include the land covered by the developer's mineral leases, mining claims, and a local study area (LSA) surrounding the proposed development. For individual VCs, the geographic scope may go beyond this minimum area (MVEIRB 2009).

The boundaries for the regional study area (RSA) 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 potential direct and indirect effects from the YGP on most VCs. Potential 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 RSA. A cumulative effects study area (CESA) was identified for the YGP and is shown on Figure 10.3-1.

As directed by the Review Board, the effects assessment includes an examination of cumulative effects. Cumulative effects were to focus on other past, present and reasonably foreseeable future developments or human activities that may combine with the effects of the proposed YGP to affect the same VCs. Such cumulative effects were to be assessed at a geographic and temporal scale appropriate to the particular VC under consideration.

For cumulative effects to water resources, the geographic scope includes all areas that the proposed project may potentially affect, including the Yellowknife River Basin downstream of the YGP (Figure 10.3-1). The inclusion of lakes outside of the Giauque Lake and Round/Winter/Narrow Lake watershed that have not been contaminated by the historic Discovery Mine development is also required (MVEIRB 2009).

The geographic scope for assessing effects to the human environment is to encompass any potentially affected communities. Throughout this environmental assessment, the term 'potentially affected community' is intended to refer to any settlement, town, village, city or hamlet as well as any First Nation or Métis group that may be impacted by the proposed development. This includes the communities of Yellowknife, Déttah, N'Dilo, Behchoko, Gameti, Wekweeti and Whati (MVEIRB 2009).

Since the North Slave Métis Alliance (NSMA) is an organization representing the interests of Métis people in the North Slave region, the developer was to include the NSMA and its constituents in any consideration that affects Aboriginal persons, communities or organizations (MVEIRB 2009).

Potential effects that occur beyond the regional scale concern wildlife populations with large home ranges, namely Bathurst caribou, wolverine, and wolf. Individuals within these populations (or VCs) travel large distances during their daily and seasonal movements and can potentially be affected by the Project, and one or more additional projects. For these species, the spatial boundary was defined by the seasonal or annual range of the Bathurst caribou population (Figure 10.3-1).

10.2 TEMPORAL BOUNDARIES

The approach used to determine the temporal boundaries of potential effects from natural and human-related disturbances on VCs is similar to the approach used to define spatial boundaries. In the DAR, temporal boundaries used for the cumulative effects assessment are:

- the development phases of the Project, which include;
 - construction (2 years);
 - operations (7.5 years); and
 - closure (2 years).
- 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 but does not necessarily imply returning to environmental conditions prior to development of the Project. For example, ecological and socio-economic systems continually evolve through time (Chapin et al. 2004; Folke 2006) and the physical, biological, social, and economic properties 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.

The Review Board determined that the temporal boundaries should reflect the potential long term effects, not the duration of YGP operations. The temporal scope included all phases of the YGP from construction to post-closure, until such time that potential significant adverse effects attributable to the YGP are predicted to no longer occur (MVEIRB 2009).

10.3 REGIONAL DEVELOPMENTS

10.3.1 Previous and Existing Developments

A complete list of previous and existing, and reasonably foreseeable projects was compiled. This information is depicted on Figure 10.3-1.

10.3.2 Reasonably Foreseeable Projects

This section summarizes the potential future projects included in the assessment. The reasonably foreseeable projects included in the assessment were projects or activities that:

- have been proposed and scoped to a reasonable level of detail;
- may be induced by the Project, and
- have the potential to change the Project or the impact predictions.

For the purposes of this assessment, we have reviewed and incorporated the concepts and approach taken by De Beers (2010) and have assumed that each of the reasonably foreseeable projects is carried forward to full development, and that their effects have both spatial and temporal overlap with the YGP. Using this approach, the following proposed

projects were selected as the likely developments in the reasonably foreseeable future (De Beers 2010) (Figure 10.3-1):

- Gahcho Kue Project;
- Nechalacho Project;
- Damoti Lake Gold Project;
- NICO Project;
- Taltson Hydroelectric Expansion Project; and
- Clan Lake Gold Project (Tyhee NWT Corp.)

