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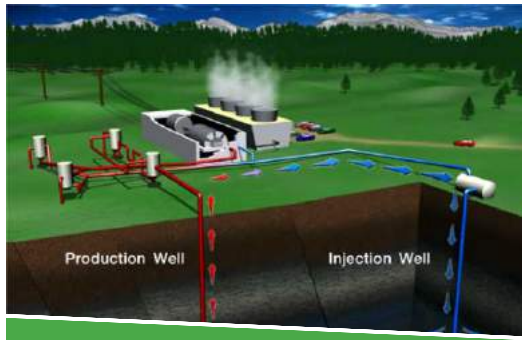

Final Report

An Assessment of the Economic Viability of Selected Geothermal Resources in British Columbia

Geoscience BC Report 2015-11

June 29, 2015
KWL File No. 2692.004-300

Submitted by:

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GeothermEx
A Schlumberger Company

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Project No.
2692-004

Date
April 30, 2015

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Kilometers

Potential Geothermal Resources

Figure 1

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Appendix B

Canoe Creek – Valemount Geothermal Development Decision Matrix and Figures 2 & 3

CANOE CREEK - VALEMOUNT

Near Valemount, British Columbia, Canada
Topographical Map Sheet: Figure 2
Geological Map Sheet: Figure 3

Category		Comments
A.	**Reservoir Potential**	
	Size/Potential/Type	• **Reservoir size:** N/A (no area or depth defined in literature) - therefore, reservoir volume estimated* at: 2.2 km^3 (most-likely area: 2 km^2; most-likely thickness: 1.1 km) (*Reservoir assumptions made using Appendix III in GeothermEx, 2004) • **Potential:** 15 MW (Gutierrez-Negrin, 2014) • **Type:** binary or flash (Ghomshei, 2010)
	Temperature/Water and Gas Chemistry/Mineral Indicators	**Surface features:** • Separate series of thermal features along banks of Canoe River ~20 km to the south of Canoe River Hot Springs, including high-temperature hot springs and mud pools (submerged since drowned by dam construction - 1973) (Ghomshei et al., 2009) • Canoe H.S.: 70-80°C (Ghomshei, 2010) • Canoe River hot springs: 57-60°C (Souther, 1975) • Canoe River hot springs: 50°C (Fairbank and Faulkner, 1992) **Geothermometry:** • Canoe H.S.: indications reservoir >200°C (Ghomshei, 2010) • Canoe River hot springs: chemical geothermometers suggest subsurface temperatures as high as 185~190°C. (Souther, 1975) • Deep reservoir temperature is therefore estimated at 210 to 230°C, as inferred by Na-K and Na-Li geothermometers (Ghomshei et al., 2009) • Na-K-Ca and SiO_2 geothermometry of fluids gives source temperature of 187°C and 129°C, respectively (Fairbank and Faulkner, 1992) **Exploration drilling:** • Shallow temperature-gradient and deep-core hole drilling was planned to start in 2010 (Ghomshei, 2010), however no drilling has occurred and no drilling licenses have been provided. **Water chemistry:** • Canoe River hot springs: water type is Na-(Cl>SO·) with Cl at a maximum of about 320 mg/L. There is ample evidence of mixing. (Souther, 1975) • Water samples collected at 9 locations in 1994 when reservoir was unusually low: fluids considered neutral (pH values of 6 to 8) and fairly conductive (1.4 to 1.6 S/cm). Fluids have low dissolved oxygen at less than 10% of saturation at local elevation. Springs have medium concentrations of bicarbonate and sulphate, neutral to slightly basic pH. No silica or carbonaceous precipitates were visible in the inspected area. (Ghomshei et al., 2009) **Mineral indicators:** • No information
	Surface Flow Rates and Reservoir Recharge	• Canoe River hot springs: temperature of the hot spring fluids (as they appear at the surface) reaches 70°C to 80°C (Ghomshei, 2010) • Canoe River hot springs: flow rate 3 L/s (Fairbank and Faulkner, 1992)
	3D Permeability (heat exchange potential)	"Relatively high surface temperatures and lack of evidence for potassium re-equilibration indicates rapid fluid movement in the geothermal system, suggesting that the permeability at depth is controlled by fracture systems. In this case, the reservoir permeability is possibly related to the Purcell fault and SRMT. Moreover, the spread of the outlets over a large area indicates that the reservoir permeability extends to the surface." (Ghomshei et al., 2009)
	Recent Magmatism	No recent volcanic activity known. Quaternary basaltic flows present 50 km southeast of springs. (Ghomshei et al., 2009)
	Structural Setting	Hot spring area is bounded by three major faults: the normal North Thompson-Alberta Fault to the east (westerly dip), the E-W striking Purcell fault (southerly dip) located 5 to 10 km north of the hot springs, and the NW-SE striking South Rocky Mountain Trench (SRMT) fault to the west along the Canoe River (70° dip to SW). The SRMT fault appears to provide a conduit to bring thermal waters to the surface (Ghomshei et al., 2009)
	Geophysics	Magnetotelluric (MT) survey (2008) showed low resistivity anomalies in the upper 1,000 m corresponding with known hot springs and surface manifestations. The anomaly is also observed at greater depths (1,500 to 2,000 m) - may indicate a change in lithology or presence of a large underlying geothermal reservoir. An additional low-resistivity zone in an area with no known hot springs was identified (away from the lake shore to the northeast of known surface manifestations) (Ghomshei et al., 2009)

CANOE CREEK - VALEMOUNT

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Category		Comments
	Reservoir Host Rock	• Cambrian (age unconfirmed) basement gneiss (with radiogenic heat source or rising mantle in the Southern Rocky Mountain Trench) (Ghomshei, 2010) The basement rocks consist of well-foliated granitic to quartz-dioritic orthogneiss with porphyroblastic potassium feldspar and dykes of garnet amphibolite; overlain by a pebble- to boulder-conglomerate with normal and graded bedding; contact of the conglomerate with basement unconformity (Ghomshei et al., 2009) • Deep flow systems within layered sedimentary rocks (Fairbank and Faulkner, 1992)
	Drilling Issues	Steep terrain: maximum elevation changes within permitted areas (from lake surface) ~1,850 m. (Dunn, 2013a)
	Brief Description of Geological Setting of Thermal Features (i.e., springs emanate from fluvial gravels; beside a river, etc.)	Canoe River hot springs are flooded seasonally by reservoir along the Canoe River (Souther, 1975) (Kinebasket Lake is a catch basin for a hydroelectric dam downstream. (Dunn, 2013a)
B.	**Exploration Uncertainty (Risk)**	
	Degree of Identification of Resources/Reserves	Moderate • Geochemistry and recent geophysical survey at the Canoe hot springs (a geothermal prospect in the Rockies) show a substantial geothermal power potential. Slim hole drilling in this prospect is planned to start in the spring of 2010. (Ghomshei, 2010) • MT survey conducted in 2008 to determine depth and extent of reservoir (Ghomshei et al., 2009) • Borealis has conducted magnetotelluric geophysics, bio-geochemistry and soil-geochemistry surveys, geologic mapping and water sampling, CO_2/soil degassing, shallow ground probe analysis, 3-D mapping and modeling of reservoir. Slim-hole drilling planned for next step (pending funding) (Morphet, 2012). • Additional work was planned for 2013 (Dunn, 2013a and 2013b).
	Likelihood of Covering Reservoir with Concession	Moderate • Borealis GeoPower holds developing permit (Thompson et al., 2015) • One active permit at Canoe Reach; geothermal permit straddle the northern arm of Kinbasket Lake, which lies within the Rocky Mountain Trench, and near the end of a power line in need of upgrading. (Dunn, 2013a) • Geothermal title tracts do not cover the Canoe River hot spring itself, but they do cover a greater area focused on the thermal features to the south along the lake shore.
	Expected Authorization Date	As of 2013, Borealis was targeting 2016-2017 (Dunn, 2013b)
	Specific Timing of Exploration (2 + 2 years, BC 8 years, etc.)	4 years (1 year deep gradient-well drilling + 1 year successful development drilling and testing + 1 year further development drilling and start plant construction + 1 year drilling wrap-up and finish plant construction)
	Degree of Previous Exploration (can be good or bad)	Moderate • Geology, geochemistry, and geophysics have been performed. No slim-hole drilling yet
	Surface Operational Capacity (enough stable area for drilling and a plant?)	High • Assuming the power plant is near the series of thermal features in the south-central portion of the geothermal title tract. However, this area may need more strategizing than if the project was developed near the Canoe River Hot Springs location.
	Exploration to Exploitation: A summary rating of Exploration Uncertainty (risk) on a scale of difficult (high risk) through medium (moderate risk) to easy (low risk)	Moderate Note: Memorandums of Understanding (MOUs) have been signed with the Town of Valemount and the surrounding First Nations (Shuswap and the Simpcw); additionally have funding secured from Sustainable Development Technology Canada (SDTC) (Dunn, 2013a).

CANOE CREEK - VALEMOUNT

Near Valemount, British Columbia, Canada
Topographical Map Sheet: Figure 2
Geological Map Sheet: Figure 3

Category		Comments
C.	**Environmental Issues**	
	Protected Areas	• Cranberry Marsh/Starratt Wildlife Habitat Area is 5 km north of potential transmission connection location. • Next nearest protected area approx. 25 km from proposed infrastructure.
	Endangered Species	• Southern Mountain Caribou (Endangered (SARA Schedule 1); red-listed) habitat polygon approx. 2 km from proposed transmission line.
	Geothermal Surface Features	• One hotspring close to proposed transmission line.
	Other	• Proposed transmission line crosses one known fish bearing stream, and 9 streams that do not have fish bearing classification. • Tincup Creek is in a Wildlife Habitat Area that is designated for Grizzly Bear 5 km east of proposed transmission connection and 15 km east of proposed plant location. Wildlife Habitat Area for Grizzly Bear and Spotted Owl 20 km north of proposed plant location. • Long-term habitat area and managed forest habitat area for Spotted Owl 17 km southeast of proposed plant location.
D.	**Geothermal Area - Bidding and/or Type of Land Holding (private/government/lease/etc.)**	
	Bidding Area	Active geothermal title tract. Borealis GeoPower obtained a renewed geothermal exploration permits October 17, 2011 (http://borealisgeopower.com/projects/canoe-reach/), and they currently have an exploration permit.
	Other Claim Rights (mining and/or oil)	No known mineral/coal titles within active geothermal tract. Proposed location is not within known oil and gas management area; no known tenures at proposed location.

CANOE CREEK - VALEMOUNT

Near Valemount, British Columbia, Canada
Topographical Map Sheet: Figure 2
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Category		Comments
E.	**Market**	
	Main Electricity Consumers (direct sales and/or government)	General Overview 1. BC Hydro acquires power from Independent Power Producers (which would include geothermal proponents) through two main processes: • Competitive calls: when BC Hydro issues a Call for Tenders for the supply of electricity to BC Hydro, geothermal proponents can bid into those competitive calls. • Standing Offer Program (SOP): This program is presently available for clean generation projects greater than 0.1 MW but not more than 15 MW. Proponents do not compete against each other but are paid a predetermined price by BC Hydro. Depending on the specifics of each project, proponents may wish to size their projects to be under the 15 MW threshold for the SOP (BC Hydro is developing a 'mini-SOP' component within the overall SOP. This mini-SOP will apply to projects in the 0.1 MW to 1 MW range, but would not realistically apply to potential geothermal generation projects). • In addition, BC Hydro's net metering program is designed for residential and commercial customers who wish to connect a small electricity generating unit to the BC Hydro distribution system. Generating units up to 0.1 MW in capacity that utilize a clean or renewable resource are eligible to participate in the program. Given the small size, this program has no applicability to potential geothermal generation projects. The acquisition of geothermal power would contribute to BC Hydro's current target for clean energy and to the diversification of BC Hydro's resource mix, making it less reliant on snow melt and stream flow. 2. Although FortisBC is a potential customer for electricity from geothermal sources, the opportunities may be limited given FortisBC's ability to receive electricity from BC Hydro under Rate Schedule 3808. However there is a wheeling agreement in place which would facilitate a geothermal project located in FortisBC's service territory to sell electricity to BC Hydro through BC Hydro's competitive calls and/or the SOP, or to other potential customers as noted below. 3. Wholesale wheeling (whereby electricity is transmitted from electricity generators to utilities) to customers in Alberta, the US, or other wholesale customer in BC is allowed. The generation supplier must request service on the appropriate BC Hydro transmission line under the Open Access Transmission Tariff (OATT) at a regulated cost for that service. Depending on the end customer, the generation supplier will have to make similar arrangements to cover transmission access in other jurisdictions (e.g. the Bonneville Power Authority for wheeling to a US customer). This 'pancaking' of rates, along with congestion issues, affects the economic viability of the potential wholesale opportunity. 4. Retail access, defined as a market in which electricity is sold directly to consumers by competing suppliers, is generally not permitted in BC. However there may be opportunities for bilateral arrangements for direct sales of electricity from geothermal generating plants to large customers (e.g. pulp mills, large sawmills, mines) as follows: • To replace the electricity supplied at a high voltage from BC Hydro under BC Hydro Transmission Rate 1823 of the Electric Tariff. Such replacement would be challenging given the rates charged under that tariff. • To supply electricity to a remote facility (e.g. a mine, LNG plant or other industrial facility) directly from a geothermal plant located in close proximity to the facility, thereby precluding the need for a lengthy transmission line to connect to the BC Hydro electrical grid. • A potential electricity customer, Imperial Metals Corporation's' Ruddock Creek, a zinc/lead development project, is in the permitting/environmental assessment phase. The potential operations are located approximately 115 km away.

CANOE CREEK - VALEMOUNT

Near Valemount, British Columbia, Canada
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Category		Comments
	Time Limits? (business agreements, operating/generating-by deadlines?)	• BC Hydro has issued competitive Calls for Tender for the supply of electricity in the past. • BC Hydro's SOP is presently directly available for clean energy projects which meet certain criteria, including a generation output of less than 15 MW. • Typical BC Hydro Energy Purchase Agreements from Independent Power Producers are 20-40 years in duration. • Business agreements with the owners of private transmission lines (e.g. independent power producers) for access to the market will be necessary. • The lead times to develop geothermal resources will include appropriate allowances for investigative drilling, technical and environmental studies, public consultation, transmission considerations, marketing, licencing, design, construction and commissioning. These lead times will vary from four to seven years depending on the specifics of each project. Projects with a history of exploration and analysis (e.g. Meager Creek/Pebble Creek, Lakelse, and Canoe Creek) will generally be on the shorter end of this time continuum, while other projects with less investigative work will take longer. Although the time required to drill a geothermal well and construct a power plant could conceivably be less than two years, the key uncertainties inherent in the environmental review, public consultation, transmission arrangements (either with BC Hydro or a private transmission owner), and the permitting and regulatory processes will realistically result in a further two years at a minimum for these activities.
F.	**Transmission Line Infrastructure**	
	State of the Infrastructure	Valemount substation is closest available on 138 kV line. The 138 kV line to Valemount from Kamloops is a long radial line that has reliability challenges, forest fire exposure (20 km of 138 kV line burned) and already has a number of independent power projects connected. Capacity on the line may be a concern. An interconnection study from BC Hydro would inform these issues.
	Transmission Route (distance, terrain and costs)	Approx. 20 km of new 138 kV transmission line required via unpaved roads and forested land; moderately sloped, mountainous terrain.
H.	**Community Issues**	
	Indigenous Law and Indigenous Development Areas	• First Nation consultative areas include Neskonlith Indian Band, Secwepemc Nation, Shuswap Indian Band, Lheidli Band, Simpcw First Nation • Simpcw First Nation Traditional Territory. See Simpcw First Nation Consultation and Accommodation Guidelines and Heritage Policy - outlines specific steps for consultation and accommodation. (Simpcw First Nation Consultation and Accommodation Guidelines - 2006, available from www.simpcw.com) • Draft Comprehensive Community Plan (CCP) from First Nations BC Website: "Simpcw FN will continue to negotiate constructive mutually beneficial, investment opportunities within Simpcwulucw. • An excerpt from the Borealis website states: "Borealis is also pleased to announce that the Shuswap and the Simpcw First Nations have entered into a Memorandum of Understanding with Borealis Geopower on the development and construction of a geothermal power plant on the Canoe Reach property, located just south of Valemount British Columbia. This represents an important milestone in moving the project forward and we welcome our new partners."
	Community Action	• Valemount Integrated Community Sustainability Plan adopted in 2013 (http://www.valemount.ca/community-sustainability) sets out 4 main sustainability objectives: 1. "eliminate our part in creating socio-cultural and economic conditions that undermine people's ability to meet their basic needs," 2. eliminate our part in the ongoing physical degradation of nature," 3. "eliminate our part in the ongoing build-up of synthetic materials," and 4. "eliminate our part in the on-going build-up on materials extracted from the earth's crust." (Valemount, ICSP) • An excerpt from the Borealis website states: "Borealis would like to thank the Community of Valemount for their continued support of the project, and we recently signed a direct heat agreement that entails using the cooled wastewater (approx. 70 degrees Celsius) coming from the power plant after power generation for purposes such as sustaining a community greenhouse for food growth and possible public hot springs facilities."
	Surface Rights	• Simpcw cultural heritage areas for traditional use area, sacred and spiritual areas, areas of historical cultural significance, archaeological sites. (www.simpcw.com)
	Tourism	• Simpcw Natural Resource Dept. references "joint ventures with industry in forestry, mining, tourism and utilities." (www.simpcw.com) • Tourism is generally focussed on outdoor and recreational activities. Potential hot springs facilities would complement these activities.

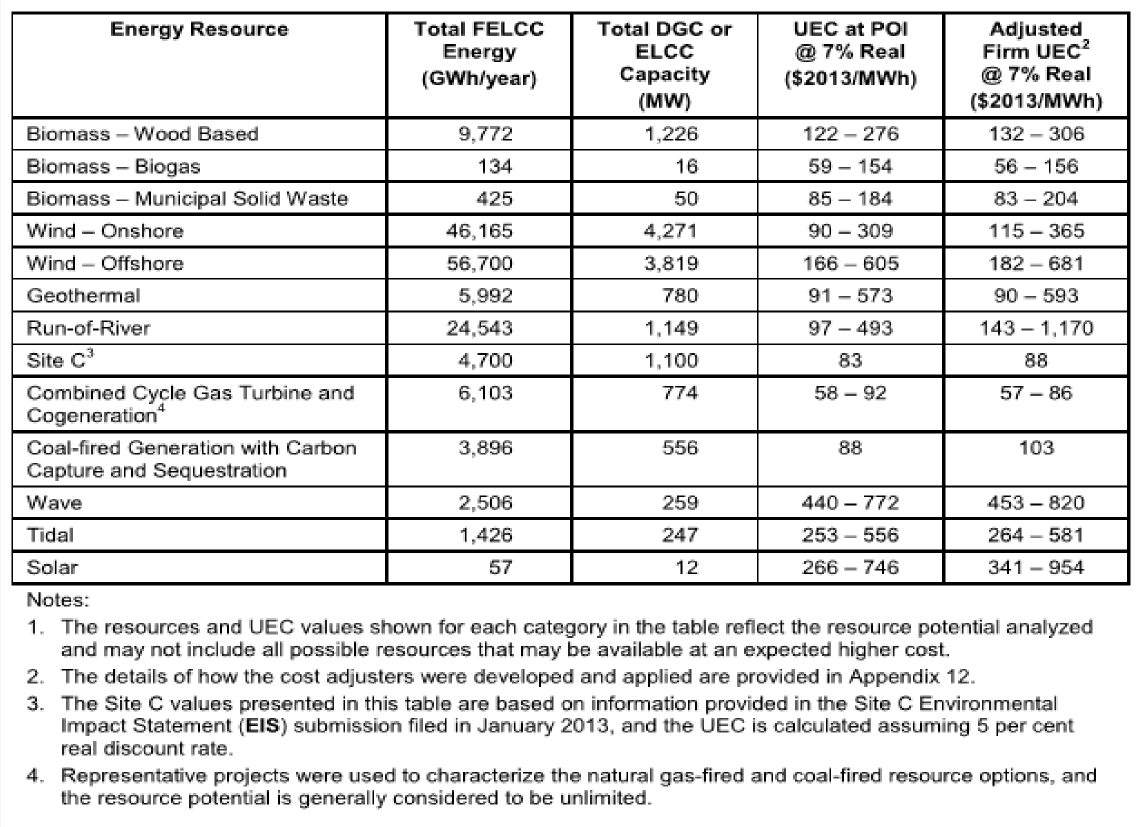
CANOE CREEK - VALEMOUNT

Near Valemount, British Columbia, Canada
Topographical Map Sheet: Figure 2
Geological Map Sheet: Figure 3

Category		Comments
I.	**Water Rights**	
	Availability (for example "air-cooled required")	Plant water requirement estimated approx. 19 L/s for binary plant. Mean Annual Discharge (MAD) for closest streams approx. 140 L/s. Currently 2 active water licences on east side of lake for C-Free Power Corp for purpose of Power-General.
	Availability for Drilling	Drilling requirement of 20 L/s. MAD for closest streams approx. 140 L/s. Currently 2 active water licences on east side of lake for C-Free Power Corp for purpose of Power-General.
J.	**Engineering**	
	Plant Location and Design	Plant location between Kinbasket Lake and Malton Mountain Range.
	Construction Issues	Plant may be located on sloping terrain with variable construction access on unpaved roads.
	Transportation Issues	Variable access on unpaved road
	Architectural Issues (Blend/hide into environment? Local styles? etc.)	No known requirements (as per Simpcw Land Use Plan review)
	Special Construction Issues (zero emissions)	None found
K.	**Non-Electrical Infrastructure (Roads and Habitation)**	
	Nearest Large Community > 50,000	Kamloops, BC
	Nearest Community	Valemount, BC
	Nearest Road and Condition	Unpaved road access along Kinbasket Lake
	Current Access Conditions (restrictions)	Unpaved roads - variable conditions. Operational staff can live in Valemount and travel to site daily.
	Terrain and Distance Factor for Road Building	No requirements for new roads expected. Relatively flat terrain; low cost.

CANOE CREEK - VALEMOUNT

Near Valemount, British Columbia, Canada
Topographical Map Sheet: Figure 2
Geological Map Sheet: Figure 3

Category		Comments
L.	**Finance**	
	General Power Prices	BC Hydro acquires power through (1) competitive processes (Calls for Tender), (2) the Standing Offer Program (not including the mini-SOP under development), and (3) upgrades to its existing facilities or the development of new generation facilities. (Note that the net metering program targets projects less than 100 kW and is therefore not relevant to geothermal generation projects). Comments on the general price of power under each one are: • The power price paid by BC Hydro to independent power producers through Energy Purchase Agreements (EPAs) under Calls for Tender are proprietary and confidential. • The power price paid by BC Hydro to independent power producers through EPAs under the SOP are made up of a predetermined base price in 2010 dollars as determined by the region of the point of interconnection to the BC Hydro system, escalated at the Consumer Price Index annually up to the year in which an EPA is signed, and further adjusted based upon the time of day and month when the energy is delivered. For reference, the base price for the Lower Mainland region in 2010 dollars is $103.69/MWh. • BC Hydro's current Integrated Resource Plan dated November 2013 includes details of both demand-side management options and supply-side resource options to consider in meeting the future demand for electricity. These resource options, together with their attributes of total energy and capacity and unit energy costs, are listed in Table 2-2 of the November 2013 Resource Options Report Update. That table is reproduced below for ready reference. • Table 5-7 of the above-noted November 2013 Resource Options Report Update provides a summary of the Geothermal Potential by Transmission Region. 

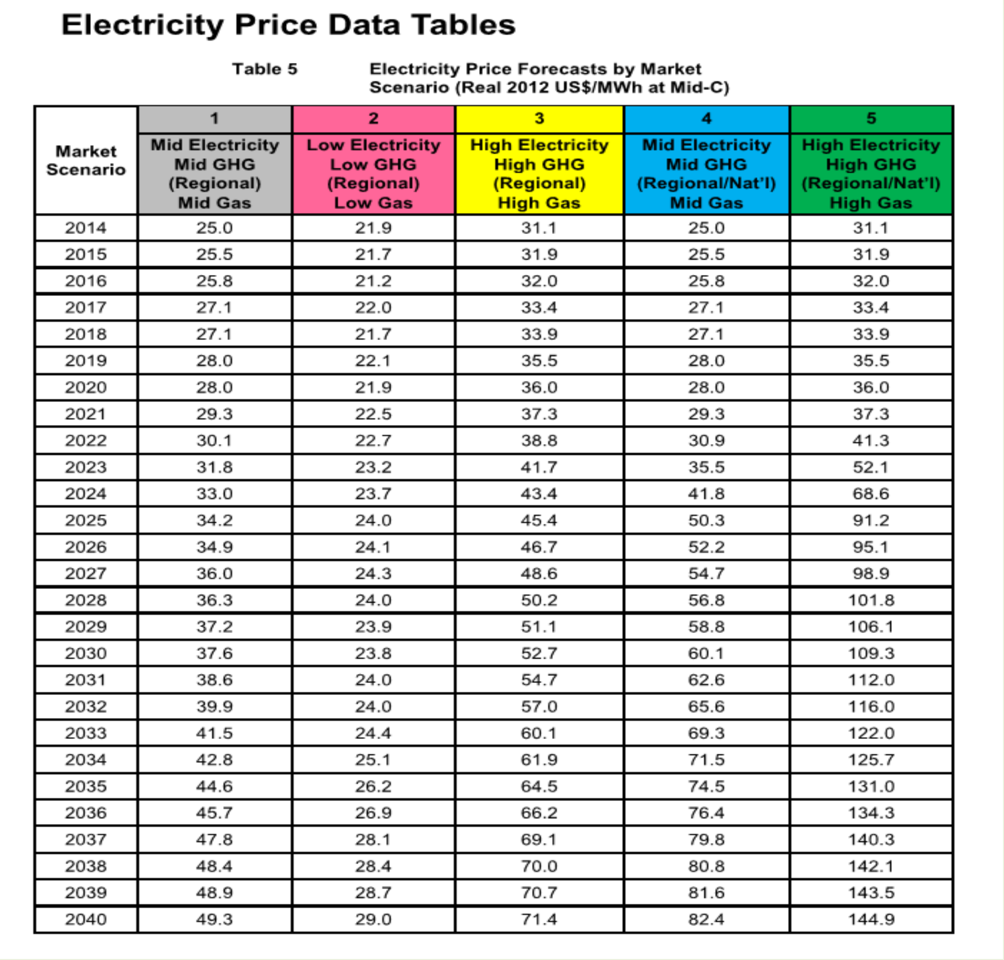
Energy Resource	Total FELCC Energy (GWh/year)	Total DGC or ELCC Capacity (MW)	UEC at POI @ 7% Real ($2013/MWh)	Adjusted Firm UEC[2] @ 7% Real ($2013/MWh)
Biomass – Wood Based	9,772	1,226	122 – 276	132 – 306
Biomass – Biogas	134	16	59 – 154	56 – 156
Biomass – Municipal Solid Waste	425	50	85 – 184	83 – 204
Wind – Onshore	46,165	4,271	90 – 309	115 – 365
Wind – Offshore	56,700	3,819	166 – 605	182 – 681
Geothermal	5,992	780	91 – 573	90 – 593
Run-of-River	24,543	1,149	97 – 493	143 – 1,170
Site C[3]	4,700	1,100	83	88
Combined Cycle Gas Turbine and Cogeneration[4]	6,103	774	58 – 92	57 – 86
Coal-fired Generation with Carbon Capture and Sequestration	3,896	556	88	103
Wave	2,506	259	440 – 772	453 – 820
Tidal	1,426	247	253 – 556	264 – 581
Solar	57	12	266 – 746	341 – 954

Notes:

1. The resources and UEC values shown for each category in the table reflect the resource potential analyzed and may not include all possible resources that may be available at an expected higher cost.
2. The details of how the cost adjusters were developed and applied are provided in Appendix 12.
3. The Site C values presented in this table are based on information provided in the Site C Environmental Impact Statement (**EIS**) submission filed in January 2013, and the UEC is calculated assuming 5 per cent real discount rate.
4. Representative projects were used to characterize the natural gas-fired and coal-fired resource options, and the resource potential is generally considered to be unlimited.

CANOE CREEK - VALEMOUNT

Near Valemount, British Columbia, Canada
Topographical Map Sheet: Figure 2
Geological Map Sheet: Figure 3

Category	Comments
Market Price ($/MWhr)	• As noted in the above Table 2-2 from the November 2013 Resource Options Report Update, the Unit Energy Cost for geothermal resources at a 7% real discount rate in 2013 dollars ranges from $91/MWh to 573/MWh at the point of interconnection to the BC Hydro system. • Wholesale electricity prices for trading purposes can vary greatly. In the Pacific Northwest, these prices are affected by such factors as precipitation/snowfall in the region, unforeseen generation outages and ambient temperatures. A general flavour of the wholesale electricity prices for potential export of electricity from BC can be obtained from a variety of sources. One such source is the US Energy Information Administration (www.eia.gov/electricity/wholesale/#history). This source provides current and historical electricity market data. Of particular relevance is the mid-C trading hub in the Northwest Region (one example would be a Mid-C peak price on March 17, 2015 of $19.87US weighted average cost from 72 trades). Access to that market for geothermal projects in BC would require access on both the BC Hydro transmission system to the Canada/US border, and on the appropriate transmission system (e.g. Bonneville Power Authority) in the US. • BC Hydro forecasts of market prices under various scenarios was provided in the November 2013 IRP. Table 5 in Appendix 5A – Market Forecast Data is reproduced below for ready reference. 

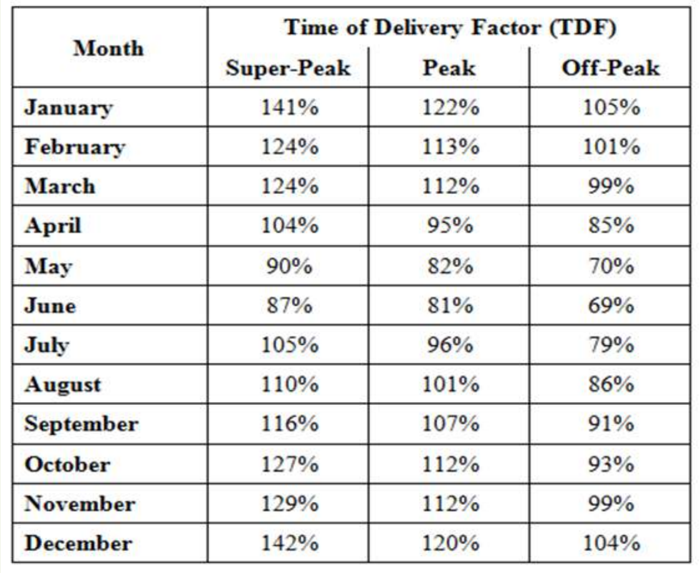
Electricity Price Data Tables

Table 5 Electricity Price Forecasts by Market Scenario (Real 2012 US$/MWh at Mid-C)

Market Scenario	1 Mid Electricity Mid GHG (Regional) Mid Gas	2 Low Electricity Low GHG (Regional) Low Gas	3 High Electricity High GHG (Regional) High Gas	4 Mid Electricity Mid GHG (Regional/Nat'l) Mid Gas	5 High Electricity High GHG (Regional/Nat'l) High Gas
2014	25.0	21.9	31.1	25.0	31.1
2015	25.5	21.7	31.9	25.5	31.9
2016	25.8	21.2	32.0	25.8	32.0
2017	27.1	22.0	33.4	27.1	33.4
2018	27.1	21.7	33.9	27.1	33.9
2019	28.0	22.1	35.5	28.0	35.5
2020	28.0	21.9	36.0	28.0	36.0
2021	29.3	22.5	37.3	29.3	37.3
2022	30.1	22.7	38.8	30.9	41.3
2023	31.8	23.2	41.7	35.5	52.1
2024	33.0	23.7	43.4	41.8	68.6
2025	34.2	24.0	45.4	50.3	91.2
2026	34.9	24.1	46.7	52.2	95.1
2027	36.0	24.3	48.6	54.7	98.9
2028	36.3	24.0	50.2	56.8	101.8
2029	37.2	23.9	51.1	58.8	106.1
2030	37.6	23.8	52.7	60.1	109.3
2031	38.6	24.0	54.7	62.6	112.0
2032	39.9	24.0	57.0	65.6	116.0
2033	41.5	24.4	60.1	69.3	122.0
2034	42.8	25.1	61.9	71.5	125.7
2035	44.6	26.2	64.5	74.5	131.0
2036	45.7	26.9	66.2	76.4	134.3
2037	47.8	28.1	69.1	79.8	140.3
2038	48.4	28.4	70.0	80.8	142.1
2039	48.9	28.7	70.7	81.6	143.5
2040	49.3	29.0	71.4	82.4	144.9

CANOE CREEK - VALEMOUNT

Near Valemount, British Columbia, Canada
Topographical Map Sheet: Figure 2
Geological Map Sheet: Figure 3

Category	Comments
Green Power Premium ($/MWhr)	• BC Hydro’s past procurement processes for the acquisition for power from independent power producers has offered a premium for green power. • Within British Columbia, there is little demand for the purchase of “green power certificates” (instruments that a customer can purchase to be assured that the electricity used is environmentally friendly) from BC Hydro. BC Hydro’s generation mix is already approximately 93% clean. • California has a goal of 33% of retail sales by 2020 to be sourced from eligible renewable energy sources. However, the opportunity for geothermal power from British Columbia, particularly “bundled” green energy with Renewable Energy Certificates (RECs), to compete in that market is low, for a number of reasons 1. The price of electricity is driven by the low cost of natural gas; 2. There are large amounts of renewables, such as wind and solar, in California; and 3. Firm transmission access to the California market through the BPA transmission system is generally not available.
Capacity Price ($/KW)	• There is no price in $/kW for capacity resource options in the market at present. • Table 3-27 entitled "UCCs of Capacity Resource Supply Options" in BC Hydro's Integrated Resource Plan dated November 2013 provided a summary of capacity resource options (e.g. pumped storage, simple cycle gas turbines and resource smart projects such as Revelstoke Unit 6). The unit capacity costs (UCCs) at the point of interconnection to the BC Hydro system in $2013/kW-year are shown in the table.
Is there a higher price for base load power?	In general, baseload power (ie firm power) is more valuable to BC Hydro and furthermore the price paid for baseload power varies by month throughout the year. As an example, the following excerpt is taken from BC Hydro’s SOP: “1. Definitions: In this Appendix 4, the following words and expressions have the following meanings: (a) “Off-Peak Hours” means all hours other than Super-Peak Hours and Peak Hours. (b) “Peak Hours” means the hours commencing at 06:00 PPT and ending at 16:00 PPT, and commencing at 20:00 PPT and ending at 22:00 PPT, Monday through Saturday inclusive, but excluding British Columbia statutory holidays. (c) “Super-Peak Hours” means the hours commencing at 16:00 PPT and ending at 20:00 PPT Monday through Saturday inclusive, but excluding British Columbia statutory holidays.” 

Month	Time of Delivery Factor (TDF)		
	Super-Peak	Peak	Off-Peak
January	141%	122%	105%
February	124%	113%	101%
March	124%	112%	99%
April	104%	95%	85%
May	90%	82%	70%
June	87%	81%	69%
July	105%	96%	79%
August	110%	101%	86%
September	116%	107%	91%
October	127%	112%	93%
November	129%	112%	99%
December	142%	120%	104%

CANOE CREEK - VALEMOUNT

Near Valemount, British Columbia, Canada
Topographical Map Sheet: Figure 2
Geological Map Sheet: Figure 3

Category	Comments
Estimated Size of Resource	See Section A.
Are there any green power incentives?	• The BC government created the Innovative Clean Energy (ICE) fund with an initial mandate to accelerate the commercialization of emerging clean energy technologies (now expanded to include a broad range of energy efficiency and conservation projects). British Columbia also has a program entitled Scientific Research and Experimental Development Tax credit (SR&ED). Geothermal proponents could keep a watching brief on these programs for applicability and relevance. • The BC government's First Nations Clean Energy Business Fund. This fund promotes increased Aboriginal community participation in the clean energy sector. It provides: o Capacity funding of up to $50,000 per applicant to cover the early stages (e.g. feasibility studies) of project development ; and o Equity funding of up to $500,000 per applicant to support a financially viable and resourced clean energy project. • There are a number of government of Canada programs to encourage the development of renewable power. Some of these programs may be active but not currently issuing calls for proposals. Others may be focussed on research and innovation and may not be directly applicable to geothermal technologies/resources, while others may be fully subscribed and even inactive but are noted in terms of completeness. Some of these programs include: o Natural Resources Canada ecoEnergy for Renewable Power program; o Sustainable Development Technology Canada funds; o Clean Energy Fund; o Industrial Research Assistance Program; and o Green Infrastructure Fund Geothermal proponents could keep a watching brief on these and other federal government programs for their applicability and relevance.
Grants	See above under green power incentives
Tax Holidays	None listed on federal and provincial websites.
Tax Relief	• Under Classes 43.1 and 43.2 in Schedule II of the Income Tax Regulations, certain capital costs of systems that produce energy by using renewable energy sources or fuels from waste, or conserve energy by using fuel more efficiently are eligible for accelerated capital cost allowance. Under Class 43.1, eligible equipment may be written-off at 30 percent per year on a declining balance basis. In general, equipment that is eligible for Class 43.1 but is acquired after February 22, 2005 and before year 2020 may be written-off at 50 percent per year on a declining balance basis under Class 43.2. Without these accelerated write-offs, many of these assets would be depreciated for income tax purposes at annual rates between 4 and 30 percent. • In addition to Class 43.1 or 43.2 capital cost allowance, the Income Tax Regulations allow certain expenses incurred during the development and start-up of renewable energy and energy conservation projects [Canadian renewable and conservation expenses (CRCE)] to be fully deducted in the year they are incurred, carried forward indefinitely and deducted in future years, or transferred to investors through a flow-through share agreement.

CANOE CREEK - VALEMOUNT

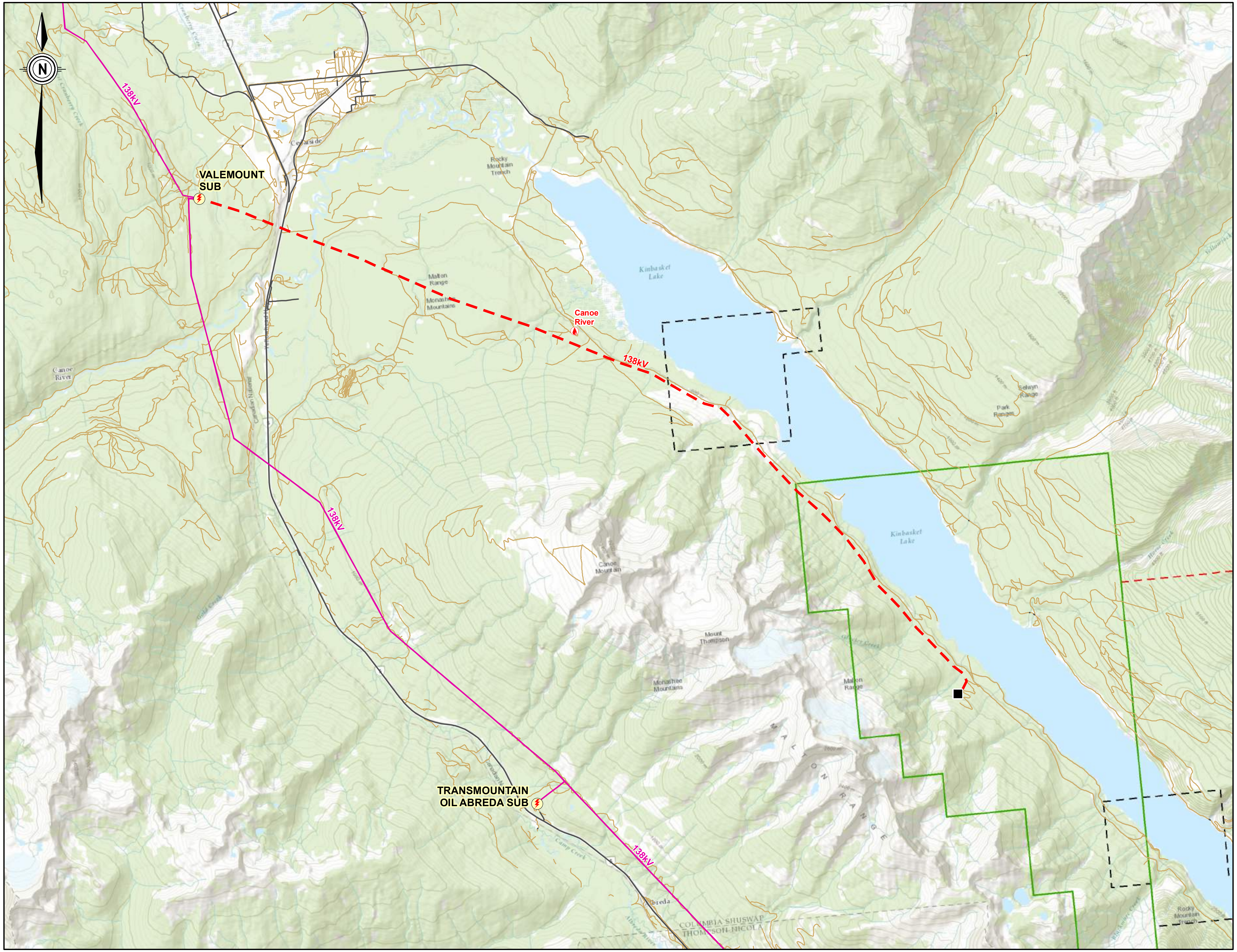
Near Valemount, British Columbia, Canada
Topographical Map Sheet: Figure 2
Geological Map Sheet: Figure 3

Category	Comments
Loan Guarantees	The following is an excerpt from http://www.fnfa.ca/en/fnfa/ “The First Nations Finance Authority (FNFA) is a statutory not-for-profit organization without share capital, operating under the authority of the First Nations Fiscal Management Act, 2005. The FNFA’s purposes are to provide investment options and capital planning advice and—perhaps most importantly, access to long-term loans with preferable interest rates. The FNFA is not an agent of Her Majesty or a Crown corporation and is governed solely by the First Nations communities that join as Borrowing Members. The advantages of joining the FNFA as a Borrowing Member are: 1. Access to low rate, below bank prime, loans with repayment terms up to 30 years; 2. First Nations choose the repayment terms that work best for their budget; 3. FNFA loans do not require collateral; 4. FNFA loans can be used to refinance existing debt; and 5. FNFA’s interest rates and terms parallel those available to provincial and local governments. Most revenue streams are eligible to support FNFA loan requests. Eligible capital projects FNFA can finance include infrastructure, social and economic development, land purchases, independent power projects, community housing and rolling stock/heavy equipment. FNFA is a stand-alone organization separate from the Government of Canada, and its operating policies are set by its Borrowing Members, represented by the First Nation’s Chief and Council appointee. The FNFA is for First Nations, by First Nations.”
Royalties/Fees	Geothermal Resources Act, [RSBC 1996] CHAPTER 171, as of March 11, 2015 Permits for well authorizations for wells to be drilled within the boundaries of the permittee's location must pay a prescribed rent for the permit (Section 5). Based on Section 17 of the Act, (1) A lessee who produces a geothermal resource for purposes other than testing must pay to the government (a) a royalty established by agreement under this section, (b) an amount agreed under this section to be paid instead of royalty, or (c) if no royalty or amount has been agreed under this section, the prescribed royalty.
General Idea of Royalties	With regard to use of the water resources within the geothermal tract, Section 4 of the Water Sustainability Act states “This Act does not apply to geothermal resources as defined in section 1 (1) [definitions] of the Geothermal Resources Act.”
Private Land Owner or Government Land	Geothermal proponents will need to arrange financial agreements (eg leases or purchases) with private property owners for the geothermal land tract. Proponents for geothermal facilities on Crown Land must apply for the appropriate tenure under the BC Land Act (eg Statutory Right of Way, Licence of Occupation).
Tax Rate in the Country	• Income eligible for small-business deduction (up to $500,000 income): 11% Federal tax, combined federal and provincial (British Columbia): 13.5%. • Income not eligible for small-business deduction: 15% Federal, combined federal and provincial (British Columbia): 26%
Transmission Tariffs	Under wholesale wheeling (whereby electricity is transmitted from electricity generators to utilities) to customers in Alberta, the US, or other wholesale customers in BC, the generation supplier must request service on the appropriate BC Hydro transmission line under the Open Access Transmission Tariff (OATT) at a regulated cost for that service. Depending on the end customer, the generation supplier will have to make similar arrangements to cover transmission access in other jurisdictions (e.g. the Bonneville Power Authority for wheeling to a US customer). This ‘pancaking’ of rates, along with transmission congestion issues, affects the economic viability of the potential wholesale opportunity.

