EXECUTIVE SUMMARY

1. INTRODUCTION

This document is a plain language summary of Dezé Energy Corporation Ltd.'s *Developer's Assessment Report*, submitted to the Mackenzie Valley Environmental Impact Review Board in February of 2009. For more information about any of the topics covered in this document, please consult the *Developer's Assessment Report*.

1.1 DEVELOPMENT OVERVIEW

The proposed Taltson Hydroelectric Expansion Project (the Expansion Project) would add a new power plant and transmission line to the existing Twin Gorges power plant on the Taltson River in Canada's Northwest Territories. The Expansion Project would provide a source of clean, renewable electrical power to diamond mines and other industrial customers in the North. Both through the three year construction period and forecast 40-year lifetime, the Expansion Project would benefit northern industry, Aboriginal businesses and individuals, and residents of the Northwest Territories in general. By building from existing facilities, the Expansion Project would minimize new effects on the environment.

1.2 DEVELOPER

Dezé Energy Corporation Ltd. (Dezé) is developing the Expansion Project. Dezé was established in November of 2006, when a Memorandum of Intent was signed by three equal partners: Akaitcho Energy Corporation, Métis Energy Company Ltd., and NWT Energy Corporation (03) Ltd. Akaitcho Energy Corporation and Métis Energy Company Ltd. are business ventures of the Akaitcho First Nation and Northwest Territory Métis Nation respectively, while NWT Energy Corporation (03) Ltd. is a wholly-owned subsidiary of Northwest Territories Hydro Corporation, a crown corporation owned by the Government of the Northwest Territories.

Dezé was created by partners working together to pursue mutually beneficial interests in developing a hydropower project. Its ownership structure would bring business opportunities to the South Slave region of the Northwest Territories, an area where economic growth has been limited in recent years. The Akaitcho First Nation and Northwest Territory Métis Nation would see significant employment opportunities, and communities would benefit from local ownership of a long-term and sustainable business venture.

1.3 DEVELOPMENT HISTORY

The potential for power development on the Taltson River has been recognized for many decades. In 1965, a power facility was built at Twin Gorges, a natural falls in the Taltson River. The 18 megawatt Twin Gorges power facility was designed to meet the needs of the Pine Point Mine and a few other customers, and did not take full advantage of the river's potential to generate power.

The Pine Point Mine was permanently closed in 1986. Today, the Twin Gorges power facility (Plate ES.1) continues to supply energy to Fort Smith, Hay River and

other communities, but is operating far below its capacity, using just a quarter of the available river flows at Twin Gorges.

Plate ES.1 — Existing Twin Gorges Power Facility

Some of the main industrial customers of the Northwest Territories—the Ekati, Diavik, and Snap Lake diamond mines—currently use diesel generators to supply electrical power. The diesel fuel is delivered to the mines once a year by winter road. The Expansion Project was proposed as a way of supplying economical, reliable, and sustainable power to these customers, and to the proposed Gahcho Kué mine. The Expansion Project would greatly reduce the requirement for diesel consumption by the mines.

Studies conducted in 2004 concluded that diesel fuel was a cheaper option for the mines, and most Project planning activities were postponed, though some environmental studies and consultations continued in 2005.

Since these studies were conducted, the price of diesel has risen significantly, and winter road access to the diamond mines is often unreliable. For these reasons, the mines have renewed their interest in the Expansion Project. Dezé commissioned consultation, environmental assessment, financial modeling, engineering design, and other project development work in 2006/2007. The Expansion Project formally entered the regulatory process in mid-2007.

2. REGULATORY PROCESS

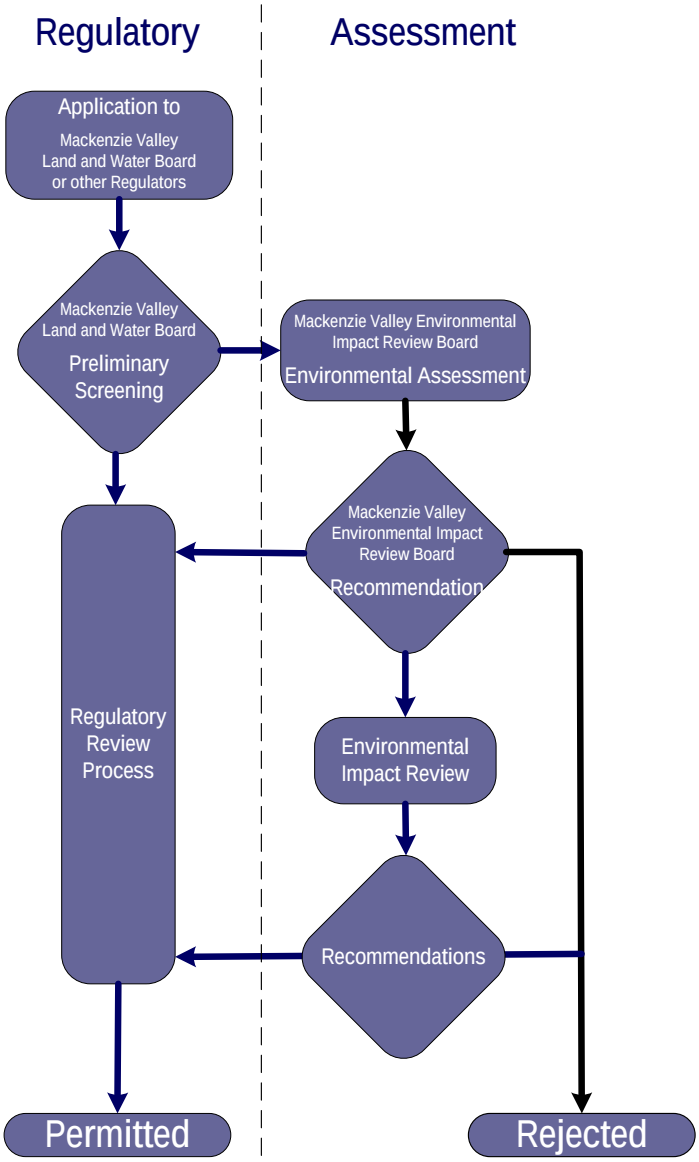
The Mackenzie Valley Land and Water Board (MVLWB) is the regulatory body responsible for approving Land Use Permits and Water Use Licence applications for developments like the Expansion Project. If the MVLWB determines that a proposed development has potential to cause a significant negative effect on the environment, or that it is likely to cause public concern, the development is referred to the Mackenzie Valley Environmental Impact Review Board (MVEIRB). The Expansion

Project is located entirely within the Mackenzie Valley regulatory regime as defined by the *Mackenzie Valley Resource Management Act*. The developers must obtain approval from the MVEIRB through the environmental assessment process (illustrated in Figure ES.1) before the development can move forward.

In 2007, Dezé submitted Land Use Permit and Water Use Licence applications to the MVLWB, supported by a detailed *Project Description*. After a preliminary screening, the MVLWB referred the applications to the MVEIRB, and the environmental assessment process began. The MVEIRB developed a document known as the Terms of Reference, a set of instructions for Dezé to use to produce a *Developer's Assessment Report* for the Expansion Project. The Terms of Reference summarizes feedback collected at a technical scoping session held in Yellowknife and community scoping sessions held in Fort Smith, Fort Resolution, and Łutsel K'e in the winter of 2007/2008, as well as other public and agency comments.

Dezé has completed the *Developer's Assessment Report* (with this plain language summary) according to the instructions in the Terms of Reference.

Figure ES.1 — Environmental Impact Assessment Process (MVEIRB Brochure, 2004)



3. DEVELOPMENT DESCRIPTION

3.1 LOCATION

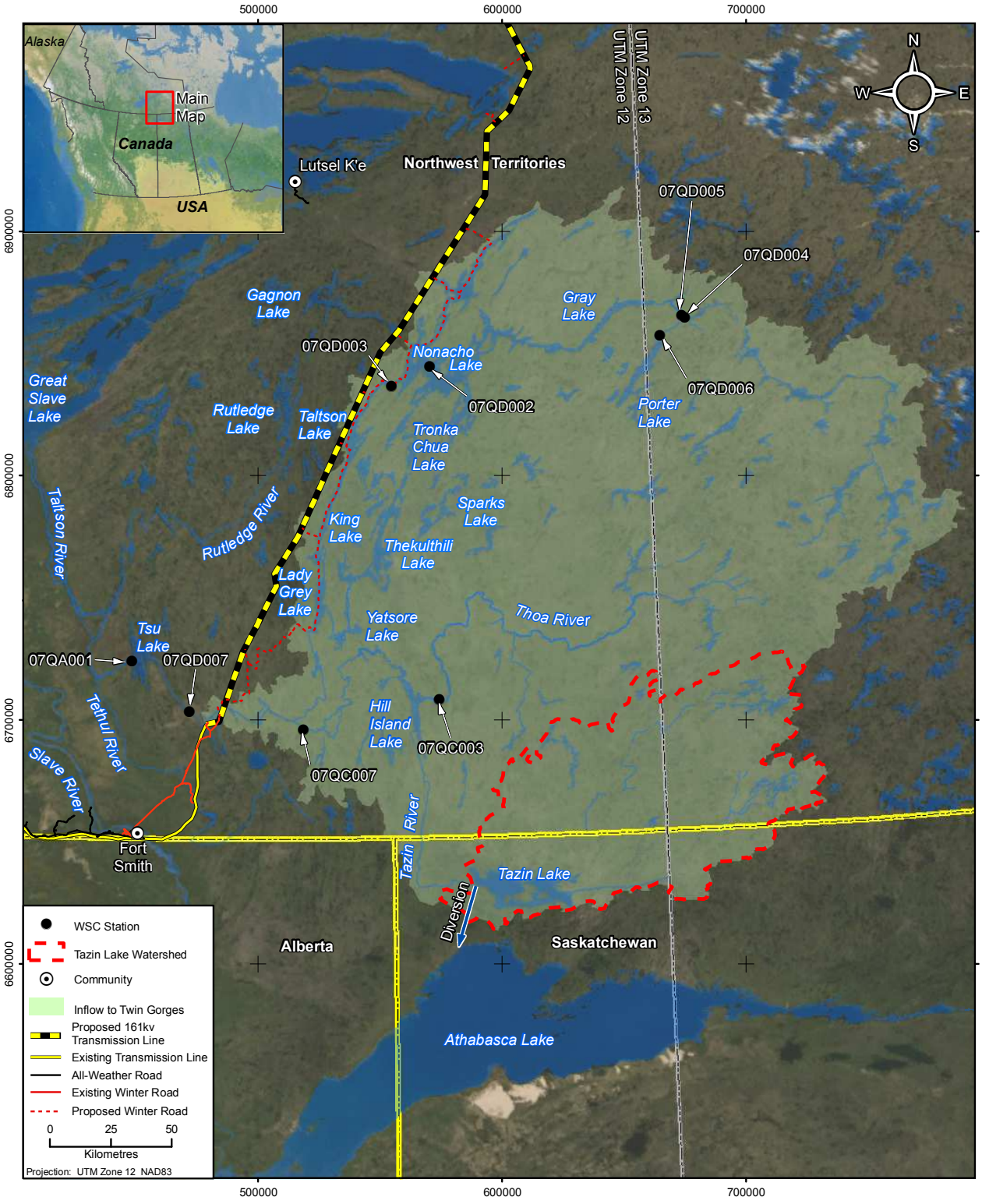
The Taltson River watershed covers approximately 60,000 square kilometres between Lake Athabaska and Great Slave Lake, west of the Thelon River drainage basin (Figure ES.2). The Taltson River enters Great Slave Lake on its southern shore at the western end of the Simpson Island chain. The existing Twin Gorges power facility is located downstream of the confluence of the mainstem Taltson River and the Tazin River.

