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# Highway 37 Transmission Line Issues and Considerations

DRAFT INTERNAL MEMO

AUGUST 2008





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<b>1. Introduction .....</b>	<b>3</b>
<b>2. Overview of Northwest British Columbia .....</b>	<b>4</b>
2.1 Geography .....	4
2.2 Mineral Resource Development.....	4
2.3 Power Demand and Supply .....	6
2.3.1 Proposed Supply.....	6
2.3.2 Proposed Demand .....	8
<b>3. The Proposed 287-kV Northwest Transmission Line.....</b>	<b>11</b>
<b>4. Potential Impacts on the Region .....</b>	<b>15</b>
4.1 Power Capacity .....	15
4.2 Effects on Communities .....	16
4.3 Effects on Water, Land and Wildlife .....	17
4.3.1 Direct Impacts .....	17
4.3.2 Indirect Impacts.....	17
4.4 Green Power Development.....	18
4.5 Greenhouse Gas Pollution .....	19
<b>5. Alternative Solutions for the Region.....</b>	<b>23</b>
5.1 A 138-kV Transmission Line .....	23
5.2 A Regional Power System of Green Power Opportunities.....	26
<b>6. A Summary of Considerations .....</b>	<b>31</b>

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## List of Figures

Figure 1: Overview of current electrical infrastructure .....	9
Figure 2: Peak power flow demand: existing and proposed developments.....	10
Figure 3: The proposed 287-kV Northwest Transmission Line .....	12
Figure 4: Greenhouse gas emissions from select and proposed sites .....	20
Figure 5: A new 138-kV transmission line.....	25
Figure 6: Overview of hydro and wind resources.....	27

## List of Tables

Table 1: Sizing up Highway 37 .....	31
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# 1. Introduction

British Columbia's government has announced plans to extend a new power transmission line into the Northwest part of the province, roughly parallel to Highway 37. Its stated aim—to spur exploration and mine development in a mineral-rich area—is clear. But for all the hoopla, very little attention has been paid to whether a large power line would in fact bring net benefits to Northwest British Columbia.

From the outset, the British Columbia Transmission Corporation (BCTC) took a critical design decision—about the power line's size—without public consultation, opting for a capacity of 287 kilovolts (287-kV).

But whereas a line of this size could power up to five major mines, only one mine has been operating in the region for the last few years. This means that the Northwest Transmission Line (NTL) could lead to unprecedented industrial expansion in one of the most pristine parts of British Columbia.

In good economic times, five mines would certainly generate new jobs—but probably far more than can be filled locally, thus bringing thousands of job seekers to Northern communities. Meanwhile, mineral prices are nothing if not fickle. When prices fall, many mines will scale back their operations and lay off staff. Local communities could end up trapped on a roller coaster of successive booms and busts.

There are also serious environmental risks. Five mining projects would create mounds of acid-generating rock, new tailings ponds, new access roads and increased traffic. In addition, a power line sized at 287-kV is too large to follow the curves of Highway 37 or of a smaller line serving Stewart. Instead, a new, straighter, right-of-way up to 80 metres wide would need to be cleared for most of the Northwest Transmission Line's 335-km length, from Terrace to Bob Quinn Lake.

The reality—often unacknowledged—is that in Northwest British Columbia, a power line isn't merely a power line; it's a pivotal piece of infrastructure that will influence the speed and scale of industrial development for decades to come. Whether or not it goes ahead will permanently shape the area's economy, environment and cultures.

Accordingly, local residents and First Nations deserve to understand the implications fully and decide what kind of future they want to see. A power line shouldn't predetermine their decision.

Fortunately, it's not too late for an earnest conversation. Although the Northwest Transmission Line proposal has been around for some time, the province is still waiting for a mine developer to cover a portion of the \$400 million price tag before breaking ground. Northwest British Columbians still have a window of opportunity to evaluate the proposal on their own terms.

This review is intended to help inform one part of the debate by comparing a 287-kV power line to two potential alternatives: first—a smaller, 138-kV power line that could power one or two mines, rather than five; second—an off-grid system, where local renewable energy sources are tapped and combined with storage technologies to power industrial development.

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# 2. Overview of Northwest British Columbia

## 2.1 Geography

Northwest British Columbia, a region of remarkable scenery and extensive wildlife, has perhaps the least intensive settlement and industrial activity of any part of the province.

This review focuses on the area north of Highway 16 near Hazelton, and along Highway 37 toward the Yukon border—a place that contains globally significant wilderness and intact ecosystems, including the headwaters of four major wild salmon rivers: the Taku, Nass, Stikine and Skeena. Those who travel Highway 37, extending from Kitwanga to Watson Lake in the Yukon, are likely to encounter black bears, grizzly bears, moose, fox and other large mammals. The abundance of fish and wildlife, the dramatic landscape and the cultural history of First Nations in this region are in themselves extraordinary resources.

Three primarily Tahltan communities are the largest populations centres: Iskut, with a population of about 350; Dease Lake, with a population of 700; and further west down the Stikine River, Telegraph Creek, with a population of 450. A few commercial operators, such as Bell II Lodge, Tatogga Lake Resort, offer ecotourism and heli-skiing opportunities. The small mining supply centre of Bob Quinn Lake has a maintenance yard, an air strip, and a handful of homes.

## 2.2 Mineral Resource Development

Although the Highway 37 corridor overlays significant mineral resources, its remoteness has tempered the rate of industrial development.

Historically, one or two mines have operated concurrently (see text box), usually providing some local employment. Today, Barrick Gold operates the Eskay Creek gold and silver mine, which employs 180 people directly, and 135 on contract,<sup>1</sup> of whom approximately 100 are Tahltan.<sup>2</sup> However, Eskay Creek is scheduled to wind down its operations in late 2008 or 2009; moreover, the long-term remediation prospects for its mine site remain uncertain.<sup>3</sup>

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<sup>1</sup> Mining Operations Branch, Ministry of Energy and Mines, *2004 Chief Inspector of Mines' Annual Report*, 15.

<sup>2</sup> Ted Mahoney of Barrick Gold Corporation (presentation at Minerals North 2007 Conference in Terrace on April 18, 2007).

<sup>3</sup> Drainage chemistry from sulphidic geologic material is one of the long-term environmental problems that can result from hard rock mining. It is the natural reaction that takes place when sulphidic materials in ore bodies that are otherwise securely underground are exposed to air and water. Once this occurs, it can create run-off of heavy metals and varying pH that will travel into waterways and soils unless contained. Metal leaching problems can occur over the entire range of pH conditions, but are most commonly associated with acid mine drainage. See Ministry of Energy and Mines, Ministry of Environment, Lands and Parks, "Policy for Metal Leaching and Acid Rock Drainage at Minesites in British Columbia," 1998. The Eskay Mine site has many issues to be addressed including future drainage chemistry and the feasibility of flooding of the underground mine workings. The long-term mitigation needs and costs are indeterminate at this time. See Bill Price, Environment Group, Mining and Mineral Sciences Lab. Natural Resources Canada, Personal Communication, October 16, 2007.

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### In Brief: A Mining History of the Highway 37 Corridor

1952–2000	Cassiar asbestos mine operated at full production until 1989. Smaller operations continued on the site throughout the 1990s. <sup>4</sup>
1988–1993	Johnny Mountain high-grade underground gold–copper–silver mine operated until 1990 and then resumed operation in 1993. <sup>5</sup>
1990–1994	Golden Bear gold–copper–silver mine closed in 1994 and then reopened as a heap leach operation from 1997 to 2002.
1991–1999	Snip high-grade underground gold–copper–silver mine operated for eight years. <sup>6</sup>

Over the last few years, high mineral prices have led to significant interest in developing new mines. In 2006, for example, more than a dozen formal exploration projects were underway along the Highway 37 corridor.<sup>7</sup>

To date, five major projects have entered the regulatory process. Four are still seeking approval:

- The Red Chris copper-gold mine, proposed by Imperial Metals (NB: although Red Chris has received provincial environmental assessment approval,<sup>8</sup> the federal environmental assessment is currently being contested before the Supreme Court of Canada.)
- The Mt. Klappan open-pit coal mine, proposed by Fortune Minerals for operations beginning in 2010.<sup>9</sup>
- The Kutcho Creek copper-zinc-silver-gold project, proposed by Western Keltic Mines for operations beginning in 2010.<sup>10</sup>

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<sup>4</sup> <http://minfile.gov.bc.ca>.

<sup>5</sup> There are concerns with acid mine drainage at the site and a need to maintain the long-term integrity of the tailings impoundment. Exposure of the materials in the tailing impoundment would increase acid mine drainage problems. See William Price and David Yaeger, “ML/ARD Assessment and Mitigation at the Johnny Mountain Gold Mine,” (CANMET Mining and Mineral Resources Laboratories, Natural Resources Canada, 2004).

<sup>6</sup> Concerns about future acid mine drainage from the unflooded portion of the underground works exist at the site. See William Price, “Case Studies for ML/ARD Assessment and Mitigation: Snip Gold Mine,” (CANMET Mining and Mineral Resources Laboratories, Natural Resources Canada, 2005).

<sup>7</sup> These include Kinaskan (GJ) just to the southwest of Iskut; Copper Creek northwest of Telegraph Creek; Eaglehead and Turnagain northeast of Dease Lake; Ball Creek, Voigtberg, Bronson Slope, Kerr-Sulphurets, Snowfields, Corey, Electrum, Granduc, Summit Lake and Silver Coin between Iskut and Stewart west of Highway 37; and Storie and Taurus north of Dease about 100 kilometres ( T.G. Schroeder and E. Man, *Operating Mines and Select Exploration Projects in British Columbia – 2006*, BC Ministry of Energy Mines & Petroleum Resources). The metal prospects include copper, gold, silver, nickel and molybdenum, and the proposed method of extraction is often open pit development.

<sup>8</sup> Ministry of the Environment, “Red Chris Mine Receives Environmental Approval,” Information Bulletin, August 24, 2005.