CANOE CREEK - VALEMOUNT

Near Valemount, British Columbia, Canada
Topographical Map Sheet: Figure 2
Geological Map Sheet: Figure 3

Category		Comments
M.	**Maps**	
	Regional topographic map showing population centres, roads and other infrastructure including electrical grid and nearest substation and/or generating station. (1:500,000?)	Topographical Map Sheet: Figure 2
	Regional map showing land tenure in area – geothermal concessions, mining concessions, private land holds, public or national lands (parks). (1:500,000?)	Topographical Map Sheet: Figure 2
	Regional geological map. (1:250 or 500,000?)	Geological Map Sheet: Figure 3
	Detailed geological map of the immediate area of the concessions. (1:50,000 or 100,000)	Geological Map Sheet: Figure 3
N.	**Other Issues and Considerations**	



Geoscience BC

Legend

- ■ Proposed Geothermal Plant Location
- ● Thermal Spring
- Proposed Transmission Line
- Existing Substation
- Existing Transmission Line
- Paved Road
- Other Road

Geothermal Title Tract

- Active
- Cancelled
- Unsold

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Service Layer Credits: Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

2 0 2
Kilometers

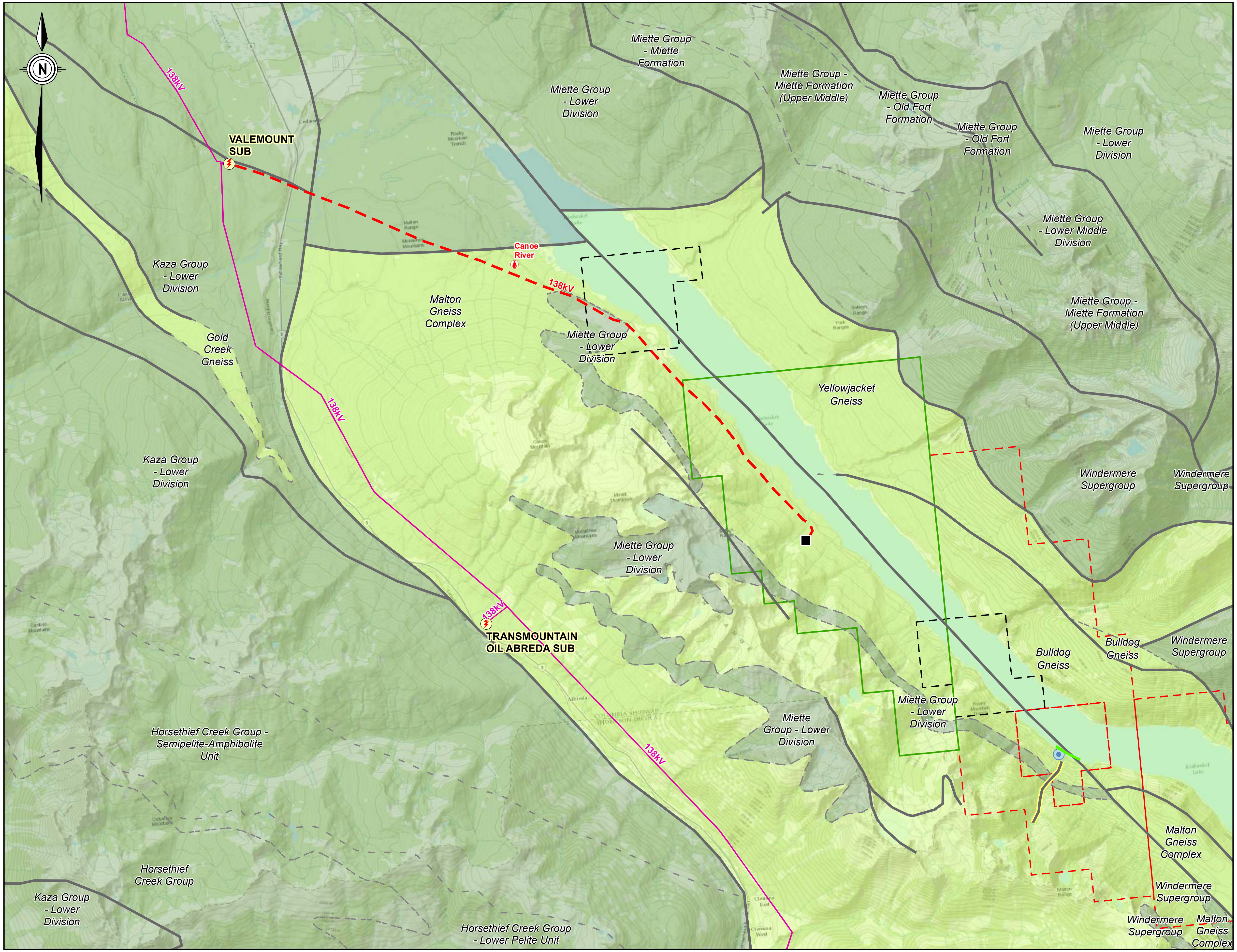
Project No.
2692-004

Date
April 30, 2015

Potential Geothermal Plant at Canoe Creek - Valemount 15MW

Figure 2

Path: Q:\2600-2699\2692-004\430-GIS\MXD-RP\2692004_GeothermalLocations_mapbook.mxd Date Saved: 2015-04-27 2:55:05 PM
Author: RTaylor



Geoscience BC

Legend

- ■ Proposed Geothermal Plant Location
- ● Thermal Spring
- ◉ Wellbore
- Proposed Transmission Line
- Existing Substation
- Existing Transmission Line

Geothermal Title Tract
- Active
- Cancelled
- Unsold

Bedrock Type
- Metamorphic Rocks
- Sedimentary Rocks
- Rock Type Boundary
- Fault
- Possible Fault
- 🟩 Thermal Discharge Area

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Service Layer Credits: Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

3 0 3
Kilometers

Project No.	Date
2692-004	April 30, 2015

Geological Strata Map for Canoe Creek - Valemount 15MW

Figure 3

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Author: RTaylor

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Appendix C

Clarke Lake Geothermal Development Decision Matrix and Figures 4 & 5

CLARKE LAKE

Near Fort Nelson, British Columbia, Canada
Topographical Map Sheet: Figure 4
Geological Map Sheet: Figure 5

Category		Comments
A.	**Reservoir Potential**	
	Size/Potential/Type	• **Reservoir size:** 6.2 km^3. This is bulk volume of reservoir for area estimated at 31 km^2 (Arianpoo et al., 2009) and thickness of 200 m (Walsh, 2013) • **Potential:** mean 34 MW (range from 12 to 74 MW; standard deviation 10.8 MW) (Walsh 2013). • **Type:** Binary plant for low-temperature resource.
	Temperature/Water and Gas Chemistry/Mineral Indicators	**Reservoir temperatures:** • Estimated at 115 ˚C, based on drill stem test (DST) records from natural gas wells. Range of DST temperatures was 81 °C to 123 °C (Walsh, 2013). **Water chemistry:** • Salinities approximately 35,000 ppm total dissolved solids (Gorell, 1979). **Gas chemistry:** • Natural gas from target formations contains 9.1% carbon dioxide and 0.23% hydrogen sulfide. (Walsh 2013). **Mineral indicators:** • NA - temperature estimate is based on direct measurements in DSTs.
	Surface Flow Rates and Reservoir Recharge	Reported maximum pumped flow of water from deepened natural gas well at Clarke Lake was 1,800 m^3/day (Walsh, 2013). Productivity of well drilled with larger diameter for geothermal production is estimated at 8,400 m^3/day [1,541 gpm]. This rate should be achievable for well with typical geothermal completion (e.g., 340-mm [13-3/8-inch] production pipe) for wells with the high productivity reported (0.75 m^3/kPa). Reservoir is reported to have a high water drive (that is, strong reservoir recharge).
	3D Permeability (heat exchange potential)	• High formation permeabilities within dolomitized carbonates (preserved primary porosity and permeability which controlled subsequent dolomitization) (Walsh, 2013) (Walsh & Tu, 2014). • Heat-exchange potential is moderate to high, due to porosity up to 25% (Weides & Majorowicz, 2014) and relatively high temperature gradients (average measured temperature gradient of 54°C/km [Ghomshei, 2010]).
	Recent Magmatism	None
	Structural Setting	Reef margin located along the SE edge of the Nahanni Terrane and the NW edge of the Fort Simpson High. Extensional tectonic setting, giving rise to normal and strike-slip fault motions. (British Columbia MEM, 2003) (Petrel Robertson, 2003)
	Geophysics	Seismic surveys available in the area. Regional aeromagnetic surveys conducted for gas field - identified main basements and fault trends. (British Columbia MEM, 2003)
	Reservoir Host Rock	Carbonate reef rocks of the Upper Elk Group and Beaverhill Lake Group [Middle Devonian]: reservoir formations include Lower and Upper Keg River, Sulphur Point and Slave Point. Reservoir overlain by Woodbend Group shale formations (British Columbia MEM, 2003) (Petrel Robertson, 2003).
	Drilling Issues	A number of natural gas wells are reported to be still open. However, wells with appropriate diameters for pumped production at geothermal rates would likely need to be "purpose built," that is, drilled specifically for use as geothermal producers. In addition, approximately as many injectors as producers would be required. Existing wells could potentially be used as injectors, but from a practical point of view would need to be within 2 kilometers of a production-well cluster.
	Brief Description of Geological Setting of Thermal Features (i.e., springs emanate from fluvial gravels; beside a river, etc.)	• Located in the Western Canadian Sedimentary Basin. The thermal reservoir at Clarke Lake gas field lies within Middle Devonian carbonate formations at an average depth of approximately 2,000 m. • The prospect does not appear to have surface thermal features. It is defined based on temperatures observed in wells drilled for natural gas production.

CLARKE LAKE

Near Fort Nelson, British Columbia, Canada
Topographical Map Sheet: Figure 4
Geological Map Sheet: Figure 5

Category		Comments
B.	**Exploration Uncertainty (Risk)**	
	Degree of Identification of Resources/Reserves	Moderate Extensive gas drilling in area has defined reservoir area and temperatures. Eighty-four gas wells have been drilled in the Slave Point A natural gas pool. Gas exploration has included: geologic mapping, stratigraphic mapping, seismic interpretations, aeromagnetics. MW capacity of thermal resource has been estimated by probabilistic analysis of heat in place. Permeability and recharge have been demonstrated by pump tests in natural gas wells. However, no well has actually been tested at threshold rates cited for economic generation (80-100 kg/sec per production well). Attached plot of net power output for binary plants indicates that 100 kg/sec production at 115˚C would yield approximately 1.0 MW after plant and injection-pump parasitics. This does not take into account power required for production pumps, which would vary based on depth and formation characteristics. (British Columbia MEM, 2003) (Petrel Robertson, 2003) (Walsh, 2013) (McKenna, 2006)
	Likelihood of Covering Reservoir with Concession	High Reservoir has large areal extent and is well delineated by natural gas drilling. The most likely development scenario would consist of several smaller power plants, each located near a cluster of production wells drilled specifically for geothermal development within a relatively small area (on the order of 1-2 km^2). For example, a cluster comprising 5 production wells is estimated to produce on the order of 6 to 7.5 MW. (Walsh, 2013) (Walsh & Tu, 2014)
	Expected Authorization Date	Unknown
	Specific Timing of Exploration (2 + 2 years, BC 8 years, etc.)	5 years for first 5-MW pilot plant (3 years for development well drilling and testing + 2 years to complete and commission 5-MW pilot plant). 4 years per 5-MW module thereafter.
	Degree of Previous Exploration (can be good or bad)	Moderate There has been significant exploration for natural gas in the area, and reservoir temperatures have been documented. No full-diameter wells have been drilled for geothermal exploration/exploitation.
	Surface Operational Capacity (enough stable area for drilling and a plant?)	Sufficient level ground exists for power plants and well pads. Gas-field operations already provide some infrastructure (such as roads and well pads).
	Exploration to Exploitation: A summary rating of Exploration Uncertainty (risk) on a scale of difficult (high risk) through medium (moderate risk) to easy (low risk)	Difficult Existing wells drilled for natural gas production are not likely to be useful for geothermal production due to smaller-diameter completions. Existing wells may be usable for injection - some wells are already in service as injectors for co-produced water from natural gas operations. Use of such wells for geothermal injection would need to be investigated on a case-by-case basis. (Walsh, personal communication [in Geoscience BC conference call,3 March 2015])

CLARKE LAKE

Near Fort Nelson, British Columbia, Canada
Topographical Map Sheet: Figure 4
Geological Map Sheet: Figure 5

Category		Comments
C.	**Environmental Issues**	
	Protected Areas	• No protected areas located along potential transmission connection routes or proposed site.
	Endangered Species	• Canada Warbler (Threatened (SARA Schedule 1); blue-listed) habitat polygon approx. 600 m from proposed trasnmission line. • Southern Mountain Caribou (Endangered (SARA Schedule 1); red-listed) habitat polygon approx. 2 km from proposed plant location. • Cape May Warbler (Special Concern (SARA Schedule 1); red-listed) habitat polygon approx 2 km from proposed plant location.
	Geothermal Surface Features	• Nearest hot springs approx 180 km from proposed plant location.
	Other	• Wildlife Habitat Area that is allotted for for Boreal Caribou 3.5 km south of the proposed transmission line, Winter Type A Range. • Proposed transmission line crosses six streams that do not have fish bearing classification.
D.	**Geothermal Area - Bidding and/or Type of Land Holding (private/government/lease/etc.)**	
	Bidding Area	No existing active, cancelled, or unsold geothermal title tracts in vicinity
	Other Claim Rights (mining and/or oil)	No existing mineral, coal titles in vicinity; significant natural gas activity in the area. Proposed location is within oil and gas management area. Proposed location is in close proximity to oil and gas tenure area. Overlapping Petroleum and Natural Gas Tenures exist.

CLARKE LAKE

Near Fort Nelson, British Columbia, Canada
Topographical Map Sheet: Figure 4
Geological Map Sheet: Figure 5

Category		Comments
E.	**Market**	
	Main Electricity Consumers (direct sales and/or government)	General Overview 1. BC Hydro acquires power from Independent Power Producers (which would include geothermal proponents) through two main processes: • Competitive calls: when BC Hydro issues a Call for Tenders for the supply of electricity to BC Hydro, geothermal proponents can bid into those competitive calls. • Standing Offer Program (SOP): This program is presently available for clean generation projects greater than 0.1 MW but not more than 15 MW. Proponents do not compete against each other but are paid a predetermined price by BC Hydro. Depending on the specifics of each project, proponents may wish to size their projects to be under the 15 MW threshold for the SOP (BC Hydro is developing a ‘mini-SOP’ component within the overall SOP. This mini-SOP will apply to projects in the 0.1 MW to 1 MW range, but would not realistically apply to potential geothermal generation projects). • In addition, BC Hydro's net metering program is designed for residential and commercial customers who wish to connect a small electricity generating unit to the BC Hydro distribution system. Generating units up to 0.1 MW in capacity that utilize a clean or renewable resource are eligible to participate in the program. Given the small size, this program has no applicability to potential geothermal generation projects. The acquisition of geothermal power would contribute to BC Hydro’s current target for clean energy and to the diversification of BC Hydro’s resource mix, making it less reliant on snow melt and stream flow. 2. Although FortisBC is a potential customer for electricity from geothermal sources, the opportunities may be limited given FortisBC’s ability to receive electricity from BC Hydro under Rate Schedule 3808. However there is a wheeling agreement in place which would facilitate a geothermal project located in FortisBC’s service territory to sell electricity to BC Hydro through BC Hydro’s competitive calls and/or the SOP, or to other potential customers as noted below. 3. Wholesale wheeling (whereby electricity is transmitted from electricity generators to utilities) to customers in Alberta, the US, or other wholesale customer in BC is allowed. The generation supplier must request service on the appropriate BC Hydro transmission line under the Open Access Transmission Tariff (OATT) at a regulated cost for that service. Depending on the end customer, the generation supplier will have to make similar arrangements to cover transmission access in other jurisdictions (e.g. the Bonneville Power Authority for wheeling to a US customer). This ‘pancaking’ of rates, along with congestion issues, affects the economic viability of the potential wholesale opportunity. 4. Retail access, defined as a market in which electricity is sold directly to consumers by competing suppliers, is generally not permitted in BC. However there may be opportunities for bilateral arrangements for direct sales of electricity from geothermal generating plants to large customers (e.g. pulp mills, large sawmills, mines) as follows: • To replace the electricity supplied at a high voltage from BC Hydro under BC Hydro Transmission Rate 1823 of the Electric Tariff. Such replacement would be challenging given the rates charged under that tariff. • To supply electricity to a remote facility (e.g. a mine, LNG plant or other industrial facility) directly from a geothermal plant located in close proximity to the facility, thereby precluding the need for a lengthy transmission line to connect to the BC Hydro electrical grid. • There are potential customers for geothermal electricity in the energy intensive natural gas processing and piping facilities from the wellhead to the processing plants. Spectra Energy's gas processing facilities in the Ft. Nelson area is one such potential customer (depending on the geothermal reservoir potential and size, there may be an opportunity to locate a geothermal generating plant close to the gas processing facility), for the supply of both heat and power.

CLARKE LAKE

Near Fort Nelson, British Columbia, Canada
Topographical Map Sheet: Figure 4
Geological Map Sheet: Figure 5

Category		Comments
	Time Limits? (business agreements, operating/generating-by deadlines?)	• BC Hydro has issued competitive Calls for Tender for the supply of electricity in the past. • BC Hydro's SOP is presently directly available for clean energy projects which meet certain criteria, including a generation output of less than 15 MW. • Typical BC Hydro Energy Purchase Agreements from Independent Power Producers are 20-40 years in duration. • Business agreements with the owners of private transmission lines (e.g. independent power producers) for access to the market will be necessary. • The lead times to develop geothermal resources will include appropriate allowances for investigative drilling, technical and environmental studies, public consultation, transmission considerations, marketing, licencing, design, construction and commissioning. These lead times will vary from four to seven years depending on the specifics of each project. Projects with a history of exploration and analysis (e.g. Meager Creek/Pebble Creek, Lakelse, and Canoe Creek) will generally be on the shorter end of this time continuum, while other projects with less investigative work will take longer. Although the time required to drill a geothermal well and construct a power plant could conceivably be less than two years, the key uncertainties inherent in the environmental review, public consultation, transmission arrangements (either with BC Hydro or a private transmission owner), and the permitting and regulatory processes will realistically result in a further two years at a minimum for these activities.
F.	**Transmission Line Infrastructure**	
	State of the Infrastructure	Existing 138 kV transmission line with closest substations Wescup substation and Fort Nelson G.S.
	Transmission Route (distance, terrain and costs)	10 km of new 138 kV line required to connection to Wescup substation. Terrain is relatively flat; potential wetland conditions likely. Crossing of Fort Nelson River is necessary.
H.	**Community Issues**	
	Indigenous Law and Indigenous Development Areas	• First Nation consultative areas include Doig River First Nation, West Moberly First Nation, Prophet River First Nation, Fort Nelson First Nation, Dene Tha' First Nation as per Government of BC First Nations Consultative Areas Database. Consultation also required with Acho Dene Koe as per Geoscience BC recommendation. • Fort Nelson First Nation Lands Dept. (lands.fnnation.ca) has jurisdiction.
	Community Action	• BC Hydro completed the Site C Clean Energy Project Community Summary for Dene Tha' First Nation. Extent of area is south of proposed geothermal location, however, report includes community summary, BCH consultation summary, land use and resource use summary, aboriginal summary; community was generally apprehensive for new large scale energy development on traditional lands. (See Site C Clean Energy Project, volume 5 Appendix A04 published January 2013) • Fort Nelson Official Community Plan completed in 2006; community goals include expanding the region's economic base, cooperation with agencies in the provision of community services, protect the environment from pollution of the land, water and air and discourage development in areas that are potentially hazardous among others (see For Nelson Official Community Plan).
	Surface Rights	• First Nation consultative areas include Doig River First Nation, West Moberly First Nation, Prophet River First Nation, Fort Nelson First Nation, Dene Tha' First Nation as per Government of BC First Nations Consultative Areas Database. Consultation also required with Acho Dene Koe as per Geoscience BC recommendation. • Fort Nelson First Nation lands department is responsible for ensuring that the "interests of the Fort Nelson First Nation are represented with regard to all matters of Lands and Natural Resources." (http://www.fortnelsonfirstnation.org/lands--resources.html).
	Tourism	• Tourism is seasonal since winters are very harsh, cold and snowy, however, still a strong tourism industry in the area. Fort Nelson is on route to Alaska and serves as stop point for road-tripping tourists. Fort Nelson tourism website references several hotels and accommodations. (See Northern Rockies Travel Guide, Fort Nelson tourism website: http://www.tourismnorthernrockies.ca/index.php) • Although there is significant work underway in the natural gas industry, no reports were found to support a large influx of temporary workers in the town of Fort Nelson itself (most workers fly-in, fly-out).

CLARKE LAKE

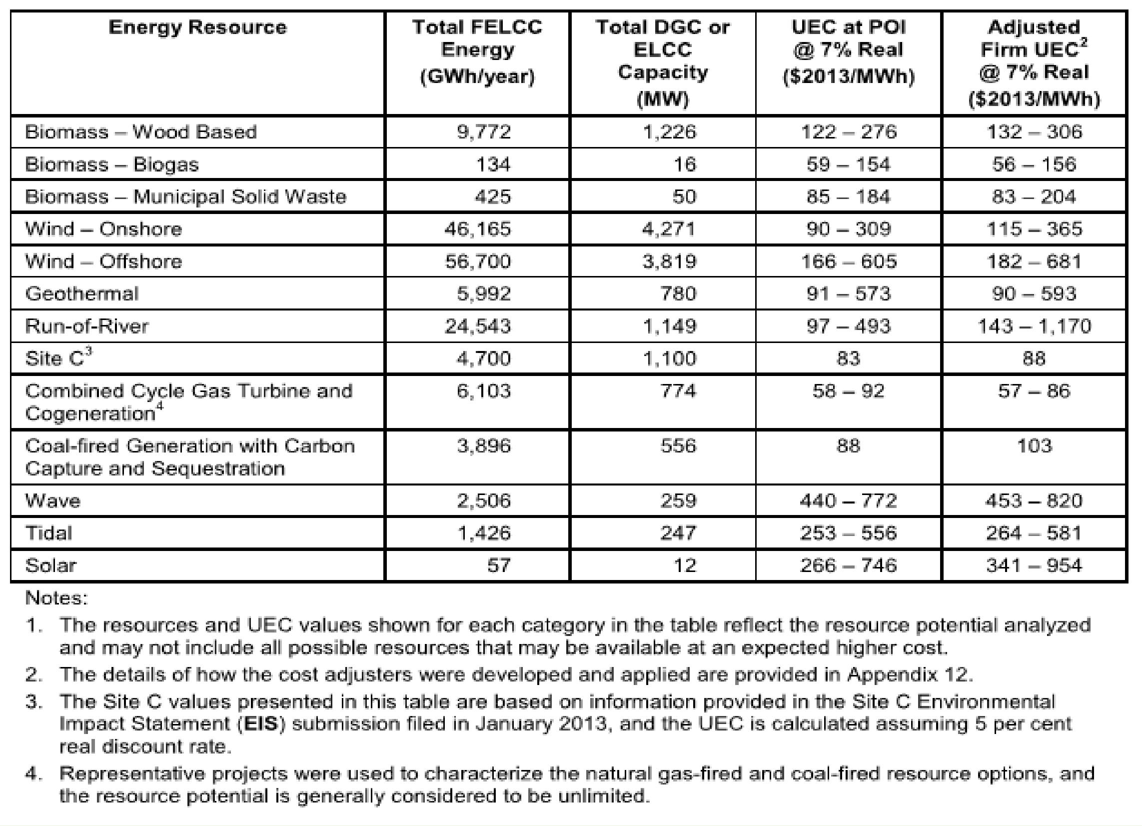
Near Fort Nelson, British Columbia, Canada
Topographical Map Sheet: Figure 4
Geological Map Sheet: Figure 5

	Category	Comments
I.	**Water Rights**	
	Availability (for example "air-cooled required")	Plant water requirement estimated approx. 43 L/s for binary plant. MAD out of Clarke lake 110 L/s; closest stream MAD 140 L/s. No existing water licence east of Fort Nelson River. Closest water licence approx. 12 km away (straight line). Currently 7 existing water licences on the following streams: Fort Nelson River (300 L/s), Muskwa River, Hanson Pond, Bailey Brook, Burbage Creek for purpose of processing, waterworks, and stockwatering.
	Availability for Drilling	Drilling requirement of 20 L/s. MAD out of Clarke lake 110 L/s; closest stream MAD 140 L/s. No existing water licence east of Fort Nelson River. Closest water licence approx. 12 km away (straight line). Currently 7 existing water licences on the following streams: Fort Nelson River (300 L/s), Muskwa River, Hanson Pond, Bailey Brook, Burbage Creek for purpose of processing, waterworks, and stockwatering.
J.	**Engineering**	
	Plant Location and Design	17 km west of highway 96. Significant existing unpaved road network (actual condition of road is unknown).
	Construction Issues	Potential wetland conditions. May need mat or pile foundations to address muskeg foundation issues.
	Transportation Issues	Possible wetland conditions. Unknown condition of extensive existing unpaved road network.
	Architectural Issues (Blend/hide into environment? Local styles? etc.)	None found
	Special Construction Issues (zero emissions)	None found
K.	**Non-Electrical Infrastructure (Roads and Habitation)**	
	Nearest Large Community > 50,000	Prince George, BC
	Nearest Community	Fort Nelson, BC
	Nearest Road and Condition	Nearest road is unpaved access road.
	Current Access Conditions (restrictions)	Significant unpaved road network in vicinity. Possible wetland conditions. Construction and operation workers can live in FN and travel to site each day.
	Terrain and Distance Factor for Road Building	Terrain is relatively flat; possible wetland conditions. Extensive unpaved road network already exists.

CLARKE LAKE

Near Fort Nelson, British Columbia, Canada
Topographical Map Sheet: Figure 4
Geological Map Sheet: Figure 5

	Category	Comments
L.	**Finance**	
	General Power Prices	BC Hydro acquires power through (1) competitive processes (Calls for Tender), (2) the Standing Offer Program (not including the mini-SOP under development), and (3) upgrades to its existing facilities or the development of new generation facilities. (Note that the net metering program targets projects less than 100 kW and is therefore not relevant to geothermal generation projects). Comments on the general price of power under each one are: • The power price paid by BC Hydro to independent power producers through Energy Purchase Agreements (EPAs) under Calls for Tender are proprietary and confidential. • The power price paid by BC Hydro to independent power producers through EPAs under the SOP are made up of a predetermined base price in 2010 dollars as determined by the region of the point of interconnection to the BC Hydro system, escalated at the Consumer Price Index annually up to the year in which an EPA is signed, and further adjusted based upon the time of day and month when the energy is delivered. For reference, the base price for the Lower Mainland region in 2010 dollars is $103.69/MWh. • BC Hydro's current Integrated Resource Plan dated November 2013 includes details of both demand-side management options and supply-side resource options to consider in meeting the future demand for electricity. These resource options, together with their attributes of total energy and capacity and unit energy costs, are listed in Table 2-2 of the November 2013 Resource Options Report Update. That table is reproduced below for ready reference. • Table 5-7 of the above-noted November 2013 Resource Options Report Update provides a summary of the Geothermal Potential by Transmission Region.

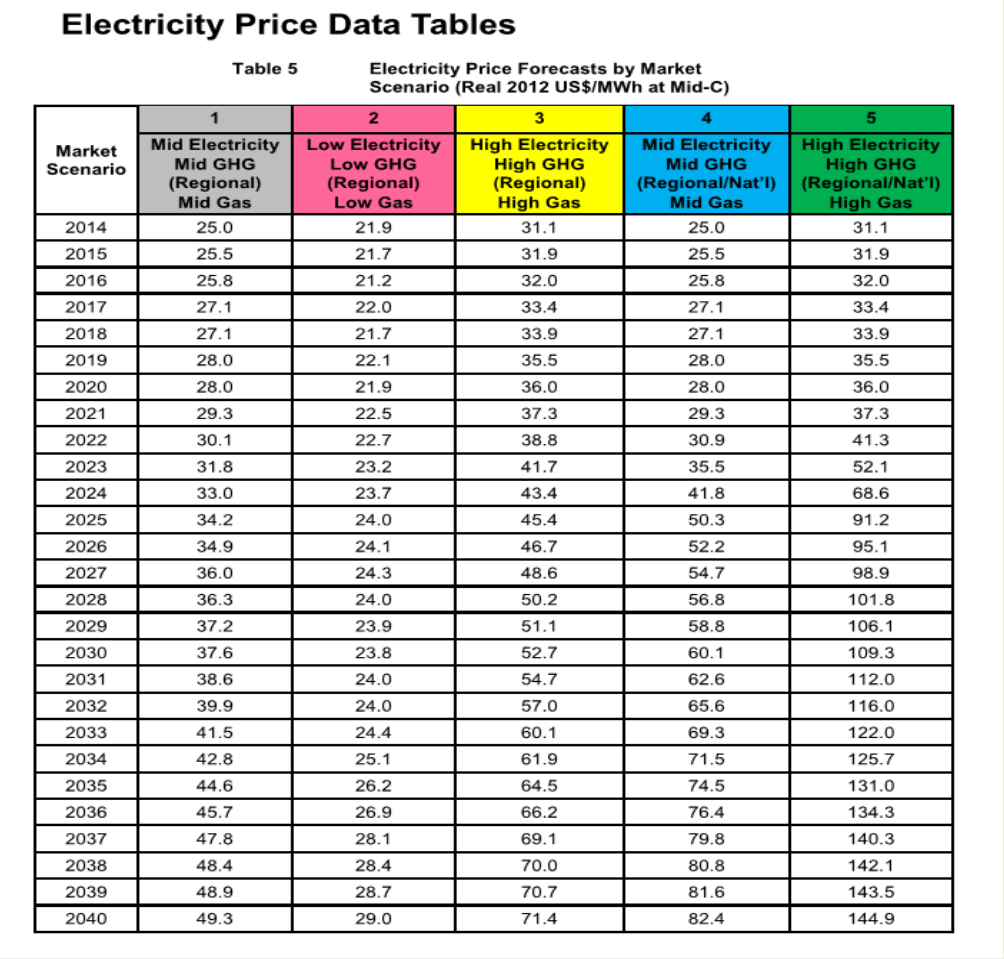


Energy Resource	Total FELCC Energy (GWh/year)	Total DGC or ELCC Capacity (MW)	UEC at POI @ 7% Real ($2013/MWh)	Adjusted Firm UEC[2] @ 7% Real ($2013/MWh)
Biomass – Wood Based	9,772	1,226	122 – 276	132 – 306
Biomass – Biogas	134	16	59 – 154	56 – 156
Biomass – Municipal Solid Waste	425	50	85 – 184	83 – 204
Wind – Onshore	46,165	4,271	90 – 309	115 – 365
Wind – Offshore	56,700	3,819	166 – 605	182 – 681
Geothermal	5,992	780	91 – 573	90 – 593
Run-of-River	24,543	1,149	97 – 493	143 – 1,170
Site C[3]	4,700	1,100	83	88
Combined Cycle Gas Turbine and Cogeneration[4]	6,103	774	58 – 92	57 – 86
Coal-fired Generation with Carbon Capture and Sequestration	3,896	556	88	103
Wave	2,506	259	440 – 772	453 – 820
Tidal	1,426	247	253 – 556	264 – 581
Solar	57	12	266 – 746	341 – 954

Notes:
1. The resources and UEC values shown for each category in the table reflect the resource potential analyzed and may not include all possible resources that may be available at an expected higher cost.
2. The details of how the cost adjusters were developed and applied are provided in Appendix 12.
3. The Site C values presented in this table are based on information provided in the Site C Environmental Impact Statement (**EIS**) submission filed in January 2013, and the UEC is calculated assuming 5 per cent real discount rate.
4. Representative projects were used to characterize the natural gas-fired and coal-fired resource options, and the resource potential is generally considered to be unlimited.

CLARKE LAKE

Near Fort Nelson, British Columbia, Canada
Topographical Map Sheet: Figure 4
Geological Map Sheet: Figure 5

Category	Comments
Market Price ($/MWhr)	• As noted in the above Table 2-2 from the November 2013 Resource Options Report Update, the Unit Energy Cost for geothermal resources at a 7% real discount rate in 2013 dollars ranges from $91/MWh to 573/MWh at the point of interconnection to the BC Hydro system. • Wholesale electricity prices for trading purposes can vary greatly. In the Pacific Northwest, these prices are affected by such factors as precipitation/snowfall in the region, unforeseen generation outages and ambient temperatures. A general flavour of the wholesale electricity prices for potential export of electricity from BC can be obtained from a variety of sources. One such source is the US Energy Information Administration (www.eia.gov/electricity/wholesale/#history). This source provides current and historical electricity market data. Of particular relevance is the mid-C trading hub in the Northwest Region (one example would be a Mid-C peak price on March 17, 2015 of $19.87US weighted average cost from 72 trades). Access to that market for geothermal projects in BC would require access on both the BC Hydro transmission system to the Canada/US border, and on the appropriate transmission system (e.g. Bonneville Power Authority) in the US. • BC Hydro forecasts of market prices under various scenarios was provided in the November 2013 IRP. Table 5 in Appendix 5A – Market Forecast Data is reproduced below for ready reference. 

Electricity Price Data Tables

Table 5 Electricity Price Forecasts by Market Scenario (Real 2012 US$/MWh at Mid-C)

Market Scenario	1 Mid Electricity Mid GHG (Regional) Mid Gas	2 Low Electricity Low GHG (Regional) Low Gas	3 High Electricity High GHG (Regional) High Gas	4 Mid Electricity Mid GHG (Regional/Nat'l) Mid Gas	5 High Electricity High GHG (Regional/Nat'l) High Gas
2014	25.0	21.9	31.1	25.0	31.1
2015	25.5	21.7	31.9	25.5	31.9
2016	25.8	21.2	32.0	25.8	32.0
2017	27.1	22.0	33.4	27.1	33.4
2018	27.1	21.7	33.9	27.1	33.9
2019	28.0	22.1	35.5	28.0	35.5
2020	28.0	21.9	36.0	28.0	36.0
2021	29.3	22.5	37.3	29.3	37.3
2022	30.1	22.7	38.8	30.9	41.3
2023	31.8	23.2	41.7	35.5	52.1
2024	33.0	23.7	43.4	41.8	68.6
2025	34.2	24.0	45.4	50.3	91.2
2026	34.9	24.1	46.7	52.2	95.1
2027	36.0	24.3	48.6	54.7	98.9
2028	36.3	24.0	50.2	56.8	101.8
2029	37.2	23.9	51.1	58.8	106.1
2030	37.6	23.8	52.7	60.1	109.3
2031	38.6	24.0	54.7	62.6	112.0
2032	39.9	24.0	57.0	65.6	116.0
2033	41.5	24.4	60.1	69.3	122.0
2034	42.8	25.1	61.9	71.5	125.7
2035	44.6	26.2	64.5	74.5	131.0
2036	45.7	26.9	66.2	76.4	134.3
2037	47.8	28.1	69.1	79.8	140.3
2038	48.4	28.4	70.0	80.8	142.1
2039	48.9	28.7	70.7	81.6	143.5
2040	49.3	29.0	71.4	82.4	144.9

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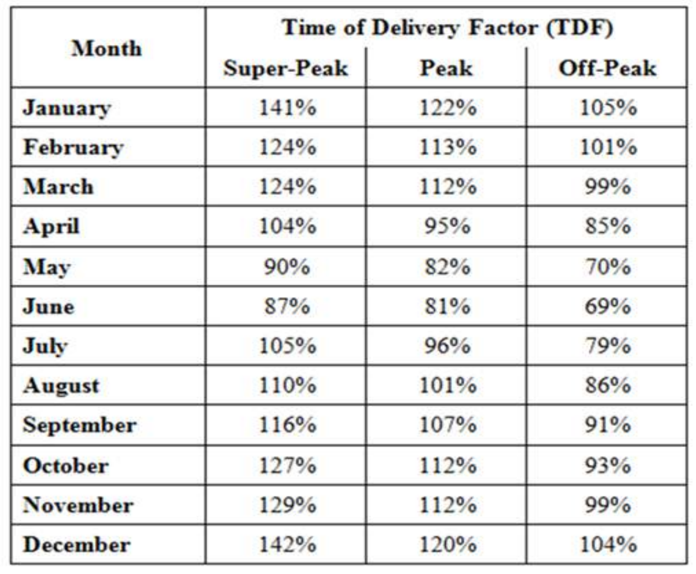
Near Fort Nelson, British Columbia, Canada
Topographical Map Sheet: Figure 4
Geological Map Sheet: Figure 5

Category	Comments
Green Power Premium ($/MWhr)	• BC Hydro’s past procurement processes for the acquisition for power from independent power producers has offered a premium for green power. • Within British Columbia, there is little demand for the purchase of “green power certificates” (instruments that a customer can purchase to be assured that the electricity used is environmentally friendly) from BC Hydro. BC Hydro’s generation mix is already approximately 93% clean. • California has a goal of 33% of retail sales by 2020 to be sourced from eligible renewable energy sources. However, the opportunity for geothermal power from British Columbia, particularly “bundled” green energy with Renewable Energy Certificates (RECs), to compete in that market is low, for a number of reasons 1. The price of electricity is driven by the low cost of natural gas; 2. There are large amounts of renewables, such as wind and solar, in California; and 3. Firm transmission access to the California market through the BPA transmission system is generally not available.
Capacity Price ($/KW)	• There is no price in $/kW for capacity resource options in the market at present. • Table 3-27 entitled "UCCs of Capacity Resource Supply Options" in BC Hydro’s Integrated Resource Plan dated November 2013 provided a summary of capacity resource options (e.g. pumped storage, simple cycle gas turbines and resource smart projects such as Revelstoke Unit 6). The unit capacity costs (UCCs) at the point of interconnection to the BC Hydro system in $2013/kW-year are shown in the table.
Is there a higher price for base load power?	In general, baseload power (ie firm power) is more valuable to BC Hydro and furthermore the price paid for baseload power varies by month throughout the year. As an example, the following excerpt is taken from BC Hydro’s SOP: “1. Definitions: In this Appendix 4, the following words and expressions have the following meanings: (a) “Off-Peak Hours” means all hours other than Super-Peak Hours and Peak Hours. (b) “Peak Hours” means the hours commencing at 06:00 PPT and ending at 16:00 PPT, and commencing at 20:00 PPT and ending at 22:00 PPT, Monday through Saturday inclusive, but excluding British Columbia statutory holidays. (c) “Super-Peak Hours” means the hours commencing at 16:00 PPT and ending at 20:00 PPT Monday through Saturday inclusive, but excluding British Columbia statutory holidays.” 

Month	Time of Delivery Factor (TDF)		
	Super-Peak	Peak	Off-Peak
January	141%	122%	105%
February	124%	113%	101%
March	124%	112%	99%
April	104%	95%	85%
May	90%	82%	70%
June	87%	81%	69%
July	105%	96%	79%
August	110%	101%	86%
September	116%	107%	91%
October	127%	112%	93%
November	129%	112%	99%
December	142%	120%	104%

CLARKE LAKE

Near Fort Nelson, British Columbia, Canada
Topographical Map Sheet: Figure 4
Geological Map Sheet: Figure 5

	Category	Comments
	Estimated Size of Resource	See Section A.
	Is there any green power incentives?	• The BC government created the Innovative Clean Energy (ICE) fund with an initial mandate to accelerate the commercialization of emerging clean energy technologies (now expanded to include a broad range of energy efficiency and conservation projects). British Columbia also has a program entitled Scientific Research and Experimental Development Tax credit (SR&ED). Geothermal proponents could keep a watching brief on these programs for applicability and relevance. • The BC government's First Nations Clean Energy Business Fund. This fund promotes increased Aboriginal community participation in the clean energy sector. It provides: o Capacity funding of up to $50,000 per applicant to cover the early stages (e.g. feasibility studies) of project development ; and o Equity funding of up to $500,000 per applicant to support a financially viable and resourced clean energy project. • There are a number of government of Canada programs to encourage the development of renewable power. Some of these programs may be active but not currently issuing calls for proposals. Others may be focussed on research and innovation and may not be directly applicable to geothermal technologies/resources, while others may be fully subscribed and even inactive but are noted in terms of completeness. Some of these programs include: o Natural Resources Canada ecoEnergy for Renewable Power program; o Sustainable Development Technology Canada funds; o Clean Energy Fund; o Industrial Research Assistance Program; and o Green Infrastructure Fund Geothermal proponents could keep a watching brief on these and other federal government programs for their applicability and relevance.
	Grants	See above under green power incentives
	Tax Holidays	None listed on federal and provincial websites.
	Tax Relief	• Under Classes 43.1 and 43.2 in Schedule II of the Income Tax Regulations, certain capital costs of systems that produce energy by using renewable energy sources or fuels from waste, or conserve energy by using fuel more efficiently are eligible for accelerated capital cost allowance. Under Class 43.1, eligible equipment may be written-off at 30 percent per year on a declining balance basis. In general, equipment that is eligible for Class 43.1 but is acquired after February 22, 2005 and before year 2020 may be written-off at 50 percent per year on a declining balance basis under Class 43.2. Without these accelerated write-offs, many of these assets would be depreciated for income tax purposes at annual rates between 4 and 30 percent. • In addition to Class 43.1 or 43.2 capital cost allowance, the Income Tax Regulations allow certain expenses incurred during the development and start-up of renewable energy and energy conservation projects [Canadian renewable and conservation expenses (CRCE)] to be fully deducted in the year they are incurred, carried forward indefinitely and deducted in future years, or transferred to investors through a flow-through share agreement.

CLARKE LAKE

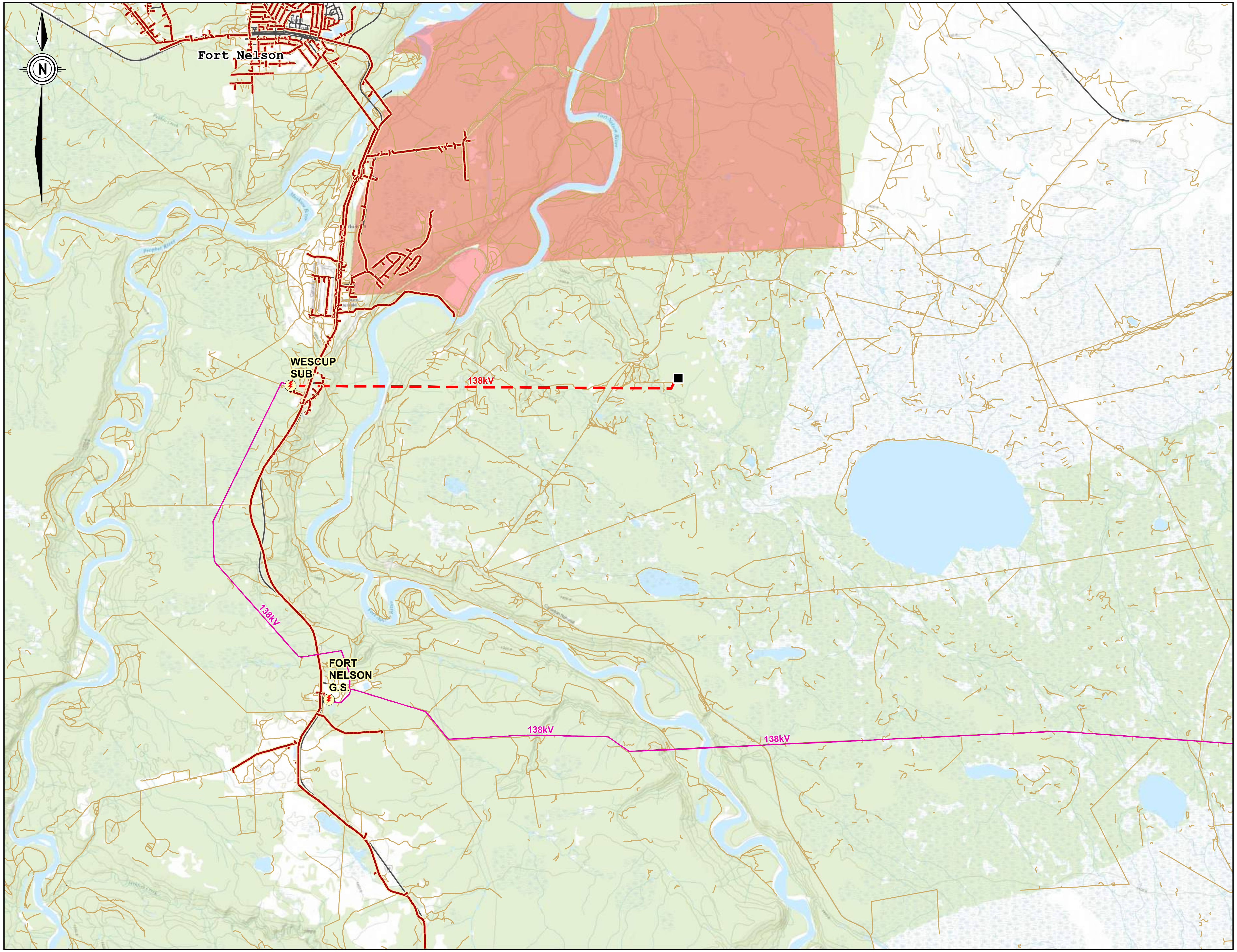
Near Fort Nelson, British Columbia, Canada
Topographical Map Sheet: Figure 4
Geological Map Sheet: Figure 5

	Category	Comments
	Loan Guarantees	The following is an excerpt from http://www.fnfa.ca/en/fnfa/ “The First Nations Finance Authority (FNFA) is a statutory not-for-profit organization without share capital, operating under the authority of the First Nations Fiscal Management Act, 2005. The FNFA’s purposes are to provide investment options and capital planning advice and—perhaps most importantly, access to long-term loans with preferable interest rates. The FNFA is not an agent of Her Majesty or a Crown corporation and is governed solely by the First Nations communities that join as Borrowing Members. The advantages of joining the FNFA as a Borrowing Member are: 1. Access to low rate, below bank prime, loans with repayment terms up to 30 years; 2. First Nations choose the repayment terms that work best for their budget; 3. FNFA loans do not require collateral; 4. FNFA loans can be used to refinance existing debt; and 5. FNFA’s interest rates and terms parallel those available to provincial and local governments. Most revenue streams are eligible to support FNFA loan requests. Eligible capital projects FNFA can finance include infrastructure, social and economic development, land purchases, independent power projects, community housing and rolling stock/heavy equipment. FNFA is a stand-alone organization separate from the Government of Canada, and its operating policies are set by its Borrowing Members, represented by the First Nation’s Chief and Council appointee. The FNFA is for First Nations, by First Nations.”
	Royalties/Fees	Geothermal Resources Act, [RSBC 1996] CHAPTER 171, as of March 11, 2015 Permits for well authorizations for wells to be drilled within the boundaries of the permittee's location must pay a prescribed rent for the permit (Section 5). Based on Section 17 of the Act, (1) A lessee who produces a geothermal resource for purposes other than testing must pay to the government (a) a royalty established by agreement under this section, (b) an amount agreed under this section to be paid instead of royalty, or (c) if no royalty or amount has been agreed under this section, the prescribed royalty.