3.2 FACILITIES

Following construction, the Expansion Project would include the following key permanent facilities:

- existing 18 megawatt power plant,
- new power plant,
- Nonacho Lake control structure,
- South Valley Spillway,
- minimum flow release structure,
- South Gorge Bypass Spillway,
- new transmission line,
- integrated switchyard, and
- electrical substations.

Construction of these permanent facilities would require some temporary infrastructure, which would later be removed or decommissioned.



TALTSON HYDROELECTRIC EXPANSION PROJECT	Developer's Assessment Report 2009	Taltson River Drainage Basin	Figure ES.2

3.2.1 New Power Plant

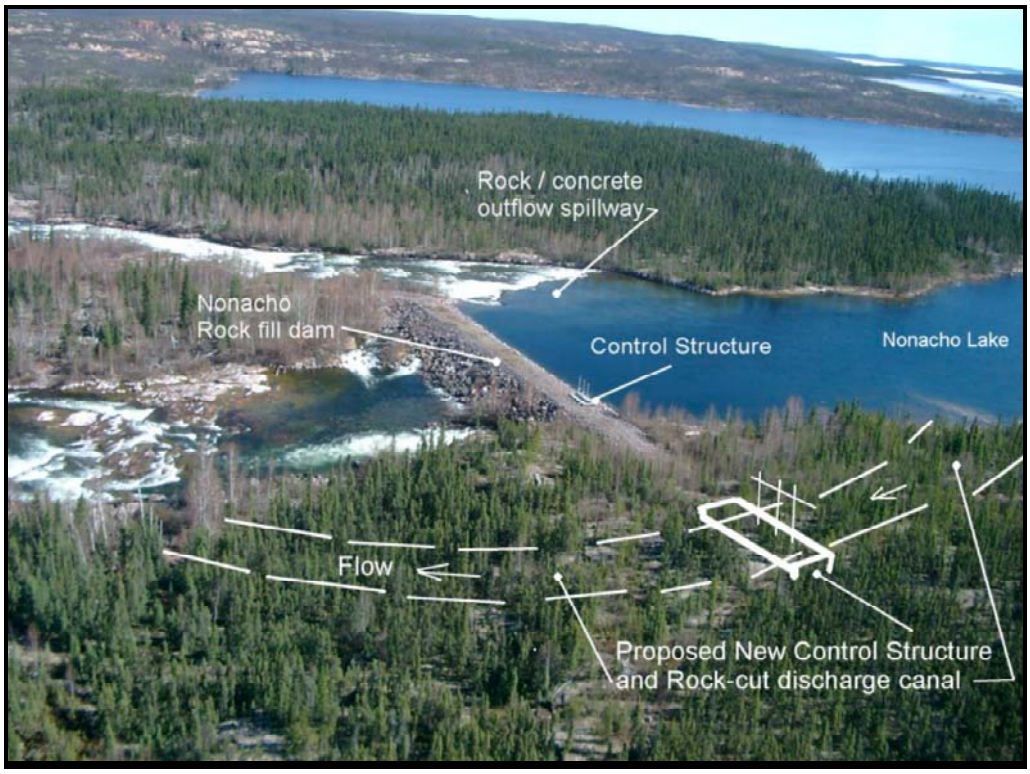
The new power plant would generate up to 56 megawatts, and would be built on the north side of the existing Twin Gorges power facility. Water would flow from the existing Forebay (the lake upstream of the Twin Gorges dam), through an open canal and two buried pipelines, to the powerhouse. There, turbines would generate electricity from the flow. After leaving the powerhouse, the water would enter a second canal and discharge into the Taltson River downstream of Elsie Falls.

3.2.2 Nonacho Lake Control Structure

The Project would require a much larger release of water than the existing timber sluice gates can handle, so a new control structure (Plate ES.2) would be built alongside the existing dam. The new facilities would allow much better control of flows, through four new gates in a new concrete structure. The dam leakage would be stopped with additional rockfill, the existing gates closed, and a low sill placed on the spillway to reduce uncontrolled flows. Key features of the new facilities include:

- a short intake canal from the lake at a point upstream of the existing Nonacho dam,
- a concrete structure housing four gated sluice passages,
- a rock-cut canal downstream of the gates leading to the existing release channel downstream of the dam,
- a micro-hydro generation plant to heat the gates and power the lighting, control, and communications equipment,
- a backup diesel generator and associated equipment,
- a concrete sill across the existing Nonacho spillway (a rock channel around the dam, acting as a “safety valve”), raising it by approximately half a metre.

Plate ES.2 — Proposed Nonacho Lake Control Structure



3.2.3 Minimum Flow Release Structure

The existing Forebay formed by the Twin Gorges dam and the associated spillway into Trudel Creek (known as the South Valley Spillway) would be largely unchanged by the Expansion Project. The only addition would be a minimum flow release structure on the right bank of the main weir of the South Valley Spillway (Plate ES.3).

Plate ES.3 — South Valley Spillway

3.2.4 South Gorge Bypass Spillway

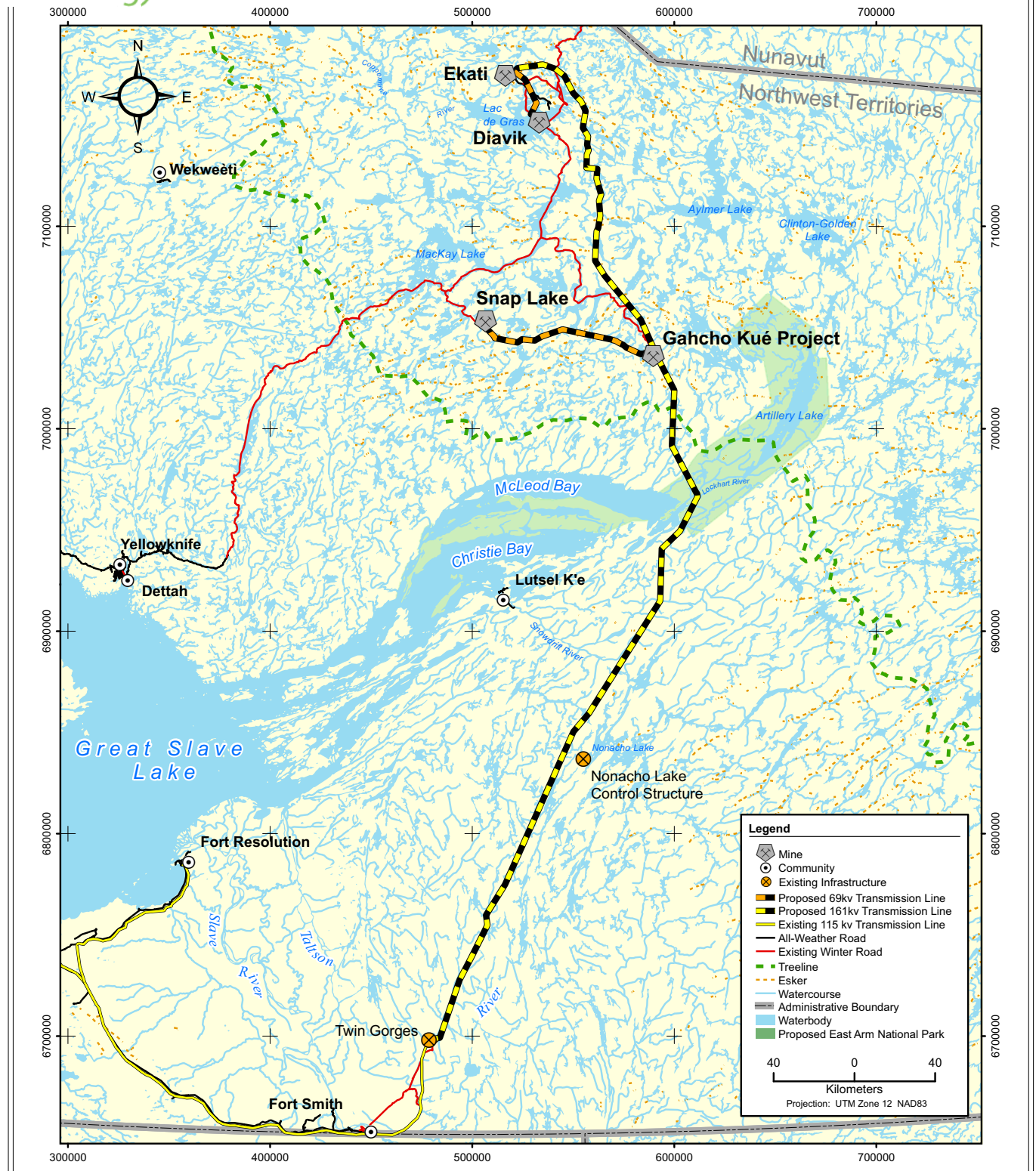
The water licence for the existing Twin Gorges power facility requires that a minimum flow of 28 cubic metres per second be maintained in the Taltson River below Elsie Falls. This water normally flows over the South Valley Spillway sourced from excess flow into the Forebay that is not used for power generation. To sustain this minimum flow after the new plant is added and the water is used for generation, a 200 metre long rock-cut canal would be built around the dam, discharging at the South Gorge. This canal, known as the South Gorge Bypass Spillway, would include a gated structure designed to release up to 30 cubic metres per second during normal operations. The gates would open immediately in case of outages at both the new and existing plants.