<sup>9</sup> Robin Goad, Fortune Minerals Ltd., “Mount Klappan Anthracite Coal Project” (presentation at Minerals North 2007 conference, Terrace, British Columbia, April 18, 2007).

<sup>10</sup> See <http://www.westernkeltic.com>, accessed October 16, 2007.

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- The Schaft Creek copper-gold-molybdenum-silver project, proposed by Copper Fox Metals for operations beginning in 2011.<sup>11</sup>

The fifth project, the Galore Creek copper-gold mine, initiated construction in 2007. The project was a joint venture by Teck Cominco and NovaGold and was slated to be the largest single mining investment in British Columbia. (Its construction costs were expected to exceed those of the 2010 Vancouver Olympics, even accounting for venue construction and highway upgrades.<sup>12</sup>)

NovaGold estimated that Galore Creek would generate significant regional economic benefits including more than 1,000 construction jobs and 500 operations jobs, worth about \$23 million.<sup>13</sup> However, on November 26, 2007, Teck Cominco and NovaGold announced that they were suspending Galore Creek, citing soaring cost assessments. The project's future is now uncertain. Although Galore Creek is thought to contain one of the largest undeveloped deposits of copper and gold in the world, the climate for mining investment has changed dramatically as a result of the economic crisis in late 2008.

## 2.3 Power Demand and Supply

Electricity demand in Northwest British Columbia is currently modest. The three communities of Iskut, Dease Lake and Telegraph Creek have a combined peak power requirement of about 3.1 MW<sup>14</sup>; the Eskay Creek mine has power requirements of roughly 3-5 MW.

Figure 1 shows the existing electricity sources that meet regional needs: Dease Lake is supplied by the Hluey Lake Hydro Generating Station, a small 3 MW capacity hydro facility with a storage reservoir<sup>15</sup>; Iskut and Telegraph Creek are supplied by BC Hydro-operated diesel generators; the Eskay Creek mine and commercial operations and light industrial sites along Highway 37 are supplied by privately-owned diesel generators.

In addition, a 138-kV power line serving the port of Stewart travels along Highway 37 from Cranberry Junction to Meziadin Junction. However, there are no existing connections from this line to communities or mines farther North.

### 2.3.1 Proposed Supply

A run-of-river hydro proposal for the lower Iskut River, known as the Forest Kerr project, is already well developed. It holds environmental assessment approval from the British Columbia government for generating capacity up to 112 MW, and for a 138-kV transmission line to tie in to the grid at Meziadin Junction. (See figure 5 on page XX for Forest Kerr's location.)

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<sup>11</sup> Guillermo Salazar (presentation at Minerals North Conference, Terrace, British Columbia, April 18, 2007). The rate of production would increase from 65,000 tonnes to 130,000 of ore per day.

<sup>12</sup> Nathan VanderKlippe, "Building B.C.'s most expensive mine," *The Financial Post*, October 12, 2007.

<sup>13</sup> Presentation to the AME BC Speaker Series, September 13, 2007, <http://www.novagold.com/section.asp?pageid=3343>.

<sup>14</sup> In the 2005/2006 fiscal year, the peak power demand for Dease Lake, Iskut and Telegraph Creek was 1.55 MW, 0.84 MW and 0.71 MW respectively (email communication with BC Hydro, June 11, 2007).

<sup>15</sup> BC Hydro owns and operates the diesel generators in Iskut and Telegraph Creek and maintains a standby diesel generator in Dease Lake. The Hluey Lake Hydro generating station is owned by Regional Power and operated by the Tahltan Native Development Corporation. Regional Power sells the electricity to BC Hydro. The project has the option of upgrading to 6 MW capacity.



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Forest Kerr was originally conceived as a grid-supply project; BC Hydro signed a 15-year purchase agreement with the proponent in 2003.<sup>16</sup> However, in 2006 the developer of the Galore Creek Mine, NovaGold, purchased Forest Kerr. At the time, it was understood that NovaGold was interested both in using power from Forest Kerr, and in using an extension from Forest Kerr's transmission line to obtain grid power for Galore Creek.

With Galore Creek on hold, the current status of Forest Kerr is unclear.

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<sup>16</sup> See <http://www.bchydro.com/info/ipp/ipp958.html>

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### How Electricity Is Measured: Power vs. Energy

Power is the instantaneous flow of electricity at any particular time. The term can refer to either the rate of supply from a generating station, the rate of transfer along a transmission line, or the rate of demand by consumers. The measurement of power is *watts* — the unit used for light bulbs and home appliances. A *megawatt* (MW), the unit of measurement used in this report, is one-million watts.

*Peak power demand* is the largest demand for electricity of a user or system at any one time. If the only electrical device in a home is a 25-watt light bulb, for example, when the switch is turned on, the home's peak power demand is 25 watts.

*Peak power capacity* is the largest amount of electricity that can be supplied or transferred at any one time. For example, a home with only a 25-watt light bulb could meet its peak power demand with an electrical generator that has a peak power capacity of 25-watts or more.

When electricity is used to turn on lights or appliances, energy consumed is typically measured and paid for in *kilowatt hours*.

Energy is calculated by multiplying power by time. For example, operating a 25-watt light bulb for 100 hours would consume 2.5 kilowatt hours (25 watts x 100 hours/1000) of energy. The measurement for large-scale energy use is megawatt hours (MWh). One megawatt hour is the same as 1,000 kilowatt hours (kWh) or 1/1000 gigawatt hours (GWh).

### 2.3.2 Proposed Demand

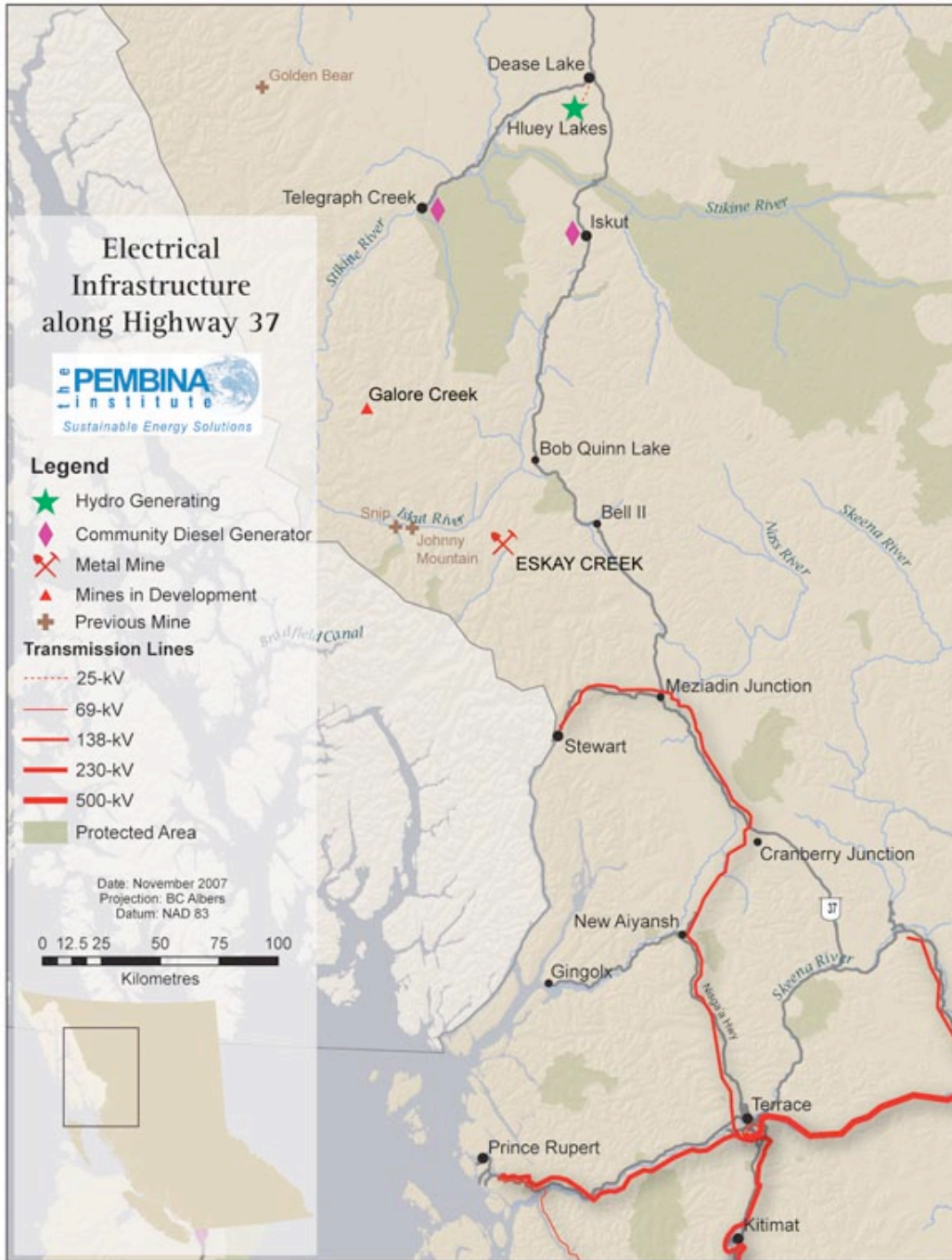
The five mining projects along the Highway 37 corridor that are seeking, or have received, regulatory approval would be massive energy consumers, especially in comparison to existing mines and communities. For example, Iskut, Telegraph Creek and Dease Lake collectively consume roughly 11,000 megawatt hours (MWh) annually<sup>17</sup> (equivalent to about one tenth the consumption of the town of Smithers<sup>18</sup>). By contrast, the Galore Creek Mine alone would consume 745,000 MWh per year.<sup>19</sup>