CLARKE LAKE

Near Fort Nelson, British Columbia, Canada
Topographical Map Sheet: Figure 4
Geological Map Sheet: Figure 5

Category		Comments
	General Idea of Royalties	With regard to use of the water resources within the geothermal tract, Section 4 of the Water Sustainability Act states "This Act does not apply to geothermal resources as defined in section 1 (1) [definitions] of the Geothermal Resources Act."
	Private Land Owner or Government Land	Geothermal proponents will need to arrange financial agreements (eg leases or purchases) with private property owners for the geothermal land tract. Proponents for geothermal facilities on Crown Land must apply for the appropriate tenure under the BC Land Act (eg Statutory Right of Way, Licence of Occupation).
	Tax Rate in the Country	• Income eligible for small-business deduction (up to $500,000 income): 11% Federal tax, combined federal and provincial (British Columbia): 13.5%. • Income not eligible for small-business deduction: 15% Federal, combined federal and provincial (British Columbia): 26%
	Transmission Tariffs	Under wholesale wheeling (whereby electricity is transmitted from electricity generators to utilities) to customers in Alberta, the US, or other wholesale customers in BC, the generation supplier must request service on the appropriate BC Hydro transmission line under the Open Access Transmission Tariff (OATT) at a regulated cost for that service. Depending on the end customer, the generation supplier will have to make similar arrangements to cover transmission access in other jurisdictions (e.g. the Bonneville Power Authority for wheeling to a US customer). This 'pancaking' of rates, along with transmission congestion issues, affects the economic viability of the potential wholesale opportunity.
M.	**Maps**	
	Regional topographic map showing population centres, roads and other infrastructure including electrical grid and nearest substation and/or generating station. (1:500,000?)	Topographical Map Sheet: Figure 4
	Regional map showing land tenure in area – geothermal concessions, mining concessions, private land holds, public or national lands (parks). (1:500,000?)	Topographical Map Sheet: Figure 4
	Regional geological map. (1:250 or 500,000?)	Geological Map Sheet: Figure 5
	Detailed geological map of the immediate area of the concessions. (1:50,000 or 100,000)	Geological Map Sheet: Figure 5
N.	**Other Issues and Considerations**	



Legend

■	Proposed Geothermal Plant Location
- -	Proposed Transmission Line
⚡	Existing Substation
~	Existing Transmission Line
~	Existing Distribution Line
~	Paved Road
~	Other Road
▨	First Nations Reserve

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Service Layer Credits: Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

2 0 2
Kilometers

Project No.	Date
2692-004	April 30, 2015

Potential Geothermal Plant at Clarke Lake 34MW

Figure 4

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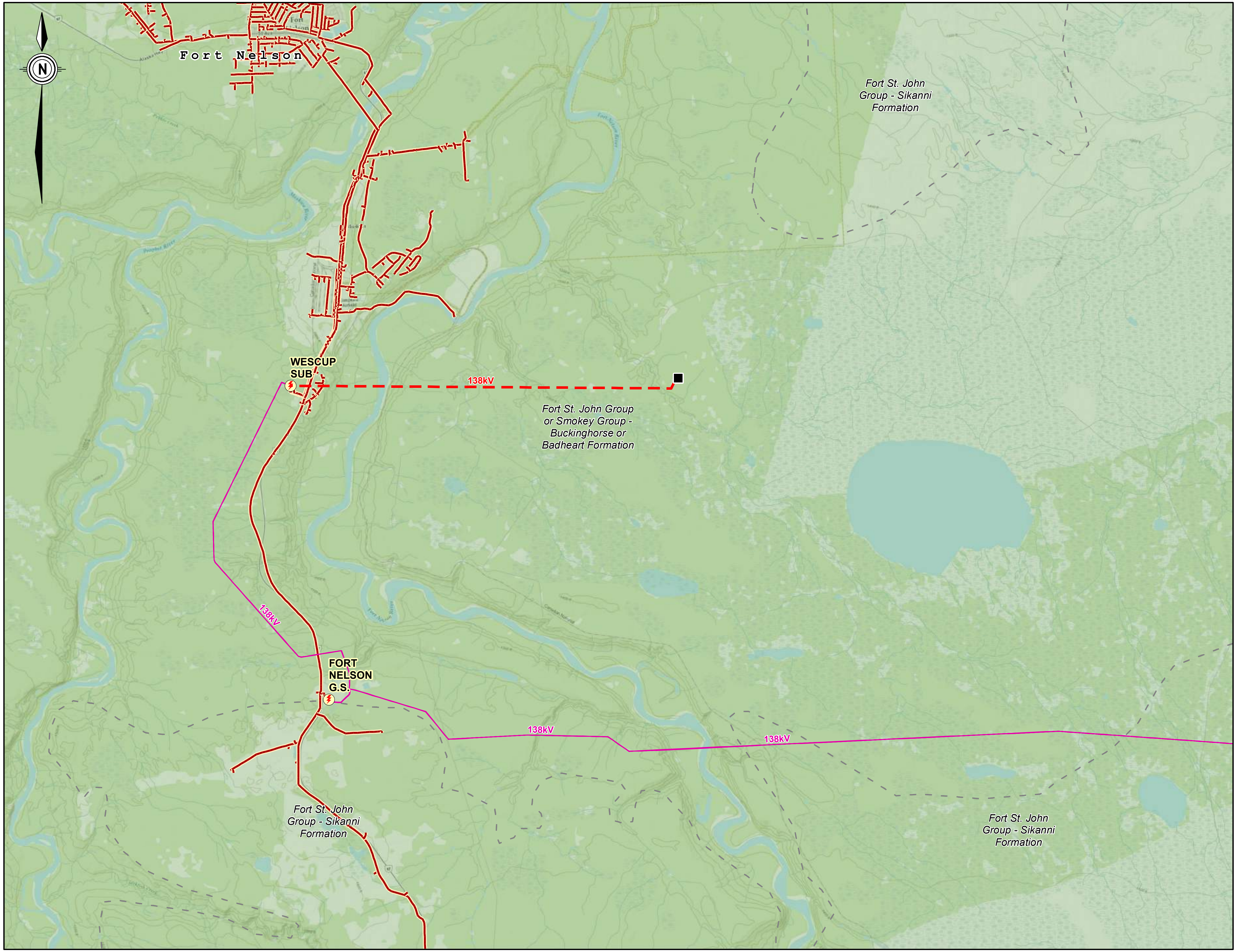
Author: RTaylor



Geoscience BC

Legend

- ■ Proposed Geothermal Plant Location
- Proposed Transmission Line
- Existing Substation
- Existing Transmission Line
- Existing Distribution Line

Bedrock Type

- 🟩 Sedimentary Rocks
- Rock Type Boundary

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3 0 3
Kilometers

Project No.	Date
2692-004	April 30, 2015

Geological Strata Map for Clarke Lake 34MW

Figure 5

Path: Q:\2600-2699\2692-004\430-GIS\MXD-RP\2692004_GeothermalLocationsGeology_mapbook.mxd Date Saved: 2015-04-27 2:16:45 PM
Author: RTaylor

Appendix D

Clearwater Volcanic Field Geothermal Development Decision Matrix and Figures 6 & 7

CLEARWATER VOLCANIC

Near Clearwater, British Columbia, Canada
Topographical Map Sheet: Figure 6
Geological Map Sheet: Figure 7

Category		Comments
A.	**Reservoir Potential**	
	Size/Potential/Type	• **Reservoir size:** N/A (no area or depth defined in literature) - therefore, reservoir volume estimated* at: 2.2 km^3 assuming the equivalent of a single spring (most-likely area: 2 km^2; most-likely thickness: 1.1 km) (*Reservoir assumptions made using Appendix III in GeothermEx, 2004) • **Potential:** Assume 10 MW, compatible with generic reservoir volume (above) in vicinity of single spring, for reservoir temperatures in range of 150˚C to 200˚C. • **Type:** unknown, likely binary
	Temperature/Water and Gas Chemistry/Mineral Indicators	**Surface features:** • Two springs are in the area: Clearwater Springs and Ray's Mineral Spring. Both lie within the Clearwater Depression (CD, aka Murtle Plateau), with Clearwater Springs located on the southwest flank of McLeod Hill (a tuya, or flat-topped subglacially-erupted mound, in the east-central portion of the CD) and Ray's Mineral Spring is located ~11 km almost due north on the north side of a drainage valley between Kilpill Mountain and Jack's Jump (7.5km SW of Kostal Cone). **Surface discharge temperatures** (Souther, 1975): • Clearwater spring: 14°C • Ray's Mineral Spring: 10°C **Geothermometry** (Souther, 1975): • Clearwater spring: Na-K-Ca 72°C • Ray's Mineral Spring: Na-K-Ca 49°C • SiO$_2$ (chalcedony) temperatures for both: 112°C **Water chemistry:** • Clearwater Spring and Ray's Mineral Spring are both cold, (Ca>Na)-HCO$_3$ type waters with high Mg and low cation temperatures (maximum about 50°C) **Mineral indicators:** • Ray's Mineral Spring: small carbonated spring that bubbles forth out of a small volcano-like cone (tufa mound) (Wells Gray Park, 2015)
	Surface Flow Rates and Reservoir Recharge	Unknown
	3D Permeability (heat exchange potential)	No information
	Recent Magmatism	• Potentially active field of numerous small basaltic cinder cones and extensive lava flows • Volcanic activity dates back to ~3 mya. • Most recent eruption took place from Kostal cone around 1,550 AD, thus being one of the most recent volcanic eruptions in Canada (Global Volcanism Program, 2015). The Kostal cone is about 30 km north of the developable prospect area.
	Structural Setting	The Wells Gray-Clearwater area appears to be the locus of transition from northerly-trending large-scale structures (Fraser Fault Zone) and major north-south trending valleys to northwesterly directed ones. The distribution of metamorphic core complexes culminate in a wedge at this point. Active uplift may extend to the north in the Cariboo Mountains (where the Premier Range has some of the highest elevations). Normal faults (west-side down) developed in response to this uplift and are coincident with Clearwater Lake and the Clearwater and North Thompson Rivers. The faults running the length of the Clearwater River system form an en-echelon set which overlap in the vicinity of the Clearwater Depression, with the north and south sides of the depression paralleling other faults in the region. (Hickson, 1987)

CLEARWATER VOLCANIC

Near Clearwater, British Columbia, Canada
Topographical Map Sheet: Figure 6
Geological Map Sheet: Figure 7

Category		Comments
	Geophysics	No information
	Reservoir Host Rock	• The Wells Gray-Clearwater volcanic field is located at the western margin of the Columbia Mountains (Omineca Crystalline Terrane), an uplifted belt of metamorphic and granitic rocks that straddles the boundary between accreted terranes of the Interior Plateau (Hickson et al., 1995). • The Wells Gray Park is underlain by Hadrynian and possibly younger metamorphic rocks of the Kaza Group and Shuswap Complex (Canil and Scarfe, 1989) • The Wells Gray-Clearwater area includes a succession of late Cenozoic, alkali-olivine basalt flows that lie east of the extensive Chilcotin lavas and define the eastern end of the Anahim Volcanic Belt. The rocks are petrographically similar to (but less altered than) the Chilcotin basalts (Hickson & Souther, 1984). • The Wells Gray-Clearwater Volcanic Field (WGCVF) is the site of transitional- to alkali-olivine basaltic volcanism erupted over the last three million years. The small-volume magmas (<1 km^3) erupted along pre-existing normal faults related to late-stage terrane amalgamation (Hickson and Vigouroux, 2014). Origin of volcanism may be a result of local crustal thinning. • McLeod Hill volcanics date to ~3.5 mya; however, the majority of volcanic activity likely occurred in the last 600,000 years, with areas of Holocene volcanism located in the east, northwest and west portions of the Clearwater Depression. (Hickson, 1987)
	Drilling Issues	Springs are located within Wells Gray Provincial Park
	Brief Description of Geological Setting of Thermal Features (i.e., springs emanate from fluvial gravels; beside a river, etc.)	Exposures of the basal surfaces of the flows are commonly associated with springs and seepages. Extensive tufa deposits have been built around some springs, such as those in the upper Hemp Creek valley and at Red Spring, Ray's Mineral Spring, Meadow Falls, and 3rd Canyon Creek. Where springs exit from the base of a cliff, centralized erosion around the seepage has formed large grottos in the cliff face (The Shadden is an example). (Hickson, 1987)
B.	**Exploration Uncertainty (Risk)**	
	Degree of Identification of Resources/Reserves	Low No focused definition of resource location to date.
	Likelihood of Covering Reservoir with Concession	Low Both cold springs are located within Wells Gray Provincial Park (Pynn, 2010), so development near the springs is unlikely. There is an elongated tract of non-park land (about 15 km long and 4 km wide) extending northward from the park's southern boundary. The prospect location based on coordinates provided by Geoscience BC is toward the northern end of this tract, but still 10 km south of the closest spring (Clearwater) .
	Expected Authorization Date	Unknown
	Specific Timing of Exploration (2 + 2 years, BC 8 years, etc.)	5-6 years Assuming a viable prospect can be identified within non-park land, expect at least 1-2 years for permitting and surface exploration (possibly including shallow temperature-gradient holes) + 1 year of deep gradient-well drilling + 1 year for development drilling and testing + 1 year for further development drilling and start of plant construction + 1 year for drilling wrap-up and completion of plant construction.
	Degree of Previous Exploration (can be good or bad)	Low Geological studies of the area describe regional setting. Nearest geochemical data are from springs at a distance of 10 km or more from accessible land. Prospect lacks geophysical or temperature-gradient data.
	Surface Operational Capacity (enough stable area for drilling and a plant?)	There is potentially enough space for well pads and a power plant within the non-park tract, but there is not much evidence that the accessible land is anywhere near the geothermal resource.
	Exploration to Exploitation: A summary rating of Exploration Uncertainty (risk) on a scale of difficult (high risk) through medium (moderate risk) to easy (low risk)	Difficult Constraints on accessible land will likely be a serious impediment to locating and developing geothermal power in this area. Since there are no nearby springs, geochemical indications of source temperatures will be available only by drilling. Geophysical studies and temperature-gradient wells could potentially provide more encouragement, but these require a relatively high threshold of investment for a prospect about which not much is known.

CLEARWATER VOLCANIC

Near Clearwater, British Columbia, Canada
Topographical Map Sheet: Figure 6
Geological Map Sheet: Figure 7

Category		Comments
C.	**Environmental Issues**	
	Protected Areas	• Proposed transmission line is approx. 2 km from Wells Gray Provincial Park. Site location is within Park.
	Endangered Species	• Coast Mountain Draba (blue-listed plant) habitat polygon in proposed transmission line location. • Oregon Willowherb (blue-listed plant) habitat polygon approx. 2.7 km from proposed transmission line. • Southern Mountain Caribou (Endangered (SARA Schedule 1), red-listed) habitat polygon approx. 9.5 km from proposed plant location.
	Geothermal Surface Features	• Clearwater Hotsprings approx. 11 km north of proposed plant location.
	Other	• Rainbow Trout in Fage Creek, located along proposed transmission line. • Coho Salmon present and Chinook Salmon spawning location in Clearwater River, 1.3 km west of proposed transmission line.
D.	**Geothermal Area - Bidding and/or Type of Land Holding (private/government/lease/etc.)**	
	Bidding Area	No known existing active, cancelled or unsold geothermal title tracts
	Other Claim Rights (mining and/or oil)	No known coal or mineral titles. Proposed location is not within known oil and gas management area; no known tenures at proposed location.

CLEARWATER VOLCANIC

Near Clearwater, British Columbia, Canada
Topographical Map Sheet: Figure 6
Geological Map Sheet: Figure 7

Category		Comments
E.	**Market**	
	Main Electricity Consumers (direct sales and/or government)	General Overview 1. BC Hydro acquires power from Independent Power Producers (which would include geothermal proponents) through two main processes: • Competitive calls: when BC Hydro issues a Call for Tenders for the supply of electricity to BC Hydro, geothermal proponents can bid into those competitive calls. • Standing Offer Program (SOP): This program is presently available for clean generation projects greater than 0.1 MW but not more than 15 MW. Proponents do not compete against each other but are paid a predetermined price by BC Hydro. Depending on the specifics of each project, proponents may wish to size their projects to be under the 15 MW threshold for the SOP (BC Hydro is developing a 'mini-SOP' component within the overall SOP. This mini-SOP will apply to projects in the 0.1 MW to 1 MW range, but would not realistically apply to potential geothermal generation projects). • In addition, BC Hydro's net metering program is designed for residential and commercial customers who wish to connect a small electricity generating unit to the BC Hydro distribution system. Generating units up to 0.1 MW in capacity that utilize a clean or renewable resource are eligible to participate in the program. Given the small size, this program has no applicability to potential geothermal generation projects. The acquisition of geothermal power would contribute to BC Hydro's current target for clean energy and to the diversification of BC Hydro's resource mix, making it less reliant on snow melt and stream flow. 2. Although FortisBC is a potential customer for electricity from geothermal sources, the opportunities may be limited given FortisBC's ability to receive electricity from BC Hydro under Rate Schedule 3808. However there is a wheeling agreement in place which would facilitate a geothermal project located in FortisBC's service territory to sell electricity to BC Hydro through BC Hydro's competitive calls and/or the SOP, or to other potential customers as noted below. 3. Wholesale wheeling (whereby electricity is transmitted from electricity generators to utilities) to customers in Alberta, the US, or other wholesale customer in BC is allowed. The generation supplier must request service on the appropriate BC Hydro transmission line under the Open Access Transmission Tariff (OATT) at a regulated cost for that service. Depending on the end customer, the generation supplier will have to make similar arrangements to cover transmission access in other jurisdictions (e.g. the Bonneville Power Authority for wheeling to a US customer). This 'pancaking' of rates, along with congestion issues, affects the economic viability of the potential wholesale opportunity. 4. Retail access, defined as a market in which electricity is sold directly to consumers by competing suppliers, is generally not permitted in BC. However there may be opportunities for bilateral arrangements for direct sales of electricity from geothermal generating plants to large customers (e.g. pulp mills, large sawmills, mines) as follows: • To replace the electricity supplied at a high voltage from BC Hydro under BC Hydro Transmission Rate 1823 of the Electric Tariff. Such replacement would be challenging given the rates charged under that tariff. • To supply electricity to a remote facility (e.g. a mine, LNG plant or other industrial facility) directly from a geothermal plant located in close proximity to the facility, thereby precluding the need for a lengthy transmission line to connect to the BC Hydro electrical grid. • A potential electricity customer, Yellowhead Mining Company's Ruddock Creek, a metal project, is in the permitting or environmental assessment phase. The potential operations are located approximately 115km away. • A potential electricity customer, Imperial Metals Mount Polley mine, is located approximately 120 km away from the Clearwater site. • Taseko's Gibraltar Mine is located approximately 125 km from the Clearwater geothermal site. • A potential electricity customer, Imperial Metals Corporation's' Ruddock Creek, a zinc/lead development project, is in the permitting or environmental assessment phase. The potential operations are located approximately 130 km away.

CLEARWATER VOLCANIC

Near Clearwater, British Columbia, Canada
Topographical Map Sheet: Figure 6
Geological Map Sheet: Figure 7

Category		Comments
	Time Limits? (business agreements, operating/generating-by deadlines?)	• BC Hydro has issued competitive Calls for Tender for the supply of electricity in the past. • BC Hydro's SOP is presently directly available for clean energy projects which meet certain criteria, including a generation output of less than 15 MW. • Typical BC Hydro Energy Purchase Agreements from Independent Power Producers are 20-40 years in duration. • Business agreements with the owners of private transmission lines (e.g. independent power producers) for access to the market will be necessary. • The lead times to develop geothermal resources will include appropriate allowances for investigative drilling, technical and environmental studies, public consultation, transmission considerations, marketing, licencing, design, construction and commissioning. These lead times will vary from four to seven years depending on the specifics of each project. Projects with a history of exploration and analysis (e.g. Meager Creek/Pebble Creek, Lakelse, and Canoe Creek) will generally be on the shorter end of this time continuum, while other projects with less investigative work will take longer. Although the time required to drill a geothermal well and construct a power plant could conceivably be less than two years, the key uncertainties inherent in the environmental review, public consultation, transmission arrangements (either with BC Hydro or a private transmission owner), and the permitting and regulatory processes will realistically result in a further two years at a minimum for these activities.
F.	**Transmission Line Infrastructure**	
	State of the Infrastructure	Closest transmission line is 138 kV via Clearwater substation. The 138 kV line to Valemount from Kamloops is a long radial line that has reliability challenges, forest fire exposure and already has a number of IPPs connected. Capacity on the line may be a concern. Interconnection study is available from BC Hydro.
	Transmission Route (distance, terrain and costs)	New transmission line approx. 30 km via existing paved road (minimal routing with non-existing or unpaved roads) to Clearwater Substation. Terrain is moderate with minimal elevation changes through the remote location.
H.	**Community Issues**	
	Indigenous Law and Indigenous Development Areas	• First Nation Consultative areas include Canim Lake Indian Band, Simpcw First Nation, Nekonlith Indian Band. • Simpcw First Nation Traditional Territory. See Simpcw First Nation Consultation and Accommodation Guidelines and Heritage Policy - outlines specific steps for consultation and accommodation. (Simpcw First Nation Consultation and Accommodation Guidelines - 2006, available from www.simpcw.com) • Draft Comprehensive Community Plan (CCP) from First Nations BC Website: "Simpcw FN will continue to negotiate constructive mutually beneficial, investment opportunities within Simpcwulucw."
	Community Action	• Clearwater, BC is carbon neutral BC Climate Action Community 2012. (http://www.districtofclearwater.com/news/407-clearwater-is-a-carbon-neutral-bc-climate-action-community-2012). • Clearwater, BC official community plan is currently under public consultation. Vision includes a carbon-neutral community achieved through the use of innovative energy alternatives, power productions and new construction. (Clearwater Official Community Plan).
	Surface Rights	• First Nation Consultative areas include Canim Lake Indian Band, Simpcw First Nation, Nekonlith Indian Band. • Simpcw cultural heritage areas for traditional use area, sacred and spiritual areas, areas of historical cultural significance, archaeological sites. (www.simpcw.com)
	Tourism	• Simpcw Natural Resource Dept. references "joint ventures with industry in forestry, mining, tourism and utilities." (www.simpcw.com) • Tourism is a large industry along with the major forestry industry in Clearwater. Tourism includes outdoor recreational activities, advertised as "more than just a stop over location" on Clearwater's tourism website. (http://www.districtofclearwater.com/visitors/tourism)

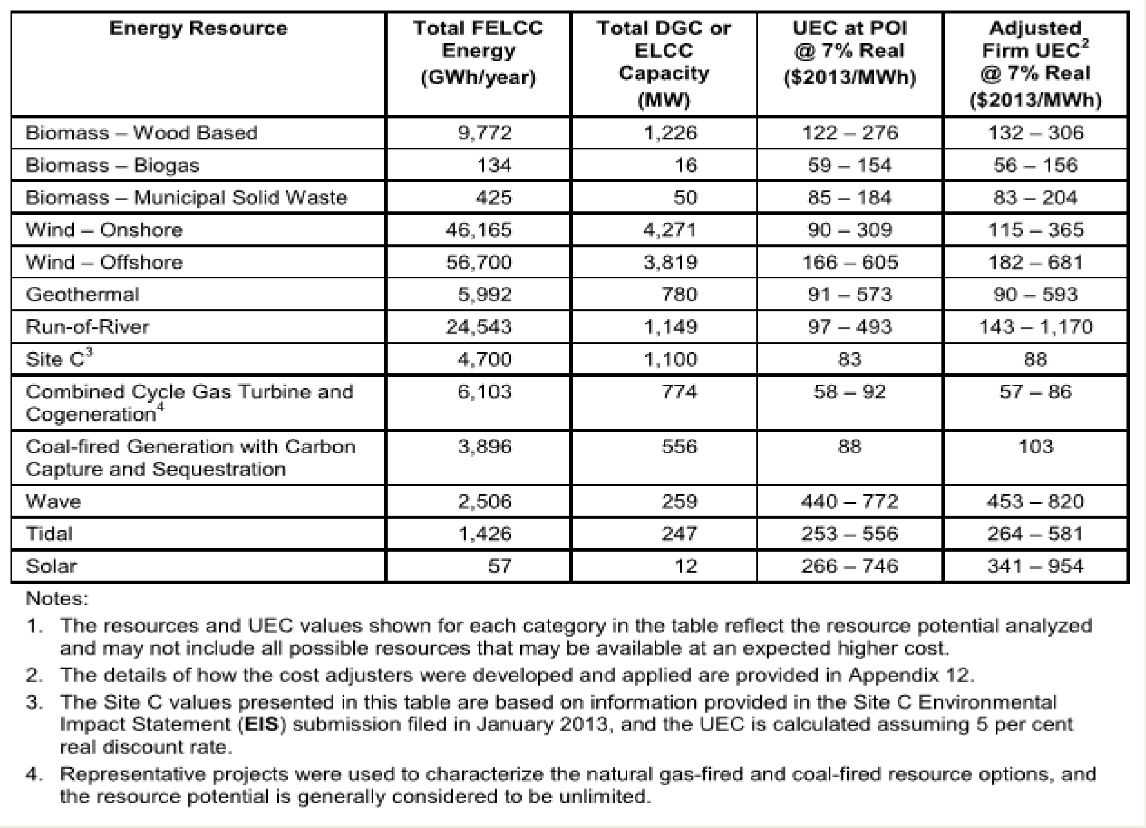
CLEARWATER VOLCANIC

Near Clearwater, British Columbia, Canada
Topographical Map Sheet: Figure 6
Geological Map Sheet: Figure 7

Category		Comments
I.	**Water Rights**	
	Availability (for example "air-cooled required")	Plant water requirement estimated approx. 13 L/s for binary plant. Closest river Hemp Creek has MAD of 4900 L/s. 33 current water licences applications within 5 km of existing geothermal point location with purposes including domestic, irrigation, land improve, stockwatering and enterprise. No existing energy/hydro power water licences within 5 km buffer.
	Availability for Drilling	Drilling requirement of 20 L/s. Closest river Hemp Creek has MAD of 4900 L/s. 33 current water licences applications within 5 km of existing geothermal point location with purposes including domestic, irrigation, land improve, stockwatering and enterprise. No existing energy/hydro power water licences within 5 km buffer.
J.	**Engineering**	
	Plant Location and Design	Remote location with three sides of geothermal point location surrounded by existing provincial park.
	Construction Issues	Close proximity to existing provincial parks and protected areas.
	Transportation Issues	Existing 2 km unpaved road section from plant location to paved road to Clearwater substation. Unknown condition of existing unpaved road.
	Architectural Issues (Blend/hide into environment? Local styles? etc.)	Location is remote surrounded on three sides with existing provincial park.
	Special Construction Issues (zero emissions)	none found
K.	**Non-Electrical Infrastructure (Roads and Habitation)**	
	Nearest Large Community > 50,000	Kamloops, BC
	Nearest Community	Clearwater, BC
	Nearest Road and Condition	Approx. 2 km of unpaved road to existing paved road from plant location.
	Current Access Conditions (restrictions)	Three sides of geothermal point location is surrounded with existing protected area provincial park.
	Terrain and Distance Factor for Road Building	Existing paved road from approx. 2 km from geothermal point location to Clearwater substation.

CLEARWATER VOLCANIC

Near Clearwater, British Columbia, Canada
Topographical Map Sheet: Figure 6
Geological Map Sheet: Figure 7

Category		Comments
L.	**Finance**	
	General Power Prices	BC Hydro acquires power through (1) competitive processes (Calls for Tender), (2) the Standing Offer Program (not including the mini-SOP under development), and (3) upgrades to its existing facilities or the development of new generation facilities. (Note that the net metering program targets projects less than 100 kW and is therefore not relevant to geothermal generation projects). Comments on the general price of power under each one are: • The power price paid by BC Hydro to independent power producers through Energy Purchase Agreements (EPAs) under Calls for Tender are proprietary and confidential. • The power price paid by BC Hydro to independent power producers through EPAs under the SOP are made up of a predetermined base price in 2010 dollars as determined by the region of the point of interconnection to the BC Hydro system, escalated at the Consumer Price Index annually up to the year in which an EPA is signed, and further adjusted based upon the time of day and month when the energy is delivered. For reference, the base price for the Lower Mainland region in 2010 dollars is $103.69/MWh. • BC Hydro's current Integrated Resource Plan dated November 2013 includes details of both demand-side management options and supply-side resource options to consider in meeting the future demand for electricity. These resource options, together with their attributes of total energy and capacity and unit energy costs, are listed in Table 2-2 of the November 2013 Resource Options Report Update. That table is reproduced below for ready reference. • Table 5-7 of the above-noted November 2013 Resource Options Report Update provides a summary of the Geothermal Potential by Transmission Region. 

Energy Resource	Total FELCC Energy (GWh/year)	Total DGC or ELCC Capacity (MW)	UEC at POI @ 7% Real ($2013/MWh)	Adjusted Firm UEC[2] @ 7% Real ($2013/MWh)
Biomass – Wood Based	9,772	1,226	122 – 276	132 – 306
Biomass – Biogas	134	16	59 – 154	56 – 156
Biomass – Municipal Solid Waste	425	50	85 – 184	83 – 204
Wind – Onshore	46,165	4,271	90 – 309	115 – 365
Wind – Offshore	56,700	3,819	166 – 605	182 – 681
Geothermal	5,992	780	91 – 573	90 – 593
Run-of-River	24,543	1,149	97 – 493	143 – 1,170
Site C[3]	4,700	1,100	83	88
Combined Cycle Gas Turbine and Cogeneration[4]	6,103	774	58 – 92	57 – 86
Coal-fired Generation with Carbon Capture and Sequestration	3,896	556	88	103
Wave	2,506	259	440 – 772	453 – 820
Tidal	1,426	247	253 – 556	264 – 581
Solar	57	12	266 – 746	341 – 954

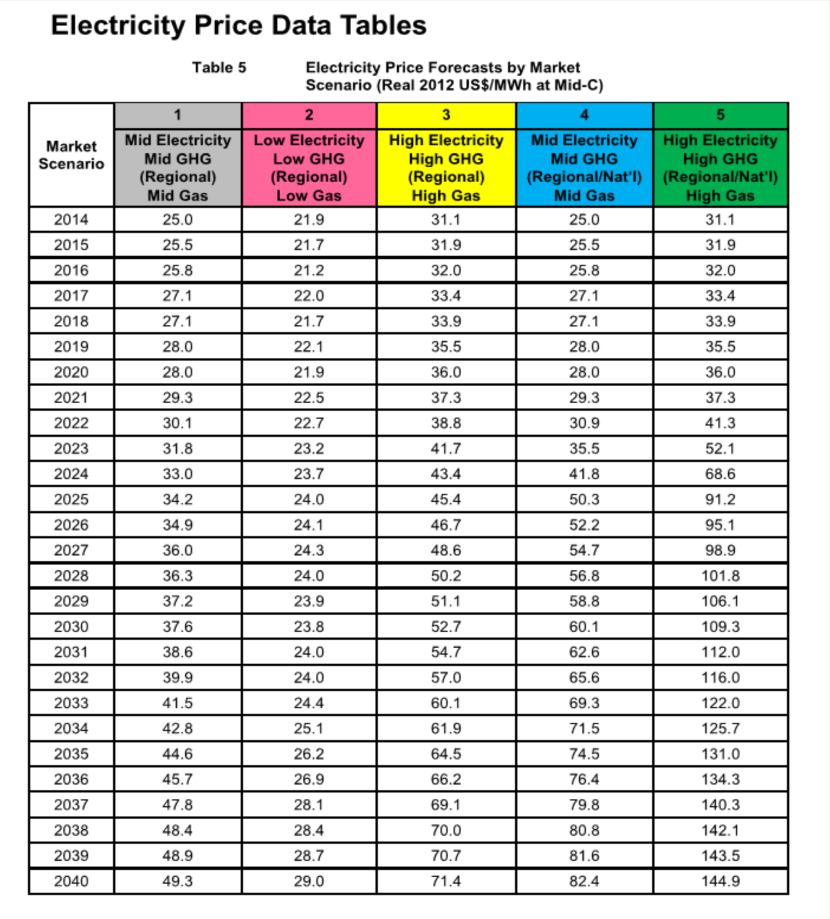
Notes:

1. The resources and UEC values shown for each category in the table reflect the resource potential analyzed and may not include all possible resources that may be available at an expected higher cost.
2. The details of how the cost adjusters were developed and applied are provided in Appendix 12.
3. The Site C values presented in this table are based on information provided in the Site C Environmental Impact Statement (**EIS**) submission filed in January 2013, and the UEC is calculated assuming 5 per cent real discount rate.
4. Representative projects were used to characterize the natural gas-fired and coal-fired resource options, and the resource potential is generally considered to be unlimited.

CLEARWATER VOLCANIC

Near Clearwater, British Columbia, Canada
Topographical Map Sheet: Figure 6
Geological Map Sheet: Figure 7

Category	Comments
Market Price ($/MWhr)	• As noted in the above Table 2-2 from the November 2013 Resource Options Report Update, the Unit Energy Cost for geothermal resources at a 7% real discount rate in 2013 dollars ranges from $91/MWh to 573/MWh at the point of interconnection to the BC Hydro system. • Wholesale electricity prices for trading purposes can vary greatly. In the Pacific Northwest, these prices are affected by such factors as precipitation/snowfall in the region, unforeseen generation outages and ambient temperatures. A general flavour of the wholesale electricity prices for potential export of electricity from BC can be obtained from a variety of sources. One such source is the US Energy Information Administration (www.eia.gov/electricity/wholesale/#history). This source provides current and historical electricity market data. Of particular relevance is the mid-C trading hub in the Northwest Region (one example would be a Mid-C peak price on March 17, 2015 of $19.87US weighted average cost from 72 trades). Access to that market for geothermal projects in BC would require access on both the BC Hydro transmission system to the Canada/US border, and on the appropriate transmission system (e.g. Bonneville Power Authority) in the US. • BC Hydro forecasts of market prices under various scenarios was provided in the November 2013 IRP. Table 5 in Appendix 5A – Market Forecast Data is reproduced below for ready reference.



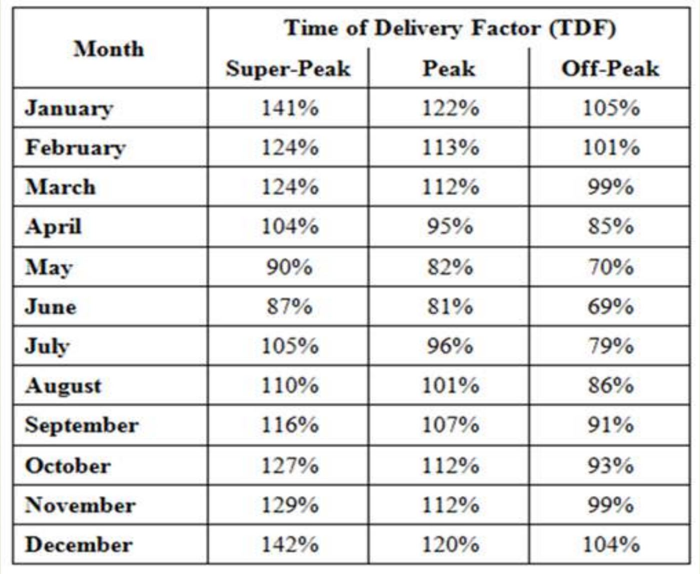
Electricity Price Data Tables

Table 5 Electricity Price Forecasts by Market Scenario (Real 2012 US$/MWh at Mid-C)

Market Scenario	1 Mid Electricity Mid GHG (Regional) Mid Gas	2 Low Electricity Low GHG (Regional) Low Gas	3 High Electricity High GHG (Regional) High Gas	4 Mid Electricity Mid GHG (Regional/Nat'l) Mid Gas	5 High Electricity High GHG (Regional/Nat'l) High Gas
2014	25.0	21.9	31.1	25.0	31.1
2015	25.5	21.7	31.9	25.5	31.9
2016	25.8	21.2	32.0	25.8	32.0
2017	27.1	22.0	33.4	27.1	33.4
2018	27.1	21.7	33.9	27.1	33.9
2019	28.0	22.1	35.5	28.0	35.5
2020	28.0	21.9	36.0	28.0	36.0
2021	29.3	22.5	37.3	29.3	37.3
2022	30.1	22.7	38.8	30.9	41.3
2023	31.8	23.2	41.7	35.5	52.1
2024	33.0	23.7	43.4	41.8	68.6
2025	34.2	24.0	45.4	50.3	91.2
2026	34.9	24.1	46.7	52.2	95.1
2027	36.0	24.3	48.6	54.7	98.9
2028	36.3	24.0	50.2	56.8	101.8
2029	37.2	23.9	51.1	58.8	106.1
2030	37.6	23.8	52.7	60.1	109.3
2031	38.6	24.0	54.7	62.6	112.0
2032	39.9	24.0	57.0	65.6	116.0
2033	41.5	24.4	60.1	69.3	122.0
2034	42.8	25.1	61.9	71.5	125.7
2035	44.6	26.2	64.5	74.5	131.0
2036	45.7	26.9	66.2	76.4	134.3
2037	47.8	28.1	69.1	79.8	140.3
2038	48.4	28.4	70.0	80.8	142.1
2039	48.9	28.7	70.7	81.6	143.5
2040	49.3	29.0	71.4	82.4	144.9

CLEARWATER VOLCANIC

Near Clearwater, British Columbia, Canada
Topographical Map Sheet: Figure 6
Geological Map Sheet: Figure 7

	Category	Comments
	Green Power Premium ($/MWhr)	• BC Hydro’s past procurement processes for the acquisition for power from independent power producers has offered a premium for green power. • Within British Columbia, there is little demand for the purchase of “green power certificates” (instruments that a customer can purchase to be assured that the electricity used is environmentally friendly) from BC Hydro. BC Hydro’s generation mix is already approximately 93% clean. • California has a goal of 33% of retail sales by 2020 to be sourced from eligible renewable energy sources. However, the opportunity for geothermal power from British Columbia, particularly “bundled” green energy with Renewable Energy Certificates (RECs), to compete in that market is low, for a number of reasons 1. The price of electricity is driven by the low cost of natural gas; 2. There are large amounts of renewables, such as wind and solar, in California; and 3. Firm transmission access to the California market through the BPA transmission system is generally not available.
	Capacity Price ($/KW)	• There is no price in $/kW for capacity resource options in the market at present. • Table 3-27 entitled "UCCs of Capacity Resource Supply Options" in BC Hydro's Integrated Resource Plan dated November 2013 provided a summary of capacity resource options (e.g. pumped storage, simple cycle gas turbines and resource smart projects such as Revelstoke Unit 6). The unit capacity costs (UCCs) at the point of interconnection to the BC Hydro system in $2013/kW-year are shown in the table.
	Is there a higher price for base load power?	In general, baseload power (ie firm power) is more valuable to BC Hydro and furthermore the price paid for baseload power varies by month throughout the year. As an example, the following excerpt is taken from BC Hydro’s SOP: “1. Definitions: In this Appendix 4, the following words and expressions have the following meanings: (a) “Off-Peak Hours” means all hours other than Super-Peak Hours and Peak Hours. (b) “Peak Hours” means the hours commencing at 06:00 PPT and ending at 16:00 PPT, and commencing at 20:00 PPT and ending at 22:00 PPT, Monday through Saturday inclusive, but excluding British Columbia statutory holidays. (c) “Super-Peak Hours” means the hours commencing at 16:00 PPT and ending at 20:00 PPT Monday through Saturday inclusive, but excluding British Columbia statutory holidays.” 

Month	Time of Delivery Factor (TDF)		
	Super-Peak	Peak	Off-Peak
January	141%	122%	105%
February	124%	113%	101%
March	124%	112%	99%
April	104%	95%	85%
May	90%	82%	70%
June	87%	81%	69%
July	105%	96%	79%
August	110%	101%	86%
September	116%	107%	91%
October	127%	112%	93%
November	129%	112%	99%
December	142%	120%	104%

CLEARWATER VOLCANIC

Near Clearwater, British Columbia, Canada
Topographical Map Sheet: Figure 6
Geological Map Sheet: Figure 7

Category	Comments
Estimated Size of Resource	See Section A.
Is there any green power incentives?	• The BC government created the Innovative Clean Energy (ICE) fund with an initial mandate to accelerate the commercialization of emerging clean energy technologies (now expanded to include a broad range of energy efficiency and conservation projects). British Columbia also has a program entitled Scientific Research and Experimental Development Tax credit (SR&ED). Geothermal proponents could keep a watching brief on these programs for applicability and relevance. • The BC government's First Nations Clean Energy Business Fund. This fund promotes increased Aboriginal community participation in the clean energy sector. It provides: o Capacity funding of up to $50,000 per applicant to cover the early stages (e.g. feasibility studies) of project development ; and o Equity funding of up to $500,000 per applicant to support a financially viable and resourced clean energy project. • There are a number of government of Canada programs to encourage the development of renewable power. Some of these programs may be active but not currently issuing calls for proposals. Others may be focussed on research and innovation and may not be directly applicable to geothermal technologies/resources, while others may be fully subscribed and even inactive but are noted in terms of completeness. Some of these programs include: o Natural Resources Canada ecoEnergy for Renewable Power program; o Sustainable Development Technology Canada funds; o Clean Energy Fund; o Industrial Research Assistance Program; and o Green Infrastructure Fund Geothermal proponents could keep a watching brief on these and other federal government programs for their applicability and relevance.
Grants	See above under green power incentives
Tax Holidays	None listed on federal and provincial websites.
Tax Relief	• Under Classes 43.1 and 43.2 in Schedule II of the Income Tax Regulations, certain capital costs of systems that produce energy by using renewable energy sources or fuels from waste, or conserve energy by using fuel more efficiently are eligible for accelerated capital cost allowance. Under Class 43.1, eligible equipment may be written-off at 30 percent per year on a declining balance basis. In general, equipment that is eligible for Class 43.1 but is acquired after February 22, 2005 and before year 2020 may be written-off at 50 percent per year on a declining balance basis under Class 43.2. Without these accelerated write-offs, many of these assets would be depreciated for income tax purposes at annual rates between 4 and 30 percent. • In addition to Class 43.1 or 43.2 capital cost allowance, the Income Tax Regulations allow certain expenses incurred during the development and start-up of renewable energy and energy conservation projects [Canadian renewable and conservation expenses (CRCE)] to be fully deducted in the year they are incurred, carried forward indefinitely and deducted in future years, or transferred to investors through a flow-through share agreement.

CLEARWATER VOLCANIC

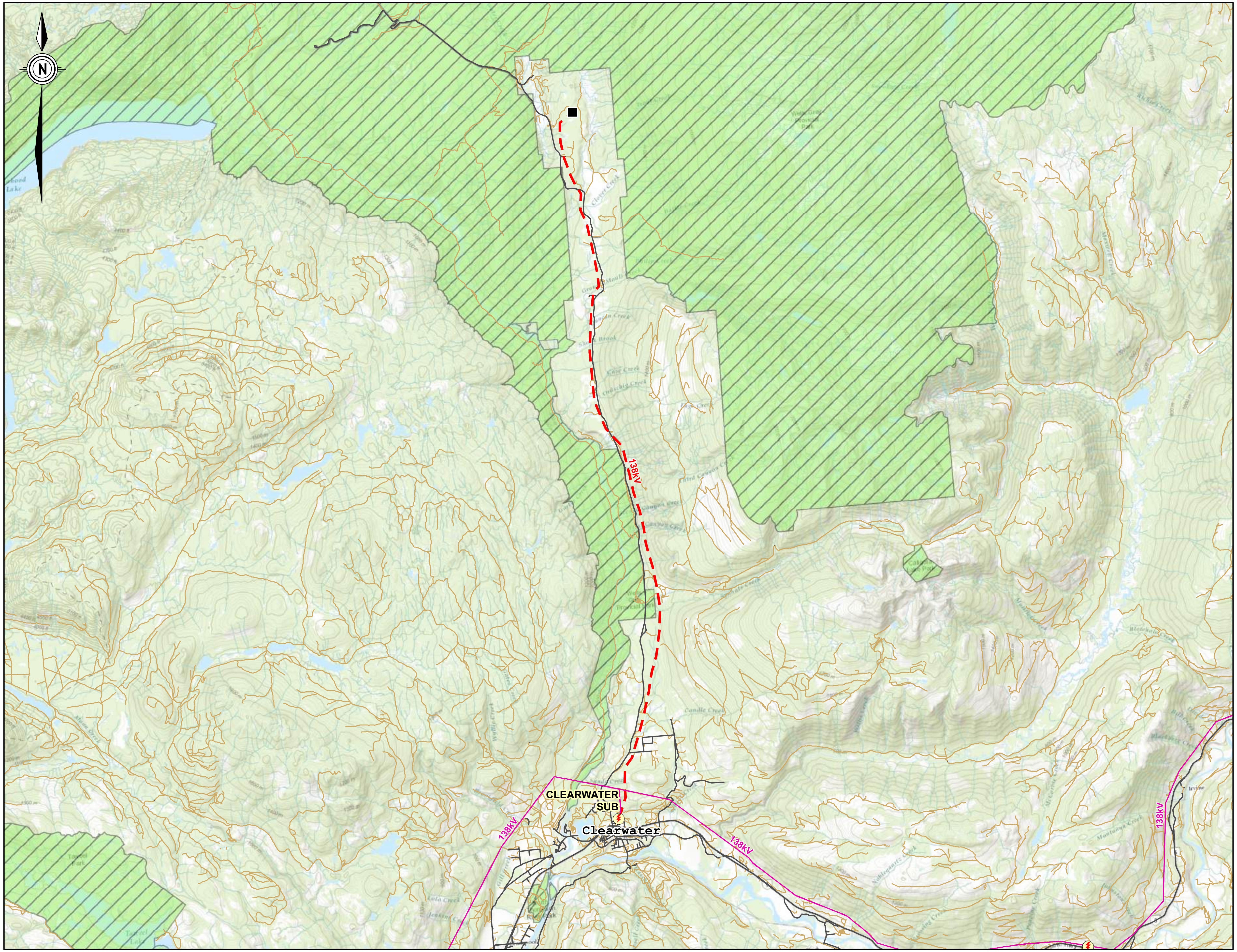
Near Clearwater, British Columbia, Canada
Topographical Map Sheet: Figure 6
Geological Map Sheet: Figure 7

Category	Comments
Loan Guarantees	The following is an excerpt from http://www.fnfa.ca/en/fnfa/ "The First Nations Finance Authority (FNFA) is a statutory not-for-profit organization without share capital, operating under the authority of the First Nations Fiscal Management Act, 2005. The FNFA's purposes are to provide investment options and capital planning advice and—perhaps most importantly, access to long-term loans with preferable interest rates. The FNFA is not an agent of Her Majesty or a Crown corporation and is governed solely by the First Nations communities that join as Borrowing Members. The advantages of joining the FNFA as a Borrowing Member are: 1. Access to low rate, below bank prime, loans with repayment terms up to 30 years; 2. First Nations choose the repayment terms that work best for their budget; 3. FNFA loans do not require collateral; 4. FNFA loans can be used to refinance existing debt; and 5. FNFA's interest rates and terms parallel those available to provincial and local governments. Most revenue streams are eligible to support FNFA loan requests. Eligible capital projects FNFA can finance include infrastructure, social and economic development, land purchases, independent power projects, community housing and rolling stock/heavy equipment. FNFA is a stand-alone organization separate from the Government of Canada, and its operating policies are set by its Borrowing Members, represented by the First Nation's Chief and Council appointee. The FNFA is for First Nations, by First Nations."
Royalties/Fees	Geothermal Resources Act, [RSBC 1996] CHAPTER 171, as of March 11, 2015 Permits for well authorizations for wells to be drilled within the boundaries of the permittee's location must pay a prescribed rent for the permit (Section 5). Based on Section 17 of the Act, (1) A lessee who produces a geothermal resource for purposes other than testing must pay to the government (a) a royalty established by agreement under this section, (b) an amount agreed under this section to be paid instead of royalty, or (c) if no royalty or amount has been agreed under this section, the prescribed royalty.
General Idea of Royalties	With regard to use of the water resources within the geothermal tract, Section 4 of the Water Sustainability Act states "This Act does not apply to geothermal resources as defined in section 1 (1) [definitions] of the Geothermal Resources Act."
Private Land Owner or Government Land	Geothermal proponents will need to arrange financial agreements (eg leases or purchases) with private property owners for the geothermal land tract. Proponents for geothermal facilities on Crown Land must apply for the appropriate tenure under the BC Land Act (eg Statutory Right of Way, Licence of Occupation).
Tax Rate in the Country	• Income eligible for small-business deduction (up to $500,000 income): 11% Federal tax, combined federal and provincial (British Columbia): 13.5%. • Income not eligible for small-business deduction: 15% Federal, combined federal and provincial (British Columbia): 26%
Transmission Tariffs	Under wholesale wheeling (whereby electricity is transmitted from electricity generators to utilities) to customers in Alberta, the US, or other wholesale customers in BC, the generation supplier must request service on the appropriate BC Hydro transmission line under the Open Access Transmission Tariff (OATT) at a regulated cost for that service. Depending on the end customer, the generation supplier will have to make similar arrangements to cover transmission access in other jurisdictions (e.g. the Bonneville Power Authority for wheeling to a US customer). This 'pancaking' of rates, along with transmission congestion issues, affects the economic viability of the potential wholesale opportunity.