3.2.5 New Transmission Line

To deliver the power from Twin Gorges to the mine sites, a new transmission line (Figure ES.3) would be built. The transmission line would run from the Twin Gorges switchyard northeast around the East Arm of Great Slave Lake to a branch point at Gahcho Kué mine site, with a westward spur to Snap Lake mine site, a northwards extension to the Ekati mine site, and a short spur from Ekati to the Diavik mine site.

Vegetation along the new transmission line would be cleared, where necessary, to form a right-of-way from 15 to 30 metres wide. The transmission line towers would be either pole-type structures or lattice steel structures similar to those used on the existing transmission line to Fort Smith and Pine Point, which have provided excellent service and reliability. The towers would be spaced about 350 metres apart for 161 kilovolt sections of the line and slightly less for the 69 kilovolt sections of the line, depending on the terrain. Typically, towers would be built on rock outcrops,

secured by anchor bolts. The height of the towers would be approximately 22 to 25 metres. The line itself would include three conductors. The conductors would be "sagged" to meet standard electrical clearance requirements above ground, and would present no shock hazard to humans or wildlife on the ground.



TALTSON Hydroelectric Expansion Project	**Developer's Assessment Report 2009**	**Proposed Transmission Line Route**	**Figure ES.3**

N:\Active\GIS\2008\07-1328-0013 Taltson\Mapping\MXD\DAR_Figures\YK_139 East Route

3.2.6 Integrated Switchyard

An integrated switchyard would be built for the existing 115 kilovolt and new 161 kilovolt transmission lines at Twin Gorges. This facility would allow power from either of the plants to power the existing customers on the 115 kilovolt line and the mines on the 161 kilovolt line. This configuration will enhance reliability of power to customers.

3.2.7 Electrical Substations

New substations would be built at each of the four mine sites to house the ends of the incoming and outgoing power lines. These structures, which would disturb a surface area of about 30 metres by 35 metres, would also contain voltage step-down transformers, circuit breakers, isolation devices, and protection and metering equipment.

3.2.8 Site Access

Given the varied landscape of the Expansion Project area, site access presents a unique challenge. In the southern section, all construction materials for the new plant, Nonacho Lake control structure, and Southern sector of the transmission line would be routed through Twin Gorges from Fort Smith. Extensive winter road development and maintenance would take place during the winters of the construction period. Beyond Twin Gorges, a lower-capacity winter road ending near the Nonacho dam, spur sections to numerous staging areas, and track extensions would deliver materials from Twin Gorges to the staging areas and then overland to the transmission line. The existing airstrip at Twin Gorges, as well as float and ski planes, would be used for smaller deliveries and crew rotations.

Nearer to the East Arm, materials would be delivered by barge to two landing sites: one in Charlton Bay and one in McLeod Bay. Few, if any, winter roads would be required. Float planes would carry light loads and personnel.

Just south of Gahcho Kué, north of the treeline, spurs from existing ice roads would be used for winter deliveries to the main staging areas. Winter tracks would also be used, where possible. The existing mine sites would become critical centres for major staging and camp facilities. Airstrips at the mines would be used for smaller deliveries and personnel moves.

3.2.9 Construction Camps

During the three-year construction phase, two large camps would be located in the southern section of the Expansion Project: one at Twin Gorges, and one at Nonacho Lake. Small camps would be necessary for construction of the transmission line. These camps would be self-contained accommodations for up to 40 people, and would be moved as construction progresses.

3.3 TIMELINE

The 2009/2010 winter season would largely be devoted to rebuilding the former winter road from Fort Smith to Twin Gorges (if this has not already been done), building ice spurs to key staging areas, and pioneering the winter road northwards from Twin Gorges to Nonacho Lake. The camps and staging areas would be cleared and prepared in preparation for the summer work. Equipment and foundation materials would be delivered to the staging areas in the southern sector.

In the summer of 2010, as soon as the ice has left Great Slave Lake, barges would be sent from Hay River to the Charlton Bay and McLeod Bay staging area locations on the East Arm of the Lake.

In winter 2010/2011, ice road spurs to the staging areas would again be built. The remaining transmission line components, fuel and installation equipment, and camp provisions would be sent to the staging areas. Substation equipment would be delivered to the mine sites.

In winter 2011/2012, ice road spurs would be built as required to remove the remaining camps and equipment.

Transmission line construction would take place in phases, using methods appropriate to the sector terrain, access availability, environmental constraints, and requirements of the overall Expansion Project schedule.

3.4 EMPLOYMENT

The construction and operation of the Expansion Project would generate direct, indirect, and induced employment opportunities for northern Aboriginal and Northwest Territories residents. Direct employment refers to jobs at the Expansion Project itself. Indirect employment refers to jobs in businesses that provide goods and services to the Project. Induced employment refers to jobs created when workers (both direct and indirect) spend their incomes.

Dezé is committed to providing opportunities for northern Aboriginal and Northwest Territories residents to participate in the Expansion Project, and would give priority for employment to those in affected communities. If a position cannot be filled from within the local labour pool, the search will expand to workers with suitable experience from the broader Northwest Territories, and then to outside of the Northwest Territories. Table ES.1 presents a summary of the employment opportunities presented by the Expansion Project.

Table ES.1. Direct Employment during Expansion Project Construction

Expansion Project Component	Number of Employees	Total Person Months of Work
Twin Gorges Plant	387	2,504
Nonacho Lake Control Structure	60	352
Transmission line	81 to166	1,865
Substations	24 to 84	222
Total	**552 to 697**	**4,953**

Direct employment during the operational phase would be limited. Between 8 and 10 people would be required annually to operate the Expansion Project. Almost all of these would be skilled workers.

In addition to direct employment, Dezé estimates that approximately 230 indirect jobs would be generated at businesses supporting the Expansion Project (such as catering, surveying, and industrial supply companies), as well as over 250 induced jobs. All of these jobs would be created within the Northwest Territories.

3.5 CLOSURE

The Expansion Project has an operating life of over 40 years. However, the infrastructure, with proper care and maintenance, could be functional for up to 100 years. Several closure and restoration plans would be required at different stages of the Expansion Project's lengthy lifespan. Restoration plans would be needed to manage the effects of the temporary construction facilities, both while they are in use and after final decommissioning. Other plans would be required in the event of changes to Expansion Project operation modes, such as lower demand for power generation.

Eventually, if all stakeholders concluded that the Expansion Project was to be decommissioned, a final closure and restoration plan for the "permanent" facilities would be needed. The transmission line would be taken down, and materials salvaged. The power facility would revert to supplying energy only to local communities.

4. ALTERNATIVES

Dezé has considered many alternatives to the Expansion Project plans described in the previous section, including different plant layouts, plant sizes, and transmission line routes. Some options were eliminated early in the design process due to technical, environmental, or financial concerns. Others were selected for further study, and are discussed in the following paragraphs.

4.1 PLANT LAYOUT

Two alternatives for connecting the Forebay to the Taltson River downstream of Elsie Falls were considered: the North Gorge layout and the Janine Lake layout. The Janine Lake layout considered a canal connecting a series of small lakes, including Janine Lake, about two kilometres north of the existing Twin Gorges facility. The North Gorge layout was selected as the preferred alternative because it would disturb a much smaller area of terrain and would cost approximately 10 per cent less than the Janine Lake layout.

4.2 PLANT SIZE

Dezé considered a variety of plant sizes to expand the existing facility from its current 18 megawatt capacity to a total capacity of between 40 and 90 megawatts. A computer model, which took into account the historical record of water flows for the Taltson River watershed, determined that a total plant capacity of between 54 and 74 megawatts (i.e., 36 to 56 megawatt expansion of the current capacity) would take best advantage of water flows without necessitating any major changes to the basic plant design. The final capacity of the power plant would be decided at the end of the design stage. Dezé commissioned assessments of the potential environmental and social effects of both 36 and 56 megawatt expansion options.

4.3 TRANSMISSION LINE ROUTE

The route for the transmission line connecting the Twin Gorges facility to the four mine sites was closely studied, and four alternatives were selected for detailed consideration:

- **West Arm route**: from Twin Gorges around the west arm of Great Slave Lake, through Fort Providence, Yellowknife, on to Snap Lake, and northward to Ekati.
- **Submarine route:** from Twin Gorges to a marine crossing of Great Slave Lake, on to Snap Lake, and northward to Ekati.
- **Island Crossing route:** from Twin Gorges to the Simpson Islands, and an island-hopping and short section of submarine cable crossing of Great Slave Lake, on to Snap Lake, and northward to Ekati.
- **East Arm route:** from Twin Gorges northeast around the East Arm of the Lake to Gahcho Kué; from there, this route would proceed either:
  - **Northeast:** north to Ekati with a branch line to Snap Lake,
  - **Northwest:** west to Snap Lake and then north on to Ekati, or
  - **South:** from the Lockhart River direct to Snap Lake.

Factors such as the terrain, vegetation, and water crossings on each of these routes, as well as potential effects on land use and wildlife, were considered. The East Arm route was selected as the preferred route. This route is more easily accessible than the other routes and is the only option that would not pose significant risks to permitting and tenure approval. The approval issues associated with the other routes pose potential hazards to the Expansion Project and its financial backers.