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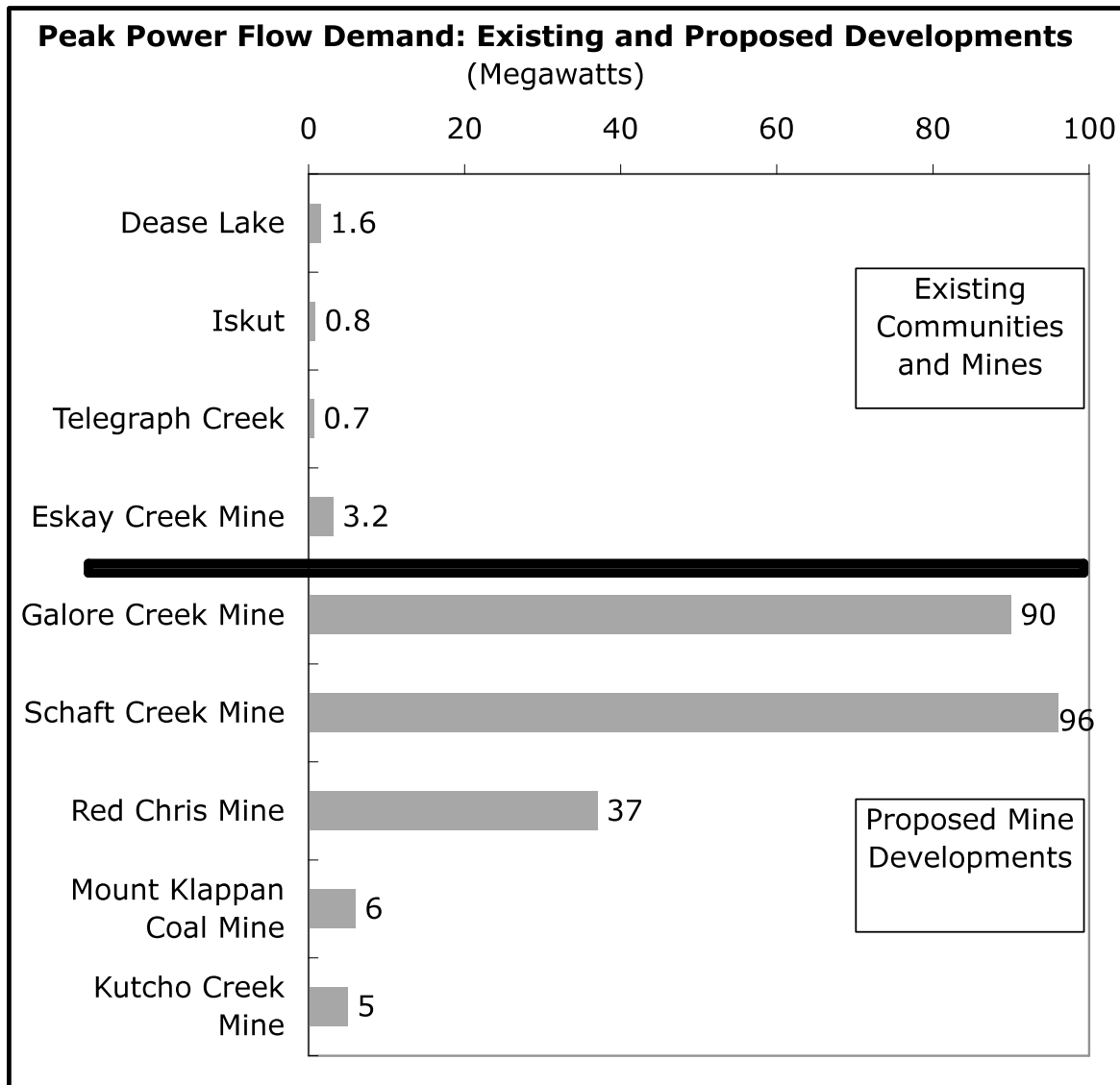
<sup>17</sup> Email communication from Bob Gammer, BC Hydro, June 11, 2007.

<sup>18</sup> Joshua McNab and Nikki Skuce, *Town of Smithers – Community Energy Plan, March 2007*.

<sup>19</sup> Government of Canada and BC Environmental Assessment Office, *Galore Creek Copper-Gold-Silver Project – Assessment Report/Comprehensive Study Report, February 2007, 53*.



**Figure 1: Overview of current electrical infrastructure along Highway 37. This map includes the existing 138-kV transmission line to Meziadin Junction and Stewart, as well as community hydro and diesel generating facilities.**



**Figure 2: Peak power flow demand of communities and existing and proposed developments.<sup>20</sup>**

<sup>20</sup> Dease Lake, Iskut and Telegraph Creek peak load for the F2005 and F2006 sourced from Bob Gammer, Public Affairs Coordinator, Community Relations, BC Hydro, email communication, June 11, 2007. Eskay Creek sourced from Paul Wojdak, Ministry of Energy Mines and Petroleum Resources, personal communication. Galore Creek sourced from Environmental Assessment Office, Transport Canada, Fisheries and Oceans Canada, Natural Resources Canada, Environment Canada, *Galore Creek Copper-Gold-Silver Project: Assessment Report/Comprehensive Study Report*, February 2007, 16. Schaft Creek estimated using ratio of production versus peak power demand from Galore Creek (65,000 TPD requiring 90MW) and applied to Schaft Creek's production estimate of 70,000 from Environmental Assessment Project Description. Red Chris sourced from Red Chris Development Co. Ltd., *Application for an Environmental Assessment Certificate: Red Chris Porphyry Copper-Gold Mine Project – Addendum*, November 2004. Kutcho Creek sourced from Knight Piesold Ltd., *Western Keltic Mines Inc. Kutcho Creek - Project Description Report*, July 2006, 11. Mount Klappan sourced from Fortunes Minerals Ltd., "Fortune Announces Results of Mount Klappan Bankable Feasibility Study," news release, October 17, 2005. Used the reference for 3 Mtpa case.

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# 3. The Proposed 287-kV Northwest Transmission Line

Initial plans for the 287-kV Northwest Transmission Line proposed a public-private partnership based upon a cost-sharing agreement with the Galore Creek Mine. The Galore Creek Partnership was expected to contribute the initial \$158 million, with BC Hydro paying the balance.<sup>21</sup> The Northwest Transmission Line would be owned by BC Hydro and operated by the British Columbia Transmission Corporation (BCTC) as part of BC Hydro's transmission system.

Running 335 kilometres from the Skeena substation near Terrace to Bob Quinn Lake via Meziadin Junction, the proposed line would require new rights-of-way up to 80 metres wide. The line would be constructed in two stages: the northern section from Meziadin Junction to Bob Quinn Lake was to be in service by October 2009 to enable power delivery for Galore Creek Mine construction;<sup>22</sup> the southern section, from Terrace to Meziadin Junction, was to be completed by October 2011.

The 287-line to Bob Quinn Lake would not provide electricity for either of the diesel communities of Iskut or Telegraph Creek. In the original plans for the power line in 2005, BCTC investigated constructing the Northwest Transmission Line past Bob Quinn Lake to Dease Lake as depicted in Figure 3 below.

The future of this renewable energy project is now unclear. When the 287-kV Northern Transmission Line was initially announced, NovaGold indicated that it might not follow through with its plans for Forest Kerr.<sup>23</sup> When the Northern Transmission Line was called into question, however, the company announced that it would investigate the feasibility of increasing the capacity of the Forest Kerr project to 195 MW. Doing so would require a 287-kV line from Terrace to Bob Quinn Lake.<sup>24</sup>

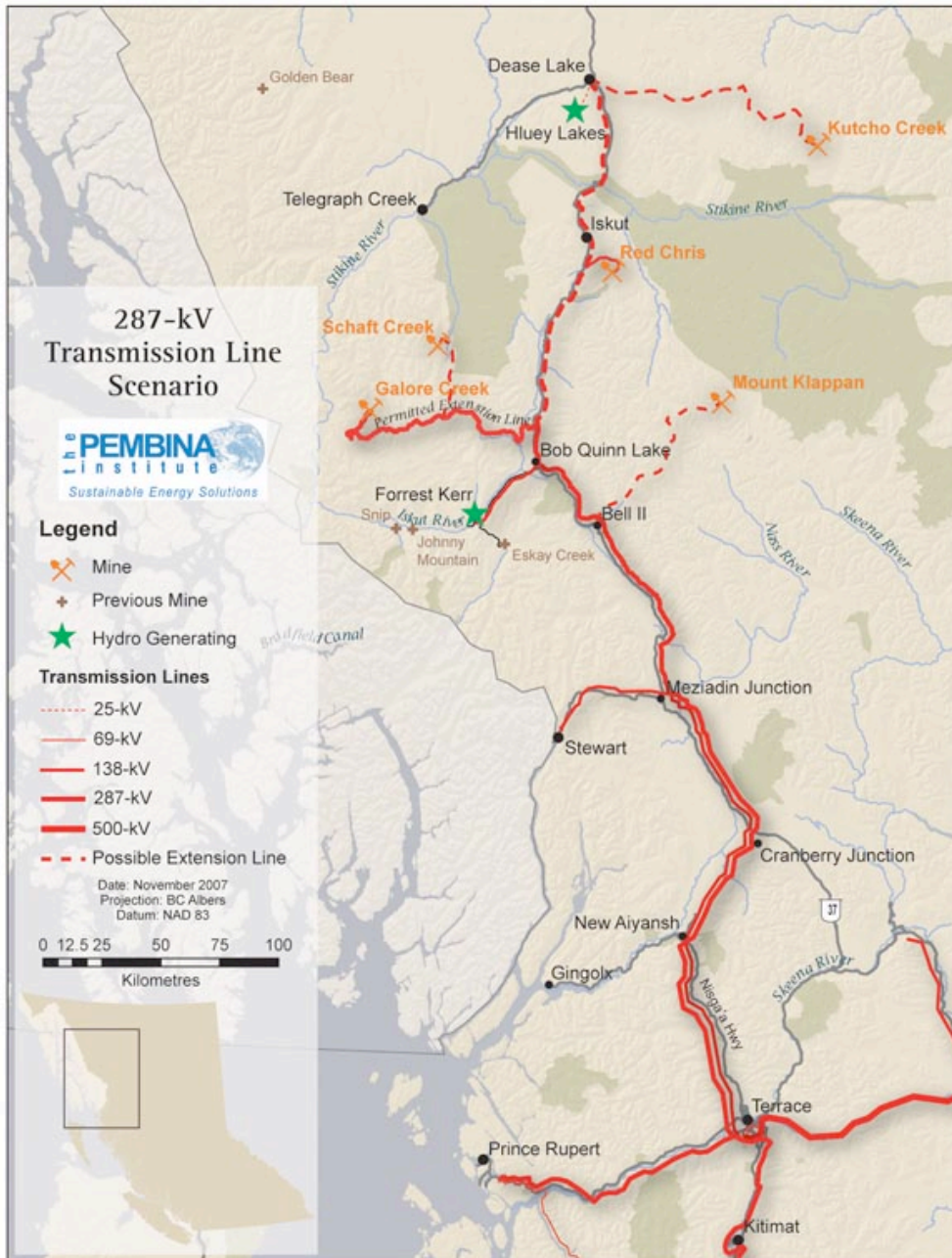
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<sup>21</sup> Office of the Premier, "New Transmission Line will boost northern B.C. economy," news release, October 1, 2007.