CLEARWATER VOLCANIC

Near Clearwater, British Columbia, Canada
Topographical Map Sheet: Figure 6
Geological Map Sheet: Figure 7

Category		Comments
M.	**Maps**	
	Regional topographic map showing population centres, roads and other infrastructure including electrical grid and nearest substation and/or generating station. (1:500,000?)	Topographical Map Sheet: Figure 6
	Regional map showing land tenure in area – geothermal concessions, mining concessions, private land holds, public or national lands (parks). (1:500,000?)	Topographical Map Sheet: Figure 6
	Regional geological map. (1:250 or 500,000?)	Geological Map Sheet: Figure 7
	Detailed geological map of the immediate area of the concessions. (1:50,000 or 100,000)	Geological Map Sheet: Figure 7
N.	**Other Issues and Considerations**	



Geoscience BC

Legend

- ■ Proposed Geothermal Plant Location
- Proposed Transmission Line
- Existing Substation
- Existing Transmission Line
- Paved Road
- Other Road
- 🟩 Park, Eco-Reserve, Protected Area

KERR WOOD LEIDAL
consulting engineers

Service Layer Credits: Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

4 0 4
Kilometers

Project No.	Date
2692-004	April 30, 2015

Potential Geothermal Plant at Clearwater Volcanic Field 10MW

Figure 6

Path: Q:\2600-2699\2692-004\430-GIS\MXD-RP\2692004_GeothermalLocations_mapbook.mxd Date Saved: 2015-04-27 3:35:17 PM
Author: RTaylor

Geoscience BC

Legend

- ■ Proposed Geothermal Plant Location
- Proposed Transmission Line
- Existing Substation
- Existing Transmission Line

Bedrock Type

- Intrusive Rocks
- Metamorphic Rocks
- Sedimentary Rocks
- Volcanic Rocks
- Rock Type Boundary
- Fault

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Service Layer Credits: Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

5 0 5
Kilometers

Project No.	Date
2692-004	April 30, 2015

Geological Strata Map for Clearwater Volcanic Field 10MW

Figure 7

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Author: RTaylor

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Appendix E

Iskut Geothermal Development Decision Matrix and Figures 8 & 9

ISKUT

Near Iskut, British Columbia, Canada
Topographical Map Sheet: Figure 8
Geological Map Sheet: Figure 9

Category		Comments
A.	**Reservoir Potential**	
	Size/Potential/Type	• **Reservoir size:** N/A (no area or depth defined in literature) - therefore, reservoir volume estimated* at: 2.2 km^3 (most-likely area: 2 km^2; most-likely thickness: 1.1 km) (*Reservoir assumptions made using Appendix III in GeothermEx, 2004) • **Potential:** Assume 10 MW, compatible with generic reservoir volume (above) in vicinity of single spring, for reservoir temperatures in range of 150˚C to 200˚C. • **Type:** unknown, likely binary
	Temperature/Water and Gas Chemistry/Mineral Indicators	**Surface features:** • Extremely hot water (noted on various online hot spring sites as "too hot" to bathe in unless mixed with cold river water) seeps out of a rocky embankment along the west bank of the Iskut River at Iskut River Hot Springs Provincial Park (park covers an area of 4 hectares). This "bathing water" criterion implies a surface discharge temperature of at least 45˚C. **Geothermometry:** • None available **Exploration drilling:** • None known Water chemistry: • None available **Mineral indicators:** • No information
	Surface Flow Rates and Reservoir Recharge	No information. Water percolates from a cliff face and runs directly into the fast flowing Iskut River - no pooling of water.
	3D Permeability (heat exchange potential)	Unknown
	Recent Magmatism	Most recent Miocene volcanism in the Spectrum Range ~ 40 km NW of the springs (Souther, 1992). Eocene plutonic rocks outcropping ~1 km to the SW - possibly underlying the spring (Alldrick, 2006).
	Structural Setting	• Major structures in the hot spring area include the NW-SE-trending left-lateral Northmore Fault as it intersects a major N-S-trending fault. The Northmore Fault has significant offset and appears to be related to a string of small plutons (Alldrick et al., 2003). • Locally, several N-S, NE-SW and NW-SE left-lateral faults are mapped in the vicinity. Iskut River Hot Spring is located near the apparent intersection of a N-S fault along Iskut River valley and a set of NE-SW trending faults that splay off to the southwest cutting the Triassic Stuhini Group volcanics and the Eocene Hyder Plutonic Suite. Additional NW-SE-trending faults cutting the Triassic Stuhini Group volcanics and Jurassic Lower Hazelton Group to the northwest of the spring possibly intersect in this area as well (Alldrick, 2006).
	Geophysics	None available
	Reservoir Host Rock	Uncertain
	Drilling Issues	Access to the park is very limited. Foot access is difficult and there is no developed trail. Helicopter and boat access are possible. Several springs are present but no pools are available for bathing. Iskut River Hot Springs Park lies within the asserted traditional territory of the Tahltan First Nation. (CanGEA, 2015)
	Brief Description of Geological Setting of Thermal Features (i.e., springs emanate from fluvial gravels; beside a river, etc.)	• The Cenozoic Stikine Volcanic Belt is considered to be the most recently active of the volcanic belts in British Columbia, and most of the recent volcanism in the Stikine Belt has been basaltic in nature. The volcanic activity is likely the result of extensional fracturing (Piteau and Associates, 1988). • The Iskut River valley is bounded to the east by the Bowser sedimentary basin (Alldrick et al., 2003). • Iskut River Hot Spring is located ~20 km to the SW of Hankin Peak, which is composed of Mesozoic sedimentary and plutonic rocks at the southern end of the Edziza Complex (Souther, 1992).

ISKUT

Near Iskut, British Columbia, Canada
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Category		Comments
B.	**Exploration Uncertainty (Risk)**	
	Degree of Identification of Resources/Reserves	Low Geologic mapping has been done; no known geophysical or geochemical studies have been conducted. No drilling in area known.
	Likelihood of Covering Reservoir with Concession	Moderate The spring itself lies within a provincial park. There is potential to have a concession that spans the resource if suitable temperature and permeability can be discovered to be outside the small park area. Potential competition with mineral tracts if resource lies to the east of the river.
	Expected Authorization Date	Unknown
	Specific Timing of Exploration (2 + 2 years, BC 8 years, etc.)	5-6 years (1 year deep gradient-well drilling + 2 year successful development drilling and testing + 1 year further development drilling and start plant construction + 1 year drilling wrap-up and finish plant construction). Possible delays due to issues of access and competing use (mining and park land).
	Degree of Previous Exploration (can be good or bad)	Low Geologic mapping comprises the only known exploration in the area.
	Surface Operational Capacity (enough stable area for drilling and a plant?)	Likely Area has very little infrastructure. Any work would involve construction of roads and clearing areas for well pads/drilling. Area for surface operations would need to be assessed.
	Exploration to Exploitation: A summary rating of Exploration Uncertainty (risk) on a scale of difficult (high risk) through medium (moderate risk) to easy (low risk)	Difficult Little resource information, compounded by difficult access. Area only accessible by Galore Creek Mine Road.
C.	**Environmental Issues**	
	Protected Areas	• Iskut River Hot Springs Provincial Park located 2.6 km north of proposed plant location. Iskut River Hot Springs Park protects a small area on the west bank of the Iskut River where extremely hot water weeps out of a rocky embankment. Several springs are present but no pools are available for bathing. • Mount Edziza Provincial Park located 42 km north of proposed transmission line.
	Endangered Species	• Snow Pearlwort (blue-listed plant) occurrence polygon located approx. 50 m of proposed transmission line. • Northern Mountain Caribou (Endangered (SARA Schedule 1); red-listed) habitat polygon located approx. 110 km northeast of proposed plant.
	Geothermal Surface Features	• Iskut Hotsprings (surface feature) located at the site. • Mess Creek Hotsprings is approx. 50-60 km west of the Iskut site.
	Other	• Proposed transmission line crosses approximately 10 streams. • Stream crossings that contain observed fish include Devil Creek that contains Rainbow Trout and More Creek which contains Dolly Varden. • Proposed transmission line runs through Cassiar Proposed Wildlife Habitat Area allotted for Grizzly Bear.
D.	**Geothermal Area - Bidding and/or Type of Land Holding (private/government/lease/etc.)**	
	Bidding Area	No known existing active, cancelled or unsold geothermal title tracts
	Other Claim Rights (mining and/or oil)	No existing mineral, coal titles in vicinity. Proposed location is not within known oil and gas management area; no known tenures at proposed location.

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Category		Comments
E.	**Market**	
	Main Electricity Consumers (direct sales and/or government)	General Overview 1. BC Hydro acquires power from Independent Power Producers (which would include geothermal proponents) through two main processes: • Competitive calls: when BC Hydro issues a Call for Tenders for the supply of electricity to BC Hydro, geothermal proponents can bid into those competitive calls. • Standing Offer Program (SOP): This program is presently available for clean generation projects greater than 0.1 MW but not more than 15 MW. Proponents do not compete against each other but are paid a predetermined price by BC Hydro. Depending on the specifics of each project, proponents may wish to size their projects to be under the 15 MW threshold for the SOP (BC Hydro is developing a 'mini-SOP' component within the overall SOP. This mini-SOP will apply to projects in the 0.1 MW to 1 MW range, but would not realistically apply to potential geothermal generation projects). • In addition, BC Hydro's net metering program is designed for residential and commercial customers who wish to connect a small electricity generating unit to the BC Hydro distribution system. Generating units up to 0.1 MW in capacity that utilize a clean or renewable resource are eligible to participate in the program. Given the small size, this program has no applicability to potential geothermal generation projects. The acquisition of geothermal power would contribute to BC Hydro's current target for clean energy and to the diversification of BC Hydro's resource mix, making it less reliant on snow melt and stream flow. 2. Although FortisBC is a potential customer for electricity from geothermal sources, the opportunities may be limited given FortisBC's ability to receive electricity from BC Hydro under Rate Schedule 3808. However there is a wheeling agreement in place which would facilitate a geothermal project located in FortisBC's service territory to sell electricity to BC Hydro through BC Hydro's competitive calls and/or the SOP, or to other potential customers as noted below. 3. Wholesale wheeling (whereby electricity is transmitted from electricity generators to utilities) to customers in Alberta, the US, or other wholesale customer in BC is allowed. The generation supplier must request service on the appropriate BC Hydro transmission line under the Open Access Transmission Tariff (OATT) at a regulated cost for that service. Depending on the end customer, the generation supplier will have to make similar arrangements to cover transmission access in other jurisdictions (e.g. the Bonneville Power Authority for wheeling to a US customer). This 'pancaking' of rates, along with congestion issues, affects the economic viability of the potential wholesale opportunity. 4. Retail access, defined as a market in which electricity is sold directly to consumers by competing suppliers, is generally not permitted in BC. However there may be opportunities for bilateral arrangements for direct sales of electricity from geothermal generating plants to large customers (e.g. pulp mills, large sawmills, mines) as follows: • To replace the electricity supplied at a high voltage from BC Hydro under BC Hydro Transmission Rate 1823 of the Electric Tariff. Such replacement would be challenging given the rates charged under that tariff. • To supply electricity to a remote facility (e.g. a mine, LNG plant or other industrial facility) directly from a geothermal plant located in close proximity to the facility, thereby precluding the need for a lengthy transmission line to connect to the BC Hydro electrical grid. • Potential regional power shortage may occur in the NW BC. BC Hydro may need dependable capacity in the area. • A potential electricity customer, Bear River Gravel open pit aggregate mine, is in the permitting or environmental assessment phase. The potential operations are located approximately 120 km away. • The proposed Galore Creek mine is a potential customer (it is proposed that the access to this geothermal site use the Galore Creek access road). However, the location is over 150 km away from the Iskut geothermal site. • Kerr-Sulphurets-Mitchell Mine is proceeding through regulatory processes for a mine project located approximately 150 km from the geothermal site. The gold/copper project would be 65 km northwest of Stewart.

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Category		Comments
	Time Limits? (business agreements, operating/generating-by deadlines?)	• BC Hydro has issued competitive Calls for Tender for the supply of electricity in the past. • BC Hydro's SOP is presently directly available for clean energy projects which meet certain criteria, including a generation output of less than 15 MW. • Typical BC Hydro Energy Purchase Agreements from Independent Power Producers are 20-40 years in duration. • Business agreements with the owners of private transmission lines (e.g. independent power producers) for access to the market will be necessary. • The lead times to develop geothermal resources will include appropriate allowances for investigative drilling, technical and environmental studies, public consultation, transmission considerations, marketing, licencing, design, construction and commissioning. These lead times will vary from four to seven years depending on the specifics of each project. Projects with a history of exploration and analysis (e.g. Meager Creek/Pebble Creek, Lakelse, and Canoe Creek) will generally be on the shorter end of this time continuum, while other projects with less investigative work will take longer. Although the time required to drill a geothermal well and construct a power plant could conceivably be less than two years, the key uncertainties inherent in the environmental review, public consultation, transmission arrangements (either with BC Hydro or a private transmission owner), and the permitting and regulatory processes will realistically result in a further two years at a minimum for these activities.
F.	**Transmission Line Infrastructure**	
	State of the Infrastructure	Existing 287 kV line to Bob Quinn substation.
	Transmission Route (distance, terrain and costs)	New powerline 69 kV line to existing Bob Quinn substation (need to add 69 to 287 kV transformation. Powerline approx. 25 km via existing transmission line corridor and Galore Creek Mine Road.
H.	**Community Issues**	
	Indigenous Law and Indigenous Development Areas	• First Nation Consultative Areas include Tahltan Indian Band, Iskut Band, Tahltan Central Council. • Proposed plant location is within Tahltan territory. (http://www.tahltan.org/welcome) • Tahltan Nation plan is in development (started 2011); broad issues that have been identified include better community infrastructure (particularly Bob Quinn and Dease Lake), managing social-culture growth. (http://www.tahltan.org/news/tahltan-nation-plan-community-vision-our-future) • Iskut Band Council (http://iskut.org/) does not provide any specific community/environmental planning agendas
	Community Action	• Tahltan Heritage Resources Environmental Assessment Team (THREAT) established in 2005 to support protection of the environmental, social, cultural, heritage and economic interests. (http://www.tahltan.org/administration/threat) • 2005 community action stopped Shell Canada test well activities • Tahltan activists block Red Chris Mine site in 2014
	Surface Rights	• First Nation Consultative Areas include Tahltan Indian Band, Iskut Band, Tahltan Central Council. • Tahltan Nation Development Council is business council owned by the people of Tahltan Iskut bands and ensures First Nation consultation, involvement in economic ventures within Tahltan territory. (http://www.tahltan.org/nation/economy/economic-development)
	Tourism	• Bob Quinn Lake Airport is near proposed project location. • Schoquette Hot Springs is near Stikine, BC. • Proposed project location is remote; no significant infrastructure in within extents of project, although Bob Quinn Lake is a recreational outdoors park.

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Category		Comments
I.	**Water Rights**	
	Availability (for example "air-cooled required")	Plant water requirement estimated approx. 13 L/s for binary plant. MAD of 89000 L/s in closest stream. Very few water licences in area; only active water licence at Bob Quinn Lake 2L/s for purpose of Ministry of Transportation and Infrastructure.
	Availability for Drilling	Drilling requirement of 20 L/s. MAD of 89000 L/s in closest stream. Very few water licences in area; only active water licence at Bob Quinn Lake 2L/s for purpose of Ministry of Transportation and Infrastructure.
J.	**Engineering**	
	Plant Location and Design	Remote plant location, on flats west of Highway 37. Proposed plant location is in close proximity to several creeks and lakes.
	Construction Issues	Generally flat terrain accessible via existing mining roads.
	Transportation Issues	Access via the Galore Creek mine road. Several creek crossings, remote access.
	Architectural Issues (Blend/hide into environment? Local styles? etc.)	None found.
	Special Construction Issues (zero emissions)	None found.
K.	**Non-Electrical Infrastructure (Roads and Habitation)**	
	Nearest Large Community > 50,000	Prince George, BC
	Nearest Community	Iskut, BC (approx. 100 km)
	Nearest Road and Condition	Galore Creek Mine Road; road condition is unknown.
	Current Access Conditions (restrictions)	Remote access via mining roads.
	Terrain and Distance Factor for Road Building	No new road requirements expected contingent on location and condition of existing Galore Creek Mine Road.

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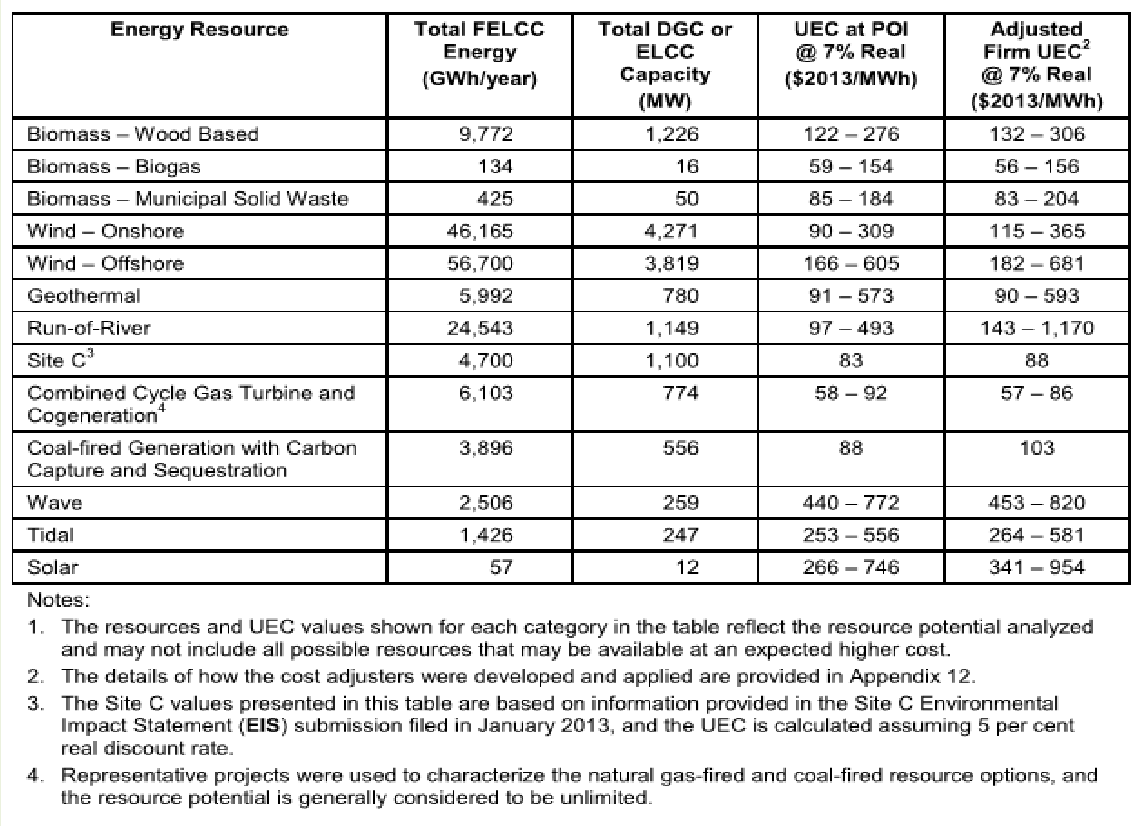
Category		Comments
L.	**Finance**	
	General Power Prices	BC Hydro acquires power through (1) competitive processes (Calls for Tender), (2) the Standing Offer Program (not including the mini-SOP under development), and (3) upgrades to its existing facilities or the development of new generation facilities. (Note that the net metering program targets projects less than 100 kW and is therefore not relevant to geothermal generation projects). Comments on the general price of power under each one are: • The power price paid by BC Hydro to independent power producers through Energy Purchase Agreements (EPAs) under Calls for Tender are proprietary and confidential. • The power price paid by BC Hydro to independent power producers through EPAs under the SOP are made up of a predetermined base price in 2010 dollars as determined by the region of the point of interconnection to the BC Hydro system, escalated at the Consumer Price Index annually up to the year in which an EPA is signed, and further adjusted based upon the time of day and month when the energy is delivered. For reference, the base price for the Lower Mainland region in 2010 dollars is $103.69/MWh. • BC Hydro's current Integrated Resource Plan dated November 2013 includes details of both demand-side management options and supply-side resource options to consider in meeting the future demand for electricity. These resource options, together with their attributes of total energy and capacity and unit energy costs, are listed in Table 2-2 of the November 2013 Resource Options Report Update. That table is reproduced below for ready reference. • Table 5-7 of the above-noted November 2013 Resource Options Report Update provides a summary of the Geothermal Potential by Transmission Region.



Energy Resource	Total FELCC Energy (GWh/year)	Total DGC or ELCC Capacity (MW)	UEC at POI @ 7% Real ($2013/MWh)	Adjusted Firm UEC[2] @ 7% Real ($2013/MWh)
Biomass – Wood Based	9,772	1,226	122 – 276	132 – 306
Biomass – Biogas	134	16	59 – 154	56 – 156
Biomass – Municipal Solid Waste	425	50	85 – 184	83 – 204
Wind – Onshore	46,165	4,271	90 – 309	115 – 365
Wind – Offshore	56,700	3,819	166 – 605	182 – 681
Geothermal	5,992	780	91 – 573	90 – 593
Run-of-River	24,543	1,149	97 – 493	143 – 1,170
Site C[3]	4,700	1,100	83	88
Combined Cycle Gas Turbine and Cogeneration[4]	6,103	774	58 – 92	57 – 86
Coal-fired Generation with Carbon Capture and Sequestration	3,896	556	88	103
Wave	2,506	259	440 – 772	453 – 820
Tidal	1,426	247	253 – 556	264 – 581
Solar	57	12	266 – 746	341 – 954

Notes:

1. The resources and UEC values shown for each category in the table reflect the resource potential analyzed and may not include all possible resources that may be available at an expected higher cost.
2. The details of how the cost adjusters were developed and applied are provided in Appendix 12.
3. The Site C values presented in this table are based on information provided in the Site C Environmental Impact Statement (**EIS**) submission filed in January 2013, and the UEC is calculated assuming 5 per cent real discount rate.
4. Representative projects were used to characterize the natural gas-fired and coal-fired resource options, and the resource potential is generally considered to be unlimited.

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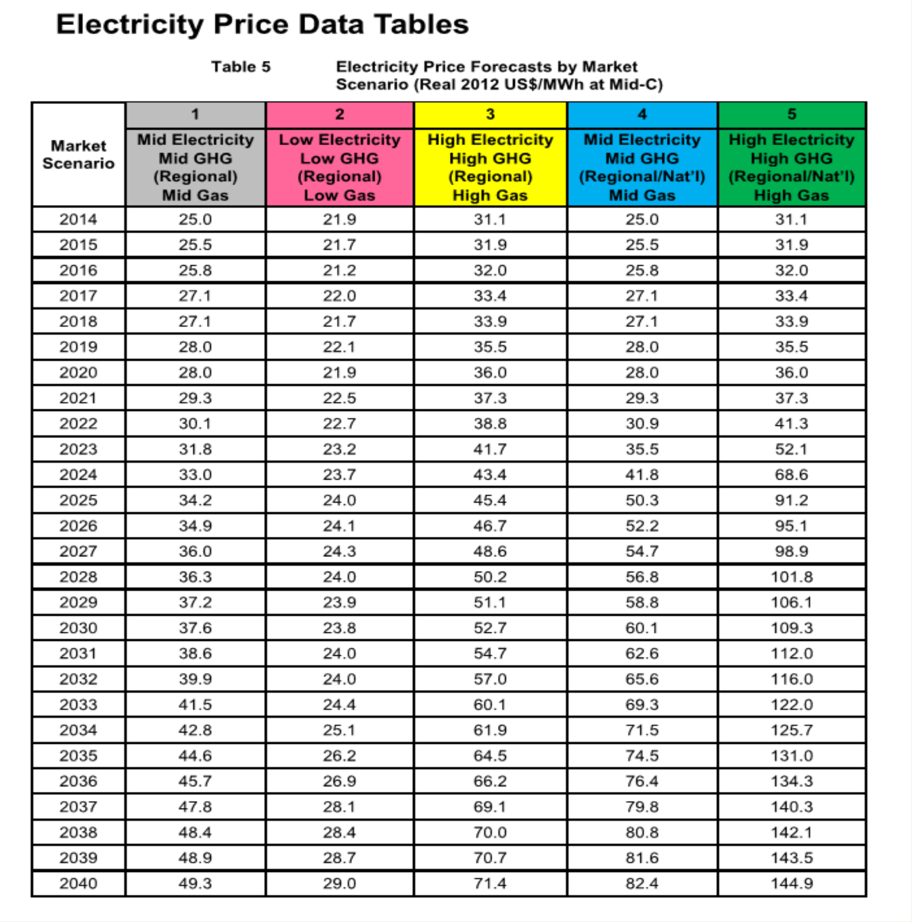
Category	Comments
Market Price ($/MWhr)	• As noted in the above Table 2-2 from the November 2013 Resource Options Report Update, the Unit Energy Cost for geothermal resources at a 7% real discount rate in 2013 dollars ranges from $91/MWh to 573/MWh at the point of interconnection to the BC Hydro system. • Wholesale electricity prices for trading purposes can vary greatly. In the Pacific Northwest, these prices are affected by such factors as precipitation/snowfall in the region, unforeseen generation outages and ambient temperatures. A general flavour of the wholesale electricity prices for potential export of electricity from BC can be obtained from a variety of sources. One such source is the US Energy Information Administration (www.eia.gov/electricity/wholesale/#history). This source provides current and historical electricity market data. Of particular relevance is the mid-C trading hub in the Northwest Region (one example would be a Mid-C peak price on March 17, 2015 of $19.87US weighted average cost from 72 trades). Access to that market for geothermal projects in BC would require access on both the BC Hydro transmission system to the Canada/US border, and on the appropriate transmission system (e.g. Bonneville Power Authority) in the US. • BC Hydro forecasts of market prices under various scenarios was provided in the November 2013 IRP. Table 5 in Appendix 5A – Market Forecast Data is reproduced below for ready reference. 

Electricity Price Data Tables

Table 5 Electricity Price Forecasts by Market Scenario (Real 2012 US$/MWh at Mid-C)

Market Scenario	1 Mid Electricity Mid GHG (Regional) Mid Gas	2 Low Electricity Low GHG (Regional) Low Gas	3 High Electricity High GHG (Regional) High Gas	4 Mid Electricity Mid GHG (Regional/Nat'l) Mid Gas	5 High Electricity High GHG (Regional/Nat'l) High Gas
2014	25.0	21.9	31.1	25.0	31.1
2015	25.5	21.7	31.9	25.5	31.9
2016	25.8	21.2	32.0	25.8	32.0
2017	27.1	22.0	33.4	27.1	33.4
2018	27.1	21.7	33.9	27.1	33.9
2019	28.0	22.1	35.5	28.0	35.5
2020	28.0	21.9	36.0	28.0	36.0
2021	29.3	22.5	37.3	29.3	37.3
2022	30.1	22.7	38.8	30.9	41.3
2023	31.8	23.2	41.7	35.5	52.1
2024	33.0	23.7	43.4	41.8	68.6
2025	34.2	24.0	45.4	50.3	91.2
2026	34.9	24.1	46.7	52.2	95.1
2027	36.0	24.3	48.6	54.7	98.9
2028	36.3	24.0	50.2	56.8	101.8
2029	37.2	23.9	51.1	58.8	106.1
2030	37.6	23.8	52.7	60.1	109.3
2031	38.6	24.0	54.7	62.6	112.0
2032	39.9	24.0	57.0	65.6	116.0
2033	41.5	24.4	60.1	69.3	122.0
2034	42.8	25.1	61.9	71.5	125.7
2035	44.6	26.2	64.5	74.5	131.0
2036	45.7	26.9	66.2	76.4	134.3
2037	47.8	28.1	69.1	79.8	140.3
2038	48.4	28.4	70.0	80.8	142.1
2039	48.9	28.7	70.7	81.6	143.5
2040	49.3	29.0	71.4	82.4	144.9

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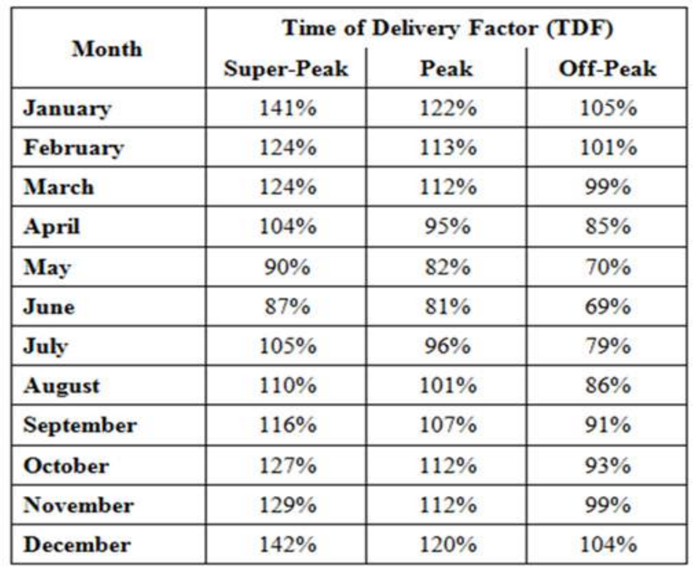
<table>
<tr><th colspan="2">Category</th><th>Comments</th></tr>
<tr><td></td><td>Green Power Premium ($/MWhr)</td><td>• BC Hydro’s past procurement processes for the acquisition for power from independent power producers has offered a premium for green power.
• Within British Columbia, there is little demand for the purchase of “green power certificates” (instruments that a customer can purchase to be assured that the electricity used is environmentally friendly) from BC Hydro. BC Hydro’s generation mix is already approximately 93% clean.
• California has a goal of 33% of retail sales by 2020 to be sourced from eligible renewable energy sources. However, the opportunity for geothermal power from British Columbia, particularly “bundled” green energy with Renewable Energy Certificates (RECs), to compete in that market is low, for a number of reasons
1. The price of electricity is driven by the low cost of natural gas;
2. There are large amounts of renewables, such as wind and solar, in California; and
3. Firm transmission access to the California market through the BPA transmission system is generally not available.</td></tr>
<tr><td></td><td>Capacity Price ($/KW)</td><td>• There is no price in $/kW for capacity resource options in the market at present.
• Table 3-27 entitled "UCCs of Capacity Resource Supply Options" in BC Hydro's Integrated Resource Plan dated November 2013 provided a summary of capacity resource options (e.g. pumped storage, simple cycle gas turbines and resource smart projects such as Revelstoke Unit 6). The unit capacity costs (UCCs) at the point of interconnection to the BC Hydro system in $2013/kW-year are shown in the table.</td></tr>
<tr><td></td><td>Is there a higher price for base load power?</td><td>In general, baseload power (ie firm power) is more valuable to BC Hydro and furthermore the price paid for baseload power varies by month throughout the year. As an example, the following excerpt is taken from BC Hydro’s SOP:

“1. Definitions: In this Appendix 4, the following words and expressions have the following meanings:
(a) “Off-Peak Hours” means all hours other than Super-Peak Hours and Peak Hours.
(b) “Peak Hours” means the hours commencing at 06:00 PPT and ending at 16:00 PPT, and commencing at 20:00 PPT and ending at 22:00 PPT, Monday through Saturday inclusive, but excluding British Columbia statutory holidays.
(c) “Super-Peak Hours” means the hours commencing at 16:00 PPT and ending at 20:00 PPT Monday through Saturday inclusive, but excluding British Columbia statutory holidays.”

<table>
<tr><th rowspan="2">Month</th><th colspan="3">Time of Delivery Factor (TDF)</th></tr>
<tr><th>Super-Peak</th><th>Peak</th><th>Off-Peak</th></tr>
<tr><td>January</td><td>141%</td><td>122%</td><td>105%</td></tr>
<tr><td>February</td><td>124%</td><td>113%</td><td>101%</td></tr>
<tr><td>March</td><td>124%</td><td>112%</td><td>99%</td></tr>
<tr><td>April</td><td>104%</td><td>95%</td><td>85%</td></tr>
<tr><td>May</td><td>90%</td><td>82%</td><td>70%</td></tr>
<tr><td>June</td><td>87%</td><td>81%</td><td>69%</td></tr>
<tr><td>July</td><td>105%</td><td>96%</td><td>79%</td></tr>
<tr><td>August</td><td>110%</td><td>101%</td><td>86%</td></tr>
<tr><td>September</td><td>116%</td><td>107%</td><td>91%</td></tr>
<tr><td>October</td><td>127%</td><td>112%</td><td>93%</td></tr>
<tr><td>November</td><td>129%</td><td>112%</td><td>99%</td></tr>
<tr><td>December</td><td>142%</td><td>120%</td><td>104%</td></tr>
</table></td></tr>
</table>

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Category	Comments
Estimated Size of Resource	See Section A.
Is there any green power incentives?	• The BC government created the Innovative Clean Energy (ICE) fund with an initial mandate to accelerate the commercialization of emerging clean energy technologies (now expanded to include a broad range of energy efficiency and conservation projects). British Columbia also has a program entitled Scientific Research and Experimental Development Tax credit (SR&ED). Geothermal proponents could keep a watching brief on these programs for applicability and relevance. • The BC government's First Nations Clean Energy Business Fund. This fund promotes increased Aboriginal community participation in the clean energy sector. It provides: o Capacity funding of up to $50,000 per applicant to cover the early stages (e.g. feasibility studies) of project development ; and o Equity funding of up to $500,000 per applicant to support a financially viable and resourced clean energy project. • There are a number of government of Canada programs to encourage the development of renewable power. Some of these programs may be active but not currently issuing calls for proposals. Others may be focussed on research and innovation and may not be directly applicable to geothermal technologies/resources, while others may be fully subscribed and even inactive but are noted in terms of completeness. Some of these programs include: o Natural Resources Canada ecoEnergy for Renewable Power program; o Sustainable Development Technology Canada funds; o Clean Energy Fund; o Industrial Research Assistance Program; and o Green Infrastructure Fund Geothermal proponents could keep a watching brief on these and other federal government programs for their applicability and relevance.
Grants	See above under green power incentives
Tax Holidays	None listed on federal and provincial websites.
Tax Relief	• Under Classes 43.1 and 43.2 in Schedule II of the Income Tax Regulations, certain capital costs of systems that produce energy by using renewable energy sources or fuels from waste, or conserve energy by using fuel more efficiently are eligible for accelerated capital cost allowance. Under Class 43.1, eligible equipment may be written-off at 30 percent per year on a declining balance basis. In general, equipment that is eligible for Class 43.1 but is acquired after February 22, 2005 and before year 2020 may be written-off at 50 percent per year on a declining balance basis under Class 43.2. Without these accelerated write-offs, many of these assets would be depreciated for income tax purposes at annual rates between 4 and 30 percent. • In addition to Class 43.1 or 43.2 capital cost allowance, the Income Tax Regulations allow certain expenses incurred during the development and start-up of renewable energy and energy conservation projects [Canadian renewable and conservation expenses (CRCE)] to be fully deducted in the year they are incurred, carried forward indefinitely and deducted in future years, or transferred to investors through a flow-through share agreement.

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	Category	Comments
	Loan Guarantees	The following is an excerpt from http://www.fnfa.ca/en/fnfa/ "The First Nations Finance Authority (FNFA) is a statutory not-for-profit organization without share capital, operating under the authority of the First Nations Fiscal Management Act, 2005. The FNFA's purposes are to provide investment options and capital planning advice and—perhaps most importantly, access to long-term loans with preferable interest rates. The FNFA is not an agent of Her Majesty or a Crown corporation and is governed solely by the First Nations communities that join as Borrowing Members. The advantages of joining the FNFA as a Borrowing Member are: 1. Access to low rate, below bank prime, loans with repayment terms up to 30 years; 2. First Nations choose the repayment terms that work best for their budget; 3. FNFA loans do not require collateral; 4. FNFA loans can be used to refinance existing debt; and 5. FNFA's interest rates and terms parallel those available to provincial and local governments. Most revenue streams are eligible to support FNFA loan requests. Eligible capital projects FNFA can finance include infrastructure, social and economic development, land purchases, independent power projects, community housing and rolling stock/heavy equipment. FNFA is a stand-alone organization separate from the Government of Canada, and its operating policies are set by its Borrowing Members, represented by the First Nation's Chief and Council appointee. The FNFA is for First Nations, by First Nations."

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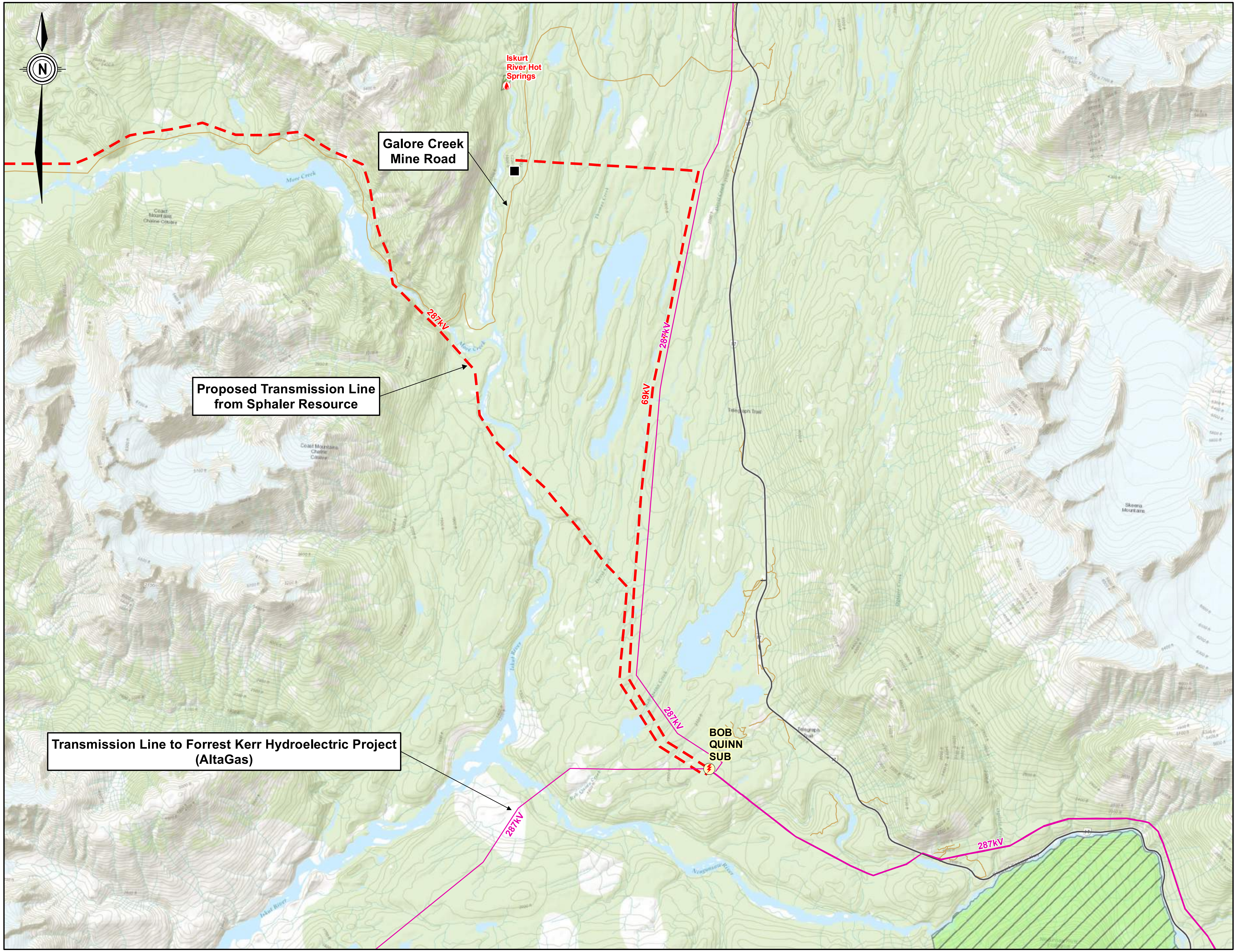
Category	Comments
Royalties/Fees	Geothermal Resources Act, [RSBC 1996] CHAPTER 171, as of March 11, 2015 Permits for well authorizations for wells to be drilled within the boundaries of the permittee's location must pay a prescribed rent for the permit (Section 5). Based on Section 17 of the Act, (1) A lessee who produces a geothermal resource for purposes other than testing must pay to the government (a) a royalty established by agreement under this section, (b) an amount agreed under this section to be paid instead of royalty, or (c) if no royalty or amount has been agreed under this section, the prescribed royalty.
General Idea of Royalties	With regard to use of the water resources within the geothermal tract, Section 4 of the Water Sustainability Act states “This Act does not apply to geothermal resources as defined in section 1 (1) [definitions] of the Geothermal Resources Act.”
Private Land Owner or Government Land	Geothermal proponents will need to arrange financial agreements (eg leases or purchases) with private property owners for the geothermal land tract. Proponents for geothermal facilities on Crown Land must apply for the appropriate tenure under the BC Land Act (eg Statutory Right of Way, Licence of Occupation).
Tax Rate in the Country	• Income eligible for small-business deduction (up to $500,000 income): 11% Federal tax, combined federal and provincial (British Columbia): 13.5%. • Income not eligible for small-business deduction: 15% Federal, combined federal and provincial (British Columbia): 26%
Transmission Tariffs	• Under wholesale wheeling (whereby electricity is transmitted from electricity generators to utilities) to customers in Alberta, the US, or other wholesale customers in BC, the generation supplier must request service on the appropriate BC Hydro transmission line under the Open Access Transmission Tariff (OATT) at a regulated cost for that service. Depending on the end customer, the generation supplier will have to make similar arrangements to cover transmission access in other jurisdictions (e.g. the Bonneville Power Authority for wheeling to a US customer). This ‘pancaking’ of rates, along with transmission congestion issues, affects the economic viability of the potential wholesale opportunity. • Tariff Supplement 37, approved by the BC Utilities commission on April 10, 2013, sets out the contributions from future clean, renewable energy projects (such as geothermal) and mine developments that will connect to the Northwest Transmission Line (NTL). This contribution, in general terms, equates to about $10/MWh. These contributions are intended to offset the ratepayer contributions for the cost of building NTL.

ISKUT

Near Iskut, British Columbia, Canada
Topographical Map Sheet: Figure 8
Geological Map Sheet: Figure 9

Category		Comments
M.	**Maps**	
	Regional topographic map showing population centres, roads and other infrastructure including electrical grid and nearest substation and/or generating station. (1:500,000?)	Topographical Map Sheet: Figure 8
	Regional map showing land tenure in area – geothermal concessions, mining concessions, private land holds, public or national lands (parks). (1:500,000?)	Topographical Map Sheet: Figure 8
	Regional geological map. (1:250 or 500,000?)	Geological Map Sheet: Figure 9
	Detailed geological map of the immediate area of the concessions. (1:50,000 or 100,000)	Geological Map Sheet: Figure 9
N.	**Other Issues and Considerations**	



Geoscience BC

Legend

- ■ Proposed Geothermal Plant Location
- 🌢 Thermal Spring
- Proposed Transmission Line
- Existing Substation
- Existing Transmission Line
- Paved Road
- Other Road
- 🟩 Park, Eco-Reserve, Protected Area

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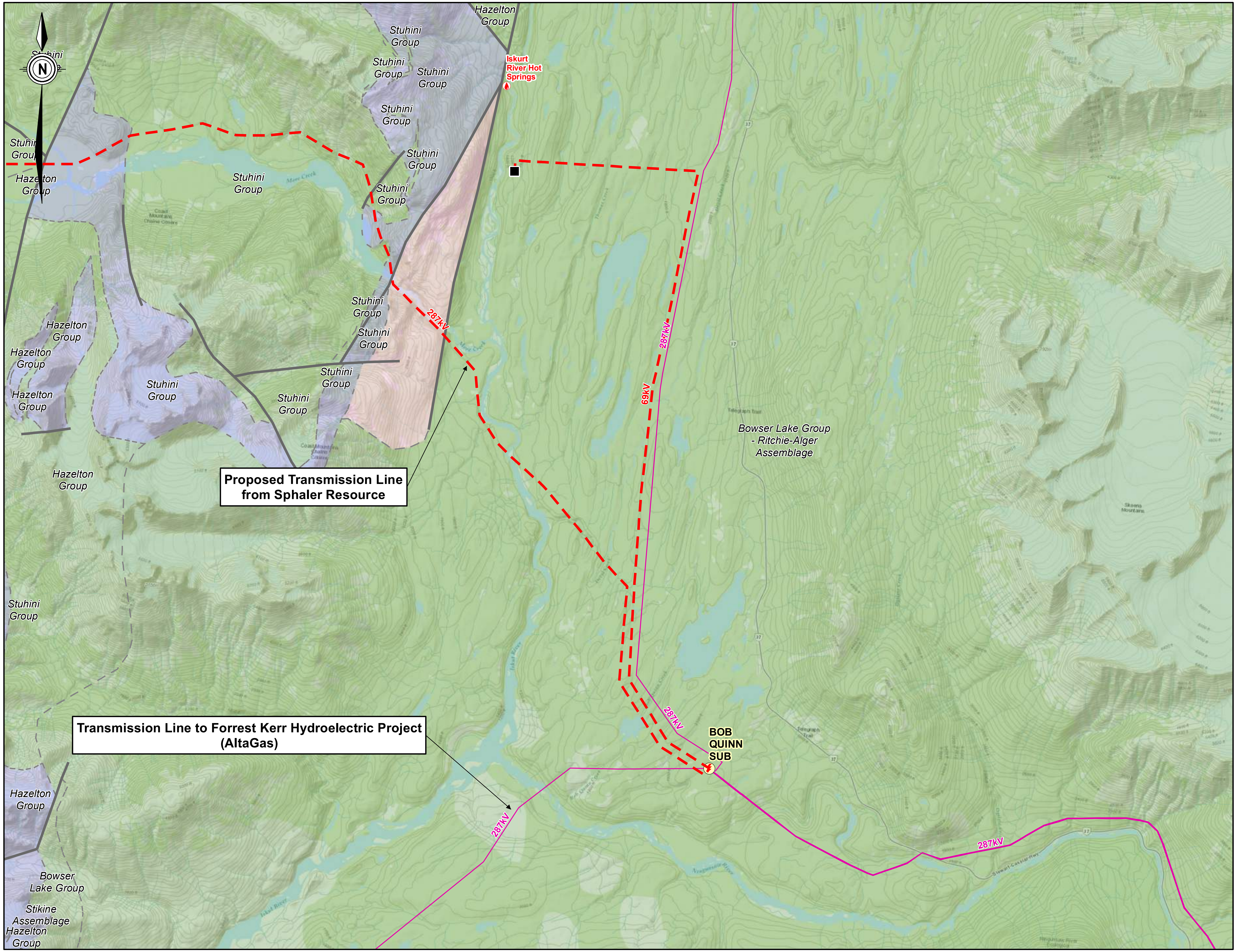
2 0 2
Kilometers

Project No.	Date
2692-004	April 30, 2015

Potential Geothermal Plant at Iskut 10MW

Figure 8

Path: Q:\2600-2699\2692-004\430-GIS\MXD-RP\2692004_GeothermalLocations_mapbook.mxd Date Saved: 2015-04-27 3:55:23 PM
Author: RTaylor



Geoscience BC

Legend

- ■ Proposed Geothermal Plant Location
- ● Thermal Spring
- ╌ Proposed Transmission Line
- ⚡ Existing Substation
- ─ Existing Transmission Line

Bedrock Type

- ▨ Intrusive Rocks
- 🟩 Sedimentary Rocks
- ▨ Volcanic Rocks
- ╌ Rock Type Boundary
- ─ Fault

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2 0 2
Kilometers

Project No.	Date
2692-004	April 30, 2015

Geological Strata Map for Iskut 10MW

Figure 9

Path: Q:\2600-2699\2692-004\430-GIS\MXD-RP\2692004_GeothermalLocationsGeology_mapbook.mxd Date Saved: 2015-04-27 3:00:00 PM
Author: RTaylor

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Appendix F

Jedney Area Geothermal Development Decision Matrix and Figures 10 & 11

JEDNEY AREA

Near Fort St. John, British Columbia, Canada
Topographical Map Sheet: Figure 10
Geological Map Sheet: Figure 11

Category		Comments
A.	**Reservoir Potential**	
	Size/Potential/Type	• **Reservoir size:** 2.1 km^3. The Jedney Area outlined on the CDL (2015) project maps is approximately 300 km^2 - actual reservoir area has not been defined. Reservoir area is assumed to consists of the areas with dolomite development, approximately 7% of total Jedney Project area (21 km^2) (CDL, 2015). Productive reservoir thickness has not been defined. Core logs show at least 30-50 m of carbonates, and it is noted that thickness of the Slave Point formation slowly decreases toward the southern edge of the study area, (CDL, 2015). A moderate value of 100 m is therefore used for reservoir size estimate. • **Potential:** Assume 15 MW (based on geologic similarity to Clarke Lake and drill stem temperatures from CDL [2015]) • **Type:** Binary plant for low-temperature resource.
	Temperature/Water and Gas Chemistry/Mineral Indicators	**Geothermometry:** • No information available. **Exploration drilling:** • Formation temperatures were available for drill stem tests and production tests from the IHS database. Reservoir temperatures (from Slave Point formation temperatures measured) in the Jedney Area range from 142° in the SE of the Jedney Area to 149°C in the NW. The temperature at the top of the Slave Point Formation varied from around 130°C to 140°C in the deeper southwestern part of the study area (CDL, 2015). • Averagetemperature gradient in Jedney Area ~0.045°C/m (45°C/km) (CDL, 2015) • Petroleum well gradients 30-40°C/km in project area (Fairbank and Faulkner, 1992). **Water chemistry:** • Project area located within Salinity Domain 1 (salinities less than 100,000 mg/L Total Dissolved Solids (TDS) and an average salinity of 50,000 mg/L) (CDL, 2015). • The Slave Point reservoir on the MDC bank is sour, containing gas with H$_2$S levels that range from 0.1% to near 3% (CO$_2$ and H$_2$S percentages are for gas produced from the aquifer, and not the gas dissolved in the formation water) (CDL, 2015).
	Surface Flow Rates and Reservoir Recharge	Recharge in the area likely from mountains in the SW, flowing to the NE, (CDL, 2015).
	3D Permeability (heat exchange potential)	• Temperature gradients varied from slightly more than 0.040 °C/m in the western and southwestern part of the study area (CDL, 2015). • Qualitative permeability groups 1, 2 and 6 found within Jedney Area (Group 1: High Rate Gas/High Permeability; Group 2: High Rate Water/High Permeability; Group 6: drill stem tests show little to no permeability). Permeability is noted to be significantly increased in samples having a grain density in the range of dolomite compared to limestone samples, (CDL, 2015).
	Recent Magmatism	None
	Structural Setting	No faults apparent in area. Prooject area part of carbonate reef complex with edge of reef complex to the north of project area.
	Geophysics	No information available.
	Reservoir Host Rock	• Carbonate reef rocks of the Mid-Devonian Carbonate aquifer system: reservoir formations include Keg River, Muskeg and Slave Point. Reservoir overlain by the Ireton Aquitard System of the Woodbend Group shale formations. In general, if the MDCAS aquifer has hydrothermal dolomite present, there will be an interval of high permeability within the dolomitized reservoir. (CDL, 2015). • The higher given Slave Point formation temperatures in the NW of the Jedney Area are coincidental with areas of dolomite development. Two drilling logs from the Jedney Area show dolomite present between 3,300-3,350 m, and limestone from 3,330-3,360 m, (CDL, 2015).
	Drilling Issues	A number of natural gas wells are shown on maps of the project area and provided data for the CDL (2015) report, though it is unknown if these are still open. However, wells with appropriate diameters for pumped production at geothermal rates would likely need to be "purpose built," that is, drilled specifically for use as geothermal producers. In addition, approximately as many injectors as producers would be required. Existing wells could potentially be used as injectors, but from a practical point of view would need to be within 2 kilometers of a production-well cluster.