Gahcho Kue Project

The Gahcho Kué project is located on the AK claim block, south of Lac de Gras, 80 km southeast of the Snap Lake Diamond Project, approximately 230 km east of the YGP, and approximately 300 km northeast of Yellowknife in the Northwest Territories (Figure 10.3-1). Gahcho Kué is a joint venture between De Beers Canada Exploration Inc. (51%) and Mountain Province Diamonds Inc. (49%). Exploration has determined that three kimberlite deposits have potential to be mined, these have been designated 5034, Hearne and Tuzo.

The mine complex will include an accommodation facility with enough private rooms to house the employees needed to operate the mine and the workers needed during the construction phase. There will also be an administration complex, process plant, maintenance and warehouse facility, a lined and bermed fuel tank farm, explosives storage and manufacturing facilities, and an airstrip capable of handling the aircraft needed to fly workers and supplies to the site. A 120 km winter road that follows the route established during exploration of the site would be built to the site each year, connecting to the Tibbitt-Contwoyto winter road near the top end of MacKay Lake.

Nechalacho Project

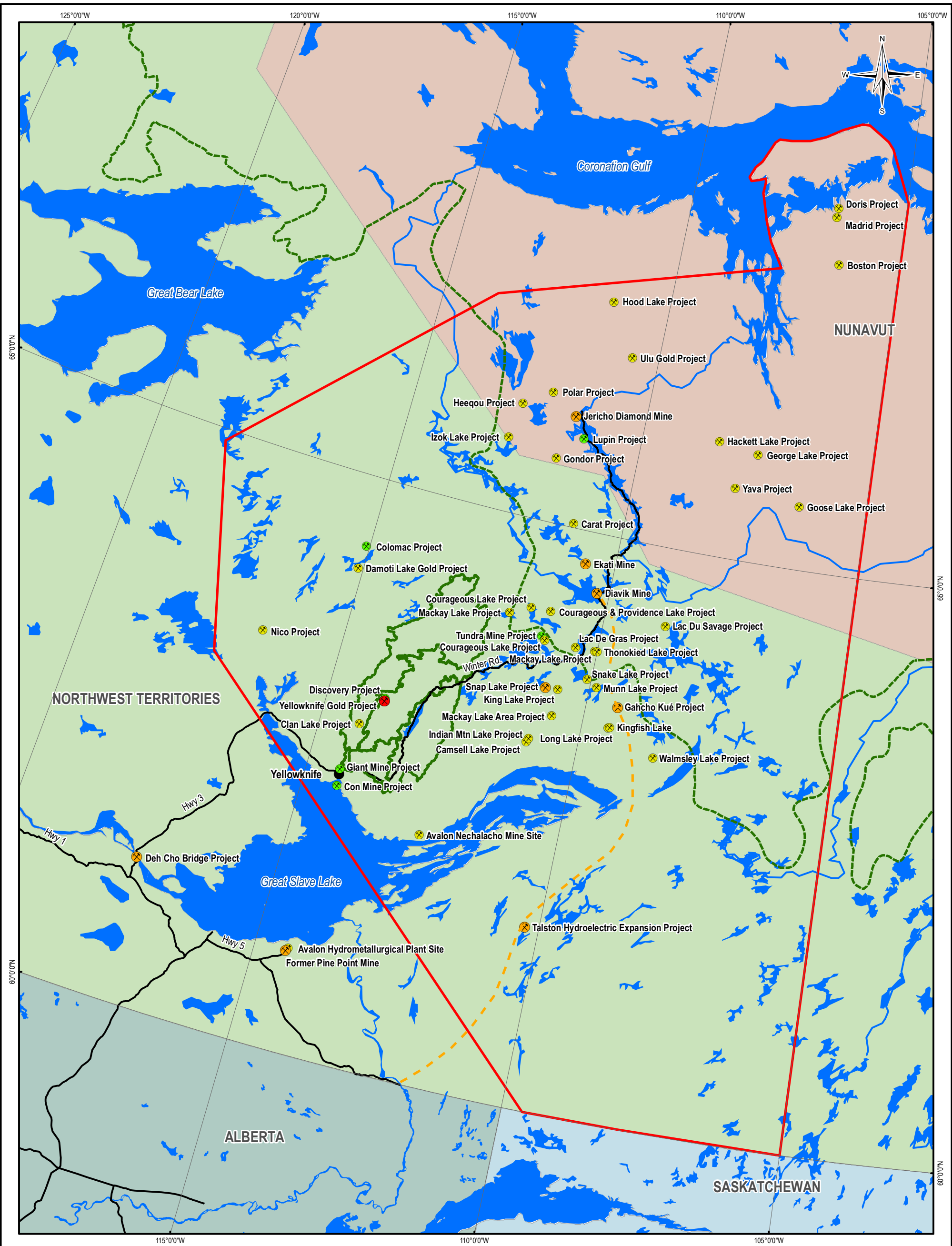
The Nechalacho Project is a rare earth elements deposit, owned by Avalon Rare Metals Inc. The property is located approximately 100 km southeast of the City of Yellowknife near Hearne Channel on the East Arm of Great Slave Lake and 240 km southwest of the YGP (Figure 10.3-1). Rare earth elements such as cerium, lanthanum, and neodymium along with associated zirconium, niobium and tantalum will be mined underground from the Nechalacho deposit. Production would peak at 2,000 tonnes per day, mining approximately 12 million tonnes over a period of approximately 18 years of operations, with construction beginning in 2013 and operations in 2015 (Avalon 2010).