Of the three options to complete the East Arm routes after Gahcho Kué, the Northeast route avoids a highly visible crossing at Mackay Lake that would be part of the Northwest route, and provides slightly easier access for construction. This route forms the transmission line corridor proposed for the Expansion Project.

5. COMMUNITY ENGAGEMENT

Dezé recognizes that community involvement is key to the success of the Expansion Project, and has made community engagement a cornerstone of the Expansion Project from its conception. Contributions of the communities of the South Slave Region have been woven directly into the Expansion Project design at every new stage of its development.

The Dezé partnership itself was formed as a result of extensive consultations between the Akaitcho Treaty 8 First Nations, South Slave Métis (now known as the Northwest Territory Métis Nation), and NWT Energy Corporation (03) Ltd., that took place from early 2000 to 2006. These consultations led to a Contribution Agreement between the Akaitcho Treaty Tribal 8 Corporation and the South Slave Métis. The Contribution Agreement laid the groundwork for communicating Expansion Project developments to community leaders and members and collecting feedback.

During this time period, Community Coordinators chosen by the Akaitcho and Métis were responsible for informing the communities of Fort Resolution, Fort Smith, Hay River, and Łutsel K'e about the Expansion Project development and collecting public input on the design. These Community Coordinators provided updates to, and sought feedback from, political leaders at the annual General Assemblies. The coordinators also reached out to the South Slave region communities through presentations, brochures, newsletters, and the placement of the Expansion Project models in public buildings in each community. The feedback collected by the Community Coordinators was incorporated into both the Dezé company structure and the Expansion Project design.

In addition, community meetings were held in Fort Smith on March 16, 2003, Fort Resolution on March 17, 2003, and Hay River on March 18, 2003. Each meeting was preceded by an afternoon open house. Newspaper advertisements, radio announcements, and notices on community bulletin boards promoted the meetings. Translation services were offered in all communities. In general, communities were receptive to the Expansion Project concept, and wanted more information about the project design and developer before giving their support.

Before applying for water and land use permits in 2007, Dezé commissioned a series of studies to further engage communities, gather feedback on Expansion Project development concepts, and identify Traditional Knowledge holders. Traditional Knowledge is information about the world gained by Aboriginal people through observation and oral tradition over an extended period of time. The Deninu Kue, the Akaitcho Territory Government, and Thebacha held Traditional Knowledge engagements. Based on recommendations made at these engagements, and at follow-up workshops in Fort Resolution, Fort Smith, and Łutsel K'e, Traditional Knowledge holders in the communities were interviewed.

As part of the regulatory process started in May, 2007, the MVEIRB held community scoping sessions in Fort Smith on November 28, 2007, Fort Resolution on November 29, 2007, Yellowknife on December 7, 2007, and Łutsel K'e on March 7, 2008. A technical scoping session was also held in Yellowknife on December 7, 2007. Issues raised at these scoping sessions included questions about:

- the Expansion Project capacity,
- the commitment of the mines to the project,
- the other potential beneficiaries of power generated at the Expansion Project, and
- other potential beneficiaries of infrastructure built for the Expansion Project.

Dezé factored the issues raised by the public at these scoping sessions into the Expansion Project design.

In early 2007, Dezé conducted a series of interviews with regulators who would likely have a role in the environmental assessment or authorization of the Expansion Project. The feedback gathered at these interviews was analyzed to determine which issues were most important to regulators. Dezé used this information to guide subsequent revisions of the Expansion Project design.

Dezé has taken into account the culture and diverse needs of the South Slave region in its approach to consultation and community engagement. The result is a project design that provides a unique opportunity to communities in this region, while emphasizing progress, societal benefits, and conservation of existing resources.

6. EXISTING ENVIRONMENT

6.1 BIOPHYSICAL ENVIRONMENT

The climate of the Northwest Territories is relatively cold and dry, with long winters and mild summers. In the Expansion Project area, storm systems from the south and southwest bring wetter conditions from the late summer to the early fall, while the rest of the year is comparatively dry. An average of 350 millimetres of precipitation falls annually, with 68 per cent falling as rain and 32 per cent as snow.

The southern and central sections of the Expansion Project are found in the Taiga Shield Ecozone (Plate ES.4). "Taiga" is a Russian term referring to the northern edge of the boreal coniferous forest. In northern Canada, this forest rests on the Canadian Shield, with much of the surface containing exposed bedrock. Terrain ranges from flat to rolling, broken by sand and gravel ridges known as eskers, and by many small lakes, ponds, streams and wetlands. A layer of soil that is frozen year-round, called permafrost, exists beneath parts of this zone and not in others.

Plate ES.4 – Taiga Shield Ecozone

The Expansion Project is located in the Taltson River watershed, a relatively large drainage area of approximately 60,000 square kilometres between Lake Athabaska and Great Slave Lake (Figure ES.2). The watershed is a relatively complex system of interconnected lakes, draining generally southwest from the Canadian Shield area and then northwards to the Slave River lowland zone. The Taltson River enters Great Slave Lake on its southern shore at the western end of the Simpson Island chain. Two main tributaries form the lower Taltson River: the mainstem Taltson River and the Tazin River. The original Taltson project caused changes to the flows from Nonacho to Twin Gorges. With the creation of the Nonacho Dam, the elevation of Nonacho Lake rose by a few metres. This increase resulted in a new flow connection between Nonacho Lake and Tronka Chua Lake, known as the Tronka Chua Gap. A small portion of the flow from Nonacho Lake flows directly through the Gap during most years. This water reconnects with the Taltson River at Lady Grey Lake.

The original Taltson project also changed the direction of the majority of flow from Twin Gorges to Trudel Creek. Prior to the Taltson project, it is believed that during wet years water spilled into the top end of Trudel Creek from lakes on the Taltson River. Upon construction of the Twin Gorges power facilities, the majority of water not used for power generation was directed over the newly-constructed South Valley Spillway and into Trudel Creek. The added flows greatly changed the flows in Trudel Creek.

The Expansion Project would span a wide range of fish habitat including lakes, rivers, streams, and wetlands. Fish-bearing water bodies are located along the transmission line and winter road routes. Power generation would involve many water bodies, including Trudel Creek, the upper and lower Taltson River, and associated lakes from Nonacho Lake to Great Slave Lake.

The Taltson River watershed contains many wetlands**,** defined as lands that are saturated with water long enough to promote various kinds of biological activity that require a wet environment. These wetlands perform a variety of functions that contribute to the maintenance of biodiversity and healthy ecosystems.

Barren-ground caribou (Plate ES.5) have a significant social, cultural, and economic value for the people and communities living in the Canadian Arctic. Aboriginal people have a strong connection with caribou, and rely on the animals for food, clothing and cultural wellness. Caribou also influence the landscape through their movements and foraging, and provide food resources for predators and scavengers such as wolves, grizzly bears, wolverines, and foxes. As a result, caribou are key to environmental assessments in the Northwest Territories. Caribou herds are migratory and their use of the Expansion Project area varies seasonally. The Expansion Project area is also home to other ungulates, such as moose and muskoxen, and furbearer species such as marten, lynx, muskrat, and beaver.

Plate ES.5 – Barren Ground Caribou

Birds are an important component of the Expansion Project area ecosystem, and have provided food and materials such as feathers, which were used to make blankets and pillows for the Aboriginal people of the Northwest Territories. The bird community consists of passerines (i.e., songbirds), waterfowl (i.e., loons, ducks and geese), and raptors (i.e., eagles, hawks, falcons and owls).

The Expansion Project does not encroach on any existing protected areas, such as territorial parks, national parks or International Biological Program sites. However, Parks Canada is considering setting aside an area on the east arm of Great Slave Lake, in the area that would be disturbed by the Expansion Project, as a national park.

6.2 HUMAN ENVIRONMENT

Three significant forces shaped the human history of the South Slave region: relations among Aboriginal groups, the governments, and the interests of private industry. Before the 1950s, Aboriginal people were for the most part unaffected by significant "outside" influences other than the fur traders and explorers. After World War II, Canada's involvement in the lives of Northern and particularly Aboriginal people increased, as did efforts to modernize the management and development of the North's natural resources.

In the Northwest Territories, hunting, trapping, fishing, and plant-gathering is part of the traditional lifestyle. In most Aboriginal communities, these traditions have declined as access to alternative food sources has become available. However, traditional activities remain vitally important to Aboriginal people. Non-traditional land and resource use includes parks and protected areas, mining and exploration, highways, and winter roads.

The populations of all South Slave communities have declined over the last 10 years, except at the Hay River Dene Reserve. In 2005, the South Slave region had a recorded population of 7,457 people, of which about 60% were Aboriginal; over half of the region's population is between the ages of 25 and 59.

Most employment in the South Slave region is in the public sector—i.e., government, health, and education—except in Hay River, where other industries account for over 45% of employment. Average employment and household incomes in Fort Smith, Łutsel K'e and Fort Resolution are lower than those in other areas of the Northwest Territories.

The proposed route for the transmission line crosses the Lockhart River approximately seven kilometres downstream from Ts'ankui Theda, a site of cultural and spiritual importance to the Dene people of the area.

7. ENVIRONMENTAL ASSESSMENT

The effects of the Expansion Project on the biophysical environment can be broken into two broad categories:

- Effects attributable to the construction and operation of the new transmission line.
- Effects attributable to changes in water flow in the Taltson River watershed.

7.1 TRANSMISSION LINE EFFECTS

The construction and operation of the transmission line and associated infrastructure, such as access roads, would have an effect on the biophysical environment in the Expansion Project area. These effects are discussed in the following sections.

7.1.1 Caribou

Aspects of the Expansion Project would have the potential to affect caribou populations in four different ways:

- disturbance of land by construction and operations, leading to habitat loss and fragmentation,

- sensory disturbances, leading to changes in habitat quality and caribou movement and behaviour,
- habitat loss, leading to changes in abundance,
- use of transmission line corridors by predators, leading to change in predation rate.