JEDNEY AREA

Near Fort St. John, British Columbia, Canada
Topographical Map Sheet: Figure 10
Geological Map Sheet: Figure 11

Category		Comments
	Brief Description of Geological Setting of Thermal Features (i.e., springs emanate from fluvial gravels; beside a river, etc.)	• Located in the Western Canadian Sedimentary Basin, approximately 160 km SSE of Clarke Lake, but with apprent similar subsurface geology. • Large Mid-Devonian Carbonate thermal aquifer system consists of the following formations in the project area: Slave Point, Sulphur Point/Presqu'ile, Watt Mountain, Muskeg, Keg River and Chinchaga. The edge of the Sulphur Point/Presqu'ile bank/reef complex is dolomitzed, and the Wyatt Mountain and Muskeg evaporites, which commonly are known to act as aquicludes (barrier) in the greater area, are present in the project area, but do not appear to be effective barriers. (CDL, 2015) • The prospect does not appear to have surface thermal features. It is defined based on temperatures observed in wells drilled for natural gas production.
B.	**Exploration Uncertainty (Risk)**	
	Degree of Identification of Resources/Reserves	Moderate Gas drilling in area has provided subsurface data and temperatures. Gas exploration appears to have included geologic and stratigraphic mapping. Larger area has been evaluated for temperature gradient, downhole pressures and gas content, (CDL, 2015).
	Likelihood of Covering Reservoir with Concession	High Reservoir likely has large areal extent. The most likely development scenario would consist of several smaller power plants, each located near a cluster of production wells drilled specifically for geothermal development within a relatively small area (on the order of 1-2 km^2).
	Expected Authorization Date	Unknown
	Specific Timing of Exploration (2 + 2 years, BC 8 years, etc.)	5 years for first 5-MW pilot plant (3 years for development well drilling and testing + 2 years to complete and commission 5-MW pilot plant). 4 years per 5-MW module thereafter.
	Degree of Previous Exploration (can be good or bad)	Moderate There has been significant exploration for natural gas in the area, and formation temperatures have been documented from drill stem tests. No full-diameter wells have been drilled for geothermal exploration/exploitation.
	Surface Operational Capacity (enough stable area for drilling and a plant?)	Sufficient level ground exists for power plants and well pads. Gas-field operations may already provide some infrastructure (such as roads and well pads).
	Exploration to Exploitation: A summary rating of Exploration Uncertainty (risk) on a scale of difficult (high risk) through medium (moderate risk) to easy (low risk)	Difficult Full-diameter wells are likely to cost several million dollars each. It will be a challenge to make this economic for an output on the order of 1 MW per production well. Existing wells drilled for natural gas production are not likely to be useful for geothermal production due to smaller-diameter completions. Existing wells may be usable for injection. Use of such wells for geothermal injection would need to be investigated on a case-by-case basis.

JEDNEY AREA

Near Fort St. John, British Columbia, Canada
Topographical Map Sheet: Figure 10
Geological Map Sheet: Figure 11

Category		Comments
C.	**Environmental Issues**	
	Protected Areas	• Nearest Provincial Park, Sikanni Chief Canyon Park, approx. 40 km from proposed plant location.
	Endangered Species	• Black-throated Green Warbler (blue-listed bird) occurrence polygon located approx. 1 km from proposed transmission line. • Connecticut Warbler (blue-listed bird) occurrence polygon located approx. 4 km from proposed transmission line. • Boreal Mountain Caribou (Endangered (SARA Schedule 1); red-listed) habitat polygon approx. 30 km from proposed plant location. • Iowa Golden-saxifrage (red-listed plant) occurrence polygon located approx. 34 km from proposed plant. • Siberian Polypod (red-listed plant) occurrence polygon located approx. 45 km from proposed plant.
	Geothermal Surface Features	• Nearest hotsprings approx. 125 km from proposed infrastructure.
	Other	Transmission line crosses approx. 12 streams that contain various species of concern: • North Aitken Creek contains Longnose Dace, White Suckers, Lognose Suckers, Troutperch and Lake Chub. • Blueberry River contains Longnose Dace, Redside Shiner, White Sucker, Lake Chub, Longnose Sucker, Spoonhead Sculpin, Troutperch, Leopard Dace, Flathead Chub • Fox Creek contains Redside Shiner, Lake Chub, Longnose Sucker, Troutperch • Buick Creek contains White Sucker; • Jedney Creek contains Peamouth Chub; • Nearest Wildlife Habitat Area, for Mountain Goat, approx. 27 km from proposed transmission line. • Little Beaverdam Wildlife Habitat Area for Boreal Caribou approx. 50 km from proposed transmission line. • West Milligan Wildlife Habitat Area for Boreal Caribou approx. 70 km from proposed transmission line.
D.	**Geothermal Area - Bidding and/or Type of Land Holding (private/government/lease/etc.)**	
	Bidding Area	No known existing active, cancelled or unsold geothermal title tracts
	Other Claim Rights (mining and/or oil)	No known coal or mineral titles. Proposed location is within known oil and gas management area. Proposed lcoation is within natural gas tenure area.

JEDNEY AREA

Near Fort St. John, British Columbia, Canada
Topographical Map Sheet: Figure 10
Geological Map Sheet: Figure 11

Category		Comments
E.	**Market**	
	Main Electricity Consumers (direct sales and/or government)	General Overview 1. BC Hydro acquires power from Independent Power Producers (which would include geothermal proponents) through two main processes: • Competitive calls: when BC Hydro issues a Call for Tenders for the supply of electricity to BC Hydro, geothermal proponents can bid into those competitive calls. • Standing Offer Program (SOP): This program is presently available for clean generation projects greater than 0.1 MW but not more than 15 MW. Proponents do not compete against each other but are paid a predetermined price by BC Hydro. Depending on the specifics of each project, proponents may wish to size their projects to be under the 15 MW threshold for the SOP (BC Hydro is developing a 'mini-SOP' component within the overall SOP. This mini-SOP will apply to projects in the 0.1 MW to 1 MW range, but would not realistically apply to potential geothermal generation projects). • In addition, BC Hydro's net metering program is designed for residential and commercial customers who wish to connect a small electricity generating unit to the BC Hydro distribution system. Generating units up to 0.1 MW in capacity that utilize a clean or renewable resource are eligible to participate in the program. Given the small size, this program has no applicability to potential geothermal generation projects. The acquisition of geothermal power would contribute to BC Hydro's current target for clean energy and to the diversification of BC Hydro's resource mix, making it less reliant on snow melt and stream flow. 2. Although FortisBC is a potential customer for electricity from geothermal sources, the opportunities may be limited given FortisBC's ability to receive electricity from BC Hydro under Rate Schedule 3808. However there is a wheeling agreement in place which would facilitate a geothermal project located in FortisBC's service territory to sell electricity to BC Hydro through BC Hydro's competitive calls and/or the SOP, or to other potential customers as noted below. 3. Wholesale wheeling (whereby electricity is transmitted from electricity generators to utilities) to customers in Alberta, the US, or other wholesale customer in BC is allowed. The generation supplier must request service on the appropriate BC Hydro transmission line under the Open Access Transmission Tariff (OATT) at a regulated cost for that service. Depending on the end customer, the generation supplier will have to make similar arrangements to cover transmission access in other jurisdictions (e.g. the Bonneville Power Authority for wheeling to a US customer). This 'pancaking' of rates, along with congestion issues, affects the economic viability of the potential wholesale opportunity. 4. Retail access, defined as a market in which electricity is sold directly to consumers by competing suppliers, is generally not permitted in BC. However there may be opportunities for bilateral arrangements for direct sales of electricity from geothermal generating plants to large customers (e.g. pulp mills, large sawmills, mines) as follows: • To replace the electricity supplied at a high voltage from BC Hydro under BC Hydro Transmission Rate 1823 of the Electric Tariff. Such replacement would be challenging given the rates charged under that tariff. • To supply electricity to a remote facility (e.g. a mine, LNG plant or other industrial facility) directly from a geothermal plant located in close proximity to the facility, thereby precluding the need for a lengthy transmission line to connect to the BC Hydro electrical grid. • A potential electricity customer, Spectra Energy Jedney 1 Gas Plant, located approximately 15 km the proposed site. • A potential electricity customer, West Coast Sikanni Gas Plant, located approximately 20 km southeast of the proposed site and approximately 10 km from proposed transmission line. • A potential electricity customer, Tervita Silverberry Treatment Recovery and Disposal Facility, located approximately 30 from proposed transmission line. • A potential electricity customer, Daiber Gas Plant, located approximately 100 km from proposed transmission line. • A potential electricity customer, Canfor Pulp mill located approximately 190 km southeast of the proposed site in Taylor, BC.

JEDNEY AREA

Near Fort St. John, British Columbia, Canada
Topographical Map Sheet: Figure 10
Geological Map Sheet: Figure 11

Category		Comments
	Time Limits? (business agreements, operating/generating-by deadlines?)	• BC Hydro has issued competitive Calls for Tender for the supply of electricity in the past. • BC Hydro's SOP is presently directly available for clean energy projects which meet certain criteria, including a generation output of less than 15 MW. • Typical BC Hydro Energy Purchase Agreements from Independent Power Producers are 20-40 years in duration. • Business agreements with the owners of private transmission lines (e.g. independent power producers) for access to the market will be necessary. • The lead times to develop geothermal resources will include appropriate allowances for investigative drilling, technical and environmental studies, public consultation, transmission considerations, marketing, licencing, design, construction and commissioning. These lead times will vary from four to seven years depending on the specifics of each project. Projects with a history of exploration and analysis (e.g. Meager Creek/Pebble Creek, Lakelse, and Canoe Creek) will generally be on the shorter end of this time continuum, while other projects with less investigative work will take longer. Although the time required to drill a geothermal well and construct a power plant could conceivably be less than two years, the key uncertainties inherent in the environmental review, public consultation, transmission arrangements (either with BC Hydro or a private transmission owner), and the permitting and regulatory processes will realistically result in a further two years at a minimum for these activities.
F.	**Transmission Line Infrastructure**	
	State of the Infrastructure	Closest transmission line is 138 kV to Foxcreek Substation.
	Transmission Route (distance, terrain and costs)	New transmission line approx. 116 km via existing unpaved roads from proposed plant location to Foxcreek substation.
H.	**Community Issues**	
	Indigenous Law and Indigenous Development Areas	• First Nation consultative areas include Doig First Nation, Prophet First Nation, West Moberly First Nations, Treaty 8 Lands Office, Halkfway River First Nation, Blueberry River First Nations, Dene Tha' First Nations.
	Community Action	• Treaty 8 First Nations demonstrate against BC Hydro Dam in Fort St. John. • No existing land use plan found related to the proposed plant location.
	Surface Rights	• First Nation consultative areas include Doig First Nation, Prophet First Nation, West Moberly First Nations, Treaty 8 Lands Office, Halkfway River First Nation, Blueberry River First Nations, Dene Tha' First Nations.
	Tourism	• Due to remote location of proposed plant, no significant tourism activity is noted in the area. • Sikanni Chief Provincial Park is close to proposed plant location. • Proposed plant location is off the Alaska Highway; potential to create new recreational access.

JEDNEY AREA

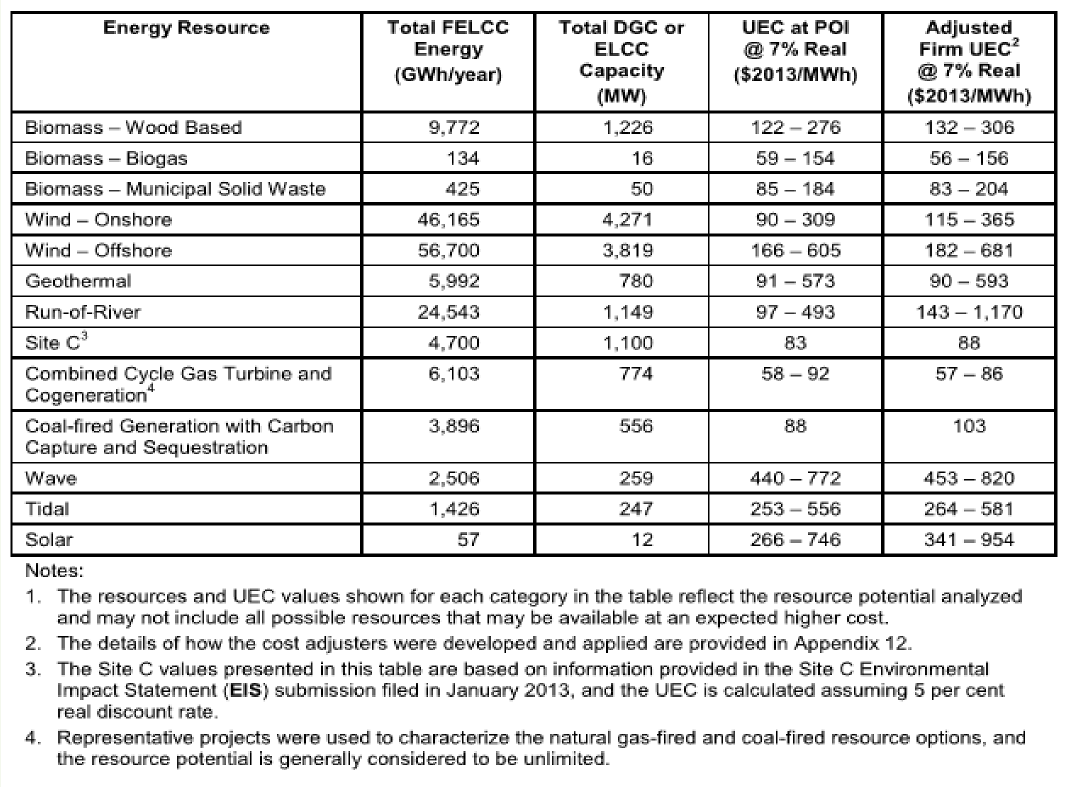
Near Fort St. John, British Columbia, Canada
Topographical Map Sheet: Figure 10
Geological Map Sheet: Figure 11

Category		Comments
I.	**Water Rights**	
	Availability (for example "air-cooled required")	Plant water requirement estimated approx. 25 L/s for binary plant. Closest River has MAD of 250 L/s. No known water licences near proposed plant location. Closest water licence is approx. 18 km away on Holman spring for 1.3 L/s for purpose of work camps.
	Availability for Drilling	Drilling requirement of 20 L/s. Closest River has MAD of 250 L/s. No known water licences near proposed plant location. Closest water licence is approx. 18 km away on Holman spring for 1.3 L/s for purpose of work camps.
J.	**Engineering**	
	Plant Location and Design	Remote plant location; significant distance of new transmission line required.
	Construction Issues	Access to location is limited. Closest town in Fort St. John approx. 230 km via road. Likely requirement for temporary work camp and fly-in access.
	Transportation Issues	Proposed plant location is approx. 230 km via road from closest town of Fort St. John.
	Architectural Issues (Blend/hide into environment? Local styles? etc.)	None found.
	Special Construction Issues (zero emissions)	None found.
K.	**Non-Electrical Infrastructure (Roads and Habitation)**	
	Nearest Large Community > 50,000	Prince George, BC
	Nearest Community	Fort St. John, BC
	Nearest Road and Condition	Significant network of existing unpaved access roads.
	Current Access Conditions (restrictions)	None found.
	Terrain and Distance Factor for Road Building	No requirement for new road anticipated.

JEDNEY AREA

Near Fort St. John, British Columbia, Canada
Topographical Map Sheet: Figure 10
Geological Map Sheet: Figure 11

Category		Comments
L.	**Finance**	
	General Power Prices	BC Hydro acquires power through (1) competitive processes (Calls for Tender), (2) the Standing Offer Program (not including the mini-SOP under development), and (3) upgrades to its existing facilities or the development of new generation facilities. (Note that the net metering program targets projects less than 100 kW and is therefore not relevant to geothermal generation projects). Comments on the general price of power under each one are: • The power price paid by BC Hydro to independent power producers through Energy Purchase Agreements (EPAs) under Calls for Tender are proprietary and confidential. • The power price paid by BC Hydro to independent power producers through EPAs under the SOP are made up of a predetermined base price in 2010 dollars as determined by the region of the point of interconnection to the BC Hydro system, escalated at the Consumer Price Index annually up to the year in which an EPA is signed, and further adjusted based upon the time of day and month when the energy is delivered. For reference, the base price for the Lower Mainland region in 2010 dollars is $103.69/MWh. • BC Hydro's current Integrated Resource Plan dated November 2013 includes details of both demand-side management options and supply-side resource options to consider in meeting the future demand for electricity. These resource options, together with their attributes of total energy and capacity and unit energy costs, are listed in Table 2-2 of the November 2013 Resource Options Report Update. That table is reproduced below for ready reference. • Table 5-7 of the above-noted November 2013 Resource Options Report Update provides a summary of the Geothermal Potential by Transmission Region.



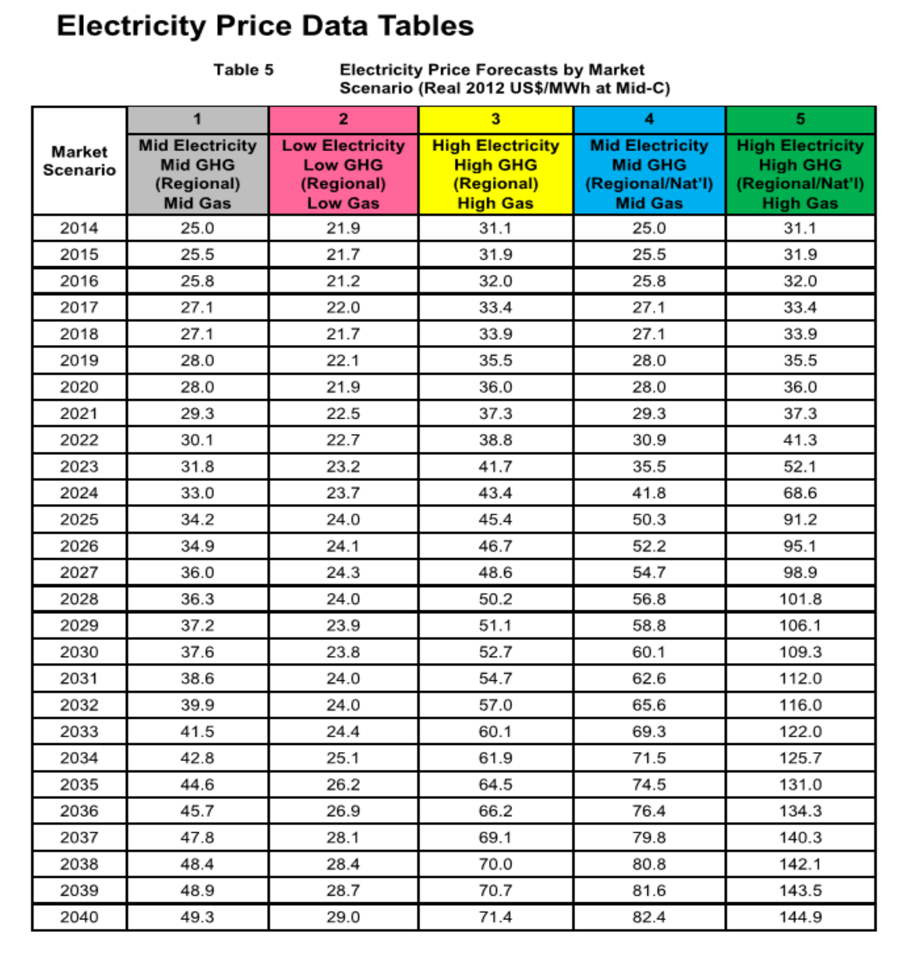
Energy Resource	Total FELCC Energy (GWh/year)	Total DGC or ELCC Capacity (MW)	UEC at POI @ 7% Real ($2013/MWh)	Adjusted Firm UEC[2] @ 7% Real ($2013/MWh)
Biomass – Wood Based	9,772	1,226	122 – 276	132 – 306
Biomass – Biogas	134	16	59 – 154	56 – 156
Biomass – Municipal Solid Waste	425	50	85 – 184	83 – 204
Wind – Onshore	46,165	4,271	90 – 309	115 – 365
Wind – Offshore	56,700	3,819	166 – 605	182 – 681
Geothermal	5,992	780	91 – 573	90 – 593
Run-of-River	24,543	1,149	97 – 493	143 – 1,170
Site C[3]	4,700	1,100	83	88
Combined Cycle Gas Turbine and Cogeneration[4]	6,103	774	58 – 92	57 – 86
Coal-fired Generation with Carbon Capture and Sequestration	3,896	556	88	103
Wave	2,506	259	440 – 772	453 – 820
Tidal	1,426	247	253 – 556	264 – 581
Solar	57	12	266 – 746	341 – 954

Notes:
1. The resources and UEC values shown for each category in the table reflect the resource potential analyzed and may not include all possible resources that may be available at an expected higher cost.
2. The details of how the cost adjusters were developed and applied are provided in Appendix 12.
3. The Site C values presented in this table are based on information provided in the Site C Environmental Impact Statement (**EIS**) submission filed in January 2013, and the UEC is calculated assuming 5 per cent real discount rate.
4. Representative projects were used to characterize the natural gas-fired and coal-fired resource options, and the resource potential is generally considered to be unlimited.

JEDNEY AREA

Near Fort St. John, British Columbia, Canada
Topographical Map Sheet: Figure 10
Geological Map Sheet: Figure 11

Category	Comments
Market Price ($/MWhr)	• As noted in the above Table 2-2 from the November 2013 Resource Options Report Update, the Unit Energy Cost for geothermal resources at a 7% real discount rate in 2013 dollars ranges from $91/MWh to 573/MWh at the point of interconnection to the BC Hydro system. • Wholesale electricity prices for trading purposes can vary greatly. In the Pacific Northwest, these prices are affected by such factors as precipitation/snowfall in the region, unforeseen generation outages and ambient temperatures. A general flavour of the wholesale electricity prices for potential export of electricity from BC can be obtained from a variety of sources. One such source is the US Energy Information Administration (www.eia.gov/electricity/wholesale/#history). This source provides current and historical electricity market data. Of particular relevance is the mid-C trading hub in the Northwest Region (one example would be a Mid-C peak price on March 17, 2015 of $19.87US weighted average cost from 72 trades). Access to that market for geothermal projects in BC would require access on both the BC Hydro transmission system to the Canada/US border, and on the appropriate transmission system (e.g. Bonneville Power Authority) in the US. • BC Hydro forecasts of market prices under various scenarios was provided in the November 2013 IRP. Table 5 in Appendix 5A – Market Forecast Data is reproduced below for ready reference.



Electricity Price Data Tables

Table 5 Electricity Price Forecasts by Market Scenario (Real 2012 US$/MWh at Mid-C)

Market Scenario	1 Mid Electricity Mid GHG (Regional) Mid Gas	2 Low Electricity Low GHG (Regional) Low Gas	3 High Electricity High GHG (Regional) High Gas	4 Mid Electricity Mid GHG (Regional/Nat'l) Mid Gas	5 High Electricity High GHG (Regional/Nat'l) High Gas
2014	25.0	21.9	31.1	25.0	31.1
2015	25.5	21.7	31.9	25.5	31.9
2016	25.8	21.2	32.0	25.8	32.0
2017	27.1	22.0	33.4	27.1	33.4
2018	27.1	21.7	33.9	27.1	33.9
2019	28.0	22.1	35.5	28.0	35.5
2020	28.0	21.9	36.0	28.0	36.0
2021	29.3	22.5	37.3	29.3	37.3
2022	30.1	22.7	38.8	30.9	41.3
2023	31.8	23.2	41.7	35.5	52.1
2024	33.0	23.7	43.4	41.8	68.6
2025	34.2	24.0	45.4	50.3	91.2
2026	34.9	24.1	46.7	52.2	95.1
2027	36.0	24.3	48.6	54.7	98.9
2028	36.3	24.0	50.2	56.8	101.8
2029	37.2	23.9	51.1	58.8	106.1
2030	37.6	23.8	52.7	60.1	109.3
2031	38.6	24.0	54.7	62.6	112.0
2032	39.9	24.0	57.0	65.6	116.0
2033	41.5	24.4	60.1	69.3	122.0
2034	42.8	25.1	61.9	71.5	125.7
2035	44.6	26.2	64.5	74.5	131.0
2036	45.7	26.9	66.2	76.4	134.3
2037	47.8	28.1	69.1	79.8	140.3
2038	48.4	28.4	70.0	80.8	142.1
2039	48.9	28.7	70.7	81.6	143.5
2040	49.3	29.0	71.4	82.4	144.9

JEDNEY AREA

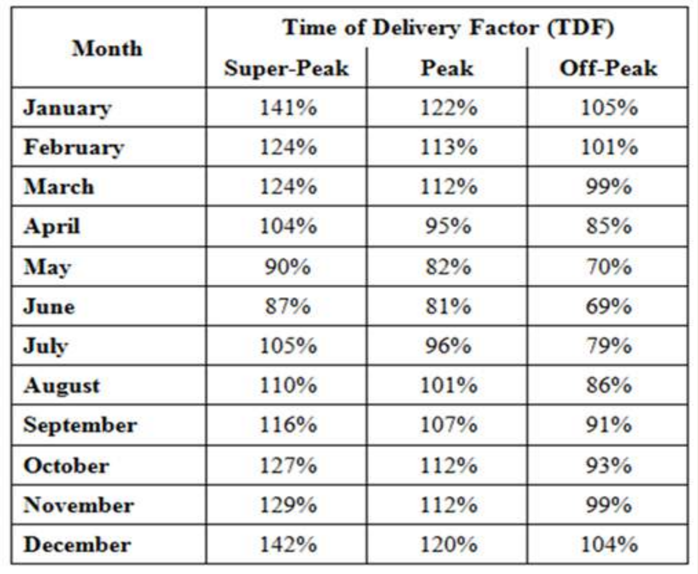
Near Fort St. John, British Columbia, Canada
Topographical Map Sheet: Figure 10
Geological Map Sheet: Figure 11

	Category	Comments
	Green Power Premium ($/MWhr)	• BC Hydro’s past procurement processes for the acquisition for power from independent power producers has offered a premium for green power. • Within British Columbia, there is little demand for the purchase of “green power certificates” (instruments that a customer can purchase to be assured that the electricity used is environmentally friendly) from BC Hydro. BC Hydro’s generation mix is already approximately 93% clean. • California has a goal of 33% of retail sales by 2020 to be sourced from eligible renewable energy sources. However, the opportunity for geothermal power from British Columbia, particularly “bundled” green energy with Renewable Energy Certificates (RECs), to compete in that market is low, for a number of reasons 1. The price of electricity is driven by the low cost of natural gas; 2. There are large amounts of renewables, such as wind and solar, in California; and 3. Firm transmission access to the California market through the BPA transmission system is generally not available.
	Capacity Price ($/KW)	• There is no price in $/kW for capacity resource options in the market at present. • Table 3-27 entitled "UCCs of Capacity Resource Supply Options" in BC Hydro’s Integrated Resource Plan dated November 2013 provided a summary of capacity resource options (e.g. pumped storage, simple cycle gas turbines and resource smart projects such as Revelstoke Unit 6). The unit capacity costs (UCCs) at the point of interconnection to the BC Hydro system in $2013/kW-year are shown in the table.

JEDNEY AREA

Near Fort St. John, British Columbia, Canada
Topographical Map Sheet: Figure 10
Geological Map Sheet: Figure 11

<table>
<tr><th colspan="2">Category</th><th>Comments</th></tr>
<tr><td></td><td>Is there a higher price for base load power?</td><td>In general, baseload power (ie firm power) is more valuable to BC Hydro and furthermore the price paid for baseload power varies by month throughout the year. As an example, the following excerpt is taken from BC Hydro’s SOP:

“1. Definitions: In this Appendix 4, the following words and expressions have the following meanings:
(a) “Off-Peak Hours” means all hours other than Super-Peak Hours and Peak Hours.
(b) “Peak Hours” means the hours commencing at 06:00 PPT and ending at 16:00 PPT, and commencing at 20:00 PPT and ending at 22:00 PPT, Monday through Saturday inclusive, but excluding British Columbia statutory holidays.
(c) “Super-Peak Hours” means the hours commencing at 16:00 PPT and ending at 20:00 PPT Monday through Saturday inclusive, but excluding British Columbia statutory holidays.”

<table>
<tr><th>Month</th><th colspan="3">Time of Delivery Factor (TDF)</th></tr>
<tr><th></th><th>Super-Peak</th><th>Peak</th><th>Off-Peak</th></tr>
<tr><td>January</td><td>141%</td><td>122%</td><td>105%</td></tr>
<tr><td>February</td><td>124%</td><td>113%</td><td>101%</td></tr>
<tr><td>March</td><td>124%</td><td>112%</td><td>99%</td></tr>
<tr><td>April</td><td>104%</td><td>95%</td><td>85%</td></tr>
<tr><td>May</td><td>90%</td><td>82%</td><td>70%</td></tr>
<tr><td>June</td><td>87%</td><td>81%</td><td>69%</td></tr>
<tr><td>July</td><td>105%</td><td>96%</td><td>79%</td></tr>
<tr><td>August</td><td>110%</td><td>101%</td><td>86%</td></tr>
<tr><td>September</td><td>116%</td><td>107%</td><td>91%</td></tr>
<tr><td>October</td><td>127%</td><td>112%</td><td>93%</td></tr>
<tr><td>November</td><td>129%</td><td>112%</td><td>99%</td></tr>
<tr><td>December</td><td>142%</td><td>120%</td><td>104%</td></tr>
</table>
</td></tr>
</table>

JEDNEY AREA

Near Fort St. John, British Columbia, Canada
Topographical Map Sheet: Figure 10
Geological Map Sheet: Figure 11

Category		Comments
	Estimated Size of Resource	See Section A.
	Is there any green power incentives?	• The BC government created the Innovative Clean Energy (ICE) fund with an initial mandate to accelerate the commercialization of emerging clean energy technologies (now expanded to include a broad range of energy efficiency and conservation projects). British Columbia also has a program entitled Scientific Research and Experimental Development Tax credit (SR&ED). Geothermal proponents could keep a watching brief on these programs for applicability and relevance. • The BC government's First Nations Clean Energy Business Fund. This fund promotes increased Aboriginal community participation in the clean energy sector. It provides: o Capacity funding of up to $50,000 per applicant to cover the early stages (e.g. feasibility studies) of project development ; and o Equity funding of up to $500,000 per applicant to support a financially viable and resourced clean energy project. • There are a number of government of Canada programs to encourage the development of renewable power. Some of these programs may be active but not currently issuing calls for proposals. Others may be focussed on research and innovation and may not be directly applicable to geothermal technologies/resources, while others may be fully subscribed and even inactive but are noted in terms of completeness. Some of these programs include: o Natural Resources Canada ecoEnergy for Renewable Power program; o Sustainable Development Technology Canada funds; o Clean Energy Fund; o Industrial Research Assistance Program; and o Green Infrastructure Fund Geothermal proponents could keep a watching brief on these and other federal government programs for their applicability and relevance.
	Grants	See above under green power incentives
	Tax Holidays	None listed on federal and provincial websites.
	Tax Relief	• Under Classes 43.1 and 43.2 in Schedule II of the Income Tax Regulations, certain capital costs of systems that produce energy by using renewable energy sources or fuels from waste, or conserve energy by using fuel more efficiently are eligible for accelerated capital cost allowance. Under Class 43.1, eligible equipment may be written-off at 30 percent per year on a declining balance basis. In general, equipment that is eligible for Class 43.1 but is acquired after February 22, 2005 and before year 2020 may be written-off at 50 percent per year on a declining balance basis under Class 43.2. Without these accelerated write-offs, many of these assets would be depreciated for income tax purposes at annual rates between 4 and 30 percent. • In addition to Class 43.1 or 43.2 capital cost allowance, the Income Tax Regulations allow certain expenses incurred during the development and start-up of renewable energy and energy conservation projects [Canadian renewable and conservation expenses (CRCE)] to be fully deducted in the year they are incurred, carried forward indefinitely and deducted in future years, or transferred to investors through a flow-through share agreement.

JEDNEY AREA

Near Fort St. John, British Columbia, Canada
Topographical Map Sheet: Figure 10
Geological Map Sheet: Figure 11

	Category	Comments
	Loan Guarantees	The following is an excerpt from http://www.fnfa.ca/en/fnfa/ "The First Nations Finance Authority (FNFA) is a statutory not-for-profit organization without share capital, operating under the authority of the First Nations Fiscal Management Act, 2005. The FNFA's purposes are to provide investment options and capital planning advice and—perhaps most importantly, access to long-term loans with preferable interest rates. The FNFA is not an agent of Her Majesty or a Crown corporation and is governed solely by the First Nations communities that join as Borrowing Members. The advantages of joining the FNFA as a Borrowing Member are: 1. Access to low rate, below bank prime, loans with repayment terms up to 30 years; 2. First Nations choose the repayment terms that work best for their budget; 3. FNFA loans do not require collateral; 4. FNFA loans can be used to refinance existing debt; and 5. FNFA's interest rates and terms parallel those available to provincial and local governments. Most revenue streams are eligible to support FNFA loan requests. Eligible capital projects FNFA can finance include infrastructure, social and economic development, land purchases, independent power projects, community housing and rolling stock/heavy equipment. FNFA is a stand-alone organization separate from the Government of Canada, and its operating policies are set by its Borrowing Members, represented by the First Nation's Chief and Council appointee. The FNFA is for First Nations, by First Nations."

JEDNEY AREA

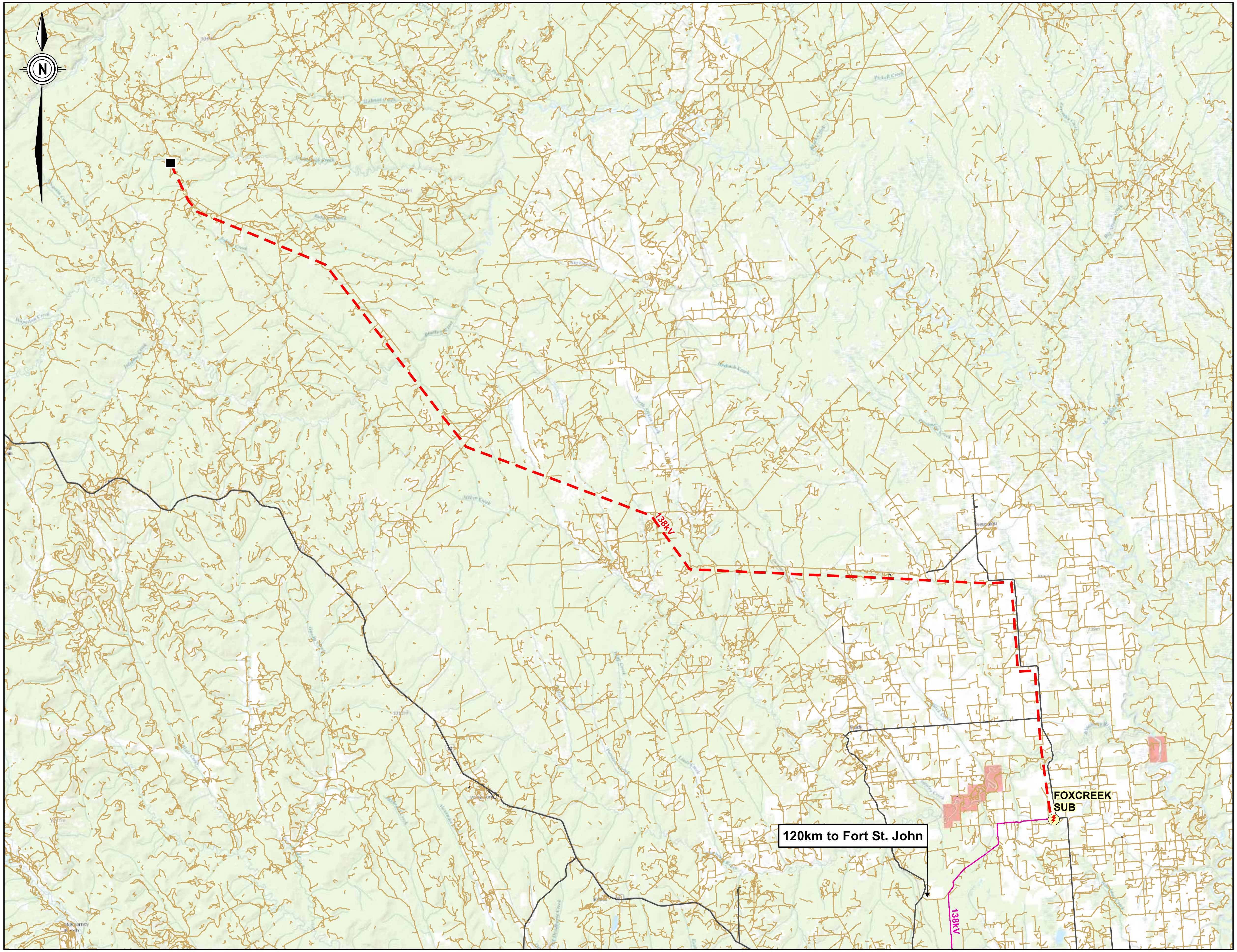
Near Fort St. John, British Columbia, Canada
Topographical Map Sheet: Figure 10
Geological Map Sheet: Figure 11

Category	Comments
Royalties/Fees	Geothermal Resources Act, [RSBC 1996] CHAPTER 171, as of March 11, 2015 Permits for well authorizations for wells to be drilled within the boundaries of the permittee's location must pay a prescribed rent for the permit (Section 5). Based on Section 17 of the Act, (1) A lessee who produces a geothermal resource for purposes other than testing must pay to the government (a) a royalty established by agreement under this section, (b) an amount agreed under this section to be paid instead of royalty, or (c) if no royalty or amount has been agreed under this section, the prescribed royalty.
General Idea of Royalties	With regard to use of the water resources within the geothermal tract, Section 4 of the Water Sustainability Act states “This Act does not apply to geothermal resources as defined in section 1 (1) [definitions] of the Geothermal Resources Act.”
Private Land Owner or Government Land	Geothermal proponents will need to arrange financial agreements (eg leases or purchases) with private property owners for the geothermal land tract. Proponents for geothermal facilities on Crown Land must apply for the appropriate tenure under the BC Land Act (eg Statutory Right of Way, Licence of Occupation).
Tax Rate in the Country	• Income eligible for small-business deduction (up to $500,000 income): 11% Federal tax, combined federal and provincial (British Columbia): 13.5%. • Income not eligible for small-business deduction: 15% Federal, combined federal and provincial (British Columbia): 26%
Transmission Tariffs	Under wholesale wheeling (whereby electricity is transmitted from electricity generators to utilities) to customers in Alberta, the US, or other wholesale customers in BC, the generation supplier must request service on the appropriate BC Hydro transmission line under the Open Access Transmission Tariff (OATT) at a regulated cost for that service. Depending on the end customer, the generation supplier will have to make similar arrangements to cover transmission access in other jurisdictions (e.g. the Bonneville Power Authority for wheeling to a US customer). This ‘pancaking’ of rates, along with transmission congestion issues, affects the economic viability of the potential wholesale opportunity.