The Nechalacho Mine infrastructure will include a 150 person camp, airstrip, diesel power generation and concentrate loading and storage areas. Concentrates will be loaded into bulk transport containers, hauled to the seasonal dock facility along the north shore of Great Slave Lake and barged during the summer to a purpose-built hydrometallurgical plant, to be

located near the site of the old Pine Point mine on the south shore of Great Slave Lake (Avalon 2010).

Damoti Lake Gold Project

The Damoti Lake Gold Project is a gold deposit owned by Merc International Minerals Inc. The property is located approximately 20 km south of the Colomac Mine and approximately 270 km west of the YGP (Figure 10.3-1), and accessed via the winter road to Colomac and Wekweeti. A bulk sample was conducted in 1996 by previous owners, and Merc has conducted drill programs since then to expand known resources (Merc 2010). As the Project is currently in exploration stage and a mine plan has not yet been developed, there is uncertainty regarding the size and duration of the Project.



LEGEND

- Cumulative Effects Study Area for Wildlife (approx. 424,000 km²)
- Yellowknife Gold Project
- Existing Mine/Project
- Exploration Mine/Projects
- Closed Mine/Project
- Yellowknife
- Talston Hydroelectric Expansion Project
- Road
- Yellowknife River Basin
- Treeline
- Watercourse
- Waterbody

NOTES
Base data sources: NWT, Canada Atlas, and ESRI.

YELLOWKNIFE GOLD PROJECT

Spatial Boundary for Assessing Cumulative Effects on Terrestrial Resources

PROJECTION
Canada Albers

DATUM
NAD83

Scale: 1:3,500,000
40 20 0 40 80
Kilometres

FILE NO.
V23201097-DAR-062.mxd

PROJECT NO.
V23201097

DWN
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CKD
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OFFICE
EBA-VANC

DATE
March 23, 2011

tyhee NWT Corp

EBA Engineering
Consultants Ltd.

Figure 10.3-1

ISSUED FOR USE

NICO Project

The NICO Project is a cobalt, gold and bismuth deposit located in the Tlicho region, approximately 50 km northwest from the community of Whati and 370 km west of the YGP (Figure 10.3-1). Fortune Minerals Ltd. proposes to mine the deposit using open-pit and underground methods. The NICO Project is located in the Marian River basin, draining into the East Arm of Great Slave Lake. The NICO Project would require an all-season road connection to Highway 3 near Bechoko. The NICO reserves will support a minimum 15-year mine life at 4,000 tonnes per day (Fortune 2010). Gold would be extracted from the ore at the NICO site, but cobalt and bismuth concentrate would be trucked to a purpose-built smelter in Saskatchewan (Fortune 2010). The NICO Project is currently undergoing an environmental assessment by the Mackenzie Valley Environmental Impact Review Board.