The area directly disturbed by the Expansion Project, known as the Project footprint, takes up less than one per cent of the habitat used by caribou during any specific season. However, at the local scale, the Project footprint would decrease the amount of quality habitat for the Bathurst caribou herd. The Expansion Project's winter access roads and transmission line right-of-way would increase habitat fragmentation for the Bathurst herd.

The Expansion Project design includes many measures to minimize this effect, including:

- selective clearing and retention of shrub vegetation at a height of up to three metres in certain areas along the transmission line,
- using helicopter construction methods to limit changes to vegetation between towers, and
- limiting clearing for winter roads to areas necessary to support the construction activities.

Planning of the transmission line route, tower placement, and other Expansion Project components has taken into consideration alternative routes to avoid high-density historical caribou migration trails, such as the Lac de Gras narrows and the outflow of MacKay Lake at the headwaters of the Lockhart River. Although the presence of the Twin Gorges to Nonacho Lake winter road could represent a partial barrier to caribou and lead to some fragmentation of the population, the road would only be in operation for approximately 10 weeks each year for a period of three years.

Changes to habitat quality from the Expansion Project have the potential to alter the movement and behaviour of caribou, resulting in changes to population size and distribution. Sensory disturbances—the combined effects of noise, dust, the physical presence of the Expansion Project, and human activity—resulting from the construction and operation of the Expansion Project could reduce habitat quality in both the Project footprint and adjacent habitats. Though the effect on habitat quality would be local, the effect on caribou movement and behaviour would extend to the entire Bathurst caribou herd.

Dezé has included several features in the design plan for the Expansion Project to reduce the effects of sensory disturbances on caribou, such as:

- limiting blasting to the construction phase;
- within the caribou range, limiting blasting to the upgrade of the Nonacho Lake control structure;
- using winter roads (which do not produce dust) for most construction transportation; and
- establishing and enforcing speed limits on winter access roads.

It is predicted that caribou would reduce their use of habitat situated within five kilometres of the transmission line and winter roads. As the transmission line is not expected to hum, this level of reduced use may be overestimated.

The loss of habitat from the construction and operation of the Expansion Project has the potential to reduce the number of caribou that the landscape can support. However, computer analysis of the possible effects of the different development scenarios on caribou abundance indicated that there would be very little change in population compared to current conditions.

South of the treeline, wolf travel would be improved by the clearing of vegetation along areas of the transmission line and winter access roads. This could provide increased access for caribou predation between the lakes along the Twin Gorges to Nonacho Lake winter road and along the temporary access trails under the transmission line. However, these roads and trails would not be maintained after construction, and natural habitat restoration would be allowed to proceed. Further, because only 28 per cent of the Project footprint used by Bathurst herds is within forest habitats, and only 4 per cent is within closed forests, there are few natural impediments to wolf travel. To mitigate this effect, cut vegetation would be placed across the transmission line right-of-way to discourage wolves from travelling along it.

7.1.2 Furbearers and Other Ungulates

The effects assessment considered the potential effects of the new transmission line on key furbearing species (marten, lynx, beaver, and muskrat), and the two species of ungulates other than caribou (muskoxen and moose). Dezé has put several measures into the design of the transmission line to reduce its effects on these animals. These include preserving habitat by limiting the clearing of vegetation for the right-of-way and locating poles on rock outcrops or previously burned areas. However, two areas were identified as having a potential to adversely affect some key animals:

- Direct habitat loss.
- Sensory disturbances.

The Expansion Project footprint is estimated to be 2,724 hectares, with 1,522 hectares south of the treeline. The assessment recognized that the Expansion Project footprint could affect all key furbearing species and ungulates by replacing habitat with infrastructure. However, because much of this infrastructure already exists, only a relatively small area (38 hectares) of new terrain would be disturbed by the expansion. In addition, while vegetation along the transmission line would need to be cleared for construction, it would re-grow naturally after construction is complete. The transmission line accounts for roughly three-quarters of the Project footprint.

In addition to direct habitat effects, indirect changes to habitat quality from the Expansion Project have the potential to affect the population size and distribution of muskoxen, moose, marten, and lynx by altering movement and behaviour. Sensory disturbances resulting from construction and operations could reduce habitat quality in both the Project footprint and adjacent habitats that are not directly affected by the Expansion Project.

Computer models have indicated that most noises would dissipate within two or three kilometres of the Expansion Project, with the exception of blasting noises, which would be short-term and infrequent. Human activity would be greatest during the construction period, and is not expected to affect muskoxen, moose, marten and lynx after construction has ended. Likewise, the sensory disturbances caused by the use of the winter access road would be limited to the construction period.

7.1.3 Species at Risk and Key Bird Species

The Expansion Project has the potential to affect species of mammals, birds, amphibians, and plants that are identified as biologically vulnerable.

Construction of Expansion Project infrastructure would have the potential to affect this rare plant habitat. However, effects on rare plants are expected to be limited. Natural recovery of vegetation is expected in the habitat in the winter road and barge landing areas after construction, as the road would be closed and the barge landing areas removed. Grizzly bear and wolverine populations would be affected by decreases in quality habitat caused by construction of the Expansion Project infrastructure and associated sensory disturbances. However, the actual area covered by the Project footprint would be a very small proportion of the grizzly bear and wolverine ranges, particularly considering that very little vegetation disturbance above the treeline is anticipated.

Sensory disturbances during the operations phase of the Expansion Project would be limited to human activity at the Twin Gorges site, and annual inspections completed by helicopter. The visual effect of the transmission line and the noise and movement caused by wind are expected to have a negligible effect on the behaviour and distribution of grizzly bears and wolverine.

The size of the passerine (i.e., songbird) population may be affected by sensory disturbances causing changes in habitat quality, and by habitat loss and fragmentation. Sensory disturbances to passerines would mostly be during the construction period, as construction crews and helicopters work along the transmission line. However, construction activity during the passerine breeding season would be limited. Further, most disturbances would be relatively short-term.

Effects of the Expansion Project on the abundance and distribution of waterfowl (i.e., loons, ducks and geese), are anticipated to change between construction and operations. Waterfowl distribution may be affected by sensory disturbances, while waterfowl abundance may be affected by collisions with the transmission line or changes in water flows. Most construction activity would take place outside of the breeding season, suggesting an effect of low magnitude. There may continue to be some sensory disturbances to waterfowl during operations due to maintenance activity and the presence of the transmission line, but still the effect is anticipated to be low. The effects of waterfowl collisions with the transmission lines and effects related to changes in water flows would be largely confined to the operations phase. Collision mortalities, while expected to occur, are not anticipated to threaten the viability of the population, particularly as collision rates may decline as waterfowl become familiar with the transmission line. The overall effect is anticipated to be low.

The effects on raptors (i.e., eagles, hawks, falcons and owls) include those from sensory disturbances, which are anticipated to affect distribution more than abundance. Although sensory disturbances to raptors would be greatest in the nesting season, there would be no construction activities scheduled near the raptors' cliff habitats during that time. Thus, construction activities are anticipated to cause a medium-term, low magnitude effect on raptors.

7.2 TALTSON RIVER WATERSHED FLOW MANAGEMENT EFFECTS

Some features of the Expansion Project, including the upgrades to the Nonacho Lake control structure, power plant expansion, and redirection of water from Trudel Creek, would alter water flow in the Taltson River watershed. The increased control of flows exiting Nonacho Lake would change the shape of the charted record of annual flows, known as the hydrograph. As part of the Taltson River watershed, Trudel Creek currently serves as the main channel of flow for water in the Forebay, while flow through the existing Twin Gorges power facility conveys only a small portion of the total Taltson River flow. The Expansion Project would reverse the roles of these two channels, as greater flows would be required for power production at Twin Gorges, and flow into Trudel Creek would be reduced (except during outages at the power plants).

As previously mentioned, Dezé has not made a final decision about the capacity of the new generation plant. In order to complete the *Developer's Assessment Report*, the assessment considered both the minimum capacity (36 megawatts) and the maximum capacity (56 megawatts) to take best advantage of water flows. Where relevant, the differing effects on the Taltson River watershed and the Trudel Creek area resulting from the 36 megawatt and 56 megawatt scenarios are noted.

7.2.1 Flow Model

A numerical model, the Taltson Basin Flow Model (Flow Model), was developed in order to assess larger-scale changes in timing and characteristics of flow conditions, and lake and river levels throughout the Taltson River from Nonacho Lake and Great Slave Lake that could be influenced by the construction and operation of the Expansion Project.

The Flow Model allows Dezé to test their water management plans and observe the effects on downstream flow conditions. Two model scenarios, 36 and 56 megawatt expansions, were tested to estimate flow conditions under the Expansion Project. Model results from the two expansion scenarios and their difference from current ("baseline") conditions formed a primary data set used to complete the environmental effects assessment of the Expansion Project. A separate model was developed for Trudel Creek so that detailed flows, water levels and flow velocities could be predicted under the two expansion scenarios and compared to current conditions as that effects could be assessed.

7.2.2 Changes in Taltson River Flows

The Taltson River flow at Twin Gorges originates from two main, and roughly equal, sources: Nonacho Lake releases and the Tazin River. Flows from the Tazin River are unregulated. Thus, Nonacho Lake releases will be managed to maximize power generation at Twin Gorges. That is, releases will be less when flows in the Tazin are

high (summer) and releases will be greater when flows in the Tazin are low (winter). The resulting managed hydrograph will be a "flattened" version of current conditions, where flow at Twin Gorges will be balanced through the year as much as possible.

Given the greater flow requirements under the 56 megawatt option, there will be less management of flow relative to the 36 megawatt option as the higher capacity expansion will likely need to release flow from Nonacho Lake year-round, whereas under the 36 megawatt expansion Dezé will have the option to store water at Nonacho for discharge during the winter low-flow period.

Depending on the expansion option selected, the specific location along the Taltson River, and the time of year, water levels are predicted to increase and decrease relative to current conditions. However, water levels will not drop below or rise above current historic levels. Thus there will be no new flooding associated with the Expansion Project.

Water levels on Nonacho Lake will be kept within the upper limit of the current Water Licence and the historic lower limit. There will be a relatively large reduction in flow from Nonacho Lake through the Tronka Chua Gap: up to a 70% reduction under the 56 megawatt expansion.