<sup>22</sup> The northern section would initially be energized at 138 kV. This would change to 287 kV once the southern section is completed.

<sup>23</sup> October 15, 2007 project update by NovaGold. <http://www.novagold.com/section.asp?pageid=5153>

<sup>24</sup> "Northern power line build idea still alive," *Terrace Standard*, December 12, 2007, [http://www.bclocalnews.com/bc\\_north/terracestandard/news/12300041.html](http://www.bclocalnews.com/bc_north/terracestandard/news/12300041.html) (accessed December 19, 2007).



**Figure 3: Proposed 287-kV Northwest Transmission Line.** This map approximates the power line infrastructure in the region if a 287-kV transmission line is extended north of Terrace. It includes the proposed extension to Galore Creek Mine, as well as potential extensions to the mining projects that are currently in the environmental assessment process.

### Energy Fairness in the North

An important consideration in energy planning is the province's historical, current and future rates of electricity. British Columbia's heritage hydroelectric assets provide some of the lowest electricity rates in North America. For example, in early 2007, the average rates in the province were \$36 per MWh for industrial customers, \$71.20 per MWh for small commercial, \$52 per MWh for large commercial and \$65.30 per MWh for residential customers.<sup>25</sup> Electricity consumption in British Columbia has increased, however, and new sources of energy have proven to be more costly. For example, the average production price for additional electricity in BC Hydro's 2006 call for power was \$74 per MWh.<sup>26</sup>

One large source of electricity in Northwest British Columbia is Rio Tinto Alcan's Kemano hydroelectric project, which was originally built to provide power to the Kitimat aluminum smelter. It has an average power capacity of 860 MW.<sup>27,28</sup> Since 1990, Alcan has been selling "surplus" electricity to BC Hydro while reducing aluminum production and related jobs. Alcan and BC Hydro have applied to the British Columbia Utilities Commission for a new contract that will average \$75 per MWh.<sup>29</sup> Alcan's power generation costs are nominal due to their historic agreements with the British Columbia government. The estimated cost of production for electricity sales, including water rentals, is less than \$10 per MWh.<sup>30</sup>

This discrepancy raises questions about fairness. If the province subsidizes industrial users with artificially low rates, who profits from the difference in the current value of electricity and the low cost of production at the sites that benefit from historical agreements? Ratepayers deserve to know how the Northwest Transmission Line would impact the cost of electricity in the province, and whether the industrial rates paid for electricity in British Columbia are fair.

<sup>25</sup> Based on February 2007 rates. Marvin Schaffer, Jennifer Hove and Jason Yamashita, *BC Hydro Electricity Rates: Impacts and Costs of Buying High and Selling Low*, (Vancouver, Canadian Office and Professional Employees Union Local 378, 2007), 3.

<sup>26</sup> Average plant gate price for large project under BC Hydro's 2006 open call for power. The adjusted bid prices for delivering power to the lower mainland was \$87.50. Source: BC Hydro, *Report on the F2006 Call for Tender Process*, August 31, 2006, 2.

<sup>27</sup> Rio Tinto, an international mining group, acquired Alcan Inc. on October 25, 2007 to form a subsidiary called Rio Tinto Alcan.

<sup>28</sup> British Columbia Hydro and Power Authority and Alcan Inc., *2007 Energy Purchase Agreement*, August 13, 2007.

<sup>29</sup> Price of firm (or guaranteed) power is \$80 per MWh. Price of non-firm (not guaranteed) power is \$54 per MWh. Prices indexed to consumer price index. The ratio of firm power to non-firm power changes over time. An average price of power is set at \$75 per MWh for discussion purposes. Source: BC Hydro, *British Columbia Hydro and Power Authority and Alcan Inc. 2007 Electricity Purchase Agreement*. (Vancouver: BC Hydro, 2007), Appendix 2.

<sup>30</sup> Production costs (running the power plant, maintenance and transmission) are about \$5.00 per MWh. In addition, there is the cost of water rent, which is \$5 per MW for electricity which is sold and \$0.05 per MWh for electricity which is used for smelting. The District of Kitimat uses the figure of \$10 per MWh for Alcan's estimated cost of production for export power. This figure is generally accepted by Alcan. Source: Trafford Hall, Municipal Manager, District of Kitimat, personal communication, November 7, 2007.





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# 4. Potential Impacts on the Region

A line the size of the proposed Northwest Transmission Line would have a number of significant impacts on the region. While increasing the power capacity of Northwest British Columbia, a 287-kV line would affect local communities; impact the region's water, land and wildlife; increase the pace and scale of future development in Northwest British Columbia; and interfere with the province's goals to increase green initiatives and reduce greenhouse gas pollution.

## 4.1 Power Capacity

In various government announcements, the Northwest Transmission Line has been justified, at least in part, as a way for communities to transition away from polluting diesel power.<sup>31-32</sup> In fact, however, with the northern terminus of the proposed line at Bob Quinn Lake, it would not be within reach of either of the two main communities in the region that depend on diesel power — Iskut and Telegraph Creek.<sup>33</sup>

The line would best cater to the needs of future mining operations in the region. A 287-kV line would carry up to 260 MW of power,<sup>34</sup> enough for the Galore Creek Mine and the other four major mining projects that are now seeking regulatory approval.

The Galore Creek, Schaft Creek, Red Chris, Mount Klappan and Kutcho Creek mines have all indicated that they would benefit from the power provided. Fortune Minerals has stated that the transmission line would help lower the company's production costs for its Mount Klappan project,<sup>35</sup> and Copper Fox, which is building the Schaft Creek Mine, has indicated that it would double its rate of production if the Northwest Transmission Line were in place.<sup>36</sup> No doubt, the line would substantially lower operating costs and increase the viability of these projects.

The issue of power capacity is a complex one, however. While the Northwest Transmission Line would dramatically increase the amount of power available in the region and meet the needs of these five mines, it could be expected also to prompt a dramatic increase in the level of new mine development. In doing so, it could lead to a significant increase in the region's demand for power.

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<sup>31</sup> Office of the Premier and Ministry of Energy, Mines and Petroleum Resources, *New Transmission Line Will Boost Northern B.C. Economy*, news release, October 1, 2007.

<sup>32</sup> Government of Canada, "Prime Minister Harper announces ecoTrust funding for B.C.," news release, March 13, 2007, <http://ecoaction.gc.ca/news-nouvelles/20070313-eng.cfm>.

<sup>33</sup> The third main source of diesel pollution in the region is the Eskay Creek Mine. Since it is scheduled to wind down operations in 2008, the proposed Northwest Transmission Line would not affect it.

<sup>34</sup> BCTC, *Northwest Area Power Options*, July 8, 2005.

<sup>35</sup> Scott Simpson, "Northern electricity deal a boon for mining," *Vancouver Sun*, October 3, 2007.

<sup>36</sup> See [http://www.copperfoxmetals.com/news/news\\_071011.htm](http://www.copperfoxmetals.com/news/news_071011.htm)

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## 4.2 Effects on Communities

Although the 287-kV Northwest Transmission Line proposal would not provide power to Iskut, Dease Lake or Telegraph Creek, it would significantly impact these communities and the region as a whole, primarily by spurring more mine development.

New mines bring additional jobs and income to communities. Work opportunities would be available in construction as well as mining operations. The Association of Mineral Exploration of British Columbia estimates that development of the five projects now in the regulatory approvals process could create 3,700 construction jobs and more than 2,000 other jobs in the region.<sup>37</sup> To meet this labour demand, the regional population would likely increase both temporarily during construction and over the long term.

The kinds of jobs created would vary by mine. For example, the Klappan coal mine would demand relatively unskilled labour because of the amount of earth removal involved in coal mining. The company estimates that 72% of its labour force would be employed in the preparation plant or in mine maintenance and operations.<sup>38</sup> Metals mines, on the other hand, have a much higher skill requirement, particularly once construction is complete. An independent analysis of the Red Chris mine site, for example, reveals that 15% of the workers would be unskilled (holding two to four years of secondary school and some on-the-job training, but no high school diploma or formal trades training). Contract labour opportunities would also be available for less skilled employees and could be expected to constitute 25–40% of the labour needs of each mine.<sup>39</sup>

The pace of development and potential for “boom-bust” cycles could have significant negative impacts on communities in the region, as they have in many other resource communities in Canada. An accelerated pace of development can create a number of social pressures:

- increased social problems, including increased access to drugs and alcohol;
- loss of connection with traditional cultural activities, whether through a reduction in the value placed on the activities or through the degradation of the natural environment because of increased development;
- an increase in transitional living arrangements whereby workers and families move to a region temporarily but do not settle;
- an increasing gap in smaller communities between the “haves” (miners and mining service suppliers, for example) and the “have-nots” (traditional harvesters, community-based workers, the unemployed and the elderly, for example); and
- strain on families from long-distance commuting (also called “Fly-In, Fly-Out” commuting), usually with a two-week in, two-week out schedule.<sup>40</sup> The Kutcho Creek mine has proposed

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<sup>37</sup> Association for Mineral Exploration British Columbia, “BC Mining Industry Applauds Power Grid Extension in Northwestern BC,” news release, October 1, 2007.