JEDNEY AREA

Near Fort St. John, British Columbia, Canada
Topographical Map Sheet: Figure 10
Geological Map Sheet: Figure 11

Category		Comments
M.	**Maps**	
	Regional topographic map showing population centres, roads and other infrastructure including electrical grid and nearest substation and/or generating station. (1:500,000?)	Topographical Map Sheet: Figure 10
	Regional map showing land tenure in area – geothermal concessions, mining concessions, private land holds, public or national lands (parks). (1:500,000?)	Topographical Map Sheet: Figure 10
	Regional geological map. (1:250 or 500,000?)	Geological Map Sheet: Figure 11
	Detailed geological map of the immediate area of the concessions. (1:50,000 or 100,000)	Geological Map Sheet: Figure 11
N.	**Other Issues and Considerations**	



Geoscience BC

Legend

■	Proposed Geothermal Plant Location
- - -	Proposed Transmission Line
⚡	Existing Substation
—	Existing Transmission Line
—	Paved Road
—	Other Road
🟥	First Nations Reserve

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Service Layer Credits: Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

8 0 8
Kilometers

Project No.
2692-004

Date
April 30, 2015

Potential Geothermal Plant at Jedney Area 15MW

Figure 10

Path: Q:\2600-2699\2692-004\430-GIS\MXD-RP\2692004_GeothermalLocations_mapbook.mxd Date Saved: 2015-04-27 3:35:17 PM
Author: RTaylor

Geoscience BC

Legend

■ Proposed Geothermal Plant Location

Proposed Transmission Line

Existing Substation

Existing Transmission Line

Bedrock Type

🟩 Sedimentary Rocks

Rock Type Boundary

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Service Layer Credits: Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

10 0 10
Kilometers

Project No.	Date
2692-004	April 30, 2015

Geological Strata Map for Jedney Area 15MW

Figure 11

Path: Q:\2600-2699\2692-004\430-GIS\MXD-RP\2692004_GeothermalLocationsGeology_mapbook.mxd Date Saved: 2015-04-27 2:16:45 PM
Author: RTaylor

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Appendix G

King Island
Geothermal Development Decision Matrix and Figures 12 & 13

KING ISLAND

Near Bella Coola, British Columbia, Canada
Topographical Map Sheet: Figure 12
Geological Map Sheet: Figure 13

Category		Comments
A.	**Reservoir Potential**	
	Size/Potential/Type	• **Reservoir size:** No clearly defined area or thickness in literature, but description of multiple springs warrants an area estimate of about 5 km^2) - therefore, reservoir volume estimated at: 5.5 km^3 (most-likely area: 5 km^2; most-likely thickness*: 1.1 km) (*Reservoir thickness assumption based on most-likely value from Appendix III in GeothermEx, 2004) • **Potential:** 20 MW (WREZ, 2009) • **Type:** low-temperature resource, suitable for binary plant.
	Temperature/Water and Gas Chemistry/Mineral Indicators	**Surface features:** • Hot springs in this area (also known as the Dean Channel group of springs) have temperatures from warm to 64°C (Fairbank and Faulkner, 1992). • Eucott Bay Spring: 41.5°C and 54°C (BC Hydro, 1981); 41.5-54°C (Souther, 1975) • Nascall Bay Spring: 43.4°C (BC Hydro, 1981); warm (Souther and Halstead, 1973) • Ram Bluff Spring: warm (Souther and Halstead, 1973) • Bella Coola Spring: warm (Souther and Halstead, 1973) • Talheo Hot Spring: 46°C to 64°C (BC Hydro, 1981); 46-54°C (Souther, 1975); warm (Souther and Halstead, 1973) **Geothermometry:** • Eucott Bay Spring: Na-K-Ca 88.6°C; SiO_2 112.8°C (Fairbank and Faulkner, 1992); convergence of geothermometers at 80° to 90°C (Souther, 1975) • Talheo Hot Spring: Na-K-Ca 98.3°C; SiO_2 141.2°C (Fairbank and Faulkner, 1992); cations and silica combine to indicate that temperatures at depth of 100°C to ~120°C are likely to be present (Souther, 1975) **Exploration drilling:** • no information **Water chemistry:** • Eucott Bay Spring: (Na>Ca)-Cl type; Cl at 1,600~1,800 mg/l and high Ca combine to suggest that the water could be about 10% seawater, heated either before or after mixing (Souther, 1975); the largest spring in the area; water is of the calcium sulphate-calcium bicarbonate type (Souther and Halstead, 1973). **Mineral indicators:** • The main spring at Eucott Bay has a white mineral deposited at the vent and numerous seeps (BC Hydro, 1981).
	Surface Flow Rates and Reservoir Recharge	Up to 10 L/s (Fairbank and Faulkner, 1992) • Eucott Bay spring: 2 - 7.5 L/s (Souther, 1975); 634 L/min (BC Hydro, 1981) • Talheo hot spring: 2 L/s (Souther, 1975) • Nascall Bay: 46 L/min (BC Hydro, 1981)
	3D Permeability (heat exchange potential)	Heat exchange potential appears good, associated with fracturing in plutonic and metamorphic rocks.
	Recent Magmatism	Bella Bella and King Island volcanic centers range in age from 14. - 10.3 million years old (Bevier, 1989).
	Structural Setting	• Heat source is likely to be the Anaheim Volcanic Belt (Fairbank and Faulkner, 1992). • The late Cenozoic Anahim Volcanic Belt (AVB) crosses the Coast Plutonic Complex in the greater project area. Typically the AVB volcanic centers are predominantly subaerial volcanic features, alkaline and peralkaline in composition, except in the western end of the belt where it crosses the Coast Mountains (at King Island). Dike swarms near Bella Bella and plutons in the King Island area are exposed due to differential uplift of the Coast Mountains. The Bella Bella dike swarms and King Island pluton may represent the subvolcanic and plutonic parts, respectively, of an alkaline to peralkaline magmatic fractionation system similar to those found elsewhere in AVB (Bevier, 1989).
	Geophysics	No information

KING ISLAND

Near Bella Coola, British Columbia, Canada
Topographical Map Sheet: Figure 12
Geological Map Sheet: Figure 13

Category		Comments
	Reservoir Host Rock	The Dean Channel group of springs all discharge from fissures in quartz diorite of the Coast Crystalline complex. In general, they fall within a broad northwesterly trending zone of migmatite, gneiss and schist that forms nearly vertical pendants within the more uniform granitic rock (Souther and Halstead, 1973).
	Drilling Issues	Eucott Bay, Nascall Bay, and Talheo springs all lie within Conservancy lands; Bella Coola appears to lie on the boundary of the conservancy lands. Unknown road access/conditions. Best access to sites for exploration drilling is likely to be by boat.
	Brief Description of Geological Setting of Thermal Features (i.e., springs emanate from fluvial gravels; beside a river, etc.)	• The Dean Channel group of springs consists of six widely separated springs clustered around the head of Dean and Burke Channels, part of a system of narrow fiords that extend into the center of the Coast Range. All of the springs are near sea-level and all of them discharge from fissures, with the metamorphic rocks tending to be more porous and more highly fractured than the surrounding quartz diorite (may account for the localization of hot springs in the area) (Souther and Halstead, 1973). • The main spring at Eucott Bay issues from boulders near the high-tide mark (BC Hydro, 1981). • Hot water at Nascall Bay percolates from the ground near the high-tide mark and from the middle of a cold stream (BC Hydro, 1981). • There are 16 springs along 400 m of shoreline at Talheo Hot Spring, and many seeps below high tide (BC Hydro, 1981).
B.	**Exploration Uncertainty (Risk)**	
	Degree of Identification of Resources/Reserves	Low Only moderate geologic mapping done, no known geophysical or geochemical studies conducted. No drilling in area known.
	Likelihood of Covering Reservoir with Concession	Unknown Resource location not identified; multiple springs in the area along linear structural feature with patches of Conservancy land throughout.
	Expected Authorization Date	Unknown
	Specific Timing of Exploration (2 + 2 years, BC 8 years, etc.)	6-7 years (2 years deep gradient-well drilling + 2 years successful development drilling and testing + 1 year further development drilling and start plant construction + 1 year drilling wrap-up and finish plant construction). Possible delays due to issues of access (conservancy, infrastructure).
	Degree of Previous Exploration (can be good or bad)	Low Geologic mapping is the only known exploration in the area.
	Surface Operational Capacity (enough stable area for drilling and a plant?)	Unknown Area for surface operations would need to be assessed once surface exploration and temperature-gradient drilling has been performed.
	Exploration to Exploitation: A summary rating of Exploration Uncertainty (risk) on a scale of difficult (high risk) through medium (moderate risk) to easy (low risk)	Difficult Area appears to be accessible just by boat or helicopter at present. Proximity to conservancy lands could be a problem. The most promising spring based on geothermometry (Talheo) is about 60 km away from the cluster of springs near Eucott Bay.

KING ISLAND

Near Bella Coola, British Columbia, Canada
Topographical Map Sheet: Figure 12
Geological Map Sheet: Figure 13

Category		Comments
C.	**Environmental Issues**	
	Protected Areas	• Cascade-Sutslem Conservancy is close to the proposed plant location. • Bella Coola Estuary Conservancy is close to the proposed power line. • Nooseseck Convervancy approx. 6 km from proposed power line. • Tweedsmuir Provincial Park is approx. 60 km from proposed transmission line.
	Endangered Species	• Proposed transmission line connection inside the occurrence polygons of Chamisso's Montia (blue-listed plant) and Lesser Saltmarsh Sedge (blue-listed plant).
	Geothermal Surface Features	• Proposed plant location is approx. 6 km from Eucott Bay Hot Springs, and approx. 7 km from Nascall Bay Hot Springs. • Proposed transmission line is close to the Bella Coola Hot Springs, and 2 km from Ram Bluff Hotsprings.
	Other	• Transmission line crosses Nooseseck River which contains spawning locations for Pink and Chum Salmon. Nooseseck River also contains Coho Salmon. • Transmission line crosses Necleetsconnay River which contains Coho, Pink and Chumb Salmon and Cutthroat Trout. • Transmission line crosses unnamed river which contains Pink and Chum Salmon. • Transmission line crosses the Bella Coola River which contains Coho, Sockeye, Chinook, Pink, and Chum Salmon and Steelhead Trout. • Nearest Wildlife Habitat Area allotted for Grizzly Bear is approx. 10 km south of the proposed transmission line.
D.	**Geothermal Area - Bidding and/or Type of Land Holding (private/government/lease/etc.)**	
	Bidding Area	No known existing active, cancelled or unsold geothermal title tracts
	Other Claim Rights (mining and/or oil)	No known coal or mineral titles. Proposed location is not within known oil and gas management area; no known tenures at proposed location.

KING ISLAND

Near Bella Coola, British Columbia, Canada
Topographical Map Sheet: Figure 12
Geological Map Sheet: Figure 13

Category		Comments
E.	**Market**	
	Main Electricity Consumers (direct sales and/or government)	General Overview 1. BC Hydro acquires power from Independent Power Producers (which would include geothermal proponents) through two main processes: • Competitive calls: when BC Hydro issues a Call for Tenders for the supply of electricity to BC Hydro, geothermal proponents can bid into those competitive calls. • Standing Offer Program (SOP): This program is presently available for clean generation projects greater than 0.1 MW but not more than 15 MW. Proponents do not compete against each other but are paid a predetermined price by BC Hydro. Depending on the specifics of each project, proponents may wish to size their projects to be under the 15 MW threshold for the SOP (BC Hydro is developing a 'mini-SOP' component within the overall SOP. This mini-SOP will apply to projects in the 0.1 MW to 1 MW range, but would not realistically apply to potential geothermal generation projects). • In addition, BC Hydro's net metering program is designed for residential and commercial customers who wish to connect a small electricity generating unit to the BC Hydro distribution system. Generating units up to 0.1 MW in capacity that utilize a clean or renewable resource are eligible to participate in the program. Given the small size, this program has no applicability to potential geothermal generation projects. The acquisition of geothermal power would contribute to BC Hydro's current target for clean energy and to the diversification of BC Hydro's resource mix, making it less reliant on snow melt and stream flow. 2. Although FortisBC is a potential customer for electricity from geothermal sources, the opportunities may be limited given FortisBC's ability to receive electricity from BC Hydro under Rate Schedule 3808. However there is a wheeling agreement in place which would facilitate a geothermal project located in FortisBC's service territory to sell electricity to BC Hydro through BC Hydro's competitive calls and/or the SOP, or to other potential customers as noted below. 3. Wholesale wheeling (whereby electricity is transmitted from electricity generators to utilities) to customers in Alberta, the US, or other wholesale customer in BC is allowed. The generation supplier must request service on the appropriate BC Hydro transmission line under the Open Access Transmission Tariff (OATT) at a regulated cost for that service. Depending on the end customer, the generation supplier will have to make similar arrangements to cover transmission access in other jurisdictions (e.g. the Bonneville Power Authority for wheeling to a US customer). This 'pancaking' of rates, along with congestion issues, affects the economic viability of the potential wholesale opportunity. 4. Retail access, defined as a market in which electricity is sold directly to consumers by competing suppliers, is generally not permitted in BC. However there may be opportunities for bilateral arrangements for direct sales of electricity from geothermal generating plants to large customers (e.g. pulp mills, large sawmills, mines) as follows: • To replace the electricity supplied at a high voltage from BC Hydro under BC Hydro Transmission Rate 1823 of the Electric Tariff. Such replacement would be challenging given the rates charged under that tariff. • To supply electricity to a remote facility (e.g. a mine, LNG plant or other industrial facility) directly from a geothermal plant located in close proximity to the facility, thereby precluding the need for a lengthy transmission line to connect to the BC Hydro electrical grid.

KING ISLAND

Near Bella Coola, British Columbia, Canada
Topographical Map Sheet: Figure 12
Geological Map Sheet: Figure 13

Category		Comments
	Time Limits? (business agreements, operating/generating-by deadlines?)	• BC Hydro has issued competitive Calls for Tender for the supply of electricity in the past. • BC Hydro's SOP is presently directly available for clean energy projects which meet certain criteria, including a generation output of less than 15 MW. • Typical BC Hydro Energy Purchase Agreements from Independent Power Producers are 20-40 years in duration. • Business agreements with the owners of private transmission lines (e.g. independent power producers) for access to the market will be necessary. • The lead times to develop geothermal resources will include appropriate allowances for investigative drilling, technical and environmental studies, public consultation, transmission considerations, marketing, licencing, design, construction and commissioning. These lead times will vary from four to seven years depending on the specifics of each project. Projects with a history of exploration and analysis (e.g. Meager Creek/Pebble Creek, Lakelse, and Canoe Creek) will generally be on the shorter end of this time continuum, while other projects with less investigative work will take longer. Although the time required to drill a geothermal well and construct a power plant could conceivably be less than two years, the key uncertainties inherent in the environmental review, public consultation, transmission arrangements (either with BC Hydro or a private transmission owner), and the permitting and regulatory processes will realistically result in a further two years at a minimum for these activities.
F.	**Transmission Line Infrastructure**	
	State of the Infrastructure	Bella Coola is a non integrated community (not connected to the main transmission grid). It has a 25kV distribution system with power supplied by a 2 MW run-of river hydro project located 5 km west of Bella Coola at Clayton Falls and a 7.8 MW diesel station (Ah-Sin-Heek) located 3 km east of Bella Coola. At the diesel station hydrogen is generated and stored when the community load is less than the hydro plant can produce. The hydrogen is used to reduce diesel use during peak periods.
	Transmission Route (distance, terrain and costs)	New 69 kV transmission line 57 km to Bella Coola substation. Routing includes 5 km of submerged submarine transmission line; remaining new routing follows shoreline via steep, treed, remote terrain with limited or no land access (accessible by barge).
H.	**Community Issues**	
	Indigenous Law and Indigenous Development Areas	• First Nation Consultative Areas include Heiltsuk Nation, Nuxalk Nation. • Heiltsuk Economic Development Corporation established by the Heiltsuk Tribal Council to enhance existing businesses and pursue new business opportunities. (http://www.heiltsukdevco.com/). Area of concentration is Bella Bella. • Nuxalk First Nation territory;
	Community Action	• Nuxalk Nation Smayusta summary of action is documented against logging, mining, fish farms from 1995 to 2003. (http://www.nuxalk.net/) • Demonstration against Enbridge at Bella Bella in 2012 (http://www.nuxalk.net/html/enbridge_rejected.html). • Nuxalk activists and supporters blockaded logging roads on King Island to protect the Great Bear Rainforest in 1995 (http://www.firstnations.eu/forestry/nuxalk.htm) • Other community action related to fish farming, logging and mining documented up to 2003 (http://www.firstnations.eu/forestry/nuxalk.htm) • Bella Coola Residents protested ferry cuts in 2014. (http://www.coastmountainnews.com/news/252922161.html) • Bella Coola Food Action Plan developed with Vancouver Coastal Health in 2006 with goal for community food security and access for all healthy sustainable food system (see Bella Coola Food Action Plan). • Bella Coola pilot power project Clayton Falls run-of-river generating station (http://www.canadianconsultingengineer.com/features/storing-power-at-bella-coola/).
	Surface Rights	• First Nation Consultative Areas include Heiltsuk Nation, Nuxalk Nation
	Tourism	• Bella Coola is a vacation destination for outdoor recreation including camping, hiking, kayaking. It is advertised as the "Gateway to the Great Bear Rainforest." (http://bellacoola.ca/). • No significant tourism industry found on King Island.

KING ISLAND

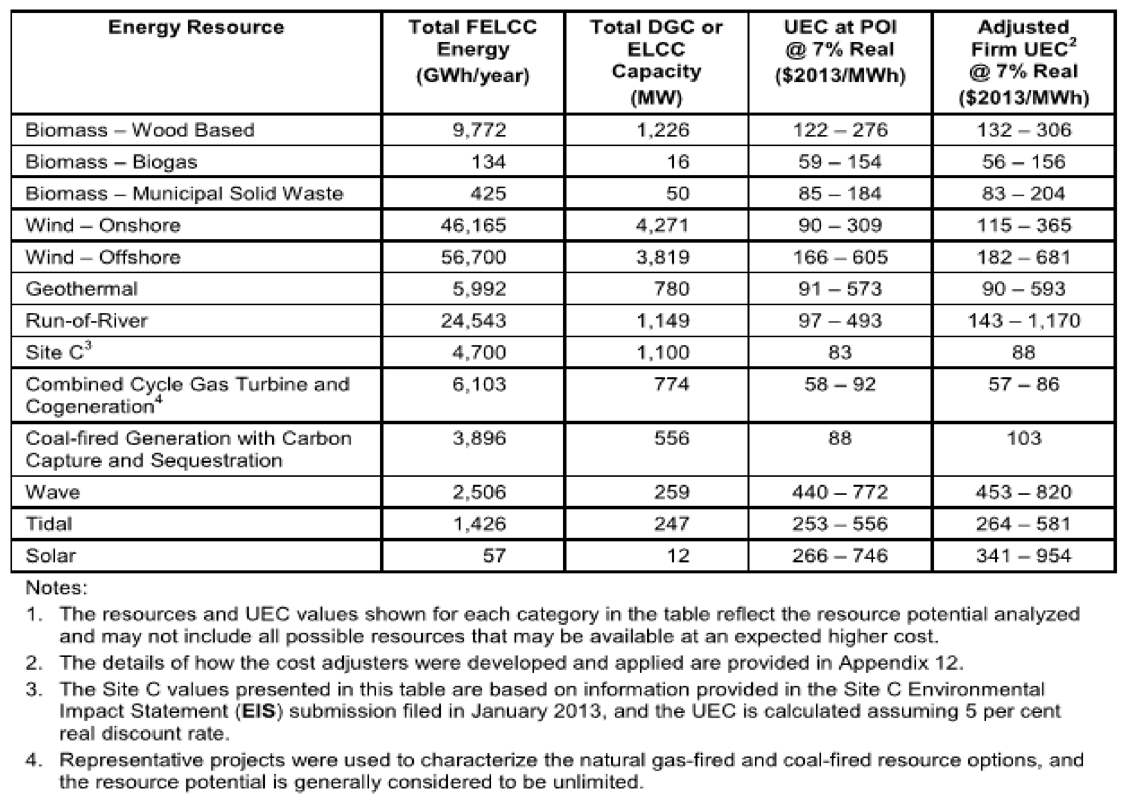
Near Bella Coola, British Columbia, Canada
Topographical Map Sheet: Figure 12
Geological Map Sheet: Figure 13

Category		Comments
I.	**Water Rights**	
	Availability (for example "air-cooled required")	Plant water requirement estimated approx. 25 L/s for binary plant. MAD of 49000 L/s. No current water licences at the proposed plant location. 3 existing active applications for water licences for purpose of power with max licence requirement of 75000 L/s.
	Availability for Drilling	Drilling requirement of 20 L/s. MAD of 49000 L/s. No current water licences at the proposed plant location. 3 existing active applications for water licences for purpose of power with max licence requirement of 75000 L/s.
J.	**Engineering**	
	Plant Location and Design	Plant location sited near existing industrial renewable energy infrastructure.
	Construction Issues	Extremely remote access; construction labour and materials must be barged to proposed plant location.
	Transportation Issues	Barge access only. No access roads from mainland BC.
	Architectural Issues (Blend/hide into environment? Local styles? etc.)	None found.
	Special Construction Issues (zero emissions)	None found.
K.	**Non-Electrical Infrastructure (Roads and Habitation)**	
	Nearest Large Community > 50,000	Prince George, BC
	Nearest Community	Bella Coola, BC (50 km by boat)
	Nearest Road and Condition	No road access to proposed plant location.
	Current Access Conditions (restrictions)	Only barge access.
	Terrain and Distance Factor for Road Building	Not applicable, only barge/marine access.

KING ISLAND

Near Bella Coola, British Columbia, Canada
Topographical Map Sheet: Figure 12
Geological Map Sheet: Figure 13

Category		Comments
L.	**Finance**	
	General Power Prices	BC Hydro acquires power through (1) competitive processes (Calls for Tender), (2) the Standing Offer Program (not including the mini-SOP under development), and (3) upgrades to its existing facilities or the development of new generation facilities. (Note that the net metering program targets projects less than 100 kW and is therefore not relevant to geothermal generation projects). Comments on the general price of power under each one are: • The power price paid by BC Hydro to independent power producers through Energy Purchase Agreements (EPAs) under Calls for Tender are proprietary and confidential. • The power price paid by BC Hydro to independent power producers through EPAs under the SOP are made up of a predetermined base price in 2010 dollars as determined by the region of the point of interconnection to the BC Hydro system, escalated at the Consumer Price Index annually up to the year in which an EPA is signed, and further adjusted based upon the time of day and month when the energy is delivered. For reference, the base price for the Lower Mainland region in 2010 dollars is $103.69/MWh. • BC Hydro's current Integrated Resource Plan dated November 2013 includes details of both demand-side management options and supply-side resource options to consider in meeting the future demand for electricity. These resource options, together with their attributes of total energy and capacity and unit energy costs, are listed in Table 2-2 of the November 2013 Resource Options Report Update. That table is reproduced below for ready reference. • Table 5-7 of the above-noted November 2013 Resource Options Report Update provides a summary of the Geothermal Potential by Transmission Region.



Energy Resource	Total FELCC Energy (GWh/year)	Total DGC or ELCC Capacity (MW)	UEC at POI @ 7% Real ($2013/MWh)	Adjusted Firm UEC[2] @ 7% Real ($2013/MWh)
Biomass – Wood Based	9,772	1,226	122 – 276	132 – 306
Biomass – Biogas	134	16	59 – 154	56 – 156
Biomass – Municipal Solid Waste	425	50	85 – 184	83 – 204
Wind – Onshore	46,165	4,271	90 – 309	115 – 365
Wind – Offshore	56,700	3,819	166 – 605	182 – 681
Geothermal	5,992	780	91 – 573	90 – 593
Run-of-River	24,543	1,149	97 – 493	143 – 1,170
Site C[3]	4,700	1,100	83	88
Combined Cycle Gas Turbine and Cogeneration[4]	6,103	774	58 – 92	57 – 86
Coal-fired Generation with Carbon Capture and Sequestration	3,896	556	88	103
Wave	2,506	259	440 – 772	453 – 820
Tidal	1,426	247	253 – 556	264 – 581
Solar	57	12	266 – 746	341 – 954

Notes:

1. The resources and UEC values shown for each category in the table reflect the resource potential analyzed and may not include all possible resources that may be available at an expected higher cost.
2. The details of how the cost adjusters were developed and applied are provided in Appendix 12.
3. The Site C values presented in this table are based on information provided in the Site C Environmental Impact Statement (**EIS**) submission filed in January 2013, and the UEC is calculated assuming 5 per cent real discount rate.
4. Representative projects were used to characterize the natural gas-fired and coal-fired resource options, and the resource potential is generally considered to be unlimited.

KING ISLAND

Near Bella Coola, British Columbia, Canada
Topographical Map Sheet: Figure 12
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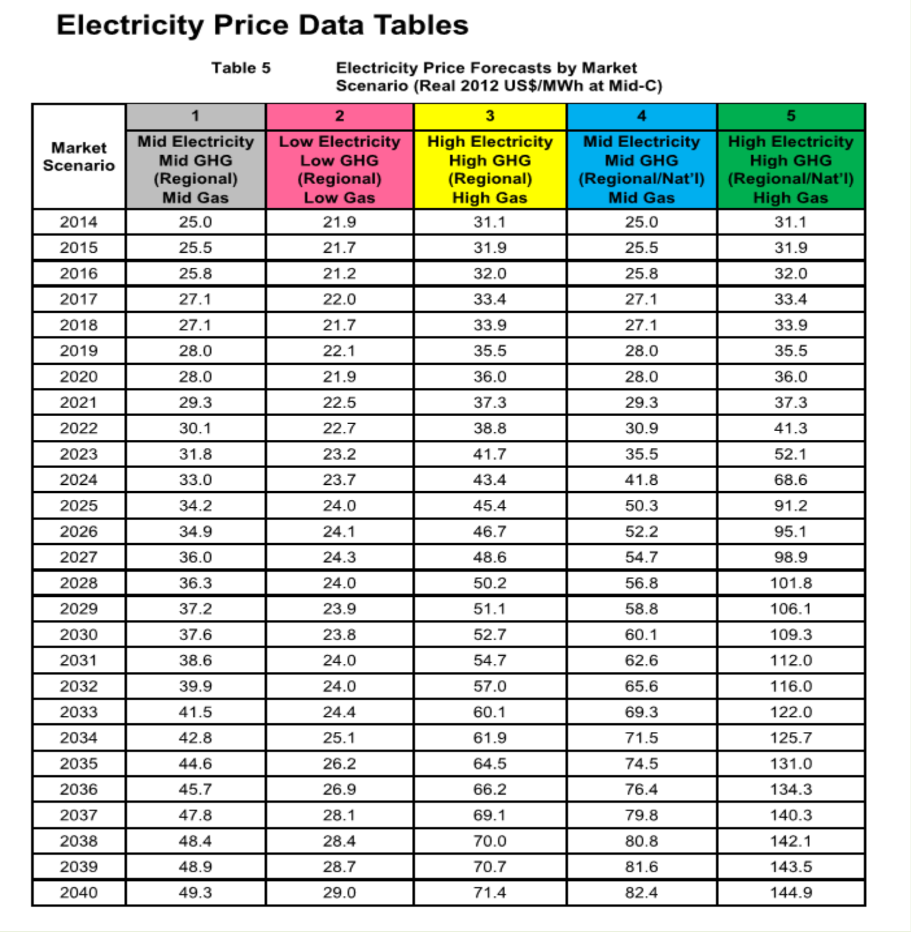
Category	Comments
Market Price ($/MWhr)	• As noted in the above Table 2-2 from the November 2013 Resource Options Report Update, the Unit Energy Cost for geothermal resources at a 7% real discount rate in 2013 dollars ranges from $91/MWh to 573/MWh at the point of interconnection to the BC Hydro system. • Wholesale electricity prices for trading purposes can vary greatly. In the Pacific Northwest, these prices are affected by such factors as precipitation/snowfall in the region, unforeseen generation outages and ambient temperatures. A general flavour of the wholesale electricity prices for potential export of electricity from BC can be obtained from a variety of sources. One such source is the US Energy Information Administration (www.eia.gov/electricity/wholesale/#history). This source provides current and historical electricity market data. Of particular relevance is the mid-C trading hub in the Northwest Region (one example would be a Mid-C peak price on March 17, 2015 of $19.87US weighted average cost from 72 trades). Access to that market for geothermal projects in BC would require access on both the BC Hydro transmission system to the Canada/US border, and on the appropriate transmission system (e.g. Bonneville Power Authority) in the US. • BC Hydro forecasts of market prices under various scenarios was provided in the November 2013 IRP. Table 5 in Appendix 5A – Market Forecast Data is reproduced below for ready reference. 

Electricity Price Data Tables

Table 5 **Electricity Price Forecasts by Market Scenario (Real 2012 US$/MWh at Mid-C)**

Market Scenario	1 Mid Electricity Mid GHG (Regional) Mid Gas	2 Low Electricity Low GHG (Regional) Low Gas	3 High Electricity High GHG (Regional) High Gas	4 Mid Electricity Mid GHG (Regional/Nat'l) Mid Gas	5 High Electricity High GHG (Regional/Nat'l) High Gas
2014	25.0	21.9	31.1	25.0	31.1
2015	25.5	21.7	31.9	25.5	31.9
2016	25.8	21.2	32.0	25.8	32.0
2017	27.1	22.0	33.4	27.1	33.4
2018	27.1	21.7	33.9	27.1	33.9
2019	28.0	22.1	35.5	28.0	35.5
2020	28.0	21.9	36.0	28.0	36.0
2021	29.3	22.5	37.3	29.3	37.3
2022	30.1	22.7	38.8	30.9	41.3
2023	31.8	23.2	41.7	35.5	52.1
2024	33.0	23.7	43.4	41.8	68.6
2025	34.2	24.0	45.4	50.3	91.2
2026	34.9	24.1	46.7	52.2	95.1
2027	36.0	24.3	48.6	54.7	98.9
2028	36.3	24.0	50.2	56.8	101.8
2029	37.2	23.9	51.1	58.8	106.1
2030	37.6	23.8	52.7	60.1	109.3
2031	38.6	24.0	54.7	62.6	112.0
2032	39.9	24.0	57.0	65.6	116.0
2033	41.5	24.4	60.1	69.3	122.0
2034	42.8	25.1	61.9	71.5	125.7
2035	44.6	26.2	64.5	74.5	131.0
2036	45.7	26.9	66.2	76.4	134.3
2037	47.8	28.1	69.1	79.8	140.3
2038	48.4	28.4	70.0	80.8	142.1
2039	48.9	28.7	70.7	81.6	143.5
2040	49.3	29.0	71.4	82.4	144.9

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Near Bella Coola, British Columbia, Canada
Topographical Map Sheet: Figure 12
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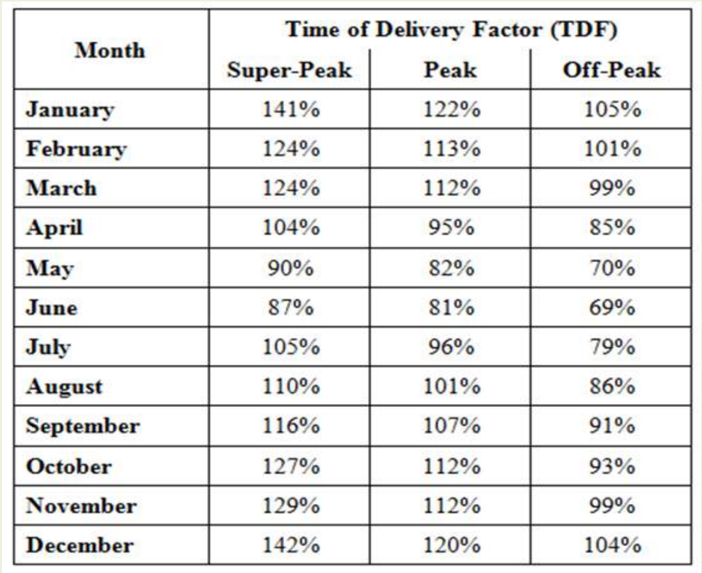
Category		Comments
	Green Power Premium ($/MWhr)	• BC Hydro’s past procurement processes for the acquisition for power from independent power producers has offered a premium for green power. • Within British Columbia, there is little demand for the purchase of “green power certificates” (instruments that a customer can purchase to be assured that the electricity used is environmentally friendly) from BC Hydro. BC Hydro’s generation mix is already approximately 93% clean. • California has a goal of 33% of retail sales by 2020 to be sourced from eligible renewable energy sources. However, the opportunity for geothermal power from British Columbia, particularly “bundled” green energy with Renewable Energy Certificates (RECs), to compete in that market is low, for a number of reasons 1. The price of electricity is driven by the low cost of natural gas; 2. There are large amounts of renewables, such as wind and solar, in California; and 3. Firm transmission access to the California market through the BPA transmission system is generally not available.
	Capacity Price ($/KW)	• There is no price in $/kW for capacity resource options in the market at present. • Table 3-27 entitled "UCCs of Capacity Resource Supply Options" in BC Hydro’s Integrated Resource Plan dated November 2013 provided a summary of capacity resource options (e.g. pumped storage, simple cycle gas turbines and resource smart projects such as Revelstoke Unit 6). The unit capacity costs (UCCs) at the point of interconnection to the BC Hydro system in $2013/kW-year are shown in the table.

KING ISLAND

Near Bella Coola, British Columbia, Canada
Topographical Map Sheet: Figure 12
Geological Map Sheet: Figure 13

<table>
<tr><th></th><th>Category</th><th>Comments</th></tr>
<tr><td></td><td>Is there a higher price for base load power?</td><td>
In general, baseload power (ie firm power) is more valuable to BC Hydro and furthermore the price paid for baseload power varies by month throughout the year. As an example, the following excerpt is taken from BC Hydro’s SOP:

“1. Definitions: In this Appendix 4, the following words and expressions have the following meanings:
(a) “Off-Peak Hours” means all hours other than Super-Peak Hours and Peak Hours.
(b) “Peak Hours” means the hours commencing at 06:00 PPT and ending at 16:00 PPT, and commencing at 20:00 PPT and ending at 22:00 PPT, Monday through Saturday inclusive, but excluding British Columbia statutory holidays.
(c) “Super-Peak Hours” means the hours commencing at 16:00 PPT and ending at 20:00 PPT Monday through Saturday inclusive, but excluding British Columbia statutory holidays.”

<table>
<tr><th rowspan="2">Month</th><th colspan="3">Time of Delivery Factor (TDF)</th></tr>
<tr><th>Super-Peak</th><th>Peak</th><th>Off-Peak</th></tr>
<tr><td>January</td><td>141%</td><td>122%</td><td>105%</td></tr>
<tr><td>February</td><td>124%</td><td>113%</td><td>101%</td></tr>
<tr><td>March</td><td>124%</td><td>112%</td><td>99%</td></tr>
<tr><td>April</td><td>104%</td><td>95%</td><td>85%</td></tr>
<tr><td>May</td><td>90%</td><td>82%</td><td>70%</td></tr>
<tr><td>June</td><td>87%</td><td>81%</td><td>69%</td></tr>
<tr><td>July</td><td>105%</td><td>96%</td><td>79%</td></tr>
<tr><td>August</td><td>110%</td><td>101%</td><td>86%</td></tr>
<tr><td>September</td><td>116%</td><td>107%</td><td>91%</td></tr>
<tr><td>October</td><td>127%</td><td>112%</td><td>93%</td></tr>
<tr><td>November</td><td>129%</td><td>112%</td><td>99%</td></tr>
<tr><td>December</td><td>142%</td><td>120%</td><td>104%</td></tr>
</table>
</td></tr>
</table>

KING ISLAND

Near Bella Coola, British Columbia, Canada
Topographical Map Sheet: Figure 12
Geological Map Sheet: Figure 13

Category	Comments
Estimated Size of Resource	See Section A.
Is there any green power incentives?	• The BC government created the Innovative Clean Energy (ICE) fund with an initial mandate to accelerate the commercialization of emerging clean energy technologies (now expanded to include a broad range of energy efficiency and conservation projects). British Columbia also has a program entitled Scientific Research and Experimental Development Tax credit (SR&ED). Geothermal proponents could keep a watching brief on these programs for applicability and relevance. • The BC government's First Nations Clean Energy Business Fund. This fund promotes increased Aboriginal community participation in the clean energy sector. It provides: o Capacity funding of up to $50,000 per applicant to cover the early stages (e.g. feasibility studies) of project development ; and o Equity funding of up to $500,000 per applicant to support a financially viable and resourced clean energy project. • There are a number of government of Canada programs to encourage the development of renewable power. Some of these programs may be active but not currently issuing calls for proposals. Others may be focussed on research and innovation and may not be directly applicable to geothermal technologies/resources, while others may be fully subscribed and even inactive but are noted in terms of completeness. Some of these programs include: o Natural Resources Canada ecoEnergy for Renewable Power program; o Sustainable Development Technology Canada funds; o Clean Energy Fund; o Industrial Research Assistance Program; and o Green Infrastructure Fund Geothermal proponents could keep a watching brief on these and other federal government programs for their applicability and relevance.
Grants	See above under green power incentives
Tax Holidays	None listed on federal and provincial websites.
Tax Relief	• Under Classes 43.1 and 43.2 in Schedule II of the Income Tax Regulations, certain capital costs of systems that produce energy by using renewable energy sources or fuels from waste, or conserve energy by using fuel more efficiently are eligible for accelerated capital cost allowance. Under Class 43.1, eligible equipment may be written-off at 30 percent per year on a declining balance basis. In general, equipment that is eligible for Class 43.1 but is acquired after February 22, 2005 and before year 2020 may be written-off at 50 percent per year on a declining balance basis under Class 43.2. Without these accelerated write-offs, many of these assets would be depreciated for income tax purposes at annual rates between 4 and 30 percent. • In addition to Class 43.1 or 43.2 capital cost allowance, the Income Tax Regulations allow certain expenses incurred during the development and start-up of renewable energy and energy conservation projects [Canadian renewable and conservation expenses (CRCE)] to be fully deducted in the year they are incurred, carried forward indefinitely and deducted in future years, or transferred to investors through a flow-through share agreement.

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Near Bella Coola, British Columbia, Canada
Topographical Map Sheet: Figure 12
Geological Map Sheet: Figure 13

	Category	Comments
	Loan Guarantees	The following is an excerpt from http://www.fnfa.ca/en/fnfa/ “The First Nations Finance Authority (FNFA) is a statutory not-for-profit organization without share capital, operating under the authority of the First Nations Fiscal Management Act, 2005. The FNFA’s purposes are to provide investment options and capital planning advice and—perhaps most importantly, access to long-term loans with preferable interest rates. The FNFA is not an agent of Her Majesty or a Crown corporation and is governed solely by the First Nations communities that join as Borrowing Members. The advantages of joining the FNFA as a Borrowing Member are: 1. Access to low rate, below bank prime, loans with repayment terms up to 30 years; 2. First Nations choose the repayment terms that work best for their budget; 3. FNFA loans do not require collateral; 4. FNFA loans can be used to refinance existing debt; and 5. FNFA’s interest rates and terms parallel those available to provincial and local governments. Most revenue streams are eligible to support FNFA loan requests. Eligible capital projects FNFA can finance include infrastructure, social and economic development, land purchases, independent power projects, community housing and rolling stock/heavy equipment. FNFA is a stand-alone organization separate from the Government of Canada, and its operating policies are set by its Borrowing Members, represented by the First Nation’s Chief and Council appointee. The FNFA is for First Nations, by First Nations.”
	Royalties/Fees	Geothermal Resources Act, [RSBC 1996] CHAPTER 171, as of March 11, 2015 Permits for well authorizations for wells to be drilled within the boundaries of the permittee's location must pay a prescribed rent for the permit (Section 5). Based on Section 17 of the Act, (1) A lessee who produces a geothermal resource for purposes other than testing must pay to the government (a) a royalty established by agreement under this section, (b) an amount agreed under this section to be paid instead of royalty, or (c) if no royalty or amount has been agreed under this section, the prescribed royalty.
	General Idea of Royalties	With regard to use of the water resources within the geothermal tract, Section 4 of the Water Sustainability Act states “This Act does not apply to geothermal resources as defined in section 1 (1) [definitions] of the Geothermal Resources Act.”
	Private Land Owner or Government Land	Geothermal proponents will need to arrange financial agreements (eg leases or purchases) with private property owners for the geothermal land tract. Proponents for geothermal facilities on Crown Land must apply for the appropriate tenure under the BC Land Act (eg Statutory Right of Way, Licence of Occupation).

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Near Bella Coola, British Columbia, Canada
Topographical Map Sheet: Figure 12
Geological Map Sheet: Figure 13

Category		Comments
	Tax Rate in the Country	• Income eligible for small-business deduction (up to $500,000 income): 11% Federal tax, combined federal and provincial (British Columbia): 13.5%. • Income not eligible for small-business deduction: 15% Federal, combined federal and provincial (British Columbia): 26%
	Transmission Tariffs	Under wholesale wheeling (whereby electricity is transmitted from electricity generators to utilities) to customers in Alberta, the US, or other wholesale customers in BC, the generation supplier must request service on the appropriate BC Hydro transmission line under the Open Access Transmission Tariff (OATT) at a regulated cost for that service. Depending on the end customer, the generation supplier will have to make similar arrangements to cover transmission access in other jurisdictions (e.g. the Bonneville Power Authority for wheeling to a US customer). This ‘pancaking’ of rates, along with transmission congestion issues, affects the economic viability of the potential wholesale opportunity.
M.	**Maps**	
	Regional topographic map showing population centres, roads and other infrastructure including electrical grid and nearest substation and/or generating station. (1:500,000?)	Topographical Map Sheet: Figure 12
	Regional map showing land tenure in area – geothermal concessions, mining concessions, private land holds, public or national lands (parks). (1:500,000?)	Topographical Map Sheet: Figure 12
	Regional geological map. (1:250 or 500,000?)	Geological Map Sheet: Figure 13
	Detailed geological map of the immediate area of the concessions. (1:50,000 or 100,000)	Geological Map Sheet: Figure 13
N.	**Other Issues and Considerations**	

Geoscience BC

Legend

■ Proposed Geothermal Plant Location
● Thermal Spring
Proposed Transmission Line
Existing Distribution Line
Paved Road
Other Road
▨ Conservancy
🟥 First Nations Reserve

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Service Layer Credits: Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

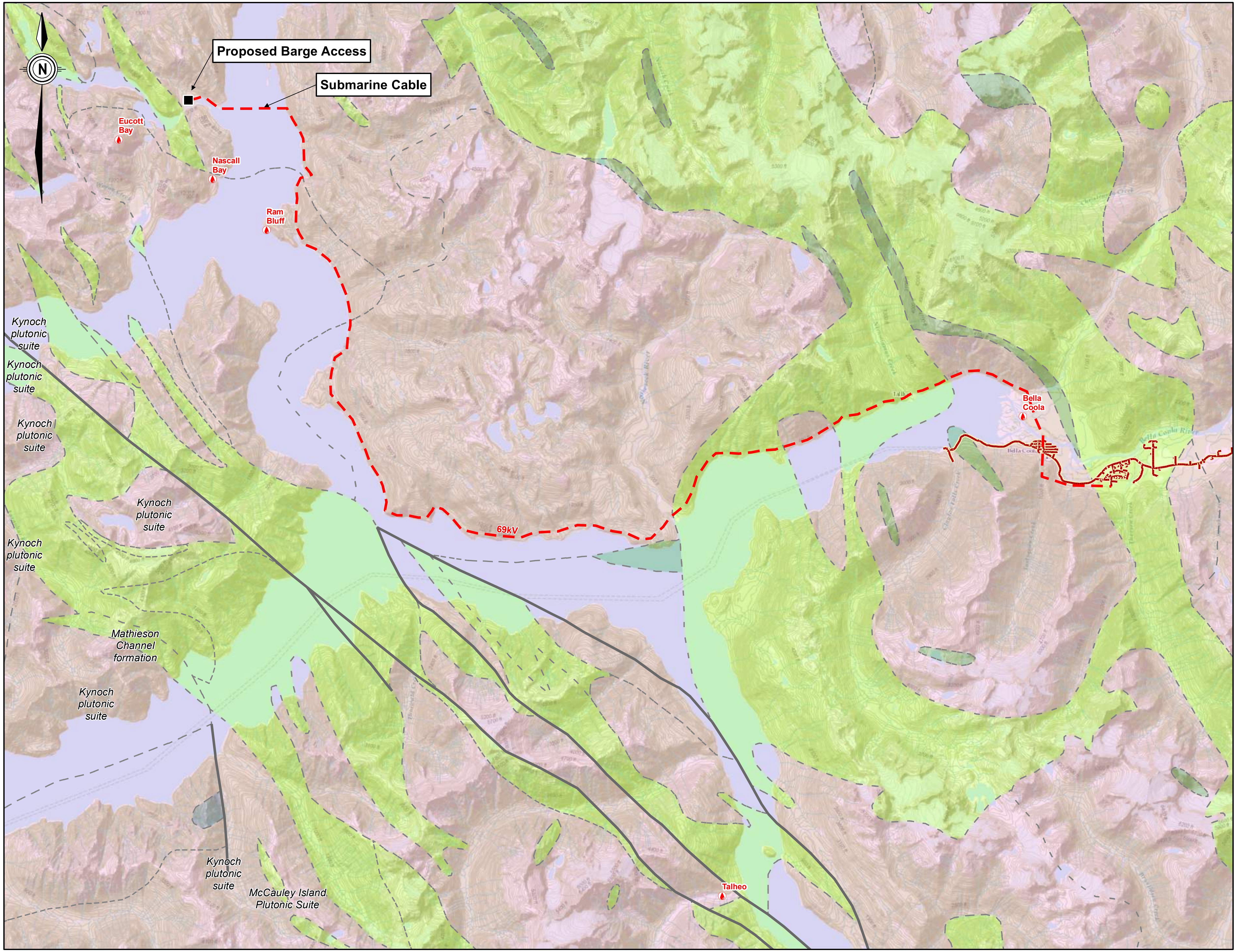
4 0 4
Kilometers

Project No.	Date
2692-004	April 30, 2015

Potential Geothermal Plant at King Island 20MW

Figure 12

Path: Q:\2600-2699\2692-004\430-GIS\MXD-RP\2692004_GeothermalLocations_mapbook.mxd Date Saved: 2015-04-27 2:55:05 PM
Author: RTaylor



Geoscience BC

Legend

■ Proposed Geothermal Plant Location

● Thermal Spring

- - - Proposed Transmission Line

— Existing Distribution Line

Bedrock Type

▨	Intrusive Rocks
▨	Metamorphic Rocks
▨	Sedimentary Rocks
▨	Volcanic Rocks
- - -	Rock Type Boundary
—	Fault

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Service Layer Credits: Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

5 0 5
Kilometers

Project No.	Date
2692-004	April 30, 2015

Geological Strata Map for King Island 20MW

Figure 13

Path: Q:\2600-2699\2692-004\430-GIS\MXD-RP\2692004_GeothermalLocationsGeology_mapbook.mxd Date Saved: 2015-04-27 2:16:45 PM
Author: RTaylor

Appendix H

Kootenay Geothermal Development Decision Matrix and Figures 14 & 15

KOOTENAY

Near Ainsworth Hotsprings, British Columbia, Canada
Topographical Map Sheet: Figure 14
Geological Map Sheet: Figure 15

Category		Comments
A.	**Reservoir Potential**	
	Size/Potential/Type	• **Reservoir size:** N/A (no area or depth defined in literature) - therefore, reservoir volume estimated* at between: 2.2 km^3 and 10.6 km^3 (with a most-likely area for any single spring of 2 km^2 and most-likely thickness of 1.1 km. The minimum estimate is calculated for a single spring, and the maximum estimate is calculated using two hot springs [Ainsworth and Riondel, based on temperature and fluids chemistry] and a separation of 4.4 km). (*Reservoir assumptions made using Appendix III in GeothermEx, 2004) • **Potential:** 20 MW gross (WREZ, 2009) • **Type:** binary (low temperature)
	Temperature/Water and Gas Chemistry/Mineral Indicators	**Surface features:** • Several springs in the Kootenay area: Ainsworth and Riondel Hot Springs are located near the west and east shores of Kootenay Lake, respectively. Also in the area are Dewar Creek HS and Kaslo Creek Spring (50 km east and 20 west of the Kootenay database location, respectively); Crawford Creek HS (14 km SE of Riondel). • Ainsworth HS: 48°C discharge temperature (Fairbank & Faulkner, 1992 for all spring temps listed) • Riondel HS: 48°C • Dewar Creek HS: 83°C discharge temperature • Kaslo Creek Spring: 11°C (cold spring) • Crawford Creek HS: ~30-32°C **Geothermometry:** • Ainsworth HS: Na-K-Ca and Na-K-Ca-Mg temperatures of all samples ~ 90°C (Souther, 1975; Grasby et al, 2000); Chalcedony and Quartz temperatures from 142 to 165°C, but sulfate-water oxygen isotope temperature given as 119°C (Grasby et al, 2000) • Dewar Creek HS: Na-K-Ca and Na-K-Ca-Mg temperature is 149°C (Souther, 1975; Grasby et al, 2000); • Crawford Creek HS: geothermometers indicate uniformly cool conditions (Souther, 1975; Grasby et al, 2000) **Exploration drilling:** • Local geothermal gradient average: 34°C/km along the Purcell Trench (Grasby & Hutcheon, 2001) • Riondel mining operations: encountered fluids ranging between 21 - 40°C. Expected depth to resource ~530 m (Desrochers, 1992) **Water chemistry:** (Souther, 1975; Grasby et al, 2000 for ALL except Riondel) • Ainsworth HS: type is (Na>Ca)-HCO$_3$, with alkalinity at about 1,050 mg/l, Mg between 0.4 to ~5 mg/l , and Cl at about 45 mg/l. • Riondel HS: Water is supersaturated with CO$_2$. (Desrochers, 1992) • Dewar HS: Water type is Na-(SO$_4$>HCO$_3$) with HCO$_3$ at 149 mg/l, Mg at 0.3 mg/l and Cl at 54 mg/l. • Kaslo Creek Spring: Ca-HCO$_3$ type with geothermometers all cool. • Crawford Creek HS: Water type is mixed cation-HCO3 but extremely dilute (2); low mineral content (65 ppm TDS) (Desrochers, 1992). **Mineral indicators:** • No information

KOOTENAY

Near Ainsworth Hotsprings, British Columbia, Canada
Topographical Map Sheet: Figure 14
Geological Map Sheet: Figure 15

Category	Comments
Surface Flow Rates and Reservoir Recharge	Various: • Ainsworth Hot Springs: low to moderate flow rate of 7 L/s (Fairbank & Faulkner, 1992) • Riondel: "large" flow rate (Fairbank & Faulkner, 1992); potential production rates of up to 150 L/s (Desrochers, 1992) • Dewar Creek: unknown flow rate • Kaslo Creek: 2 L/s flow rate • Crawford Creek: "0" flow rate (Fairbank & Faulkner, 1992); flow rate of 0.2 L/s (Desrochers, 1992) All of the hot springs in this region lie on the stable isotope meteoric water line (Ainsworth may be an exception)
3D Permeability (heat exchange potential)	No information
Recent Magmatism	N/A
Structural Setting	• The primary structures in the area are the Purcell Anticlinorium east of the lake (broad, northerly plunging fold cut by longitudinal and transverse faults, with extensive exposures of rift-related sedimentary rocks of the Proterozoic Windermere [sandstone, conglomerate, carbonates] and Purcell Supergroups) and the Kootenay Arc west of the lake (characterized by north-trending isoclinal to tight folds, increasing in metamorphic grade from greenschist to amphibolites facies to the east) to the west of the Purcell Anticlinorium. The Kootenay Arc merges on the east with the Purcell Anticlinorium (Webster & Pattison, 2013). The Nelson batholith (composite pluton of granodiorite to quartz monzonite) lies to the west of Kootenay Lake, and is bounded on the west by the Slocan Lake Fault Zone (SLFZ) (a N-S trending Eocene normal fault dipping eastward 30˚) and on east by the Purcell Trench Fault (PTF) (Sweetkind & Duncan, 1989) (Grasby & Hutcheon, 2001). • The PTF is an Eocene, east-dipping, crustal scale extensional (normal) fault, the trace of which is largely covered by the lake (Grasby & Hutcheon, 2001; Webster & Pattison, 2013). • Riondel area: Steep cross-fractures trending WNW, dipping 80-90°N containing tabular ore bodies which plunge to the west along fractures in the marbles. A major N-trending fault underlies the Badshot marble in the mining area (Hoy, 1980).
Geophysics	No information
Reservoir Host Rock	• Springs likely issuing from fractures or faults in granitic or metamorphic rocks (non-volcanic) (Souther, 1975 and Souther & Halstead 1973). • Riondel: host rock westward dipping Badshot formation (limestone ~40 m thick, dipping 35°W) (Desrochers, 1992). • Crawford: possibly hosted by same Badshot formation, on east side of Crawford Antiform; low temperature and flow (Desrochers, 1992).
Drilling Issues	Riondel: Scale Buildup and high CO_2 gas content - Rapid precipitation of $CaMgCO_3$ when pumping out fluid from mining operation (Desrochers, 1992).
Brief Description of Geological Setting of Thermal Features (i.e., springs emanate from fluvial gravels; beside a river, etc.)	Intrusive bodies (ranging in age from Middle Jurassic to Eocene) cover the west side of Kootenay Lake, including the Nelson batholith to the north and the Bayonne batholith (granodiorite to monzonite) to the south (these two bodies are separated by the Eocene normal Midge Creek Fault); granodiorite Wall and Mine stocks which truncate the upper part of the Windermere stratigraphic unit; and McGregor Intrusives as massive/porphyritic syenite plutons (Webster & Pattison, 2013). • Riondel: located in the central part of the Kootenay Arc and seemingly at the structural culmination (as the arc plunges north to the north, and south to the south of this point). (1) (2) CO_2 charged thermal waters flowed from fissures at the Bluebell Mine in the Riondel area (area has thick marble units containing ore bodies of sulphide minerals [Zn, Pb, Cu, Ag]). Deposits of $CaCO_3$ were also produced in associated caves and adits (Hoy, 1980; Desrochers, 1992). • Ainsworth and Crawford: occur near the northern termination of the Purcell Trench Fault (PTF)(Grasby & Hutcheon, 2001). • Dewer: The hottest recorded thermal spring in the southern Canadian Cordillera occurs east of the Purcell Trench, along a steeply dipping unnamed fault between the PTF and the Hall Lake Fault (another major crustal feature) (Grasby & Hutcheon, 2001).