Trudel Creek will incur a large reduction in the average flow. However, a minimum flow will be maintained at all times. Trudel Creek is a slow-flowing creek supporting three lakes from the South Valley Spillway to the confluence with the Taltson River. Water levels within the system are currently maintained at relatively high levels and would still be relatively high under the Expansion Project. There are a few narrow sections that maintain upstream water levels even during low flow periods. Thus, the minimum flow proposed for the Expansion Project will not result in very shallow sections along most of Trudel Creek. Trudel lakes will also only experience a limited reduction in the overall depth.

Flows in excess of the minimum flow will enter Trudel Creek via the South Valley Spillway when flows at Twin Gorges exceed the Expansion Project capacity or when flows exceed the plant capacity during scheduled maintenance of one turbine, i.e., ramping event.

Ramping events are rapid changes in flows caused by interruptions in the operation of the power plant turbines, such as scheduled and unscheduled outages. Ramping events from scheduled outages would be part of the normal operation of the Project for both the 36 and 56 megawatt options, with roughly three-week outages for annual maintenance scheduled to occur in April or May, just as freshet begins. Unscheduled outages resulting in partial or full loss of power generation could occur at any time of year and last up to a month under extreme conditions. Unscheduled outage ramping events could be caused by an accident or malfunction (e.g., equipment failure) or effect of the environment on the Project (e.g., lightning strike); see Accidents and Malfunctions below.

Outages would temporarily decrease flow in the Taltson River below Twin Gorges and simultaneously increase flow along Trudel Creek, with a greater increase from

the 56 MW option. Ramped-up water levels on the Forebay and flows along Trudel Creek would last for the duration of the outage. The decrease in flow on the Taltson River would only last less than a day as flows are redirected through Trudel Creek. Flows will ramp up on the Taltson River upon re-start, and this ramp-up will last less than a day.

7.2.3 Mercury

The changes in the Taltson hydrograph would cause flows and water levels to increase and/or decrease depending on the specific location and/or time of year. However, no new flooding would occur. Water levels from the Expansion Project would not exceed historic water levels on Nonacho Lake. Thus the potential effects of mercury, which can be associated with hydroelectric projects if areas are newly-flooded, are not a concern of the Taltson Expansion Project. There is the potential for increased disturbance to sediment, which could increase the availability of mercury. However, mercury modelling predicted the change to be negligible.

7.2.4 Ice Structure

A significant increase or decrease to water flows would have the potential to affect ice formation in the Taltson River watershed. During the freeze-up period in the fall, flows will be similar to baseline under the 36 megawatt scenario but slightly higher under the 56 megawatt scenario. The changes in flow are not expected to greatly alter the freeze-up process under either scenario. Along Trudel Creek, the drop in flow would cause freeze-up to start earlier and last longer. However, ramping events from scheduled outages for turbine maintenance would likely break up ice early and could increase the frequency of ice ramps.

Overall, the effects of the Expansion Project on Trudel Creek ice are predicted to be low to minor.

7.2.5 Wetlands

The Expansion Project has the potential to affect wetlands in two main ways: by changing natural flood levels, or by rapidly altering water levels as part of ramping events.

Changing flood levels will cause change in the type of vegetation found at a given location. Taltson wetlands are typically dominated by sedge and willow. These wetlands exhibit a clear transition from sedge to willow which is defined by the water levels. Changes in water levels during the growing season would alter the location of this transition from sedge to willow. Following operations, there would be a transition in the sedge/willow boundary that could take up to 10 years. However, a loss of wetland extent and function is not predicted as the wetland would either shift away from the water's edge if water levels increased, or shift toward the water's edge if water levels decreased.

7.2.6 Aquatic Resources

The changes in the Taltson hydrograph would affect the key shallow and highly productive zone of the aquatic environment. Increases in water levels would drown out aquatic plants and potentially change the habitat for aquatic insects. Decreases in water levels would dry out aquatic plants and force aquatic insects down-slope to

potentially unsuitable habitat. The changes in water levels, however, would initiate a shift in the location of the shallow zone. The new shallow zone may require time to support a high level of productivity through aquatic plants and insects. Similar to the effect on wetlands, changes in water levels will have an effect on aquatic resources until the system adjusts to the new water levels. The shift in location of the productive shallow habitat is similar to the shift experienced upon construction of the original Taltson project.

7.2.7 Fish

Four fish species were chosen to represent the various habitat requirements, ecological roles, importance to end users, and special regulatory designations of all fish in the Taltson River system, including Trudel Creek. These four species were: northern pike, lake whitefish, lake trout, and walleye (Trudel Creek only).

The Expansion Project has the potential to affect these fish in five different ways:

- by physically obstructing fish at the turbines of the Twin Gorges power facility or the Nonacho Lake micro-hydro generation plant;
- by changing water depth, velocity, and other conditions in fish habitat;
- by altering fish passage patterns (i.e., spawning and rearing habitat, food access and migration);
- by eroding banks and channel beds; and
- by increasing flows during ramping events.

Small fish could be swept into the turbines if they were to venture into the conveyance canals. For this reason, the canals are designed to make them unappealing as fish habitat. Fish that pass through the turbines would have an 80 per cent chance of survival. Under the 56 megawatt option, water flow over the Nonacho Lake spillway and the Tronka Chua Gap would be reduced, but not eliminated completely, reducing the potential for fish movement from Nonacho Lake to either Taltson Lake or Tronka Chua Lake. This change in flow would not occur under the 36 megawatt option. Northern pike, lake trout, and lake whitefish are not migratory, and thus would not need to cross these barriers.

Under both expansion options, habitat quality and usage by northern pike along Trudel Creek would be expected to remain similar to current conditions. The availability of habitat with vegetation cover, critical to the spawning and rearing stages of the northern pike's lifecycle, would increase between 27 and 48 per cent. For this reason, it is predicted that the Expansion Project would have a moderate beneficial effect on northern pike; the effect would be long-term and continuous.

Lake whitefish are relatively resilient to changes in habitat, as they can use a variety of habitat types. The one limiting factor to the success of lake whitefish is depth. The Expansion Project would affect preferred habitat conditions for lake whitefish by decreasing water depths along Trudel Creek between 9 and 45 per cent. The magnitude of this adverse effect was considered to be moderate.

The assessment of potential effects of the Expansion Project on walleye suggests that the availability of preferred spawning habitat along Trudel Creek would increase

between 0.6 and 6 per cent in lakes and decrease between 20 and 76 per cent in streams. These effects are predicted to be moderate, long-term, and continuous.

Northern pike use the shallow waters near the shores of lakes and rivers for foraging, spawning, and rearing. As previously noted, under both expansion options, lower water levels would result in changes to vegetation along the shoreline. This would have an effect on the habitat available to northern pike for spawning and rearing, though a variety of foraging habitat would still remain. The effect on northern pike is ranked as moderate and is reversible, since new habitat would become available as vegetation recolonizes.

The Expansion Project is anticipated to significantly reduce the erosion rate along Trudel Creek by lowering peak monthly and daily flows by more than 50 per cent. This reduction would result in an increase in water quality and a decrease in sediment deposition. Better water quality would benefit habitat structure and cover, while reducing current levels of deposition would have minimal effect on vegetation and eggs.

Ramping events during annual scheduled maintenance in April or May would partially overlap with the spawning period for northern pike and walleye, which typically begins in mid- to late May. During these events, water levels in the Taltson River downstream of Elsie Falls would decrease for a period of 6 to 10 hours. If this were to coincide with northern pike or walleye spawning, the fish could spawn in the newly wetted stream margins. Incubating eggs would be left above water when water levels receded a few hours later. Scheduling plant maintenance prior to mid-May would reduce or eliminate this effect.

7.2.8 Wildlife

The changes in the Taltson hydrograph would affect wildlife. Sudden changes in water levels and increases in flow during periods where flows typically decrease would cause effects. Water levels will rise through the winter on lakes downstream of Nonacho as releases increase to meet power generation at Twin Gorges. The increase could flood wildlife homes and increase exposure to winter conditions. Sudden increases in flow as a result of start-up or ramping events could also flood wildlife and increase mortality. Conversely, sudden decreases in flow could leave wildlife isolated from the water increasing the risk of predation and exposure to the elements. The changes in vegetation discussed above will also affect wildlife. However, no loss of vegetation is predicted, just a change as the wetland transitions to the new water levels.

The effects of the Expansion Project are not predicted to significantly alter wildlife abundance and distribution. There will be short- to medium-term effects as some direct and indirect mortality is expected. However, populations would not be eliminated or reduced to critical levels. The populations would return to pre-Expansion levels given that habitat quality would remain over the long term.

7.3 SOCIAL ASSESSMENT

7.3.1 Employment and Training

The Project would provide many new employment and training opportunities, benefiting the South Slave Region and greater Northwest Territories. As discussed previously, the Project would create significant direct, short-term employment for Aboriginal and northern residents, as well as limited direct, long-term employment.

Dezé would work with public and Aboriginal governments, schools, and Aurora College on a number of educational initiatives, including participating in local and regional career fairs, advising educators on potential course program and content, and identifying opportunities for student work placements or internships.

The Expansion Project's effects on employment of northern and Aboriginal residents and contracting opportunities for northern businesses are not significant. However, Project benefits to the overall economy of the South Slave region, including increased revenue flows, economic opportunities and economic life choices, are significant.

7.3.2 Communities

The assessment of socio-economic issues related to the Expansion Project involved consideration of:

- specific community resources such as road access,
- availability of business and professional services,
- local unemployment rates, and
- individual/community capacity to manage undesirable socio-economic effects and maximize desirable Project effects.

The Project has the potential to both beneficially and adversely affect a number of socio-economic components in a number of different ways. The Expansion Project would create short-term employment for Aboriginal and northern residents in the South Slave region and Northwest Territories. Direct long-term employment would be limited. However, some specialized skills and trades needed for construction of the Project may not be available in the Northwest Territories, and there may be insufficient local labour for some job categories.