<sup>38</sup> Rescan Environmental Services Ltd. and Fortune Coal Limited. “Mount Klappan Coal Project: Project Description,” prepared for the BC Environmental Assessment Office, (2004), 5–1.

<sup>39</sup> Internal research prepared for The Pembina Institute by Ginger Gibson, October 2007.

<sup>40</sup> Ibid.

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a three-week on and eight-day off schedule, which has been demonstrated elsewhere to be difficult and ultimately unsustainable for many families.<sup>41</sup>

Increased mining activity would also mean much more truck traffic on Highway 37. If all five mines began operating at the same time, the cumulative truck traffic on Highway 37 to the Port of Stewart is estimated at 640 trucks per day.<sup>42</sup> At that rate, one truck would pass Meziadin Junction every three minutes. Combined with existing logging truck traffic, this increase would compromise the safety of other drivers and strain the Highway 37 infrastructure.

### **4.3 Effects on Water, Land and Wildlife**

A line the size of the proposed Northwest Transmission Line would significantly impact the water, land and wildlife of Northwestern British Columbia. Before undertaking any project of this magnitude, the province would be well-advised to undertake a comprehensive cumulative impact assessment. Such an assessment could not only determine how extensive the direct and indirect environmental impacts would be; it would also recommend how best to manage and mitigate those impacts.

#### **4.3.1 Direct Impacts**

The direct impacts of the proposed Northwest Transmission Line would result from land clearing, stream crossings and increased hunting. These actions would have the potential to affect a variety of wildlife, including fish and birds, as well as large mammals such as grizzly bears, black bears and caribou. For example, unless carefully addressed, stream crossings could significantly damage fish habitat. Likewise, land clearing for hundreds of kilometres of rights-of-way could disturb the balance of predator-prey relationships.<sup>43</sup> Land clearing would further affect wildlife by increasing human access to the land for hunting.

#### **4.3.2 Indirect Impacts**

The indirect impacts of the proposed Northwest Transmission Line could be expected to pose more of a threat to the region than the direct impacts. The line would set a fast pace and a broad scope for industrial development in the region. Northwest British Columbia would see more mine development not only over the long term, but also in the short term.

More mines would mean more land disturbance, more roads and more potential for damage to the region's water, land and wildlife. To accurately and adequately assess potential

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<sup>41</sup> Ibid.

<sup>42</sup> Mount Klappan Coal = 100 trucks. Source: Fortune Minerals Limited, "Mount Klappan Anthracite Coal Project" (presentation at Minerals North 2007, Terrace British Columbia, April 18, 2007). Galore Creek = 70 trucks. Source: Environmental Assessment Office, Transport Canada, Fisheries and Oceans Canada, Natural Resources Canada, Environment Canada, Galore Creek Copper-Gold-Silver Project: Assessment Report/Comprehensive Study Report, February 2007, 52. Schaft Creek = 75 trucks. Estimated using the ratio of truck per day versus rate production of production for Galore Creek. Schaft Creek rate of production (70,000 tpd) taken from EA project description. Red Chris = 14 trucks. Source: Environmental Assessment Office, Red Chris Porphyry Copper-Gold Project Assessment Report, July 2005, 80. Kutcho Creek = 10 trucks. Source: Knight Piesold Ltd., *Western Keltic Mines Inc. Kutcho Creek — Project Description Report*, July 2006, 11.

<sup>43</sup> This is common where seismic lines, another form of straight land clearing, are cut.

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environmental changes to the region, mining impacts would need to be viewed cumulatively, with an eye to future development, and not simply on a case-by-case basis.

Of all of the potential indirect impacts, mining-related environmental impacts could be expected to be the most detrimental. The environmental impacts of mines can include

- sediment from roads and on-site mining activity;
- spills of fuels and process chemicals; and
- acid mine drainage from waste rock, mine workings, construction materials and tailings impoundments, which can extend hundreds of years beyond the life of the mine.<sup>44</sup>

Even when the environmental impacts of mining are mitigated with careful planning, it can leave a toxic legacy.

#### **Mining Leaves a Toxic Legacy**

Even when mining is done to the best standards and practices, its significant impact on the land remains long after the mine is gone. The Galore Creek Mine, for example, would require the construction of a 140-kilometre road into a wilderness area with approximately 600 stream crossings. The mine would create more than one billion tonnes of waste rock — and 50% of it would have the potential to generate acid mine drainage.

The mine would also produce an estimated 476 million tonnes of toxic tailings — enough to require a 2.6-by-1.5-kilometre tailings pond that would need a 275-metre high dam. It is expected that the waste tailings produced by this mine alone could fill 140,000 Olympic-sized swimming pools.<sup>45</sup>

If a number of mines were developed across Northwest British Columbia, acid mine drainage would likely present the largest potential liability to the region. Mine drainage has been identified as a potential environmental concern for all five of the currently proposed mines.

While assessments, predictions and mitigation strategies are now required of all new mining developments in British Columbia, the province still has limited experience with most aspects of prediction and prevention. Most of the key properties for determining and mitigating mine drainage can change over time,<sup>46</sup> making the prediction and management of mine drainage particularly complex and risky, with serious long-term consequences.

## **4.4 Green Power Development**

The proposed Northwest Transmission Line could be expected to act as a disincentive to the development of green power sources in the region. The Government of British Columbia has announced, as part of its Energy Plan, the goal of energy self-sufficiency for the province by

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<sup>44</sup> See, for example, EAGLE, *Beneath the Surface: Aboriginal Rights and Mining Law in British Columbia*, 2001, Environmental Aboriginal Guardianship Through Law and Education, which contains a comprehensive overview of environmental issues in relation to mining.

<sup>45</sup> Environmental Assessment Office, Transport Canada, Fisheries and Oceans Canada, Natural Resources Canada, Environment Canada, *Galore Creek Copper-Gold-Silver Project — Assessment Report/Comprehensive Study Report*, February 2007.

<sup>46</sup> Bill Price, *MEND Report 9.1, Case Studies of Metal Leaching / ARD Assessment and Mitigation in British Columbia*, (Natural Resource Canada, August 2007), preface.

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2016. To achieve this goal, the province needs to pursue new sources of responsible, clean, lower-impact electricity.

NovaGold has already raised doubts about whether it would proceed with its approved green power project — the Forrest Kerr Hydro Project — if the Northwest Transmission Line is constructed. The Forrest Kerr Hydro Project could provide clean, local power to the Galore Creek Mine. If the Northwest Transmission Line is constructed, however, the region would likely fail to pursue any number of similar opportunities to meet its increasing power demands.

Furthering responsible green power development opportunities in the region could help create local energy self-sufficiency, from which communities and industries would benefit.

## 4.5 Greenhouse Gas Pollution

Because the proposed 287-kV Northwest Transmission Line would likely discourage green power development while drawing greater mining activity to the region, the line would not serve the province's goal to reduce greenhouse gas pollution. The government of British Columbia has committed to an aggressive target of reducing its current greenhouse pollution by 33% by 2020.

In a number of government announcements, the Northwest Transmission Line has been justified as a way to help communities transition away from polluting diesel power, thereby contributing to a reduction in greenhouse gas emissions in the region.<sup>47-48</sup> This statement is problematic for two primary reasons. First, neither of the two main communities in the region that depends on diesel power — namely, Iskut and Telegraph Creek — is within reach of the proposed Northwest Transmission Line. Consequently, the line would not replace their current power supply. The third main source of diesel pollution in the region — the Eskay Creek Mine — also would not benefit from the line since the mine is scheduled to wind down operations in 2008.

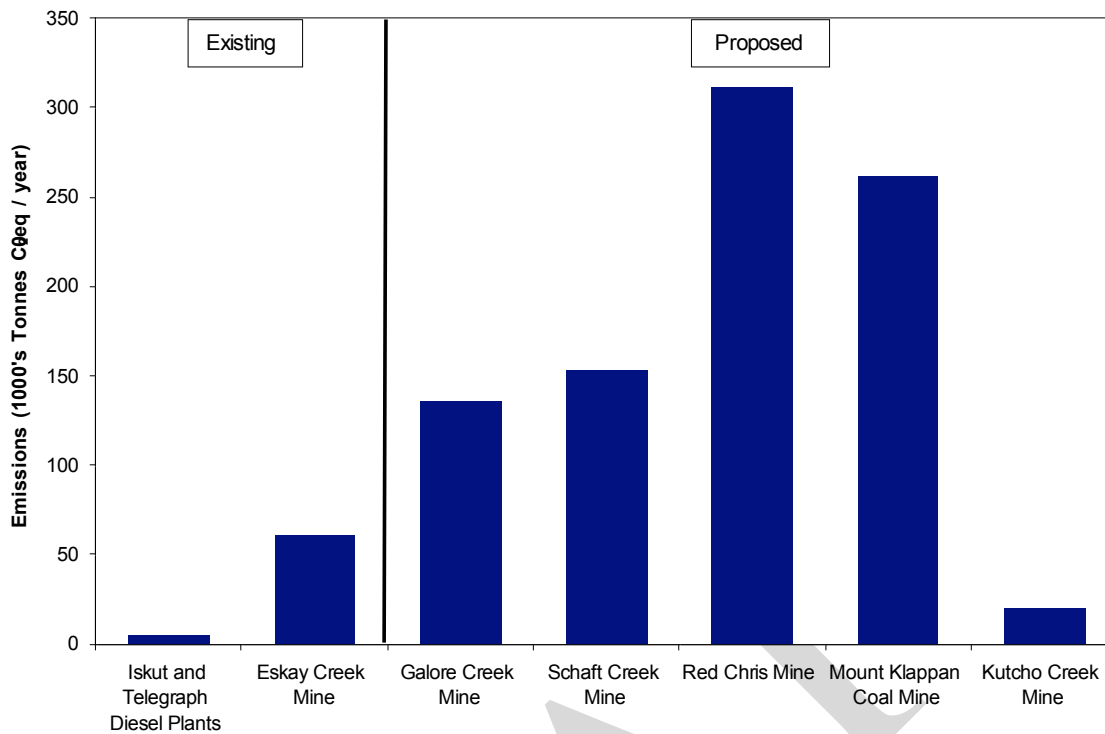
Second, by opening up the region to increased mining activity, the completion of the proposed Northwest Transmission Line would result in a significant *increase* in industrial emissions of greenhouse gases in the region.