KOOTENAY

Near Ainsworth Hotsprings, British Columbia, Canada
Topographical Map Sheet: Figure 14
Geological Map Sheet: Figure 15

Category		Comments
B.	**Exploration Uncertainty (Risk)**	
	Degree of Identification of Resources/Reserves	Low • Largely based on presence of hot springs and thermal waters in Riondel mine. Only geologic reconnaissance and mapping done in area. No reported development or exploration efforts. • Ainsworth/Riondel area may have commercial potential (geothermometer up to 165°C). Possibly also Dewar Creek HS (geothermometer up to 149°C), but it is within Purcell Wilderness Conservancy Provincial Park.
	Likelihood of Covering Reservoir with Concession	Moderate (Varied) • Aisnworth: commercial spa; mineral title tracts along west shore of Kootenay Lake surrounding Ainsworth HS • Riondel: seemingly likely; located lake-ward of town of Riondel • Dewar Creek: lies within the Purcell Wilderness Conservancy Provincial Park, hence unlikely to be within concession. • Crawford Creek: mineral title tracts surround Crawford on 3 sides
	Expected Authorization Date	Unknown
	Specific Timing of Exploration (2 + 2 years, BC 8 years, etc.)	5-6 years (1 year deep gradient-well drilling + 2 year successful development drilling and testing + 1 year further development drilling and start plant construction + 1 year drilling wrap-up and finish plant construction). Possible delays due to issues of access and competing use (mining, resorts).
	Degree of Previous Exploration (can be good or bad)	Low to moderate Geology in area is well defined. Geothermometry has been performed on springs. No temperature gradient wells drilled. No other surface-based exploration surveys known.
	Surface Operational Capacity (enough stable area for drilling and a plant?)	Likely (Varied) - Ainsworth: located in resort town, stable area appears sufficient Riondel: appears sufficient Dewar Creek: appears sufficient Crawford Creek: appears sufficient
	Exploration to Exploitation: A summary rating of Exploration Uncertainty (risk) on a scale of difficult (high risk) through medium (moderate risk) to easy (low risk)	Moderate to difficult Potential for lease/permitting issues with mine leases/conservancy areas/hot-spring resorts.
C.	**Environmental Issues**	
	Protected Areas	• Kokanee Lake Provincial Park less than 500 m from proposed transmission line. • Cody Caves Provincial Park approx. 3.5 km from proposed plant location.
	Endangered Species	• Blunt-sepaled starwort (blue-listed plant) occurrence polygon approx. 5 km from proposed infrastructure. • White Sturgeon, Kootenay River population (Endangered (SARA Schedule 1); red-listed) habitat polygon in river, approx. 0.5 km from proposed transmission line connection. • Westslope Cutthroat Trout, British Columbia Population (Special Concern (SARA Schedule 1); blue-listed) observed in Krao Creek, over which proposed transmission line crosses.
	Geothermal Surface Features	• Ainsworth Hotsprings is close to proposed plant location. • Riondel hotsprings approx. 7 km from proposed plant location.
	Other	• Proposed transmission line makes one crossing over a stream (Krao Creek). • Nearest Wildlife Habitat Area allotted for Grizzly Bear is located approx. 100 km from proposed infrastructure.

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Near Ainsworth Hotsprings, British Columbia, Canada
Topographical Map Sheet: Figure 14
Geological Map Sheet: Figure 15

Category		Comments
D.	**Geothermal Area - Bidding and/or Type of Land Holding (private/government/lease/etc.)**	
	Bidding Area	No known existing active, cancelled or unsold geothermal title tracts
	Other Claim Rights (mining and/or oil)	Existing mineral, coal title at plant location and along proposed power line route. Many mineral/coal titles within 30 km radius. Proposed location is not within known oil and gas management area; no known tenures at proposed location.
E.	**Market**	
	Main Electricity Consumers (direct sales and/or government)	General Overview 1. BC Hydro acquires power from Independent Power Producers (which would include geothermal proponents) through two main processes: • Competitive calls: when BC Hydro issues a Call for Tenders for the supply of electricity to BC Hydro, geothermal proponents can bid into those competitive calls. • Standing Offer Program (SOP): This program is presently available for clean generation projects greater than 0.1 MW but not more than 15 MW. Proponents do not compete against each other but are paid a predetermined price by BC Hydro. Depending on the specifics of each project, proponents may wish to size their projects to be under the 15 MW threshold for the SOP (BC Hydro is developing a 'mini-SOP' component within the overall SOP. This mini-SOP will apply to projects in the 0.1 MW to 1 MW range, but would not realistically apply to potential geothermal generation projects). • In addition, BC Hydro's net metering program is designed for residential and commercial customers who wish to connect a small electricity generating unit to the BC Hydro distribution system. Generating units up to 0.1 MW in capacity that utilize a clean or renewable resource are eligible to participate in the program. Given the small size, this program has no applicability to potential geothermal generation projects. The acquisition of geothermal power would contribute to BC Hydro's current target for clean energy and to the diversification of BC Hydro's resource mix, making it less reliant on snow melt and stream flow. 2. Although FortisBC is a potential customer for electricity from geothermal sources, the opportunities may be limited given FortisBC's ability to receive electricity from BC Hydro under Rate Schedule 3808. However there is a wheeling agreement in place which would facilitate a geothermal project located in FortisBC's service territory to sell electricity to BC Hydro through BC Hydro's competitive calls and/or the SOP, or to other potential customers as noted below. 3. Wholesale wheeling (whereby electricity is transmitted from electricity generators to utilities) to customers in Alberta, the US, or other wholesale customer in BC is allowed. The generation supplier must request service on the appropriate BC Hydro transmission line under the Open Access Transmission Tariff (OATT) at a regulated cost for that service. Depending on the end customer, the generation supplier will have to make similar arrangements to cover transmission access in other jurisdictions (e.g. the Bonneville Power Authority for wheeling to a US customer). This 'pancaking' of rates, along with congestion issues, affects the economic viability of the potential wholesale opportunity. 4. Retail access, defined as a market in which electricity is sold directly to consumers by competing suppliers, is generally not permitted in BC. However there may be opportunities for bilateral arrangements for direct sales of electricity from geothermal generating plants to large customers (e.g. pulp mills, large sawmills, mines) as follows: • To replace the electricity supplied at a high voltage from BC Hydro under BC Hydro Transmission Rate 1823 of the Electric Tariff. Such replacement would be challenging given the rates charged under that tariff. • To supply electricity to a remote facility (e.g. a mine, LNG plant or other industrial facility) directly from a geothermal plant located in close proximity to the facility, thereby precluding the need for a lengthy transmission line to connect to the BC Hydro electrical grid. • A potential electricity customer, Paper Excellence Skookumchuck pulp mill, is located approximately 80 km away, over Kootenay Lake.

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Near Ainsworth Hotsprings, British Columbia, Canada
Topographical Map Sheet: Figure 14
Geological Map Sheet: Figure 15

Category		Comments
	Time Limits? (business agreements, operating/generating-by deadlines?)	• BC Hydro has issued competitive Calls for Tender for the supply of electricity in the past. • BC Hydro’s SOP is presently directly available for clean energy projects which meet certain criteria, including a generation output of less than 15 MW. • Typical BC Hydro Energy Purchase Agreements from Independent Power Producers are 20-40 years in duration. • Business agreements with the owners of private transmission lines (e.g. independent power producers) for access to the market will be necessary. • The lead times to develop geothermal resources will include appropriate allowances for investigative drilling, technical and environmental studies, public consultation, transmission considerations, marketing, licencing, design, construction and commissioning. These lead times will vary from four to seven years depending on the specifics of each project. Projects with a history of exploration and analysis (e.g. Meager Creek/Pebble Creek, Lakelse, and Canoe Creek) will generally be on the shorter end of this time continuum, while other projects with less investigative work will take longer. Although the time required to drill a geothermal well and construct a power plant could conceivably be less than two years, the key uncertainties inherent in the environmental review, public consultation, transmission arrangements (either with BC Hydro or a private transmission owner), and the permitting and regulatory processes will realistically result in a further two years at a minimum for these activities.
F.	**Transmission Line Infrastructure**	
	State of the Infrastructure	Closest substation is FortisBC Coffee Creek substation on 63 kV transmission line.
	Transmission Route (distance, terrain and costs)	Approx. 7 km of new 63 kV transmission line via existing roads and powerline corridor to FortisBC Coffee Creek substation.
H.	**Community Issues**	
	Indigenous Law and Indigenous Development Areas	• First Nation consultative areas include Secwepemc First Nation, Okanagan Indian Band, Shuswap Indian Band, Neskonlith Indian Band, Lower Similkameen Indian Band, Upper Nicola Indian Band, Penticton Indian Band, Adams Lake Indian Band, Ktunaxa Nation Council, Akisqnuk First Nation, Lower Kootenay Band, St. Mary's Indian Band, Tobacco Plains Indian Band. • Lower Kootenay Band (part of Ktunaxa Nation) is responsible for the stewardship of the lands and resources within the stewardship area that includes the proposed plant location. (http://lowerkootenay.com/departments/lands-and-resources/). • The Lower Kootenay Band's vision for economic development incudes a large majority of business interests currently in forestry, agriculture, energy and tourism; the band is "always open to discuss potential business partnerships or economic development on our community lands." (http://lowerkootenay.com/departments/economic-development/) • Ainsworth Town-site Local Area Plan examines the introduction of commercial services to promote full time residents
	Community Action	• Lower Kootenay Band purchasing Ainsworth hot spring near Kaslo, BC.
	Surface Rights	• First Nation consultative areas include Secwepemc First Nation, Okanagan Indian Band, Shuswap Indian Band, Neskonlith Indian Band, Lower Similkameen Indian Band, Upper Nicola Indian Band, Penticton Indian Band, Adams Lake Indian Band, Ktunaxa Nation Council, Akisqnuk First Nation, Lower Kootenay Band, St. Mary's Indian Band, Tobacco Plains Indian Band
	Tourism	• Lower Kootenay Band purchasing Ainsworth hot spring near Kaslo, BC. • Existing extensive outdoor recreation tourism industry including camping, hiking, skiing, hot springs.

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Near Ainsworth Hotsprings, British Columbia, Canada
Topographical Map Sheet: Figure 14
Geological Map Sheet: Figure 15

Category		Comments
I.	**Water Rights**	
	Availability (for example "air-cooled required")	Plant water requirement estimated approx. 25 L/s for binary plant. MAD of 130 L/s. Approx. 70 active water licences within 5 km of proposed plant location; main purpose is domestic and mineral trading - bath.
	Availability for Drilling	Drilling requirement of 20 L/s. MAD of 130 L/s. Approx. 70 active water licences within 5 km of proposed plant location; main purpose is domestic and mineral trading - bath.
J.	**Engineering**	
	Plant Location and Design	Plant location near to existing paved roads, moderate terrain.
	Construction Issues	Moderately sloped terrain.
	Transportation Issues	Paved, existing road less than 1 km to plant location.
	Architectural Issues (Blend/hide into environment? Local styles? etc.)	None found.
	Special Construction Issues (zero emissions)	None found.
K.	**Non-Electrical Infrastructure (Roads and Habitation)**	
	Nearest Large Community > 50,000	Kelowna, BC
	Nearest Community	Ainsworth Hot Springs, BC
	Nearest Road and Condition	Nearest road is existing paved road to FortisBC Coffee Creek substation less than 1 km from plant location.
	Current Access Conditions (restrictions)	Access via existing paved road.
	Terrain and Distance Factor for Road Building	Terrain is relatively flat; no requirement for new roads expected.

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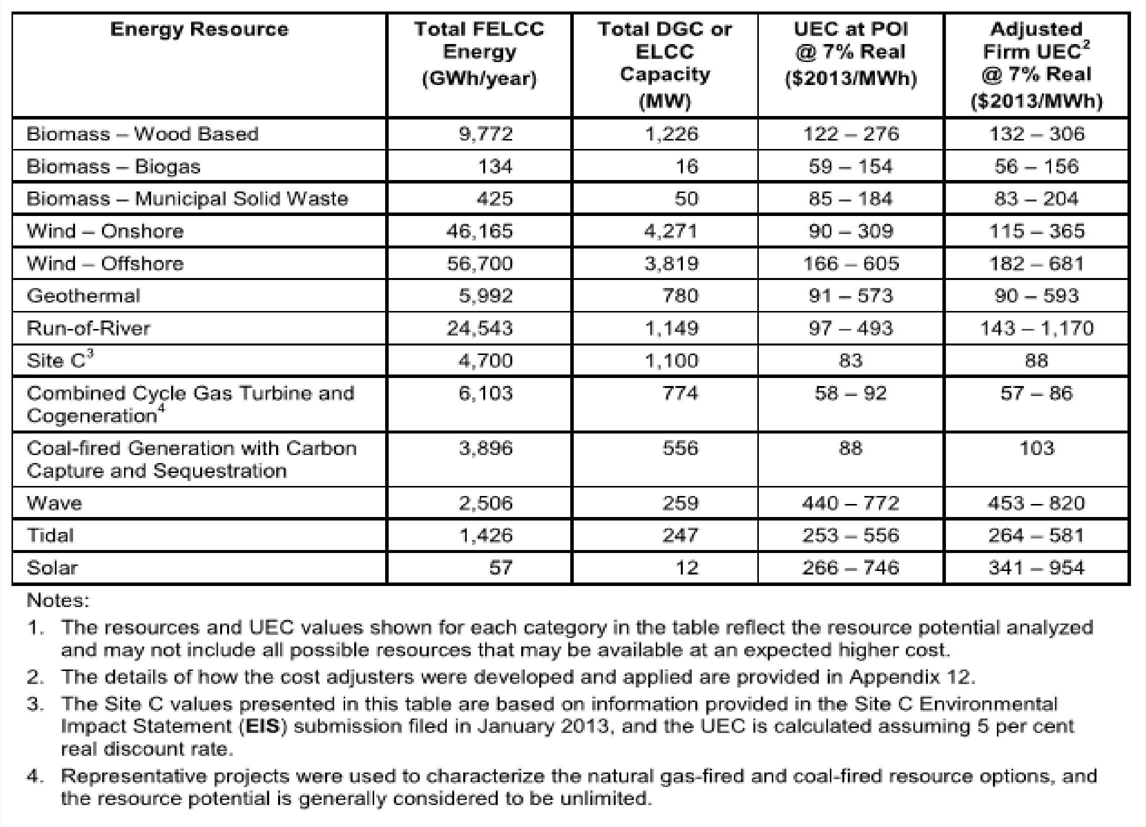
Near Ainsworth Hotsprings, British Columbia, Canada
Topographical Map Sheet: Figure 14
Geological Map Sheet: Figure 15

Category		Comments
L.	**Finance**	
	General Power Prices	BC Hydro acquires power through (1) competitive processes (Calls for Tender), (2) the Standing Offer Program (not including the mini-SOP under development), and (3) upgrades to its existing facilities or the development of new generation facilities. (Note that the net metering program targets projects less than 100 kW and is therefore not relevant to geothermal generation projects). Comments on the general price of power under each one are: • The power price paid by BC Hydro to independent power producers through Energy Purchase Agreements (EPAs) under Calls for Tender are proprietary and confidential. • The power price paid by BC Hydro to independent power producers through EPAs under the SOP are made up of a predetermined base price in 2010 dollars as determined by the region of the point of interconnection to the BC Hydro system, escalated at the Consumer Price Index annually up to the year in which an EPA is signed, and further adjusted based upon the time of day and month when the energy is delivered. For reference, the base price for the Lower Mainland region in 2010 dollars is $103.69/MWh. • BC Hydro's current Integrated Resource Plan dated November 2013 includes details of both demand-side management options and supply-side resource options to consider in meeting the future demand for electricity. These resource options, together with their attributes of total energy and capacity and unit energy costs, are listed in Table 2-2 of the November 2013 Resource Options Report Update. That table is reproduced below for ready reference. • Table 5-7 of the above-noted November 2013 Resource Options Report Update provides a summary of the Geothermal Potential by Transmission Region.



Energy Resource	Total FELCC Energy (GWh/year)	Total DGC or ELCC Capacity (MW)	UEC at POI @ 7% Real ($2013/MWh)	Adjusted Firm UEC[2] @ 7% Real ($2013/MWh)
Biomass – Wood Based	9,772	1,226	122 – 276	132 – 306
Biomass – Biogas	134	16	59 – 154	56 – 156
Biomass – Municipal Solid Waste	425	50	85 – 184	83 – 204
Wind – Onshore	46,165	4,271	90 – 309	115 – 365
Wind – Offshore	56,700	3,819	166 – 605	182 – 681
Geothermal	5,992	780	91 – 573	90 – 593
Run-of-River	24,543	1,149	97 – 493	143 – 1,170
Site C[3]	4,700	1,100	83	88
Combined Cycle Gas Turbine and Cogeneration[4]	6,103	774	58 – 92	57 – 86
Coal-fired Generation with Carbon Capture and Sequestration	3,896	556	88	103
Wave	2,506	259	440 – 772	453 – 820
Tidal	1,426	247	253 – 556	264 – 581
Solar	57	12	266 – 746	341 – 954

Notes:
1. The resources and UEC values shown for each category in the table reflect the resource potential analyzed and may not include all possible resources that may be available at an expected higher cost.
2. The details of how the cost adjusters were developed and applied are provided in Appendix 12.
3. The Site C values presented in this table are based on information provided in the Site C Environmental Impact Statement (**EIS**) submission filed in January 2013, and the UEC is calculated assuming 5 per cent real discount rate.
4. Representative projects were used to characterize the natural gas-fired and coal-fired resource options, and the resource potential is generally considered to be unlimited.

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Near Ainsworth Hotsprings, British Columbia, Canada
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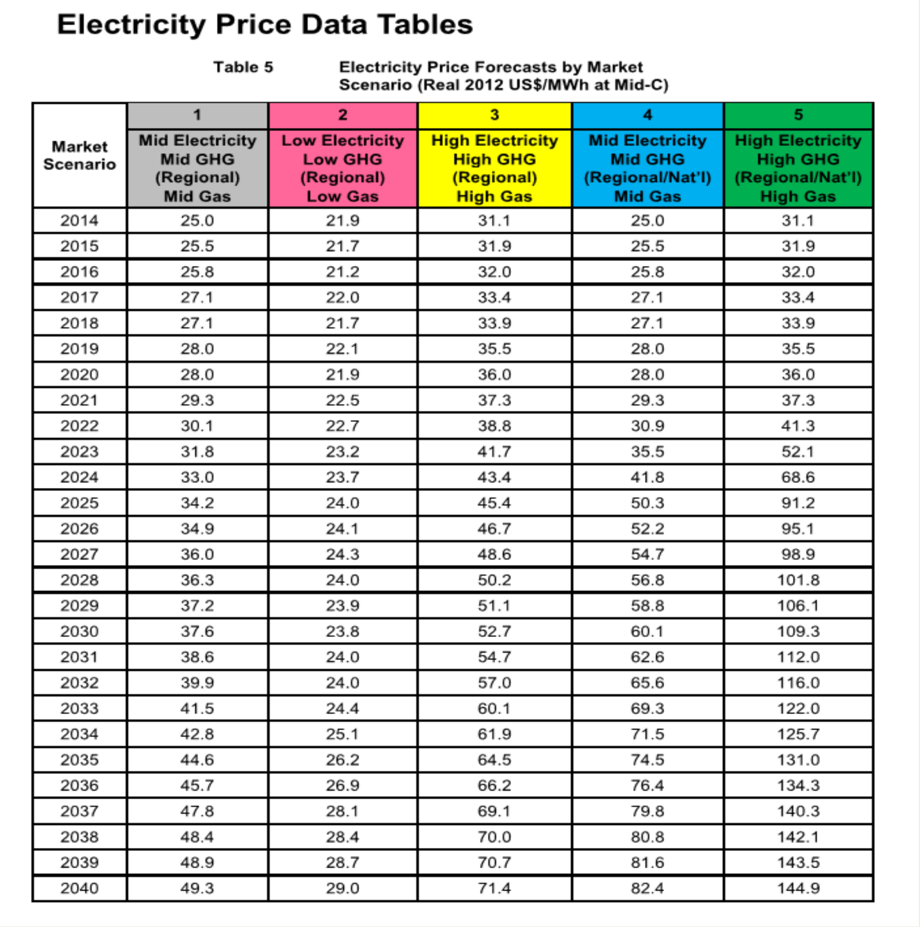
Category	Comments
Market Price ($/MWhr)	• As noted in the above Table 2-2 from the November 2013 Resource Options Report Update, the Unit Energy Cost for geothermal resources at a 7% real discount rate in 2013 dollars ranges from $91/MWh to 573/MWh at the point of interconnection to the BC Hydro system. • Wholesale electricity prices for trading purposes can vary greatly. In the Pacific Northwest, these prices are affected by such factors as precipitation/snowfall in the region, unforeseen generation outages and ambient temperatures. A general flavour of the wholesale electricity prices for potential export of electricity from BC can be obtained from a variety of sources. One such source is the US Energy Information Administration (www.eia.gov/electricity/wholesale/#history). This source provides current and historical electricity market data. Of particular relevance is the mid-C trading hub in the Northwest Region (one example would be a Mid-C peak price on March 17, 2015 of $19.87US weighted average cost from 72 trades). Access to that market for geothermal projects in BC would require access on both the BC Hydro transmission system to the Canada/US border, and on the appropriate transmission system (e.g. Bonneville Power Authority) in the US. • BC Hydro forecasts of market prices under various scenarios was provided in the November 2013 IRP. Table 5 in Appendix 5A – Market Forecast Data is reproduced below for ready reference.



Electricity Price Data Tables

Table 5 Electricity Price Forecasts by Market Scenario (Real 2012 US$/MWh at Mid-C)

Market Scenario	1	2	3	4	5
	Mid Electricity Mid GHG (Regional) Mid Gas	Low Electricity Low GHG (Regional) Low Gas	High Electricity High GHG (Regional) High Gas	Mid Electricity Mid GHG (Regional/Nat'l) Mid Gas	High Electricity High GHG (Regional/Nat'l) High Gas
2014	25.0	21.9	31.1	25.0	31.1
2015	25.5	21.7	31.9	25.5	31.9
2016	25.8	21.2	32.0	25.8	32.0
2017	27.1	22.0	33.4	27.1	33.4
2018	27.1	21.7	33.9	27.1	33.9
2019	28.0	22.1	35.5	28.0	35.5
2020	28.0	21.9	36.0	28.0	36.0
2021	29.3	22.5	37.3	29.3	37.3
2022	30.1	22.7	38.8	30.9	41.3
2023	31.8	23.2	41.7	35.5	52.1
2024	33.0	23.7	43.4	41.8	68.6
2025	34.2	24.0	45.4	50.3	91.2
2026	34.9	24.1	46.7	52.2	95.1
2027	36.0	24.3	48.6	54.7	98.9
2028	36.3	24.0	50.2	56.8	101.8
2029	37.2	23.9	51.1	58.8	106.1
2030	37.6	23.8	52.7	60.1	109.3
2031	38.6	24.0	54.7	62.6	112.0
2032	39.9	24.0	57.0	65.6	116.0
2033	41.5	24.4	60.1	69.3	122.0
2034	42.8	25.1	61.9	71.5	125.7
2035	44.6	26.2	64.5	74.5	131.0
2036	45.7	26.9	66.2	76.4	134.3
2037	47.8	28.1	69.1	79.8	140.3
2038	48.4	28.4	70.0	80.8	142.1
2039	48.9	28.7	70.7	81.6	143.5
2040	49.3	29.0	71.4	82.4	144.9

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Near Ainsworth Hotsprings, British Columbia, Canada
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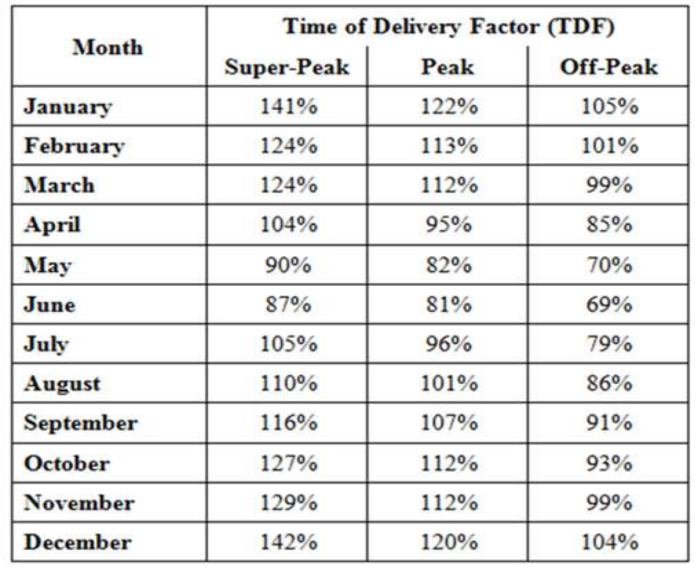
Category	Comments
Green Power Premium ($/MWhr)	• BC Hydro’s past procurement processes for the acquisition for power from independent power producers has offered a premium for green power. • Within British Columbia, there is little demand for the purchase of “green power certificates” (instruments that a customer can purchase to be assured that the electricity used is environmentally friendly) from BC Hydro. BC Hydro’s generation mix is already approximately 93% clean. • California has a goal of 33% of retail sales by 2020 to be sourced from eligible renewable energy sources. However, the opportunity for geothermal power from British Columbia, particularly “bundled” green energy with Renewable Energy Certificates (RECs), to compete in that market is low, for a number of reasons 1. The price of electricity is driven by the low cost of natural gas; 2. There are large amounts of renewables, such as wind and solar, in California; and 3. Firm transmission access to the California market through the BPA transmission system is generally not available.
Capacity Price ($/KW)	• There is no price in $/kW for capacity resource options in the market at present. • Table 3-27 entitled "UCCs of Capacity Resource Supply Options" in BC Hydro's Integrated Resource Plan dated November 2013 provided a summary of capacity resource options (e.g. pumped storage, simple cycle gas turbines and resource smart projects such as Revelstoke Unit 6). The unit capacity costs (UCCs) at the point of interconnection to the BC Hydro system in $2013/kW-year are shown in the table.
Is there a higher price for base load power?	In general, baseload power (ie firm power) is more valuable to BC Hydro and furthermore the price paid for baseload power varies by month throughout the year. As an example, the following excerpt is taken from BC Hydro’s SOP: “1. Definitions: In this Appendix 4, the following words and expressions have the following meanings: (a) “Off-Peak Hours” means all hours other than Super-Peak Hours and Peak Hours. (b) “Peak Hours” means the hours commencing at 06:00 PPT and ending at 16:00 PPT, and commencing at 20:00 PPT and ending at 22:00 PPT, Monday through Saturday inclusive, but excluding British Columbia statutory holidays. (c) “Super-Peak Hours” means the hours commencing at 16:00 PPT and ending at 20:00 PPT Monday through Saturday inclusive, but excluding British Columbia statutory holidays.” 

Month	Time of Delivery Factor (TDF)		
	Super-Peak	Peak	Off-Peak
January	141%	122%	105%
February	124%	113%	101%
March	124%	112%	99%
April	104%	95%	85%
May	90%	82%	70%
June	87%	81%	69%
July	105%	96%	79%
August	110%	101%	86%
September	116%	107%	91%
October	127%	112%	93%
November	129%	112%	99%
December	142%	120%	104%

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Near Ainsworth Hotsprings, British Columbia, Canada
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Geological Map Sheet: Figure 15

Category		Comments
	Estimated Size of Resource	See Section A.
	Is there any green power incentives?	• The BC government created the Innovative Clean Energy (ICE) fund with an initial mandate to accelerate the commercialization of emerging clean energy technologies (now expanded to include a broad range of energy efficiency and conservation projects). British Columbia also has a program entitled Scientific Research and Experimental Development Tax credit (SR&ED). Geothermal proponents could keep a watching brief on these programs for applicability and relevance. • The BC government's First Nations Clean Energy Business Fund. This fund promotes increased Aboriginal community participation in the clean energy sector. It provides: o Capacity funding of up to $50,000 per applicant to cover the early stages (e.g. feasibility studies) of project development ; and o Equity funding of up to $500,000 per applicant to support a financially viable and resourced clean energy project. • There are a number of government of Canada programs to encourage the development of renewable power. Some of these programs may be active but not currently issuing calls for proposals. Others may be focussed on research and innovation and may not be directly applicable to geothermal technologies/resources, while others may be fully subscribed and even inactive but are noted in terms of completeness. Some of these programs include: o Natural Resources Canada ecoEnergy for Renewable Power program; o Sustainable Development Technology Canada funds; o Clean Energy Fund; o Industrial Research Assistance Program; and o Green Infrastructure Fund Geothermal proponents could keep a watching brief on these and other federal government programs for their applicability and relevance.
	Grants	See above under green power incentives
	Tax Holidays	None listed on federal and provincial websites.
	Tax Relief	• Under Classes 43.1 and 43.2 in Schedule II of the Income Tax Regulations, certain capital costs of systems that produce energy by using renewable energy sources or fuels from waste, or conserve energy by using fuel more efficiently are eligible for accelerated capital cost allowance. Under Class 43.1, eligible equipment may be written-off at 30 percent per year on a declining balance basis. In general, equipment that is eligible for Class 43.1 but is acquired after February 22, 2005 and before year 2020 may be written-off at 50 percent per year on a declining balance basis under Class 43.2. Without these accelerated write-offs, many of these assets would be depreciated for income tax purposes at annual rates between 4 and 30 percent. • In addition to Class 43.1 or 43.2 capital cost allowance, the Income Tax Regulations allow certain expenses incurred during the development and start-up of renewable energy and energy conservation projects [Canadian renewable and conservation expenses (CRCE)] to be fully deducted in the year they are incurred, carried forward indefinitely and deducted in future years, or transferred to investors through a flow-through share agreement.

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	Category	Comments
	Loan Guarantees	The following is an excerpt from http://www.fnfa.ca/en/fnfa/ “The First Nations Finance Authority (FNFA) is a statutory not-for-profit organization without share capital, operating under the authority of the First Nations Fiscal Management Act, 2005. The FNFA’s purposes are to provide investment options and capital planning advice and—perhaps most importantly, access to long-term loans with preferable interest rates. The FNFA is not an agent of Her Majesty or a Crown corporation and is governed solely by the First Nations communities that join as Borrowing Members. The advantages of joining the FNFA as a Borrowing Member are: 1. Access to low rate, below bank prime, loans with repayment terms up to 30 years; 2. First Nations choose the repayment terms that work best for their budget; 3. FNFA loans do not require collateral; 4. FNFA loans can be used to refinance existing debt; and 5. FNFA’s interest rates and terms parallel those available to provincial and local governments. Most revenue streams are eligible to support FNFA loan requests. Eligible capital projects FNFA can finance include infrastructure, social and economic development, land purchases, independent power projects, community housing and rolling stock/heavy equipment. FNFA is a stand-alone organization separate from the Government of Canada, and its operating policies are set by its Borrowing Members, represented by the First Nation’s Chief and Council appointee. The FNFA is for First Nations, by First Nations.”
	Royalties/Fees	Geothermal Resources Act, [RSBC 1996] CHAPTER 171, as of March 11, 2015 Permits for well authorizations for wells to be drilled within the boundaries of the permittee's location must pay a prescribed rent for the permit (Section 5). Based on Section 17 of the Act, (1) A lessee who produces a geothermal resource for purposes other than testing must pay to the government (a) a royalty established by agreement under this section, (b) an amount agreed under this section to be paid instead of royalty, or (c) if no royalty or amount has been agreed under this section, the prescribed royalty.
	General Idea of Royalties	With regard to use of the water resources within the geothermal tract, Section 4 of the Water Sustainability Act states “This Act does not apply to geothermal resources as defined in section 1 (1) [definitions] of the Geothermal Resources Act.”
	Private Land Owner or Government Land	Geothermal proponents will need to arrange financial agreements (eg leases or purchases) with private property owners for the geothermal land tract. Proponents for geothermal facilities on Crown Land must apply for the appropriate tenure under the BC Land Act (eg Statutory Right of Way, Licence of Occupation).
	Tax Rate in the Country	• Income eligible for small-business deduction (up to $500,000 income): 11% Federal tax, combined federal and provincial (British Columbia): 13.5%. • Income not eligible for small-business deduction: 15% Federal, combined federal and provincial (British Columbia): 26%
	Transmission Tariffs	Under wholesale wheeling (whereby electricity is transmitted from electricity generators to utilities) to customers in Alberta, the US, or other wholesale customers in BC, the generation supplier must request service on the appropriate BC Hydro transmission line under the Open Access Transmission Tariff (OATT) at a regulated cost for that service. Depending on the end customer, the generation supplier will have to make similar arrangements to cover transmission access in other jurisdictions (e.g. the Bonneville Power Authority for wheeling to a US customer). This ‘pancaking’ of rates, along with transmission congestion issues, affects the economic viability of the potential wholesale opportunity.

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Near Ainsworth Hotsprings, British Columbia, Canada
Topographical Map Sheet: Figure 14
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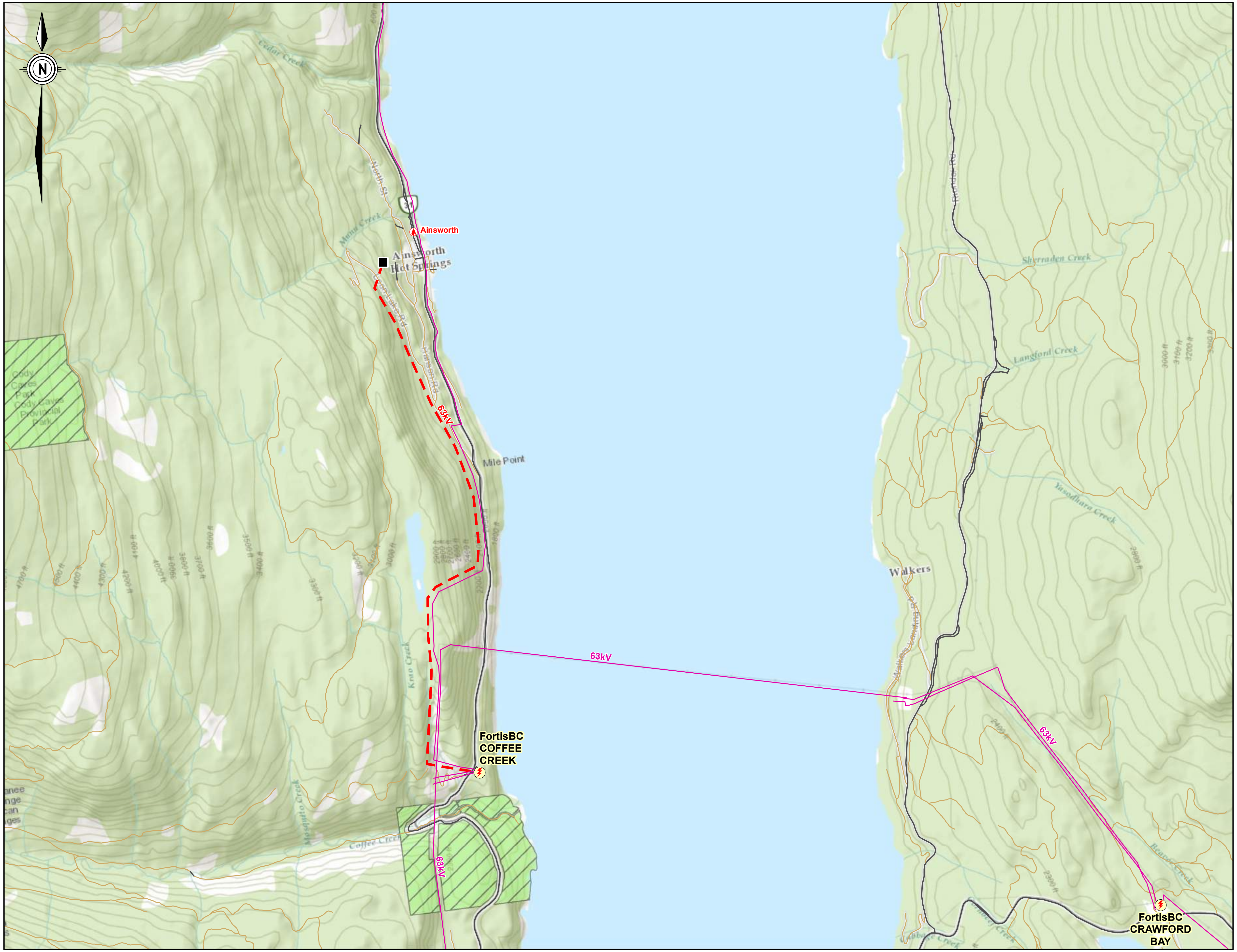
Category		Comments
M.	**Maps**	
	Regional topographic map showing population centres, roads and other infrastructure including electrical grid and nearest substation and/or generating station. (1:500,000?)	Topographical Map Sheet: Figure 14
	Regional map showing land tenure in area – geothermal concessions, mining concessions, private land holds, public or national lands (parks). (1:500,000?)	Topographical Map Sheet: Figure 14
	Regional geological map. (1:250 or 500,000?)	Geological Map Sheet: Figure 15
	Detailed geological map of the immediate area of the concessions. (1:50,000 or 100,000)	Geological Map Sheet: Figure 15
N.	**Other Issues and Considerations**	



Legend

- ■ Proposed Geothermal Plant Location
- 💧 Thermal Spring
- Proposed Transmission Line
- Paved Road
- Other Road
- ▨ Park, Eco-Reserve, Protected Area

KERR WOOD LEIDAL
consulting engineers

Service Layer Credits: Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

0.5 0 0.5
Kilometers

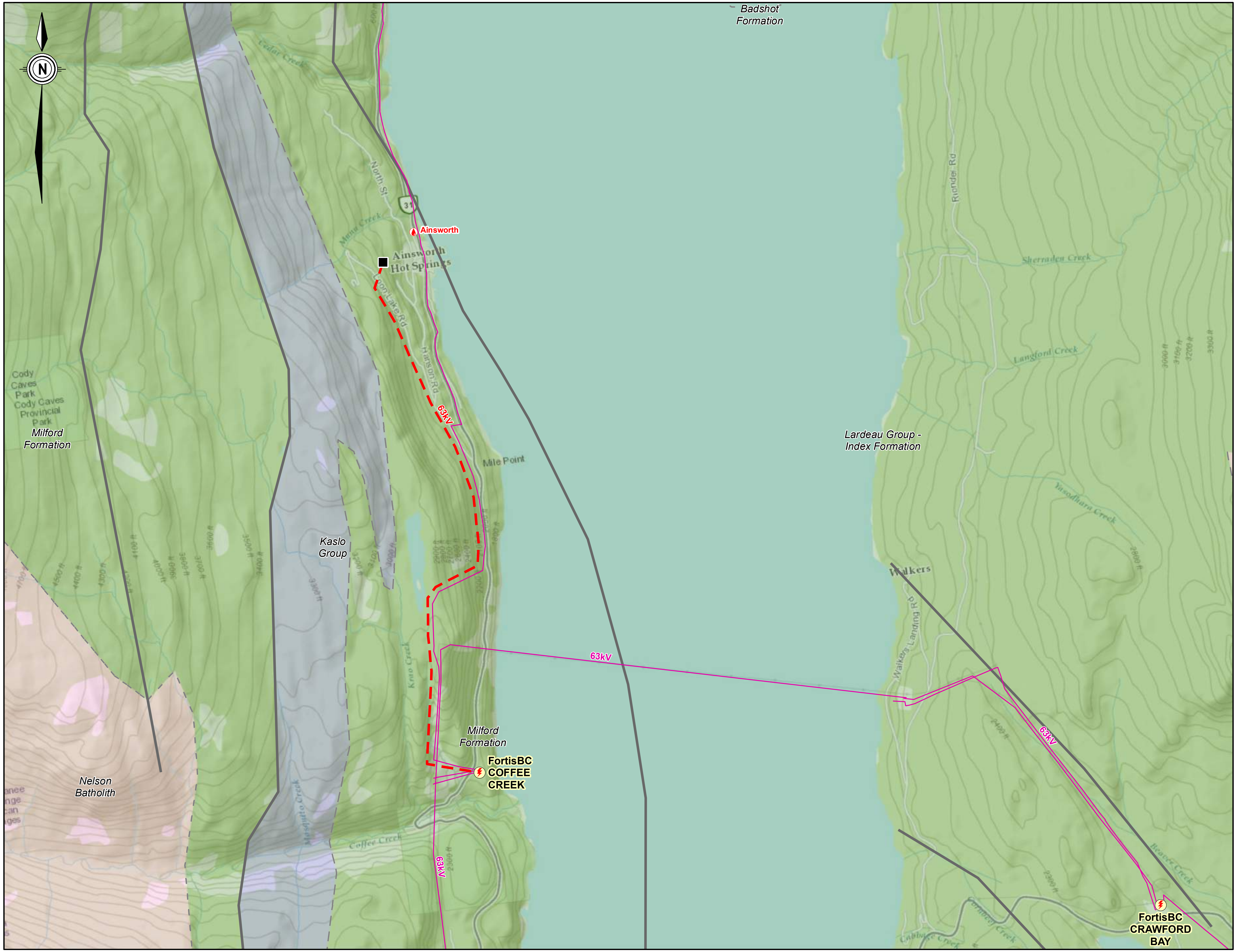
Project No.
2692-004

Date
April 30, 2015

Potential Geothermal Plant at Kootenay 20MW

Figure 14

Path: Q:\2600-2699\2692-004\430-GIS\MXD-RP\2692004_GeothermalLocations_mapbook.mxd Date Saved: 2015-04-27 3:25:15 PM
Author: RTaylor



Geoscience BC

Legend

■ Proposed Geothermal Plant Location

🌢 Thermal Spring

- - Proposed Transmission Line

Bedrock Type

▨ Intrusive Rocks

▨ Sedimentary Rocks

▨ Volcanic Rocks

- - Rock Type Boundary

— Fault

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0.5 0 0.5
Kilometers

Project No.	Date
2692-004	April 30, 2015

Geological Strata Map for Kootenay 20MW

Figure 15

Path: Q:\2600-2699\2692-004\430-GIS\MXD-RP\2692004_GeothermalLocationsGeology_mapbook.mxd Date Saved: 2015-04-27 3:18:32 PM
Author: RTaylor

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Appendix I

Lakelse Lake Geothermal Development Decision Matrix and Figures 16 & 17

LAKELSE LAKE

Near Terrace, British Columbia, Canada
Topographical Map Sheet: Figure 16
Geological Map Sheet: Figure 17

Category		Comments
A.	**Reservoir Potential**	
	Size/Potential/Type	• **Reservoir size:** No clearly defined area or thickness in literature, but description of multiple springs warrants an area estimate of about 5 km^2 - therefore, reservoir volume estimated at: 5.5 km^3 (most-likely area: 5 km^2; most-likely thickness*: 1.1 km) (*Reservoir thickness assumption based on most-likely value from Appendix III in GeothermEx, 2004) • **Potential:** 20 MW (WREZ, 2009) • Type: low-temperature resource, suitable for binary plant.
	Temperature/Water and Gas Chemistry/Mineral Indicators	**Surface features:** • There are nine springs with an average temperature of 85°C (Souther and Halstead, 1973). • Hot springs are between 52.0-73.5°C (MEM, 2015). • There are at least four springs in addition to Lakelse Hot Spring, including one on the east side of the highway at 73.5°C (BC Hydro, 1981). • Lakelse hot spring: 85°C (Fairbank and Faulkner, 1992); 54°C (Souther, 1975). **Geothermometry:** • Na-K-Ca 78.7°C; SiO_2 117.0°C (Fairbank and Faulkner, 1992). • Geothermometers converge at 85°C (Souther, 1975). Exploration drilling: • None to date for commercial power development. **Water chemistry:** • Na-SO_4-Cl composition, with Cl at ~200 mg/l, Mg less than 0.1 mg/l and not particularly high SiO_2 (about 70 mg/l) (Souther, 1975). • Water is of the sodium-sulphate type with a total of 1,109.6 ppm dissolved mineral salts. It differs from other Canadian thermal springs in the relatively high content of lithium (Souther and Halstead, 1973). **Mineral indicators:** • The springs have a continuous gas discharge and a high content of lithium has been reported (10.2 ppm) (MEM, 2015).
	Surface Flow Rates and Reservoir Recharge	• 6 L/s (Fairbank and Faulkner, 1992); 8.3 L/s (Souther, 1975). • The hot springs flow at a rate of 457 liters per minute (MEM, 2015) • The hot spring on the east side of the highway has a low flow (BC Hydro, 1981)
	3D Permeability (heat exchange potential)	Heat source likely a shallow pluton with fluid flow along graben faults (Fairbank and Faulkner, 1992).
	Recent Magmatism	A basaltic cinder cone and flow reported to be about 300 years old is located 56 km to the north (Souther and Halstead, 1973).
	Structural Setting	The springs are situated in a broad northerly-trending valley on the eastern margin of the Coast Range mountains. The valley is part of a major fault-controlled lineament (the N-S-trending Terrace Graben) (Souther and Halstead, 1973).