Taltson Hydroelectric Expansion Project

The Taltson Hydroelectric Expansion Project is proposed by Dezé Energy Corporation to enhance existing power generating facilities at the Taltson hydroelectric station near Fort Smith and the construction of a new power transmission line to the proposed Gahcho Kue mine, then branching to the Snap Lake, Diavik and Ekati mines (Dezé 2010) (Figure 10.3-1). The proposed project would offset the diesel-generated electricity at the existing mines and at the Project. This would lead to some environmental benefits, such as reduced greenhouse gas emissions and fewer haul trucks on the Tibbitt to Contwoyto Winter Road.

The Taltson Hydroelectric Expansion Project would not cause any new flooding in the Taltson River basin. However, it would require a new winter road from Fort Smith to Nonacho Lake and new spur roads from the Tibbitt to Contwoyto Winter Road during the three-year construction period (projected to be 2012 to 2015). Further, approximately 690 km of new transmission line would be required to link the Taltson generating station to the existing diamond mines and the Project (Dezé 2010). Full operations of the expansion were anticipated to in 2013.

In early March, 2011, the project was temporarily put on hold by the Government of the Northwest Territories and Dezé Energy asked the Mackenzie Valley Environmental Impact Review Board to "pause" the environmental assessment of the project (CBC 2011).

Clan Lake

The Clan Lake property is located 50 km north of Yellowknife NWT and 32 km south of the YGP (Ormsby). Tyhee NWT Corp acquired the property by staking in November 2006 and subsequently staked additional contiguous claims in February 2007 and September 2009. The property consists of seven mineral claims, 100% owned, totaling 2,809 hectares. Mineralization is largely constrained to a 6.5 kilometre long, 900 metres wide north-northeast striking domain (open in strike). Clan Lake is in the exploration phase with no definite plans for development at this time.

10.4 CUMULATIVE EFFECTS ASSESSMENT

The term “effect” used in the effects analyses and residual effects summary (Sections 6.0 and 7.0) 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 effects to VCs.

Quantitative and qualitative descriptions of the direction, magnitude, geographic extent, and duration of residual effects for all VCs are provided in the residual effects summary for each VC and the key line of inquiry (as described in Sections 6 and 7). Frequency and likelihood of effects also are described where applicable. Results from the residual impact classification are then used to determine the environmental significance of the Project. 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).

Sections 6 and 7 of this DAR assessed the potential effects of the YGP on all of the key biophysical environmental and socio-economic VCs in terms of anticipated residual effects, and their defining characteristics including nature/geographic scope, direction, magnitude, timing/duration, frequency, reversibility, likelihood/confidence and significance (definitions of these criteria are provided in Table 6.1-1).

The assessment determined that for all VCs, after the application of the proposed mitigation measures, the residual socio-economic and environmental effects of the YGP were anticipated to be negligible and insignificant. Furthermore, any identified environmental effects were generally limited to the immediate YGP footprint area and the LSA, and most were rapidly reversible once activities ceased. As such, effects of this nature cannot typically operate in a cumulative manner. Tyhee NWT Corp therefore believes that it would appear to be unnecessary to develop a plan for the monitoring of cumulative effects from the YGP since none are anticipated to occur.

10.4.1 Water Resources

10.4.1.1 Groundwater Quality

Water quality parameter levels during operations and post closure are expected to be similar to those reported for baseline conditions (Table 2.10-2). Therefore, no groundwater quality cumulative effects are anticipated to occur.

10.4.1.2 Surface Water Quality and Aquatic Resources

The Mackenzie Valley Environmental Impact Review Board (2004) has defined cumulative effects to include, “...those impacts...that result from the impacts of a proposed development in combination with other past, present or reasonably foreseeable future developments.” Based on this definition, the following provides an assessment of potential cumulative effects for projects that reasonably fit into each of these time periods.

Past Developments

The Discovery Mine Ltd. operated a gold mine in the vicinity of Giauque Lake from the 1950s and ceased operations in 1968. Properties within this area, including the Nicholas and Ormsby areas have experienced considerable further exploration by the New Discovery Mine Ltd., and more recently by Tyhee NWT Corp. (See Section 1.4.1). The Historic Discovery Mine operations resulted in the deposit of tailings within the drainage of Giauque Lake and Round Lake. Discharges to Round Lake in particular have affected water and sediment quality in Round and Winter lakes, and possibly, Narrow Lake, as well.