Figure 4 illustrates the greenhouse gas pollution of current and proposed mining developments in Northwest British Columbia. Iskut, Telegraph Creek and the Eskay Creek mine now collectively generate approximately 70,000 tonnes of greenhouse gas pollution per year. With the development of the five proposed mines, the region's annual greenhouse gas pollution would increase 12-fold — to an estimated 890,000 tonnes.

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<sup>47</sup> Office of the Premier and Ministry of Energy, Mines and Petroleum Resources, *New Transmission Line Will Boost Northern B.C. Economy*, news release, October 1, 2007.

<sup>48</sup> Government of Canada, "Prime Minister Harper announces ecoTrust funding for B.C.," news release, March 13, 2007, <http://ecoaction.gc.ca/news-nouvelles/20070313-eng.cfm>.



**Figure 4: Greenhouse gas emissions from selected exiting and proposed sites in the region. Emissions from mines include both transportation of supplies to the site and concentrate from the mine site to Port of Stewart.**

Because a 287-kV transmission line would facilitate the rapid development of additional mines, regional greenhouse gas emissions in the region could soar, increasing British Columbia's already significant challenge of meeting its greenhouse gas reduction target by 2020.

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### **EcoTrust or EcoBust?**

Some have questioned where the government's \$240-million commitment for the proposed Northwest Transmission Line would come from.

In February of this year, the federal government unveiled its ecoTrust Program, setting aside \$1.5 billion to support provincial projects designed to reduce greenhouse gas emissions.<sup>49</sup> One month later, Prime Minister Stephen Harper announced that \$199.3 million of the ecoTrust funding would be used for several projects in British Columbia, including "providing clean electricity to remote rural areas now fueled by dirty diesel, such as electrification of Highway 37."<sup>50</sup>

Since the proposed Northwest Transmission Line would not reach the remote communities that currently rely on diesel, and because it would encourage rapid industrial development in the region, the power line would contribute to a substantial *increase*, not decrease, in the province's greenhouse gas pollution.

The government of British Columbia has not confirmed whether the Northwest Transmission Line, if it were to be developed, would rely on federal funding. If it is, however, serious questions need to be answered about accountability for federal spending, as this use of funds would contradict its intended outcome.

There are also significant accountability issues around the ecoTrust Program overall. Its guidelines include no measurement mechanisms and do not oblige provincial governments to follow through with earmarked projects; nor do they require provinces to report back to the federal government or to taxpayers.

Any change to the power of the region would impact First Nations communities. Given the far-reaching and long-term implications of developing the region's power, the government of British Columbia needs to consult and accommodate these communities in particular:

- Tahltan First Nation (Telegraph Creek Band)
- Tahltan Central Council
- Iskut First Nation
- Kitselas First Nation
- Kitsumkalum First Nation
- Lax Kw'alaams First Nation
- Metlakatla First Nation
- Gitxsan Nation
- Skii km Lax Ha (former House of Gitxsan)
- Nisga'a Lisims Government
- Gitanyow First Nation (Specific Houses: Wii Litsxw, Malii/Axwindesxw, Gamlakyeltxw and Watakhayetsxw)

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<sup>49</sup> See <http://www.ecoaction.gc.ca/news-nouvelles/20070212-eng.cfm>

<sup>50</sup> Government of Canada, "Prime Minister Harper announces ecoTrust funding for B.C.," news release, March 13, 2007, <http://ecoaction.gc.ca/news-nouvelles/20070313-eng.cfm>

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- Haisla First Nation.<sup>51</sup>

Significantly, the proposed 287-kV Northwest Transmission Line, discussed subsequent sections of this report, would overlap with two Land and Resource Management Plans.<sup>52</sup> It would fall within the Kitimat-Stikine Regional District, which provides local government services to the area such as rural land-use planning.<sup>53</sup>

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<sup>51</sup> With some additions, this list is compiled from the British Columbia Transmission Corporation (BCTC), *Northern Transmission Line (NTL) Project: Terrace to Bob Quinn Lake: Project Description* (Vancouver, British Columbia: BCTC, 2007), 5-2. Note that one of the proposed mining projects — the Kutcho Creek mine — is located further north on land that is identified by the Kaska Dena Council as their traditional territory.

<sup>52</sup> Kalum South LRMP encompasses the area from Terrace north to the lower Nass Valley. The Cassiar-Iskut Stikine LRMP covers the northernmost portions of the corridor within the Iskut River drainage. The central portion of the route has not been subject to strategic land-use planning.

<sup>53</sup> See <http://www.rdks.bc.ca/about.php> for more information.



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# Alternative Solutions for the Region

Given the likely impacts of the proposed 287-kV Northwest Transmission Line, the province needs to take the current suspension of the line's development as an opportunity to look at alternatives for the region. A thorough analysis of other solutions is essential before any project proceeds.

Northwest British Columbia could meet its growing power needs in ways that better serve its communities, water, land and wildlife. With the decisions it makes about power today, the province can set a manageable pace and scale for industrial development in the region in years to come.

A lower voltage power line and/or a regional power grid could enable regional economic development and future mining projects, but on a smaller scale and more manageable pace than the Northwest Transmission Line.

## 4.6 A 138-kV Transmission Line

Before the province announced its plans to build the 287-kV Northwest Transmission Line, the Galore Creek Mine intended to meet its electricity needs through a combination of a smaller 138-kV transmission line between Meziadin Junction and Bob Quinn Lake and the Forrest Kerr Hydro Project. The line, which would connect to the existing 138-kV line at Meziadin Junction, was proposed and did receive provincial approval.<sup>54</sup>

The Forrest Kerr Run-of-River Hydro Project could provide approximately 80% of the annual energy needs of a mine the size of Galore Creek — which uses, on average, 80 MW of power. As a low-impact renewable solution, the Forrest Kerr Hydro Project would qualify as a green power project under BC Hydro's Green Power Initiative.<sup>55</sup>

When output from the run-of-river project was low, the proposed 138-kV line could meet the mine's power demand.<sup>56</sup> A 138-kV line alone could carry sufficient power for a mine the size of Galore Creek, but with the addition of regional sources of power (such as

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<sup>54</sup> The Galore Creek Mine would connect to a substation at Bob Quinn Lake and tie into the 138-kV line that was part of the Forrest Kerr Hydro Project. See <http://www.novagold.com/section.asp?catid=1294>

<sup>55</sup> The project was originally developed by Coast Mountain Hydro Corporation. It received a British Columbia environmental assessment certificate in 2003, and the original certificate has been amended three times. The first amendment, in August 2003, allowed a change in the rated capacity for the power plant (from 100 MW to 112 MW). The second, in July 2004, allowed for an overhead transmission line (rather than a buried line) from the project site to the junction of the Eskay Creek Mine Road and Highway 37 and to change the line from direct current to alternating current. The third, in August 2006, allowed divergences away from the highway right-of-way for a total of 20 kilometres. See Coast Mountain Hydro Corporation, *Forrest Kerr Hydroelectric Project — Draft Transmission Line Divergence Impact Assessment*, (Vancouver, BC: CMHC, January 20), 1.

<sup>56</sup> Max power flow of the 138-kV line is 110 MW (BCTC, *North West Area Transmission Options*, July 8, 2005, 3).

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Forrest Kerr), the line would need to carry much less power from the main BC Hydro grid, and line losses would be significantly reduced. Without Forrest Kerr, line losses would be estimated at 25%.<sup>57</sup>

As the proposal and approval of the 138-kV line between Meziadin Junction and Bob Quinn Lake make clear, it is possible to provide power to a major mine without a 287-kV transmission line. Low-impact renewable run-of-river opportunities can be connected with a smaller grid connection to provide increased access to electricity in the region.