Workers would develop skills through employment and training opportunities gained through the Expansion Project. They would have increased lifestyle choices, which include spending habits, behaviour, and participation in community and traditional activities. Additional income would result from engagement in the wage economy. Increased spending can have both beneficial and adverse effects. For example, spending on improved hunting and trapping equipment would be a beneficial effect, but spending on addictive substances would be an adverse effect. Individuals have discretion about how they choose to spend their income, but an increase in employment income makes it possible for individuals to spend income on unhealthy lifestyle choices, should they make a personal choice to do so. Unhealthy lifestyle choices could lead to increased need for social, financial, and protective services.

The Expansion Project's partner profit-sharing would provide the Aboriginal government with greater opportunity to pursue a preferred mix of traditional and non-traditional economic initiatives.

Customers of the Expansion Project would reduce their need for diesel fuel, resulting in decreased demand for diesel transport trucks and lower carbon dioxide emissions in the Northwest Territories. Fewer fuel hauls over the Tibbitt-to-Contwoyto Winter Road would lower the risks associated with accidents and spills, minimize truck-related effects on the terrain and wildlife, and extend the service life of the existing winter road system. The Project would also provide a back-up power supply to existing residential customers, reducing their reliance on diesel-generated power when the Twin Gorges facility is shut down for repairs or maintenance.

The Expansion Project could reduce development barriers associated with energy-intensive developments where access to the transmission line is feasible.

Benefits of employment are primarily linked to the length of the construction phase, as there would be limited employment during the operational phase of the Project. However, there would be periodic opportunities for additional employment during maintenance initiatives such as additional clearing required as re-forestation occurs along the transmission line.

There would be benefits for workers, who would gain additional skills, experience and knowledge as a result of participation in the Expansion Project. These skills could be applied to future jobs at new resource development projects, or to existing regional jobs.

7.3.3 Tourism and Wilderness Character

The potential effects of the Expansion Project facilities, especially the transmission line, on tourism and wilderness character were assessed. The Project is not expected to affect access to sport fishing and caribou hunting, or to the proposed East Arm National Park. Dezé would time construction in areas near the caribou hunting camps to be outside the hunting season, and choose tower locations to avoid sensitive habitat, in order to minimize effects on sport caribou hunting. Dezé has also proposed a number of mitigation measures to ensure that erosion during Project construction and operations does not affect the availability of fish for sport fishing. These include placing cut trees on steep slopes and training all staff on erosion and sediment control. The route for the transmission line was chosen to avoid rivers commonly used by canoe trip outfitters, and to be less visible from tourist destinations on MacKay Lake and Lac de Gras.

Despite these mitigation measures, the Expansion Project would still have an effect on the visual aesthetic of the wilderness, since portions of the transmission line would be visible from certain vantage points, including some tourist destinations in the proposed East Arm National Park. These effects would only occur during the lifetime of the Expansion Project, and would end with the removal of the transmission line towers. Overall, the Expansion Project's effect on tourism was assessed as not significant, since fishing and hunting opportunities, enjoyment of wilderness character, and the ecological integrity of the proposed East Arm National Park would all be maintained.

7.3.4 Traditional and Non-traditional Land and Resource Use

The Expansion Project would directly affect two traditional travel routes: the Fort Smith to Twin Gorges winter travel route and a portage at the outlet of Nonacho Lake to the Taltson River system. Improved access would allow for greater opportunities for traditional harvesting, but would also have an adverse effect on wildlife abundance and distribution.

Other environmental effects discussed in previous sections, such as sensory disturbances or changes in seasonal flow patterns, have the potential to affect traditional land and resource by altering wildlife abundance and distribution. However, after application of mitigation design features and practices, these effects are not predicted to be significant.

The Expansion Project's effects on the proposed East Arm National Park, commercial and sports fisheries, economic forests and the aesthetic quality of the area are expected to be not significant. That is, the ecological integrity of the proposed East Arm National Park and economic forests would be maintained, and there would be ongoing fishing opportunities and enjoyment of the land.

7.3.5 Heritage Resources

The Project was assessed for effects to traditional and cultural sites with archaeological and historical significance for all groups of people including Dené, Métis, and European. Construction activities would avoid known sites of traditional and cultural significance like Ts'ankui Theda and Old Fort Reliance. Where possible, the Project components would be placed where they would not be visible from these sites. No known grave sites would be disturbed by construction of the Expansion Project. Construction would also avoid known archaeological resources, and contractors and surveyors would be trained on how to manage any previously unrecorded archaeological sites discovered during construction or operation of the Project.

8. PROJECT RESPONSE TO THE ENVIRONMENT

The environmental assessment considered the effects of environmental forces, such as climate change, forest fires, ice storms, lightning strikes, and earthquakes, on the Expansion Project.

There is strong evidence from scientists and local residents that Canada's north is experiencing changes in its climate. Temperature and precipitation changes have resulted in increased runoff, decreased snow cover, decreased permafrost, and reduced duration of ice cover on rivers and lakes.

Despite the clear evidence for climate changes, making future projections is difficult. However, based on currently available climate change data, the climate of the Expansion Project area will likely be warmer and wetter in the future. Water movement and distribution in the Expansion Project area is connected to environmental components, including snow cover, permafrost, and river and lake ice. Any long-term climate change would affect these components, although the degree of these effects is uncertain. Climate changes would likely lead to greater river discharge, with more constant annual flows. In general, this probable change towards

a warmer and wetter climate would be beneficial to the Expansion Project, since increased flows would mean increased power generation capacity. Dezé will use adaptive management to change Expansion Project operations in response to climate change.

The Taltson River watershed regularly experiences forest fires, typically triggered by multiple lightning strikes. Ice storms are also regularly seen in the Expansion Project area. The Twin Gorges facilities could be affected by a forest fire or an ice storm, most likely through an outage of one of the transmission lines. The loss of either of the transmission lines would lead to a reduction in power generation and a necessary redirection of flows into Trudel Creek and/or through the South Gorge Bypass.

The effect of most outages would be similar to what would occur during annual scheduled maintenance. In the very unlikely event that a forest fire or ice storm causes outages on both lines, both plants would be taken off-line, causing full ramping of flows on the Forebay and along Trudel Creek. The environmental effect of this occurrence is discussed in *Accidents and Malfunctions*.

Lightning-induced outages on either of the transmission lines would be a normal summer occurrence. Strikes near or on the line would generate extremely short-duration but high-voltage conditions, leading to electrical instability on the line. Outages from lightning strikes could be partial or full.

Typically, lightning strikes would do little or no damage, but would cause a short-duration generation disruption. In more extreme cases, damage to the conductor and/or stringing hardware could occur. Regular inspection of the line would need to be carried out to ensure a high degree of reliability. Surge protectors would isolate the line from the potentially-affected switchyards to protect critical equipment.

9. ACCIDENTS AND MALFUNCTIONS

Accidents and malfunctions at some Expansion Project facilities would present a risk to the environment, worker health and safety, and the safety of the public in the Expansion Project area. These facilities include dams, intake facilities, canals, pipelines, and spillways.

The likelihood of many of the accidents and malfunctions assessed were rated as low because they could be avoided through proper inspection, auditing, and maintenance plans. The Expansion Project operation plan, together with a commitment to worker training, auditing, inspections, and guidelines, would be a key part of its safety and success.

One malfunction was identified as being a high risk. A major equipment failure at the powerhouse or switchyard would cause a full power outage that could last up to a month. If this occurred, water would no longer flow through the power facilities, but inflows to the Forebay would continue. Water levels would rise above the sill at the South Valley Spillway and flow into Trudel Creek. This ramping event would last until power was restored. The effects to the environment would be the same if a natural factor, such as a major lightning strike, was the cause of the outage.

A full outage would result in changes to flow rates and levels in Trudel Creek, which in turn would affect the biological environment. While outages pose a risk to northern pike reproductive success in the Trudel Creek area, it would not be an absolute risk.

Rapidly rising water levels in the Trudel Creek area could flood muskrat lodges and cause drowning, particularly of any young that are inside lodge dens and are not as mobile as adults. Flooding could also lead to loss of shelter, which would be particularly detrimental during the winter with subsequent freezing or predation. Rapidly rising water levels could also wash away food caches.

Full outages as the result of malfunctions would be rare and infrequent, giving environmental components time to recover. In addition, the Taltson River watershed has demonstrated the ability to adjust to past changes in water flows.

10. CUMULATIVE EFFECTS

Cumulative effects are defined as changes to the environment caused by projects or activities in combination with other past, present and reasonably foreseeable projects or activities. Cumulative Effects Assessment (CEA) requires the consideration of effects due to the project being assessed as well as other existing or future projects.

The cumulative effects assessment for the Expansion Project includes those that are Project-specific and the effects of all overlapping historic, current and future projects and activities. Existing activities include mineral exploration, outfitting lodges, winter roads, active mines, communication facilities and woods operations. Much of the mining and exploration activity is focused in the regions north of Great Slave Lake, while the Taltson River watershed contains very few developments. Proposed future projects include:

- the Gahcho Kué project (considered an existing project in the effects assessment),
- a small scale diamond mine in the Lac de Gras region owned by Peregrine Diamonds Ltd., which hauls ore to Ekati for processing,
- the Tyhee NWT Corp Yellowknife Gold project,
- the Bathurst Inlet Port and Road project, and
- the East Arm National Park.

10.1 CARIBOU

The cumulative effects of the Expansion Project and other existing projects on the amount of quality habitat available to caribou are expected to be negligible. Cumulative changes from the Project and previous and existing developments on the location, size, and number of quality habitat patches within seasonal ranges is estimated to range from less than 1% to 16% for the Bathurst herd. The magnitude of the cumulative effect from Expansion Project-related changes to habitat quality on caribou population size and distribution is predicted to be moderate during construction and operation. Sensory disturbances are predicted to end shortly after construction ends, and their overall cumulative effects to the persistence of caribou distribution were considered to be not significant. The creation of winter road portages and trails in the Taiga Shield forest, which currently includes many open

lakes and forest, is expected to provide limited benefit for wolves hunting caribou, but overall, was considered to be not significant.