Aquatic effects within the Narrow Lake watershed due to historic mining activities have been integrated into the assessment of the Yellowknife Gold Project because they cannot be separated from any effects to water, sediment, or aquatic biology potentially resulting from the proposed YGP within this area. Contaminant levels from past practices have been identified in the analysis of samples taken from this area, and will form a component of effluent discharges following development of the YGP at Ormsby. These cumulative discharges will necessarily meet water quality requirements of the MMER. Waste stream and TCA treatments will be applied to ensure that regulated MMER criteria and aquatic life protection levels are not exceeded. Since residual contaminant levels from the Discovery Mine tailings deposits cannot be distinguished from YGP water quality effects, remedial measures will necessarily be holistically applied. As such, no further cumulative effects assessment is necessary related to the historic Discovery Mine.

Present and Future Developments

There are no ongoing projects within the Narrow Lake drainage or in the Yellowknife River watershed upstream of its confluence with drainage from Narrow Lake (at Clan Lake; Figure 6.2-1), or for a considerable distance downstream.

Tyhee NWT Corp is undertaking initial exploration activities at its Clan Lake property, located approximately 32 km south of the YGP (Ormsby). Until further exploration activities occur resulting in the identification of potential mineral resources, one scenario that could materialise is that mining could produce additional mill feed to the Ormsby mill. However, since no detailed studies have been carried out to characterize valued ecosystem components (VEC) in this area, it is premature to determine potential effects of future mining operations, and consequently cumulative effects. However, it is likely that no residual cumulative effects would occur as a result of this potential future development.

As shown in Figure 10.3-1, there are no other known projects contemplated within the Clan Lake drainage that have the potential to interact with drainage from the YGP. Similarly, there are no known ongoing or proposed developments that have the potential to interact with or add to the effects of mining activities proposed at Nicholas Lake.

10.4.2 Wildlife

Cumulative effects within the terrestrial environment were assessed by analyzing the changes from previous, existing, and reasonably foreseeable developments on habitat

quantity and quality, and populations (VECs). Natural factors that influence populations were also included in the assessment. Assessment metrics for VECs included:

- persistence of the population; and
- continued opportunities for traditional and non-traditional use of the VEC.

VECs assessed in the effects analysis (Section 6.6) included Bathurst caribou, black bears, wolf, wolverine, and species at risk birds. Except for the Bathurst caribou herd, the incremental residual effects from the YGP on these terrestrial components have negligible or nil potential to overlap in time or space (i.e., interact) with residual effects from other developments; and therefore, were not assessed for cumulative effects. Bathurst caribou have the potential to occur in the YGP area only during winter (Section 2.12.1.1; Figures 2.12-3a to 3f). This VC was assessed for cumulative effects as stipulated in the MVEIRB Terms of Reference (2009).

10.4.2.1 Bathurst Caribou

The following section summarizes the results of the cumulative effects analysis of primary potential effects for Bathurst caribou. The information presented draws heavily from extensive studies and analyses conducted by De Beers Canada Mining Inc. (De Beers) for their Gahcho Kue Environmental Impact Statement.

Five primary potential effects or pathways were evaluated for cumulative residual effects from development on the population persistence of Bathurst caribou (Section 6.6.1.1). These included direct habitat loss and fragmentation from development footprints (including winter roads), and indirect changes to habitat quality from sensory disturbance effects such as people, vehicles, dust, and noise. De Beers (2010) analyzed these pathways through the use of habitat, energetic, and population models; their work is incorporated in this discussion by reference. Two potential effects related to changes in the availability of caribou for traditional and non-traditional use were also examined.