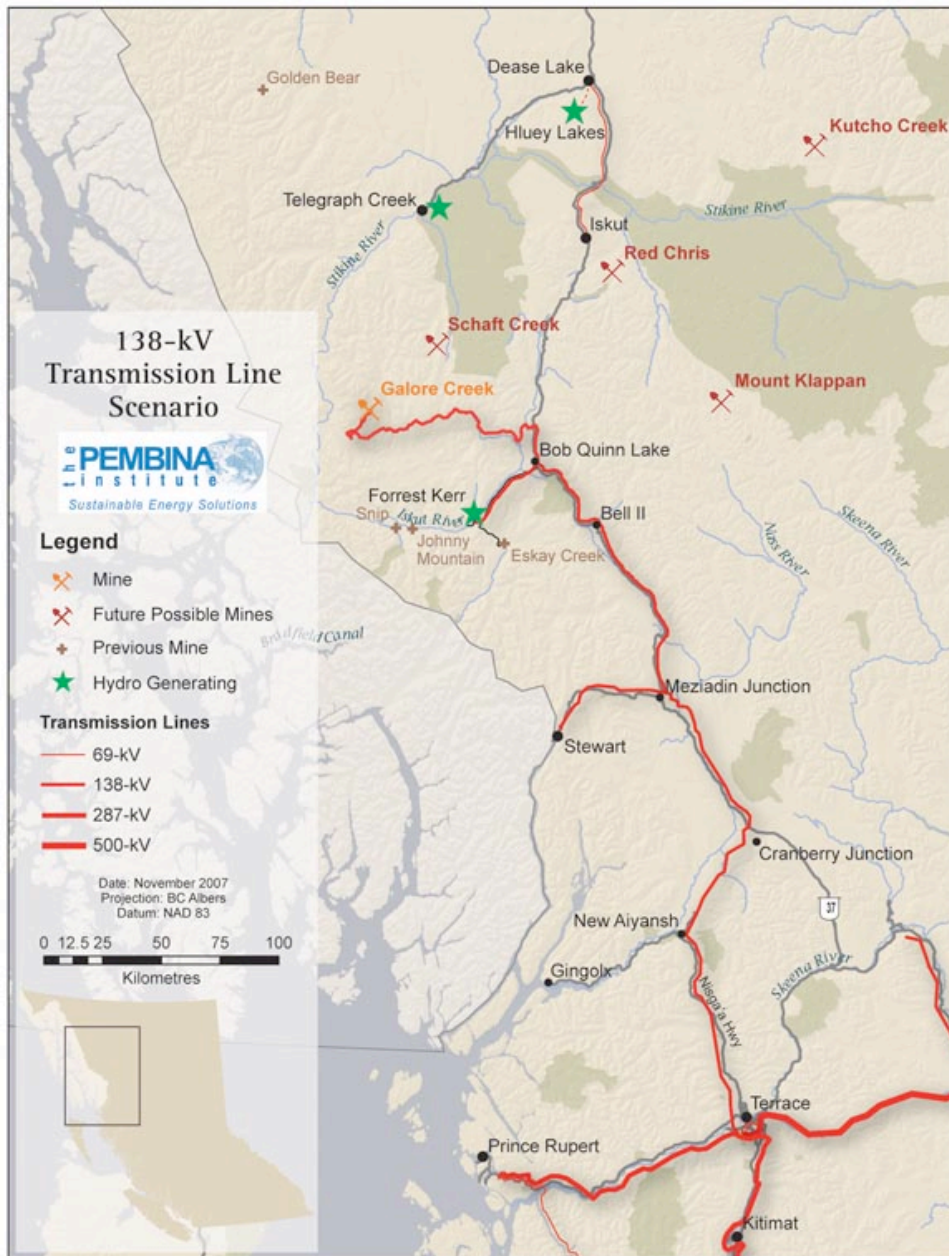
Since the 138-kV line would tie into the existing 138-kV line at Meziadin Junction, no additional transmission line construction would be required south of Meziadin Junction towards Terrace. The existing 138-kV line runs from Terrace to Meziadin Junction and then west to Stewart.

Figure 5 illustrates both the existing 138-kV line and the proposed 138-kV line. It also illustrates the Forrest Kerr Hydro Project. Additional sources of energy could be added as future industrial developments proceed in the region.

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<sup>57</sup> BCTC, *Forrest Kerr Northern Mine Stage 1 Feasibility Study Report*, June 15, 2006.

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**Figure 5: A new 138-kV transmission line and energy infrastructure in Northwest British Columbia. In this scenario, a large mine, such as the Galore Creek Mine, and the Forrest Kerr Hydro Project are developed. Regional sources are developed and expanded to meet the needs of the communities. Other mining projects could be developed with other regional power sources or in a staged sequence.**

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North of Meziadin Junction, the new line would be installed along the existing highway right-of-way for most of the 135-kilometre distance to Bob Quinn Lake, with some divergences away from the highway corridor that would require additional clearing of an area about 30 metres wide.<sup>58</sup>

Because the proposed 287-kV Northwest Transmission Line would be 200 kilometres longer than the 138-kV line and require more new rights-of-way beyond the existing highway corridor, it would impact more than 30 times the area of the smaller 138-kV line.<sup>59</sup>

While having substantially fewer direct impacts on the region than the proposed 287-kV line, a new 138-kV line would also result in a fewer indirect impacts because it would encourage a more moderate scale of development in the region. Also, with the proposed 138-kV line, the diesel communities of Telegraph Creek and Iskut could access reliable electricity in a variety of ways.

## 4.7 A Regional Power System of Green Power Opportunities

Regional sources of electricity, such as hydro and wind power, offer another lower impact way to increase power to the region.<sup>60</sup> The development of regional power can build greater self-sufficiency within a region and result in more efficient and sustainable power practices. Renewable power supplies would be developed in the vicinities in which they are needed — to power a community, a small commercial operation, or a large mining development.

Northwest British Columbia is rich in hydropower resources that range in size from small micro hydro to larger run-of-river projects such as the Forrest Kerr Hydro Project. A province-wide study completed for BC Hydro Resources identified a number of resources in the 0.5–47 MW power capacity range.<sup>61</sup> Larger resources in the region were considered in more detail in the 2005 Tahltan Territory Transmission Report.<sup>62</sup>

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<sup>58</sup> Environmental Assessment Office, *Summary of the Review of Coast Mountain Hydro Corp's Request for Amendment #3 to Environmental Review Assessment Certificate E03-01 for the Forrest Kerr Hydroelectric Project*.

<sup>59</sup> The NTL will require an additional right of way of 33–80 metres between Terrace and Meziadin Junction and a new right-of-way approximately 80 metres wide north of Meziadin Junction. Source: BCTC, "Potential Northern Transmission Line — What would NTL look like?," story boards at open house, May 31, 2007. Available at <http://www.bctc.com>. The 138-kV line would rely almost exclusively on existing right of ways. Source: Coast Mountain Hydro Corporation, *Forrest Kerr Hydroelectric Project — Draft Transmission Line Divergence Impact Assessment*, (Vancouver, British Columbia: CMHC, January 20), 1.

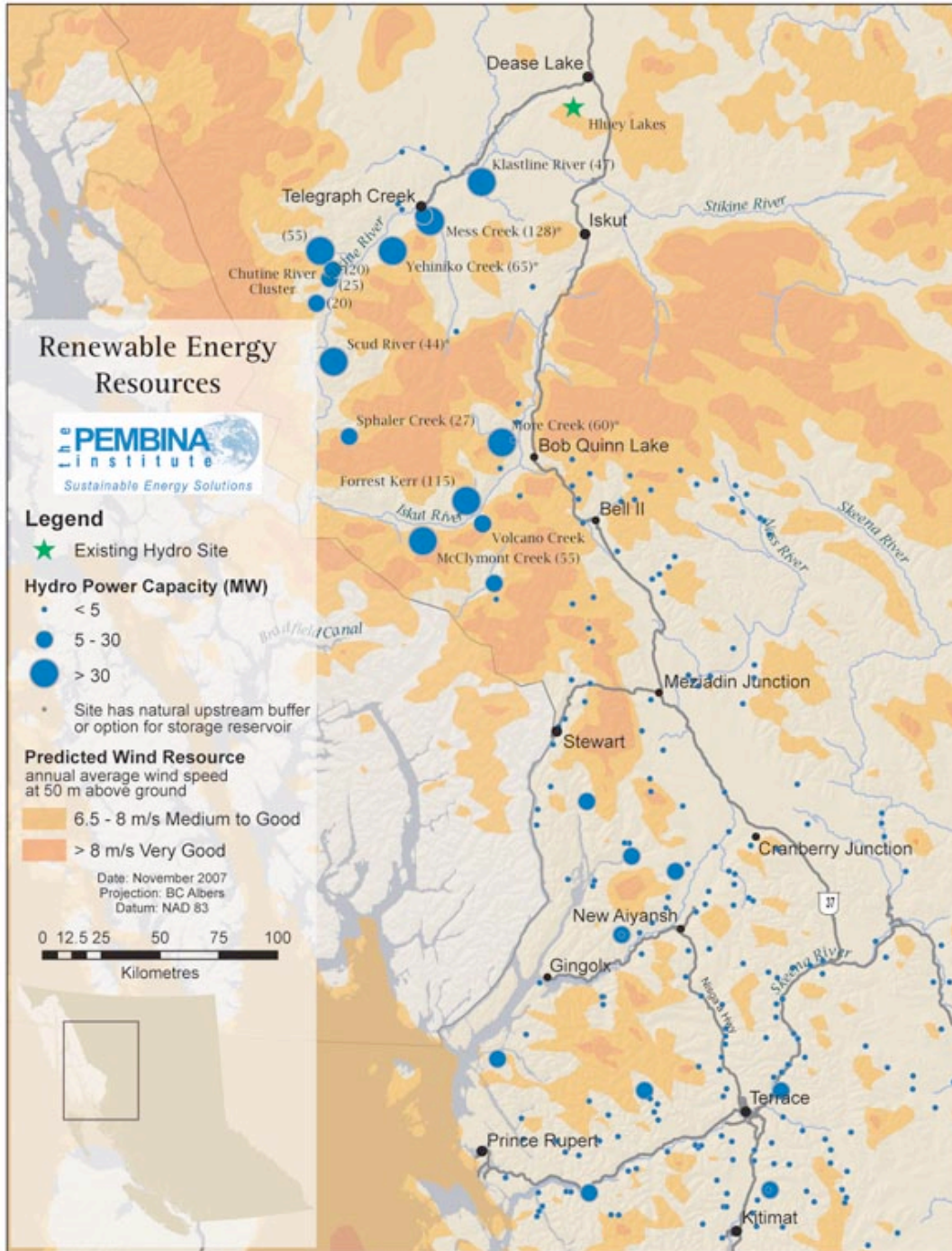
<sup>60</sup> This review does not address the complex issues around siting, licensing, assessing, monitoring and impacts of run of river projects, which would need to be factored into further discussion of renewable energy opportunities in the region.

<sup>61</sup> Sigma Engineering Ltd., *Green Energy Study for British Columbia – Phase 2 Mainland, Small Hydro – Prepared for BC Hydro*, (Vancouver, Sigma Engineering Ltd, 2002).

<sup>62</sup> Tahltan Central Council, *Tahltan Territory Transmission Report*, November 2005.

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Figure 6 includes a selection of these hydro resources and also indicates the wind power resources in the region.