10.2 SPECIES AT RISK AND KEY BIRD SPECIES

The Expansion Project is not expected to cause changes to rare plant abundance and distribution, and the resulting effect to rare plants is expected to be long-term, but local and of a low magnitude. Therefore, the Expansion Project is not anticipated to result in significant adverse effects to the abundance and distribution of rare plant species. Cumulative effects are not anticipated to occur.

10.3 KEY FURBEARER SPECIES AND UNGULATES

Cumulative effects to muskrat and beaver caused by changes to water flow are difficult to predict, and vary between different parts of the Taltson River watershed. Direct mortality may occur in some areas, due to the anticipated increases in water level during the winter. In other areas, low water levels may reduce availability of forage for muskrat. Changes to wetland function resulting from decreased flooding would reduce the vegetation available to muskrat and beaver, while in other zones muskrat populations could increase due to stabilized water levels.

Overall, it is expected that the cumulative effects from the Expansion Project and other existing developments will not have a significant effect on the persistence of the population and distribution of key furbearing species and other ungulates. That is, the cumulative effect would likely be detectable, but would be reversible over the long-term.

10.4 TOURISM POTENTIAL AND WILDERNESS CHARACTER

The transmission line would be located within landscapes with limited visual or noise indication of human presence, and would traverse the proposed East Arm National Park. The operating transmission line causes only negligible noise, and Expansion Project design considered a transmission line alignment and barge staging areas that would reduce their effects to visual aesthetics and wilderness character. Several mitigation measures would be used to minimize Expansion Project-related effects on wilderness character and tourism potential, and any remaining effects would be reversed when the transmission line is removed after closure. The effect of the Expansion Project on tourism potential and wilderness character is expected to be not significant, and cumulative effects are similarly anticipated to be not significant.

The proposed East Arm National Park would likely lead to a halt to development within its boundaries, eliminating the likelihood of future cumulative effects to tourism potential and wilderness character.

10.5 TALTSON RIVER WATERSHED

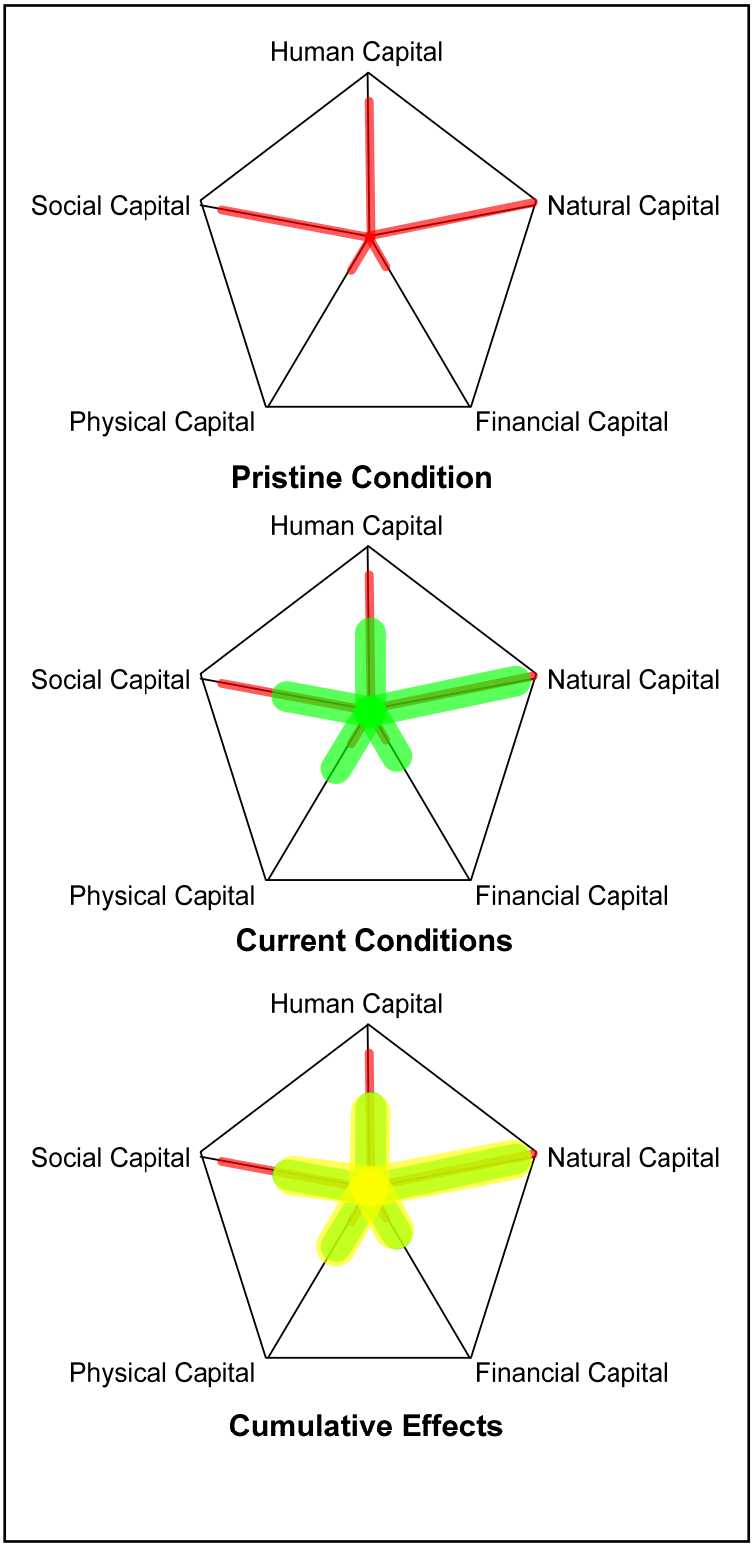
The cumulative effects assessment of the aquatic environment of the Taltson River watershed indicates that past developments resulted in changes to wetland extent and function, aquatic productivity, availability of fish habitat, and harvesting of furbearers and waterfowl. These components are anticipated to experience further changes as a result of the Expansion Project. However, it is expected that wetland extent/function and aquatic productivity would re-stabilize within 3 to 10 years. Cumulative effects to fish resources would thus be of low magnitude. The effects to furbearers and waterfowl would also be expected to stabilize in response to the environmental changes.

10.6 SOCIO-ECONOMIC EFFECTS

The livelihood pentagon found in Figure ES.4 indicates the pristine condition, current condition, and cumulative condition resulting from Expansion Project-related effects together with potential effects of future projects. Each spoke of the pentagon represents one of the five livelihood assets: human, social, physical, financial, and natural. The amount of each asset available to South Slave region communities is depicted by the length of the colour bars on each of the spokes. The longer the colour bar, the more of that asset that exists.

The pristine socio-economic conditions (shown in red in Figure ES.4) were characterized by high human, natural, and social capital, and minor financial and physical capital. Current conditions (shown in green in Figure ES.4) are characterized by a moderate to low human, social, physical and financial capital, and high natural capital. The cumulative effects of the Expansion Project and existing and future projects (shown in yellow in Figure ES.4) would be characterized by high natural capital and moderate social, physical, financial and natural capital.

Figure ES.4 — Cumulative Effects on Traditional Land and Resource Use



11. SUSTAINABILITY

Sustainable development, as described by the MVEIRB and Government of the Northwest Territories, is "the development of natural resources in a manner that ensures economic, social, and cultural needs and well-being of residents and communities in the Project's area of influence are met while maintaining ecosystem integrity and diversity without compromising the ability of future generations to meet their needs."

The four essential elements of sustainability are social, economic, cultural, and environmental. Dezé has a vision for the Expansion Project that weaves these elements into planning, design, construction, operations, and future direction and mitigation measures. Examples of this include:

- **Social**
  - Generating direct and indirect jobs, especially during the Project's construction phase.
  - Factoring energy and economic issues into the Expansion Project design.
- **Economic**
  - Keeping capital costs low (compared to the benefit of the resource) by extending the life of the existing Twin Gorges power facility, with the majority of the infrastructure already in place.
  - Looking beyond the life of the currently operating mines to other potential future hydropower customers, thereby contributing to the economic development of other industries in proximity to the line route and in the Slave Geological Province.
- **Cultural**
  - Providing opportunity for collaboration and cooperation among the First Nations of the region through Dezé's unique ownership structure.
  - Protecting culturally sensitive areas by designing infrastructure to avoid identified or known sites.
- **Environmental**
  - Limiting timber clearing along the transmission line.
  - Incorporating environmental design features relevant to traditional resource use.
  - Displacing close to 100 million litres of diesel use per year and significantly reducing greenhouse gas emissions in the Northwest Territories.

Communication is central to all aspects of the sustainability process. Engagement, openness and broad participation are crucial during the design and implementation of the Expansion Project. Throughout the Expansion Project lifecycle, Dezé is committed to communicating with governing bodies, residents, and other stakeholders through reporting and information sessions. Continual input and feedback from stakeholders would allow Dezé to assess and adjust its approach to Expansion Project management to achieve a sustainable development that meets the needs of current and future generations.

12. CONCLUSION

The Dezé Energy Corporation brings together groups that historically were reluctant to enter into joint business development agreements. The partnership represents a unique opportunity for the creation of a sustainable business opportunity in the South Slave region of the Northwest Territories, a region where economic growth has lagged behind that growth witnessed across much of the territory as a whole.

The environmental effects identified do not pose significant risk to population abundance or distribution within the Project area. Effects have been identified. However, the effects that have the potential to alter the future sustainability of populations are reversible well within the operation time frame of the Project. The Taltson River has demonstrated an ability to adjust to changes in water levels through the creation of stable river and lake vegetation communities, aquatic resources, fisheries resources and wildlife populations. The proposed changes present a disturbance to the Taltson River that will not jeopardize the long-term sustainability of the environment.

The Expansion Project builds on an existing development in the Taltson River watershed that is currently underutilized. Construction and operation of the Expansion Project would result in limited changes to existing watershed features and no additional flooding. At a low environmental cost, the Project would provide significant benefits to affected Aboriginal people through ownership, project design, and ultimately through greater control of their livelihood assets.