The duration of the potential effects from the different pathways are expected to be reversible in the medium to long term. Sensory disturbance effects associated with influences of exploration and mining activities on caribou populations are anticipated to be reversible over the long term (27 to 32 years [two caribou life spans or 1.5 human generations]). Impacts from winter roads on populations and traditional and non-traditional use of caribou are expected to be reversible in the medium term (5 years after initial closure). For all primary pathways influencing population size and distribution, cumulative effects were determined to be beyond regional in geographic extent (i.e., effects occur at the scale of the seasonal ranges). (De Beers 2010)

The cumulative direct disturbance to the landscape from the YGP and other previous, existing, and future developments is predicted to be less than or equal to 1.7 percent (%) (following De Beers 2010) of the Bathurst caribou herd's seasonal ranges relative to reference conditions (low magnitude). The YGP and other developments are predicted to result in habitat-specific cumulative changes to the number of patches and the distance between similar habitat patches and the magnitude ranges from 0% to 5% (low magnitude).

These changes are expected to have a negligible influence on the carrying capacity of the seasonal ranges and the movement and distribution of caribou (De Beers 2010).

The cumulative direct impact of habitat fragmentation on caribou movement from the Winter Access Road and Tibbitt-to-Contwoyto Winter Road (from Tibbitt Lake to MacKay Lake) is predicted to be low in magnitude (i.e., within the range of baseline values). The magnitude of changes in the number of forest patches from reference to current conditions is predicted to be no more than 1.7% in the Bathurst herd's range. Also, the change in the mean distances to nearest neighbour for forest patches was no more than 1.3% in the analysis (De Beers 2010). Although the presence of the winter roads may represent a partial barrier to caribou and lead to some fragmentation of the population within the winter range, the roads are in operation for approximately eight to 12 weeks each year. Thus, the frequency of impact from winter roads on caribou population size and distribution is periodic.

The assessment also considered the cumulative effects from indirect changes to habitat quality (sensory disturbance zones of influence) associated with the YGP and other developments on the availability of preferred habitats. Overall, the magnitude of cumulative declines in preferred habitat across seasonal ranges of the Bathurst caribou herd is predicted to be low (ranged from 1.1% to 7.3%) (De Beers 2010). Sensitivity analyses also showed that a 10% reduction in carrying capacity (or loss of preferred habitat) had no statistical effect ($P=0.24$) on population abundance and persistence of caribou (De Beers 2010).

Energetic and population models also indicated that insect harassment and harvest levels had much stronger effects on caribou populations relative to the changes from the Gahcho Kue Project and other developments, such as the YGP (De Beers 2010). Levels of human development on the landscape, measured as a percentage of seasonal ranges covered by zones of influence, peaked in 2006 at approximately 6% cover and have since declined (De Beers 2010). A recent review by Adamczewski et al. (2009) also indicates that effects from the mines are limited and unlikely a major contributing factor in the decline of the Bathurst caribou herd. Thus, the cumulative effects from development should not have a significant adverse impact on the seasonal movements and distribution of caribou relative to reference conditions.

There are natural environmental factors that operate over large scales of space and time that likely have greater influences on seasonal distributions of caribou relative to the cumulative and incremental effects from the YGP. For example, some studies of caribou have shown that the historical cumulative effect of overgrazing on calving, summer or winter ranges can result in periodic range shifts and large population fluctuations (Messier et al. 1988; Ferguson and Messier 2000). Climate change can also influence the seasonal distribution of caribou by modifying insect levels, food abundance (primary productivity), snow depth and hardness, predator numbers (and alternative prey), and burns (Sharma et al. 2009; Vors and Boyce 2009). Traditional knowledge also contends that fire frequency and intensity affects caribou numbers and distribution (Kendrick et al. 2005).

The information from the cumulative effects assessment indicates that the incremental effects from the YGP and cumulative effects from the YGP and other developments will not have a significant negative influence on the resilience and persistence of caribou populations. Most of the incremental and cumulative effects were predicted to be negligible to low in magnitude and reversible. The persistence of the Bathurst caribou herd during large fluctuations in population size indicates that the species has the capability to adapt to different disturbances and environmental selection pressures. Migration routes and survival and reproduction rates appear to have the flexibility to respond to changes through time and across the landscape. This resilience in caribou populations suggests that the effects from the YGP and other developments should be reversible and not significantly affect the future persistence of caribou populations. Subsequently, cumulative effects from development also are not predicted to have an adverse effect on continued opportunities for use of caribou by people that value the animals as part of their culture and livelihood (De Beers 2010).