**Figure 6: Overview of some of the hydro and wind resources in Northwest British Columbia. There is significant overlap between the location of potential energy sources**

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**and present and future demand from existing communities and proposed mining development.**

Residential communities and light commercial or industrial sites could develop local renewable energy sources. Telegraph Creek, for example, could pursue small hydro opportunities. In Iskut, options include building a smaller transmission line near Dease Lake and creating a small regional grid powered by an expansion of the Hluey Lake Project to 6 MW,<sup>63</sup> or investigating a local hybrid wind/diesel system.



**Photo: Power house for the Hluey Lake hydro project. The Hluey Lake hydro project, with a peak power capacity of 3 MW, currently provides year-round electricity to the community of Dease Lake. A second turbine could be added to expand its capacity to 6 MW.**

#### **Homegrown Power for the North**

In the northern, off-grid community of Atlin, British Columbia, BC Hydro partnered with the Taku River Tlingit First Nation to complete a community energy plan. The Taku Land Corporation is now constructing a 2 MW run-of-river hydroelectric project that will generate local economic benefits and provide clean power for the community.

For larger users, such as mines in the lower Iskut/Stikine region, there are potential sources of energy available from hydro sites that have natural storage capacity or have the potential to develop storage reservoirs.<sup>64</sup> A large mine could obtain power from one or more regional hydro projects. Wind energy would also be a viable option for some sites.

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<sup>63</sup> The Hluey Lake project has the water capacity and existing storage system infrastructure to expand from 3MW to 6 MW of firm capacity. The poles currently supporting the 25-kV overhead line between the powerhouse and Dease Lake were built to support a 69-kV line. CANMET Energy Technology Centre, “Real Project 03, Small Hydro Project, Remote Community / British Columbia, Canada,” case study (Natural Resources Canada, 2001–2004).

<sup>64</sup> From the projects identified in the region, there is more than 600 MW of peak power production including 333 MW of potential that has natural upstream storage or the option for a storage reservoir. More work is required to determine the technical feasibility of these projects and the potential effects on aquatic ecosystems.

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With the development of a regional power grid, users could be connected with power sources to optimize costs and reliability. Such a system of regional power development could result in a much smaller overall and cumulative impact on the landscape than a 287-kV power line.

### **Minimizing Line Loss**

One advantage of a regional supply of electricity is that when demand is closer to the supply, line loss is reduced. As electricity travels over distance, a portion of its energy is transformed into heat, and the longer the distance, the more electricity is “lost” to heat.

Line losses can be reduced by locating the source of the energy closer to the end use or by increasing the voltage of a line. Even on a 287-kV line, however, multiple mining developments could be expected to result in line losses.

The sites with hydro potential that are run-of-river have a reduced capacity factor, which means they are unable to produce peak power output every month of the year. The proposed Forrest Kerr Hydro Project, for example, could generate 115 MW of peak power during high water flows. Without storage capacity, however, its output would be constrained by water levels in the Iskut River. At times of greatly reduced flow, its power generation could be as low as 15 MW.<sup>65</sup>

To meet peak power demand, run-of-river projects benefit from a connection to the grid. Hydro sites with storage capacity, such as the Hluey Lake Generating Station, do not need to be connected: they can satisfy peak power demand all year round.

In addition to hydropower opportunities, computer modeling completed for BC Hydro in 2000<sup>66</sup> and Environment Canada in 2003<sup>67</sup> indicates that the Iskut/Stikine region contains promising wind resources. Since wind generation is subject to fluctuations throughout a daily cycle, hybrid power supply systems could be developed to combine wind with hydro sites that have storage capacity. Wind could also be paired with diesel generators.

### **What Does Self-Sufficiency Through Regional Power Look Like?**

A regional power solution would not require a grid connection down Highway 37 to Meziadin Junction. Telegraph Creek could develop a hydro project from one of the several sources nearby. Iskut could either connect with Dease Lake or be powered by a wind/diesel hybrid system.

Other regional sources of renewable energy have been identified for Northwest British Columbia, such as solar for individual homeowners and geothermal and biomass at a

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<sup>65</sup> When the project was first scoped at 100 MW, the capacity factor was estimated to be 72% (i.e., the annual average plant generation in megawatt hours (633,000 MWh): the equivalent to 72% of that possible if the plant operated continuously for the full year at rated nameplate capacity (i.e., 72% x 100 MW x 8760 hours in a year).

<sup>66</sup> TrueWind Solutions, *British Columbia Predicted Wind Speed Map*, prepared for BC Hydro, 2000.

<sup>67</sup> Go to <http://www.windatlas.ca> to view maps of the regions with estimates of wind energy potential.

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larger community or industrial scale.<sup>68</sup> Further work is needed to explore the potential for these renewable energy sources in the region.

Like a lower voltage power line, a regional energy solution would provide opportunities for more sustainable development and for local ownership of renewable energy systems.

A 138-kV line and/or a regional power system would not promote the immediate proliferation of mines. By encouraging a more moderate pace of development, they would allow communities to grow with and manage changes in the region. The potential for some negative community impacts would remain, but they would be minimized.

If well-planned, a 138-kV line and/or a regional power system could also be expected to be considerably less harmful for the environment, less costly for taxpayers, and more in line with the province's goals to increase green power initiatives and to reduce greenhouse gas pollution.

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<sup>68</sup> BC Hydro and Lou Skoda, Canadian Cartographics Ltd., *Green Electricity Resources of British Columbia*, Map, (Canadian Cartographics Ltd. and BC Hydro Power Authority, 2002).

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# 5. Summary of Considerations

This preliminary analysis suggests that, given the significant potential impacts of the proposed 287-kV Northwest Transmission Line, Northwest British Columbia would be better served by a 138-kV line and/or a regional power system with a number of green power initiatives.

Sizing up the energy needs and demands of a region is a complicated task. Any evaluation of the future power needs and capacity of Northwest British Columbia must include a consideration of the interests of local residents and regional businesses as well as the region's water, land and wildlife. Since decisions about how to power Northwest British Columbia today will play a key role in determining the pace and scope of resource development in the region in years to come, it is time to ask, *How much development can or should the region sustain while ensuring that the interests of those who reside in the region, along with fish and wildlife habitat, are protected?*

The government of British Columbia needs to re-evaluate the planning and permitting associated with the proposed 287-kV Northwest Transmission Line. Table 1 outlines its impacts alongside those of a 138-kV line and a regional power system and a 138-kV line. Now is the time to find a better solution for powering Northwest British Columbia.

**Table 1: Sizing up highway 37.**

<b>Solution</b>	<b>Northwest Transmission Line (287-kV)</b>	<b>138-kV Line (built with Forrest Kerr Run-of-River Hydro Project)</b>	<b>Self-sufficiency through reliance on regional sources</b>
<b>Power Capacity</b>	Sufficient to power at least five major mines, potentially more.  Regional energy projects could tie into line.	Sufficient power for one major mine, such as the Galore Creek Mine.  Would require regional energy projects for additional power.	Sufficient potential to meet current industry and community needs.  Responsibility for additional power needs borne by mining industry.
<b>Effects on communities</b>	If all five mines were to become operational, there would be an estimated 3,700 construction jobs and over 2,000 mine operation jobs.  Community access to power grid unlikely in the near future.  Rapid mine development in the short term could bring a number of social challenges to	A mine the size of Galore Creek could provide about 500 positions. Over time, more jobs could be created through additional mines and local power projects.  Communities of Iskut and Telegraph Creek will not get access to grid power in the near future.  Communities could still develop local power sources.	Would provide local jobs in local power generation, as well as providing jobs where mines are developed on a pace and scale consistent with local supply.  Communities of Iskut and Telegraph Creek could develop local power sources over time, including potential for community-owned power resources.  Mining developments

	communities.	Mining developments could proceed, but at a more manageable pace.	could proceed at a slower pace, allowing for advanced planning to minimize social and other impacts.  Potential for community pride when renewable energy sources in region are locally owned.
<b>Effects on Water, Land and Wildlife</b>	<p>More than 300 kilometres of additional right-of-way from Terrace to Bob Quinn Lake would be cleared, opening new access corridors for hunting and recreation.</p> <p>Would impact thirty times the area of a 138-kV line.</p> <p>Potential cumulative environmental impacts from five mines would be significant and long-term, affecting four major watersheds.</p>	<p>Approximately 20 kilometres of right-of-way north of Meziadin Junction would be cleared.</p> <p>No transmission line construction required south of Meziadin Junction.</p> <p>Mine activity would proceed at a more measured pace, reducing the intensity of impact, at least in the short term.</p> <p>Improved opportunity for long-term planning for development in the region.</p>	<p>Impact on rivers, if not developed to best standards.</p> <p>Mine activity would proceed at a more measured pace, reducing the intensity of impact, at least in the short term.</p> <p>Improved opportunity for long-term planning for development in the region, including regional renewable power.</p>
<b>Green Power Development</b>	<p>Line would likely reduce the incentive for green power initiatives.</p> <p>Line works against the provincial goal of energy self-sufficiency.</p>	<p>Some green power development would likely occur to meet regional needs and supplement the transmission line.</p> <p>Some progress toward the provincial goal energy self-sufficiency.</p>	<p>Green power development would be critical for the local development of mines.</p> <p>Provincial goal of energy self-sufficiency would be advanced by the region.</p>
<b>Greenhouse Gas Impacts</b>	<p>With the increase in industrial activity, regional greenhouse gas pollution would increase dramatically. The development of five currently proposed mines would generate a 12-fold increase in the region's emissions.</p> <p>Compromises the province's ability to meet its greenhouse gas reduction target.</p>	<p>Greenhouse gas emission would increase at a more measured pace in the short term.</p> <p>Opportunity for local communities to switch from diesel power could be facilitated by renewable power development.</p> <p>With proper planning, does not compromise the province's ability to meet its greenhouse gas reduction target.</p>	<p>Greenhouse gas emission would increase at a more measured pace in the short term.</p> <p>Opportunity for local communities to switch from diesel power could be facilitated by renewable power development.</p> <p>With proper planning, supports the province's ability to meet its greenhouse gas reduction target.</p>

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