10.4.3 Human Environment

10.4.3.1 Worker and Family Wellness

Maintaining or enhancing the physical, mental and cultural health and well-being of mine workers and their families is a key consideration for Tyhee NWT Corp. As previously indicated, Tyhee NWT Corp. is committed to maintaining a safe, healthy and productive work environment for all employees and contractors. As part of this commitment, Tyhee NWT Corp will provide support consistent with company policy to employees and their immediate families in dealing with personal health and well-being issues, including, to the extent possible, issues related to cultural health.

Tyhee NWT Corp will encourage local employees and contractors to consider and assist in dealing with the personal health and well-being needs of their spouses, children and family elders. Tyhee NWT Corp also anticipates that other family members and existing community-based social support networks will continue to be available to help to address such needs should they arise.

Employment and rotational work at mines in the region is relatively common in Yellowknife and the other primary communities. Many families have adapted to this type of work schedule, including working away from home for two week periods.

With the above in mind, the YGP will not create a cumulative effect on workers and family wellness since the workforce is already familiar with the two week on / two week off planned work rotation.

10.4.3.2 Economic Effects

Employment and business opportunities generated by the YGP will provide significant sources of income for prospective employees and contractors during the life of the project. Tyhee NWT Corp will encourage its employees and contractors to direct income and

benefits generated from their employer to positive uses for themselves, their spouses, children and family elders.

It is anticipated that there will be a positive cumulative economic effect from the YGP and other operating mines in the region.

10.4.3.3 Cultural Effects

YGP employees will work on a two week on, two week off rotation. The two week periods when employees are not working, in addition to their annual vacation time, allows them time to spend on the land or participating in traditional and cultural activities.

The operating language of the mine will be English. However, employees are free to use their traditional language during personal conversations with other employees or family members.

The traditional economy historically in the region was fur-trading. However, in the past several decades, the economy has become more wage-based due to the construction of several mines in the region, and the decline in demand (and therefore price) of furs. According to the NSMA (2005), Métis were involved in working at the historic Discovery Mine in that 1900s; furthermore, they stated that there has been a decline in trapping over time, as it is less lucrative now.

Based on the reasons stated, no effects from the YGP are anticipated that will add to the cumulative cultural effects from the current economic system in place.

10.4.3.4 Heritage Resources

No archaeological or heritage resources were found in the YGP during assessments conducted in 2004 and 2005. Furthermore, the archaeological potential of the specific areas that may be affected by the mine and camp facilities is rated low due to the nature of the terrain, soils and vegetation. Therefore, no effects (including cumulative effects) are anticipated to occur.

10.4.3.5 Traditional Activities

The cumulative effects of the YGP on traditional activities are considered minimal due to several reasons:

- the YGP is located in an area previously disturbed by the historic Discovery Mine;
- the project footprint is primarily located on brownfield sites;
- the NSMA did not identify a change in harvesting activity during winter road operations or during the operation of the historic Discovery Mine;
- the NSMA, as of 2002, identified 15 subsistence hunters in their community;
- there is evidence of five hunting camps observed in the LSA area, which are likely less than 50 years old; which indicates that the area may not be used frequently for hunting;

- no other developments within the area; and
- trapping activities are more likely to take place from the winter road.

Maintaining or enhancing the physical, mental and cultural health and well-being of mine workers and their families is a key consideration for Tyhee NWT Corp. As previously indicated, Tyhee NWT Corp is committed to maintaining a safe, healthy and productive work environment for all employees and contractors. As part of this commitment, Tyhee NWT Corp will provide support consistent with company policy to employees and their immediate families in dealing with personal health and well-being issues, including, to the extent possible, issues related to cultural health.

Tyhee NWT Corp will encourage local employees and contractors to consider and assist in dealing with the personal health and well-being needs of their spouses, children and family elders. Tyhee NWT Corp also anticipates that other family members and existing community-based social support networks will continue to be available to help to address such needs should they arise.

Employment and rotational work at mines in the region is relatively common in Yellowknife and the other primary communities. Many families have adapted to this type of work schedule, including working away from home for two week periods.

YGP anticipates employing up to 326 staff. The increase in number of people employed on rotational work will increase the overall cumulative effect, but this effect will not be significant as it is likely that most of the employees and their families have worked within this type of schedule previously.