LAKELSE LAKE

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Category		Comments
	Geophysics	Regional Bouger gravity survey conducted (Geoscience BC, 2010a); electrical resistivity survey conducted in 1983 (Shore, 1984).
	Reservoir Host Rock	• The spring probably issues from fractured granites (quartz diorite) (Geoscience BC, 2010b; Souther and Halstead, 1973). • The Lakelse Hot Spring issues from a 30.5 m cavern at the resort in the nearby swamp (BC Hydro, 1981).
	Drilling Issues	• Commercial development of the hot springs as a resort began in 1958, and includes a popular recreational pool/slide at spring near Mt. Layton Hot Springs Resort (Souther and Halstead, 1973; Fairbank and Faulkner, 1992). • Historically, the resort owner has not supported geothermal development for electricity generation at the Lakelse prospect, and the spring vents are on private land (BC Hydro, 2004).
	Brief Description of Geological Setting of Thermal Features (i.e., springs emanate from fluvial gravels; beside a river, etc.)	• Economic mineralization in the Terrace–Kitimat area is concentrated along the intrusive boundary between the eastern margin of the Coast Plutonic Complex (CPC) and supra-crustal rocks of Stikinia. Devonian–Permian arc-volcanic rocks and platform carbonate rocks form the basement to Stikinia in the Terrace-Kitimat area, and are overlain by Triassic and Lower Jurassic marine sedimentary and volcanic-arc rocks. These supra-crustal assemblages are intruded by Jurassic, Late Cretaceous and Eocene plutonic rocks of the CPC (Pignotta et al., 2009) • The major fault/lineament cuts granitic rocks (Coast Crystalline complex) near Lakelse and extends northward into sedimentary and volcanic rocks of the Interior System. 56 km north of Lakelse the lineament is occupied by a basaltic cinder cone and flow that are reported to be about 300 years old (Souther and Halstead, 1973) • Quaternary sediments overlie granodiorite of the Cretaceous to Tertiary Coast Plutonic Complex (MEM, 2015). • Resistivity and seismic surveys show a clay-capped deep sedimentary-filled graben - indicates a confined, laterally-extensive thermal aquifer (Fairbank and Faulkner, 1992).
B.	**Exploration Uncertainty (Risk)**	
	Degree of Identification of Resources/Reserves	Moderate Borealis has planned an exploration program that is currently in progress. The Borealis exploration program was planned in three phases: (1) biochemical analyses, data-gathering, modelling; (2) slim-hole drilling; (3) drilling of a small number of production wells). The first phase was to begin in June 2014 on a 2,800-hectare area. (Killen, 2014) (Massey, 2014). MW potential not yet clearly defined.
	Likelihood of Covering Reservoir with Concession	Moderate Consortium of Borealis GeoPower, Enbridge and Kitselas First Nations hold developing permits for Mount Layton Hot Springs area (Thompson et al., 2015)
	Expected Authorization Date	Unknown
	Specific Timing of Exploration (2 + 2 years, BC 8 years, etc.)	4 years (1 year deep gradient-well drilling + 1 year successful development drilling and testing + 1 year further development drilling and start plant construction + 1 year drilling wrap-up and finish plant construction)
	Degree of Previous Exploration (can be good or bad)	Moderate Exploration efforts are ongoing.
	Surface Operational Capacity (enough stable area for drilling and a plant?)	Yes A power plant would be located to the south of the resort (BC Hydro, 2004).
	Exploration to Exploitation: A summary rating of Exploration Uncertainty (risk) on a scale of difficult (high risk) through medium (moderate risk) to easy (low risk)	Moderate "The resource could be developed by relatively inexpensive shallow wells" (BC Hydro, 2004).

LAKELSE LAKE

Near Terrace, British Columbia, Canada
Topographical Map Sheet: Figure 16
Geological Map Sheet: Figure 17

	Category	Comments
C.	**Environmental Issues**	
	Protected Areas	• Northern section of proposed transmission line crosses near Lakelse Provincial Park. Route realignment to preclude park during detailed route selection.
	Endangered Species	• Northern reach of transmission line is in Bog Rush (blue-listed plant) occurrence polygon. • Southern reach of transmission line enters into White Adder's-mouth Orchid (blue-listed plant) occurrence polygon.
	Geothermal Surface Features	• Lakelse Hotsprings is close to proposed transmission line.
	Other	• Transmission line crosses approx. 6 creeks that contain Sockeye Salmon, Coho Salmon, and Steelhead Trout. • Transmission line crosses approximately 15 streams in total. • Kalum proposed Wildlife Habitat Area is 3 km east of proposed plant location.
D.	**Geothermal Area - Bidding and/or Type of Land Holding (private/government/lease/etc.)**	
	Bidding Area	LL Geothermal, of whom Borealis Geopower is a joint venture partner, obtained a geothermal exploration permit for approximately 2,800 hectares in the Lakelse area in January 2014. Existing geothermal title tract; exploration through Kitselas First Nation-led consortium (also includes Enbridge and Borealis) began in spring 2014. (http://www.terracestandard.com/news/251196971.html)
	Other Claim Rights (mining and/or oil)	No existing mineral, coal titles at plant location, several existing titles in vicinity. Proposed location is not within known oil and gas management area; no known tenures at proposed location.

LAKELSE LAKE

Near Terrace, British Columbia, Canada
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Category		Comments
E.	**Market**	
	Main Electricity Consumers (direct sales and/or government)	General Overview 1. BC Hydro acquires power from Independent Power Producers (which would include geothermal proponents) through two main processes: • Competitive calls: when BC Hydro issues a Call for Tenders for the supply of electricity to BC Hydro, geothermal proponents can bid into those competitive calls. • Standing Offer Program (SOP): This program is presently available for clean generation projects greater than 0.1 MW but not more than 15 MW. Proponents do not compete against each other but are paid a predetermined price by BC Hydro. Depending on the specifics of each project, proponents may wish to size their projects to be under the 15 MW threshold for the SOP (BC Hydro is developing a 'mini-SOP' component within the overall SOP. This mini-SOP will apply to projects in the 0.1 MW to 1 MW range, but would not realistically apply to potential geothermal generation projects). • In addition, BC Hydro's net metering program is designed for residential and commercial customers who wish to connect a small electricity generating unit to the BC Hydro distribution system. Generating units up to 0.1 MW in capacity that utilize a clean or renewable resource are eligible to participate in the program. Given the small size, this program has no applicability to potential geothermal generation projects. The acquisition of geothermal power would contribute to BC Hydro's current target for clean energy and to the diversification of BC Hydro's resource mix, making it less reliant on snow melt and stream flow. 2. Although FortisBC is a potential customer for electricity from geothermal sources, the opportunities may be limited given FortisBC's ability to receive electricity from BC Hydro under Rate Schedule 3808. However there is a wheeling agreement in place which would facilitate a geothermal project located in FortisBC's service territory to sell electricity to BC Hydro through BC Hydro's competitive calls and/or the SOP, or to other potential customers as noted below. 3. Wholesale wheeling (whereby electricity is transmitted from electricity generators to utilities) to customers in Alberta, the US, or other wholesale customer in BC is allowed. The generation supplier must request service on the appropriate BC Hydro transmission line under the Open Access Transmission Tariff (OATT) at a regulated cost for that service. Depending on the end customer, the generation supplier will have to make similar arrangements to cover transmission access in other jurisdictions (e.g. the Bonneville Power Authority for wheeling to a US customer). This 'pancaking' of rates, along with congestion issues, affects the economic viability of the potential wholesale opportunity. 4. Retail access, defined as a market in which electricity is sold directly to consumers by competing suppliers, is generally not permitted in BC. However there may be opportunities for bilateral arrangements for direct sales of electricity from geothermal generating plants to large customers (e.g. pulp mills, large sawmills, mines) as follows: • To replace the electricity supplied at a high voltage from BC Hydro under BC Hydro Transmission Rate 1823 of the Electric Tariff. Such replacement would be challenging given the rates charged under that tariff. • To supply electricity to a remote facility (e.g. a mine, LNG plant or other industrial facility) directly from a geothermal plant located in close proximity to the facility, thereby precluding the need for a lengthy transmission line to connect to the BC Hydro electrical grid. • Connection to Rio Tinto Alcan and to potential LNG customers is a possibility, but transmission line connection to this potential customer may be challenging. • A potential direct consumer, Skeena Sawmills located in Terrace, is approximately 23 km from the Lakelse site • A potential electricity customer, Huckleberry Mines Ltd. / Imperial Metals, is located approximately 110 km away over mountainous terrain. • A potential electricity customer, Avanti Kitsault Mine, is located 130 km away over mountainous terrain.

LAKELSE LAKE

Near Terrace, British Columbia, Canada
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Category		Comments
	Time Limits? (business agreements, operating/generating-by deadlines?)	• BC Hydro has issued competitive Calls for Tender for the supply of electricity in the past. • BC Hydro’s SOP is presently directly available for clean energy projects which meet certain criteria, including a generation output of less than 15 MW. • Typical BC Hydro Energy Purchase Agreements from Independent Power Producers are 20-40 years in duration. • Business agreements with the owners of private transmission lines (e.g. independent power producers) for access to the market will be necessary. • The lead times to develop geothermal resources will include appropriate allowances for investigative drilling, technical and environmental studies, public consultation, transmission considerations, marketing, licencing, design, construction and commissioning. These lead times will vary from four to seven years depending on the specifics of each project. Projects with a history of exploration and analysis (e.g. Meager Creek/Pebble Creek, Lakelse, and Canoe Creek) will generally be on the shorter end of this time continuum, while other projects with less investigative work will take longer. Although the time required to drill a geothermal well and construct a power plant could conceivably be less than two years, the key uncertainties inherent in the environmental review, public consultation, transmission arrangements (either with BC Hydro or a private transmission owner), and the permitting and regulatory processes will realistically result in a further two years at a minimum for these activities.
F.	**Transmission Line Infrastructure**	
	State of the Infrastructure	Existing 287 kV transmission line within 1 km of proposed plant location; however, closest substation is Skeena substation approx. 20 km away.
	Transmission Route (distance, terrain and costs)	New 69 kV transmission line approx. 22 km via existing transmission corridor routing with interconnection at Skeena substation. Treed, moderate terrain.
H.	**Community Issues**	
	Indigenous Law and Indigenous Development Areas	• First Nation Consultative Areas include Kitsumkalum First Nation, Lax Kwalaams Band Council, Kitselas First Nation, Metlakatla First Nation. • Kitselas Reserves Land Management Act was developed in 2005 with concentration on existing reserve land, but includes development of regulations for traditional territory. (See Kitselas Land Management Act and Kitselas Land Interests Law pdf, http://www.kitselas.com/index.php/government/laws/) • Kitselas Land Management Office provides stewardship of the lands and resources within Kitselas Traditional Territory (http://www.kitselas.com/index.php/resources/lands/)
	Community Action	• City of Terrace Official Community Plan GHG emissions reduction targets 80% by 2050 (http://www.terrace.ca/) • Borealis has made presentations to the Terrace City Council.
	Surface Rights	• First Nation Consultative Areas include Kitsumkalum First Nation, Lax Kwalaams Band Council, Kitselas First Nation, Metlakatla First Nation. • Terrace Official Community Plan includes GHG reduction target of 80% below 2007 level by 2050. Economic development includes Northwest Transmission Line, Rio-Tinto Alcan smelter modernization and major mining proposals. Objective 6 of Official Community Plan to work towards community energy self-sufficiency includes evaluation of alternative heat generation resources such as geothermal and waste heat recovery.
	Tourism	• Proposed transmission line routing follows boundary of Lakelse Lake Provincial Park. Transmission line routing is also close to existing Hai Lake - Mount Herman Provincial Park and Lakelse Lake Wetlands Provincial Park. Lakelse Lake Park offers hiking, swimming, fishing, biking, winter activities, and camping (http://www.env.gov.bc.ca/bcparks/explore/parkpgs/lakelse_lk/) • Terrace, BC has significant eco tourism industry that is punctuated by Lakelse Lake Provincial Park (http://www.visitterrace.com/stage.php/places/cabins-campgrounds-rv-parks/lakelse-lake-prov-park)

LAKELSE LAKE

Near Terrace, British Columbia, Canada
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Category		Comments
I.	**Water Rights**	
	Availability (for example "air-cooled required")	Plant water requirement estimated approx. 25 L/s for binary plant. MAD of 100-200 L/s in surrounding low-lying areas. No water licences within 5 km of proposed plant location. More than 50 water licences on east side of Lakelse Lake for domestic purpose.
	Availability for Drilling	Drilling requirement of 20 L/s. MAD of 100-200 L/s in surrounding low-lying areas. No water licences within 5 km of proposed plant location. More than 50 water licences on east side of Lakelse Lake for domestic purpose.
J.	**Engineering**	
	Plant Location and Design	Plant location in flat location south of Lakelse Lake close to existing Highway 37 and transmission line corridor.
	Construction Issues	Location accessible via paved Highway 37. Proposed plant location is within 40 km of Terrace, BC. Services for temporary workers (food, accommodation) are available here.
	Transportation Issues	Accessible via existing Highway 37.
	Architectural Issues (Blend/hide into environment? Local styles? etc.)	None found. Proposed plant location and proposed new transmission line routing skirts Lakelse Lake Wetlands provincial park and Lakelse Lake Provincial Park.
	Special Construction Issues (zero emissions)	None found.
K.	**Non-Electrical Infrastructure (Roads and Habitation)**	
	Nearest Large Community > 50,000	Prince George, BC
	Nearest Community	Terrace, BC
	Nearest Road and Condition	Highway 37, existing paved highway.
	Current Access Conditions (restrictions)	None noted.
	Terrain and Distance Factor for Road Building	No new road requirements.

LAKELSE LAKE

Near Terrace, British Columbia, Canada
Topographical Map Sheet: Figure 16
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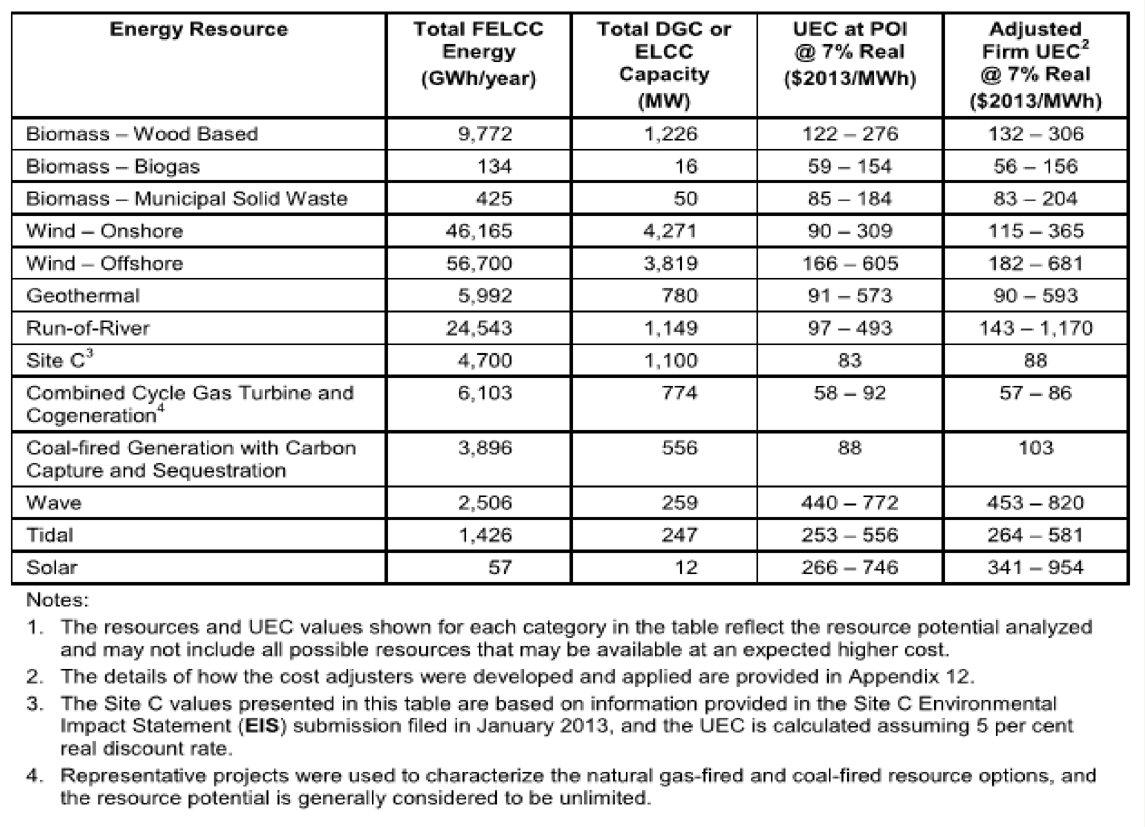
Category		Comments
L.	**Finance**	
	General Power Prices	BC Hydro acquires power through (1) competitive processes (Calls for Tender), (2) the Standing Offer Program (not including the mini-SOP under development), and (3) upgrades to its existing facilities or the development of new generation facilities. (Note that the net metering program targets projects less than 100 kW and is therefore not relevant to geothermal generation projects). Comments on the general price of power under each one are: • The power price paid by BC Hydro to independent power producers through Energy Purchase Agreements (EPAs) under Calls for Tender are proprietary and confidential. • The power price paid by BC Hydro to independent power producers through EPAs under the SOP are made up of a predetermined base price in 2010 dollars as determined by the region of the point of interconnection to the BC Hydro system, escalated at the Consumer Price Index annually up to the year in which an EPA is signed, and further adjusted based upon the time of day and month when the energy is delivered. For reference, the base price for the Lower Mainland region in 2010 dollars is $103.69/MWh. • BC Hydro's current Integrated Resource Plan dated November 2013 includes details of both demand-side management options and supply-side resource options to consider in meeting the future demand for electricity. These resource options, together with their attributes of total energy and capacity and unit energy costs, are listed in Table 2-2 of the November 2013 Resource Options Report Update. That table is reproduced below for ready reference. • Table 5-7 of the above-noted November 2013 Resource Options Report Update provides a summary of the Geothermal Potential by Transmission Region. 

Energy Resource	Total FELCC Energy (GWh/year)	Total DGC or ELCC Capacity (MW)	UEC at POI @ 7% Real ($2013/MWh)	Adjusted Firm UEC[2] @ 7% Real ($2013/MWh)
Biomass – Wood Based	9,772	1,226	122 – 276	132 – 306
Biomass – Biogas	134	16	59 – 154	56 – 156
Biomass – Municipal Solid Waste	425	50	85 – 184	83 – 204
Wind – Onshore	46,165	4,271	90 – 309	115 – 365
Wind – Offshore	56,700	3,819	166 – 605	182 – 681
Geothermal	5,992	780	91 – 573	90 – 593
Run-of-River	24,543	1,149	97 – 493	143 – 1,170
Site C[3]	4,700	1,100	83	88
Combined Cycle Gas Turbine and Cogeneration[4]	6,103	774	58 – 92	57 – 86
Coal-fired Generation with Carbon Capture and Sequestration	3,896	556	88	103
Wave	2,506	259	440 – 772	453 – 820
Tidal	1,426	247	253 – 556	264 – 581
Solar	57	12	266 – 746	341 – 954

Notes:

1. The resources and UEC values shown for each category in the table reflect the resource potential analyzed and may not include all possible resources that may be available at an expected higher cost.
2. The details of how the cost adjusters were developed and applied are provided in Appendix 12.
3. The Site C values presented in this table are based on information provided in the Site C Environmental Impact Statement (**EIS**) submission filed in January 2013, and the UEC is calculated assuming 5 per cent real discount rate.
4. Representative projects were used to characterize the natural gas-fired and coal-fired resource options, and the resource potential is generally considered to be unlimited.

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Near Terrace, British Columbia, Canada
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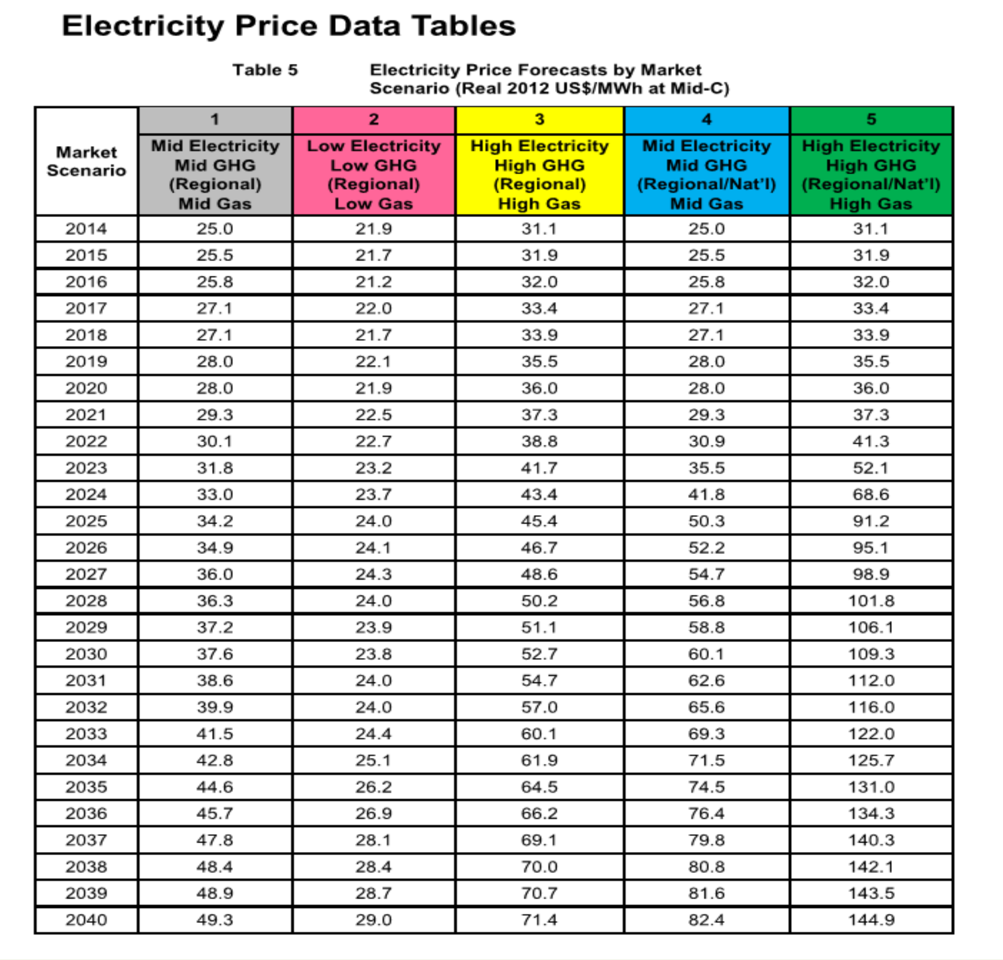
Category	Comments
Market Price ($/MWhr)	• As noted in the above Table 2-2 from the November 2013 Resource Options Report Update, the Unit Energy Cost for geothermal resources at a 7% real discount rate in 2013 dollars ranges from $91/MWh to 573/MWh at the point of interconnection to the BC Hydro system. • Wholesale electricity prices for trading purposes can vary greatly. In the Pacific Northwest, these prices are affected by such factors as precipitation/snowfall in the region, unforeseen generation outages and ambient temperatures. A general flavour of the wholesale electricity prices for potential export of electricity from BC can be obtained from a variety of sources. One such source is the US Energy Information Administration (www.eia.gov/electricity/wholesale/#history). This source provides current and historical electricity market data. Of particular relevance is the mid-C trading hub in the Northwest Region (one example would be a Mid-C peak price on March 17, 2015 of $19.87US weighted average cost from 72 trades). Access to that market for geothermal projects in BC would require access on both the BC Hydro transmission system to the Canada/US border, and on the appropriate transmission system (e.g. Bonneville Power Authority) in the US. • BC Hydro forecasts of market prices under various scenarios was provided in the November 2013 IRP. Table 5 in Appendix 5A – Market Forecast Data is reproduced below for ready reference.



Electricity Price Data Tables

Table 5 Electricity Price Forecasts by Market Scenario (Real 2012 US$/MWh at Mid-C)

Market Scenario	1 Mid Electricity Mid GHG (Regional) Mid Gas	2 Low Electricity Low GHG (Regional) Low Gas	3 High Electricity High GHG (Regional) High Gas	4 Mid Electricity Mid GHG (Regional/Nat'l) Mid Gas	5 High Electricity High GHG (Regional/Nat'l) High Gas
2014	25.0	21.9	31.1	25.0	31.1
2015	25.5	21.7	31.9	25.5	31.9
2016	25.8	21.2	32.0	25.8	32.0
2017	27.1	22.0	33.4	27.1	33.4
2018	27.1	21.7	33.9	27.1	33.9
2019	28.0	22.1	35.5	28.0	35.5
2020	28.0	21.9	36.0	28.0	36.0
2021	29.3	22.5	37.3	29.3	37.3
2022	30.1	22.7	38.8	30.9	41.3
2023	31.8	23.2	41.7	35.5	52.1
2024	33.0	23.7	43.4	41.8	68.6
2025	34.2	24.0	45.4	50.3	91.2
2026	34.9	24.1	46.7	52.2	95.1
2027	36.0	24.3	48.6	54.7	98.9
2028	36.3	24.0	50.2	56.8	101.8
2029	37.2	23.9	51.1	58.8	106.1
2030	37.6	23.8	52.7	60.1	109.3
2031	38.6	24.0	54.7	62.6	112.0
2032	39.9	24.0	57.0	65.6	116.0
2033	41.5	24.4	60.1	69.3	122.0
2034	42.8	25.1	61.9	71.5	125.7
2035	44.6	26.2	64.5	74.5	131.0
2036	45.7	26.9	66.2	76.4	134.3
2037	47.8	28.1	69.1	79.8	140.3
2038	48.4	28.4	70.0	80.8	142.1
2039	48.9	28.7	70.7	81.6	143.5
2040	49.3	29.0	71.4	82.4	144.9

LAKELSE LAKE

Near Terrace, British Columbia, Canada
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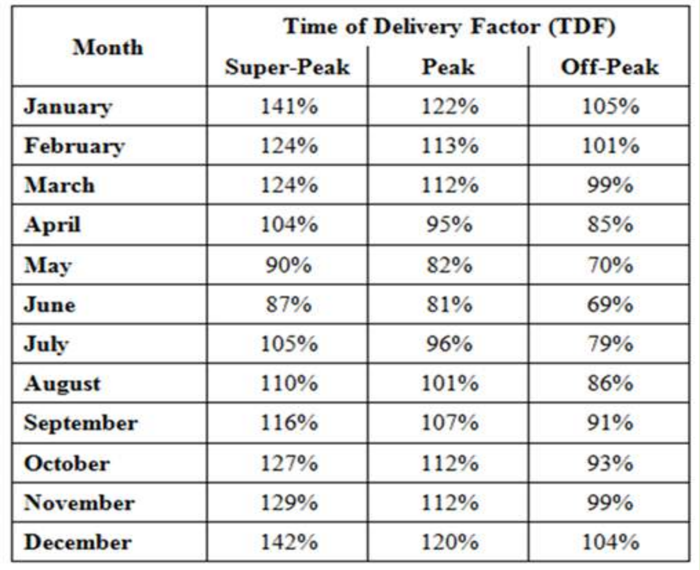
<table>
<tr><th colspan="2">Category</th><th>Comments</th></tr>
<tr><td></td><td>Green Power Premium ($/MWhr)</td><td>• BC Hydro’s past procurement processes for the acquisition for power from independent power producers has offered a premium for green power.
• Within British Columbia, there is little demand for the purchase of “green power certificates” (instruments that a customer can purchase to be assured that the electricity used is environmentally friendly) from BC Hydro. BC Hydro’s generation mix is already approximately 93% clean.
• California has a goal of 33% of retail sales by 2020 to be sourced from eligible renewable energy sources. However, the opportunity for geothermal power from British Columbia, particularly “bundled” green energy with Renewable Energy Certificates (RECs), to compete in that market is low, for a number of reasons
1. The price of electricity is driven by the low cost of natural gas;
2. There are large amounts of renewables, such as wind and solar, in California; and
3. Firm transmission access to the California market through the BPA transmission system is generally not available.</td></tr>
<tr><td></td><td>Capacity Price ($/KW)</td><td>• There is no price in $/kW for capacity resource options in the market at present.
• Table 3-27 entitled "UCCs of Capacity Resource Supply Options" in BC Hydro's Integrated Resource Plan dated November 2013 provided a summary of capacity resource options (e.g. pumped storage, simple cycle gas turbines and resource smart projects such as Revelstoke Unit 6). The unit capacity costs (UCCs) at the point of interconnection to the BC Hydro system in $2013/kW-year are shown in the table.</td></tr>
<tr><td></td><td>Is there a higher price for base load power?</td><td>In general, baseload power (ie firm power) is more valuable to BC Hydro and furthermore the price paid for baseload power varies by month throughout the year. As an example, the following excerpt is taken from BC Hydro’s SOP:

“1. Definitions: In this Appendix 4, the following words and expressions have the following meanings:
(a) “Off-Peak Hours” means all hours other than Super-Peak Hours and Peak Hours.
(b) “Peak Hours” means the hours commencing at 06:00 PPT and ending at 16:00 PPT, and commencing at 20:00 PPT and ending at 22:00 PPT, Monday through Saturday inclusive, but excluding British Columbia statutory holidays.
(c) “Super-Peak Hours” means the hours commencing at 16:00 PPT and ending at 20:00 PPT Monday through Saturday inclusive, but excluding British Columbia statutory holidays.”

<table>
<tr><th>Month</th><th colspan="3">Time of Delivery Factor (TDF)</th></tr>
<tr><th></th><th>Super-Peak</th><th>Peak</th><th>Off-Peak</th></tr>
<tr><td>January</td><td>141%</td><td>122%</td><td>105%</td></tr>
<tr><td>February</td><td>124%</td><td>113%</td><td>101%</td></tr>
<tr><td>March</td><td>124%</td><td>112%</td><td>99%</td></tr>
<tr><td>April</td><td>104%</td><td>95%</td><td>85%</td></tr>
<tr><td>May</td><td>90%</td><td>82%</td><td>70%</td></tr>
<tr><td>June</td><td>87%</td><td>81%</td><td>69%</td></tr>
<tr><td>July</td><td>105%</td><td>96%</td><td>79%</td></tr>
<tr><td>August</td><td>110%</td><td>101%</td><td>86%</td></tr>
<tr><td>September</td><td>116%</td><td>107%</td><td>91%</td></tr>
<tr><td>October</td><td>127%</td><td>112%</td><td>93%</td></tr>
<tr><td>November</td><td>129%</td><td>112%</td><td>99%</td></tr>
<tr><td>December</td><td>142%</td><td>120%</td><td>104%</td></tr>
</table>
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LAKELSE LAKE

Near Terrace, British Columbia, Canada
Topographical Map Sheet: Figure 16
Geological Map Sheet: Figure 17

Category	Comments
Estimated Size of Resource	See Section A.
Is there any green power incentives?	• The BC government created the Innovative Clean Energy (ICE) fund with an initial mandate to accelerate the commercialization of emerging clean energy technologies (now expanded to include a broad range of energy efficiency and conservation projects). British Columbia also has a program entitled Scientific Research and Experimental Development Tax credit (SR&ED). Geothermal proponents could keep a watching brief on these programs for applicability and relevance. • The BC government's First Nations Clean Energy Business Fund. This fund promotes increased Aboriginal community participation in the clean energy sector. It provides: o Capacity funding of up to $50,000 per applicant to cover the early stages (e.g. feasibility studies) of project development ; and o Equity funding of up to $500,000 per applicant to support a financially viable and resourced clean energy project. • There are a number of government of Canada programs to encourage the development of renewable power. Some of these programs may be active but not currently issuing calls for proposals. Others may be focussed on research and innovation and may not be directly applicable to geothermal technologies/resources, while others may be fully subscribed and even inactive but are noted in terms of completeness. Some of these programs include: o Natural Resources Canada ecoEnergy for Renewable Power program; o Sustainable Development Technology Canada funds; o Clean Energy Fund; o Industrial Research Assistance Program; and o Green Infrastructure Fund Geothermal proponents could keep a watching brief on these and other federal government programs for their applicability and relevance.
Grants	See above under green power incentives
Tax Holidays	None listed on federal and provincial websites.
Tax Relief	• Under Classes 43.1 and 43.2 in Schedule II of the Income Tax Regulations, certain capital costs of systems that produce energy by using renewable energy sources or fuels from waste, or conserve energy by using fuel more efficiently are eligible for accelerated capital cost allowance. Under Class 43.1, eligible equipment may be written-off at 30 percent per year on a declining balance basis. In general, equipment that is eligible for Class 43.1 but is acquired after February 22, 2005 and before year 2020 may be written-off at 50 percent per year on a declining balance basis under Class 43.2. Without these accelerated write-offs, many of these assets would be depreciated for income tax purposes at annual rates between 4 and 30 percent. • In addition to Class 43.1 or 43.2 capital cost allowance, the Income Tax Regulations allow certain expenses incurred during the development and start-up of renewable energy and energy conservation projects [Canadian renewable and conservation expenses (CRCE)] to be fully deducted in the year they are incurred, carried forward indefinitely and deducted in future years, or transferred to investors through a flow-through share agreement.

LAKELSE LAKE

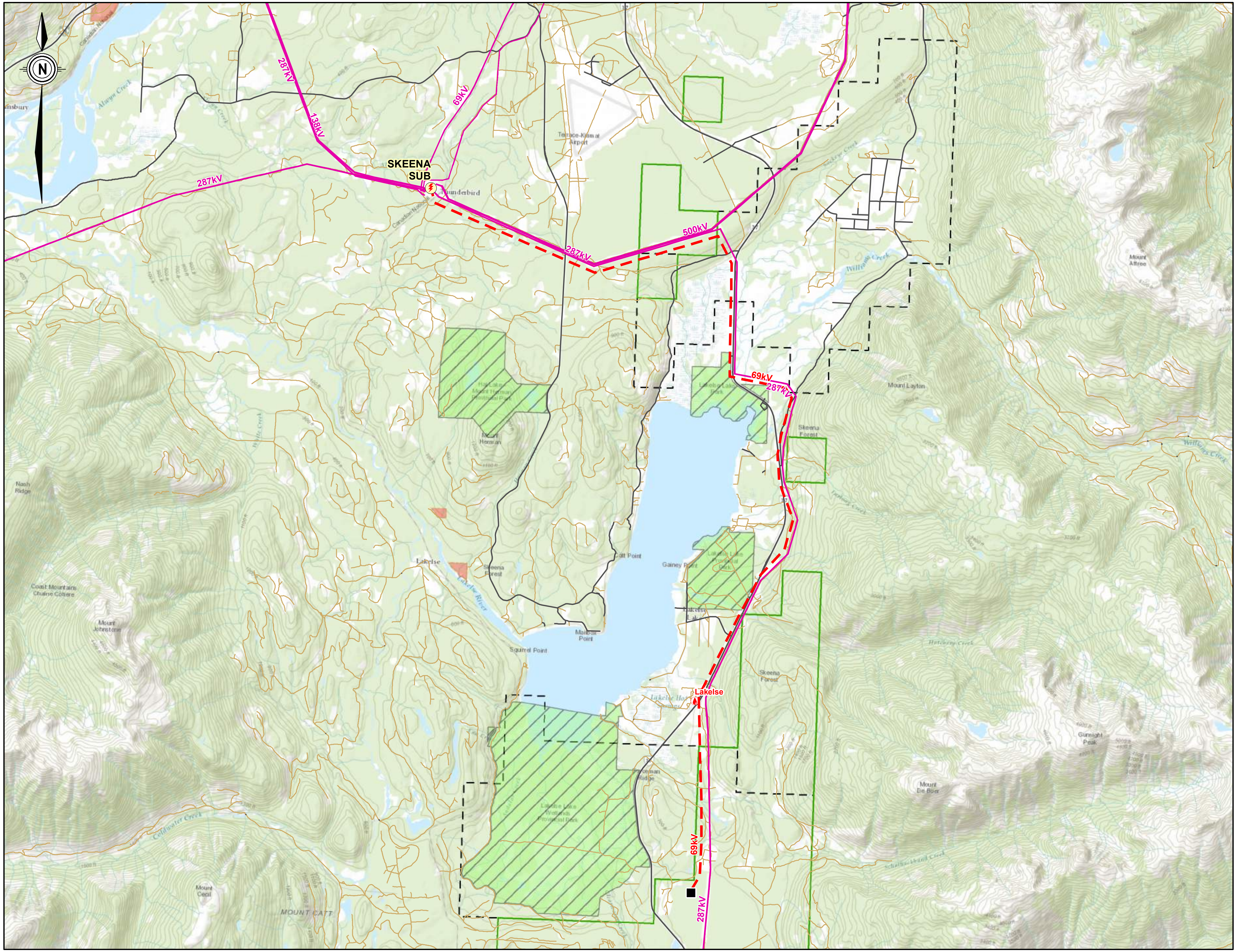
Near Terrace, British Columbia, Canada
Topographical Map Sheet: Figure 16
Geological Map Sheet: Figure 17

Category		Comments
	Loan Guarantees	The following is an excerpt from http://www.fnfa.ca/en/fnfa/ “The First Nations Finance Authority (FNFA) is a statutory not-for-profit organization without share capital, operating under the authority of the First Nations Fiscal Management Act, 2005. The FNFA’s purposes are to provide investment options and capital planning advice and—perhaps most importantly, access to long-term loans with preferable interest rates. The FNFA is not an agent of Her Majesty or a Crown corporation and is governed solely by the First Nations communities that join as Borrowing Members. The advantages of joining the FNFA as a Borrowing Member are: 1. Access to low rate, below bank prime, loans with repayment terms up to 30 years; 2. First Nations choose the repayment terms that work best for their budget; 3. FNFA loans do not require collateral; 4. FNFA loans can be used to refinance existing debt; and 5. FNFA’s interest rates and terms parallel those available to provincial and local governments. Most revenue streams are eligible to support FNFA loan requests. Eligible capital projects FNFA can finance include infrastructure, social and economic development, land purchases, independent power projects, community housing and rolling stock/heavy equipment. FNFA is a stand-alone organization separate from the Government of Canada, and its operating policies are set by its Borrowing Members, represented by the First Nation’s Chief and Council appointee. The FNFA is for First Nations, by First Nations.”
	Royalties/Fees	Geothermal Resources Act, [RSBC 1996] CHAPTER 171, as of March 11, 2015 Permits for well authorizations for wells to be drilled within the boundaries of the permittee's location must pay a prescribed rent for the permit (Section 5). Based on Section 17 of the Act, (1) A lessee who produces a geothermal resource for purposes other than testing must pay to the government (a) a royalty established by agreement under this section, (b) an amount agreed under this section to be paid instead of royalty, or (c) if no royalty or amount has been agreed under this section, the prescribed royalty.
	General Idea of Royalties	With regard to use of the water resources within the geothermal tract, Section 4 of the Water Sustainability Act states “This Act does not apply to geothermal resources as defined in section 1 (1) [definitions] of the Geothermal Resources Act.”
	Private Land Owner or Government Land	Geothermal proponents will need to arrange financial agreements (eg leases or purchases) with private property owners for the geothermal land tract. Proponents for geothermal facilities on Crown Land must apply for the appropriate tenure under the BC Land Act (eg Statutory Right of Way, Licence of Occupation).
	Tax Rate in the Country	• Income eligible for small-business deduction (up to $500,000 income): 11% Federal tax, combined federal and provincial (British Columbia): 13.5%. • Income not eligible for small-business deduction: 15% Federal, combined federal and provincial (British Columbia): 26%
	Transmission Tariffs	Under wholesale wheeling (whereby electricity is transmitted from electricity generators to utilities) to customers in Alberta, the US, or other wholesale customers in BC, the generation supplier must request service on the appropriate BC Hydro transmission line under the Open Access Transmission Tariff (OATT) at a regulated cost for that service. Depending on the end customer, the generation supplier will have to make similar arrangements to cover transmission access in other jurisdictions (e.g. the Bonneville Power Authority for wheeling to a US customer). This ‘pancaking’ of rates, along with transmission congestion issues, affects the economic viability of the potential wholesale opportunity.

LAKELSE LAKE

Near Terrace, British Columbia, Canada
Topographical Map Sheet: Figure 16
Geological Map Sheet: Figure 17

Category		Comments
M.	**Maps**	
	Regional topographic map showing population centres, roads and other infrastructure including electrical grid and nearest substation and/or generating station. (1:500,000?)	Topographical Map Sheet: Figure 16
	Regional map showing land tenure in area – geothermal concessions, mining concessions, private land holds, public or national lands (parks). (1:500,000?)	Topographical Map Sheet: Figure 16
	Regional geological map. (1:250 or 500,000?)	Geological Map Sheet: Figure 17
	Detailed geological map of the immediate area of the concessions. (1:50,000 or 100,000)	Geological Map Sheet: Figure 17
N.	**Other Issues and Considerations**	



Geoscience BC

Legend

■ Proposed Geothermal Plant Location

Thermal Spring

Proposed Transmission Line

Existing Substation

Existing Transmission Line

Paved Road

Other Road

▨ Park, Eco-Reserve, Protected Area

🟥 First Nations Reserve

Geothermal Title Tract

Active

Unsold

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Service Layer Credits: Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

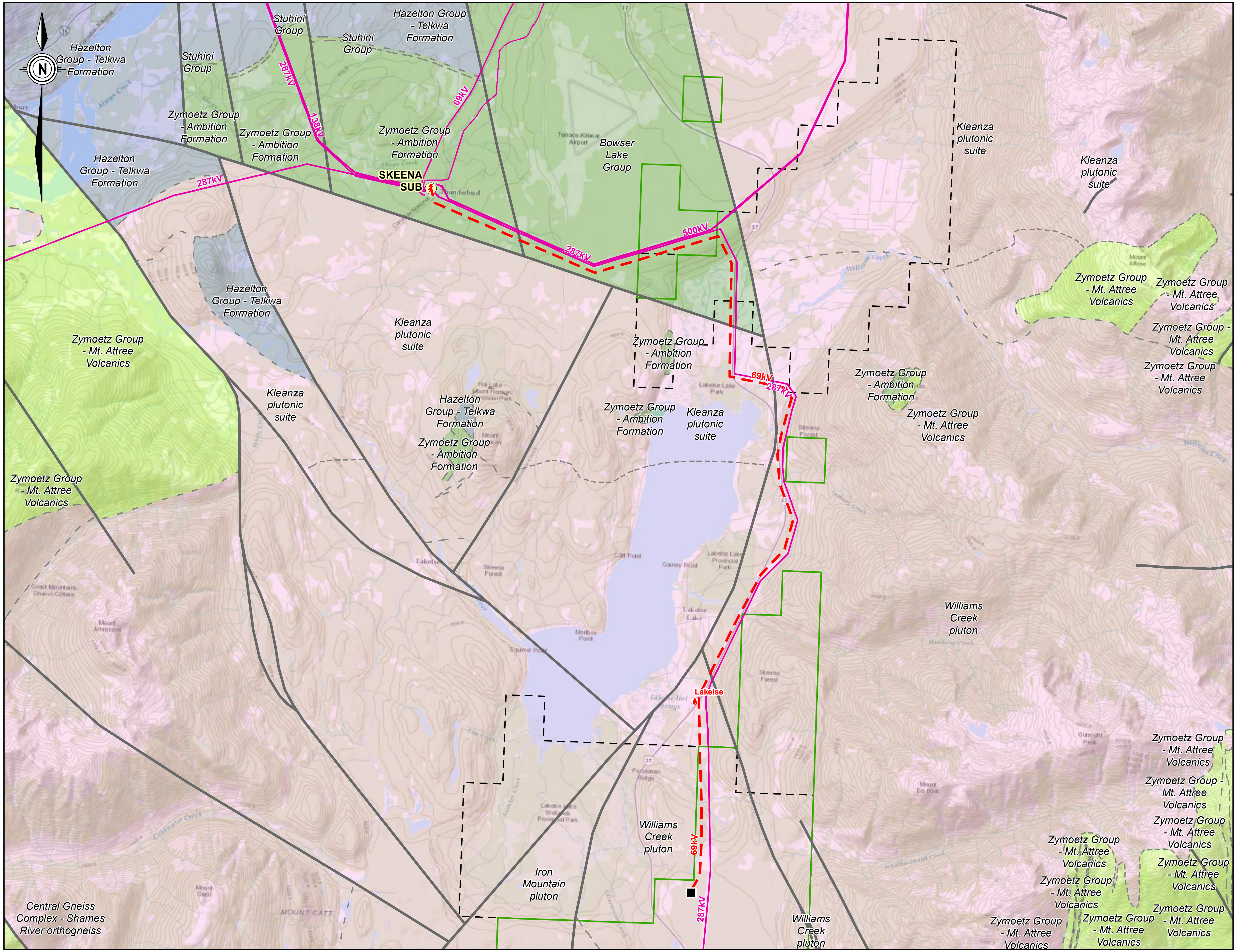
2 0 2
Kilometers

Project No.	Date
2692-004	April 30, 2015

Potential Geothermal Plant at Lakelse Lake 20MW

Figure 16

Path: Q:\2600-2699\2692-004\430-GIS\MXD-RP\2692004_GeothermalLocations_mapbook.mxd Date Saved: 2015-04-27 2:55:05 PM
Author: RTaylor



Geoscience BC

Legend

- ■ Proposed Geothermal Plant Location
- ● Thermal Spring
- Proposed Transmission Line
- ⚡ Existing Substation
- Existing Transmission Line

Geothermal Title Tract

- 🟩 Active
- ☐ Unsold

Bedrock Type

- Intrusive Rocks
- Metamorphic Rocks
- Sedimentary Rocks
- Volcanic Rocks
- Rock Type Boundary
- Fault

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2 0 2
Kilometers

Project No.
2692-004

Date
April 30, 2015

Geological Strata Map for Lakelse Lake 20MW

Figure 17

Path: Q:\2600-2699\2692-004\430-GIS\MXD-RP\2692004_GeothermalLocationsGeology_mapbook.mxd Date Saved: 2015-04-27 3:00:00 PM
Author: RTaylor

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Appendix J

Lower Arrow Lake Geothermal Development Decision Matrix and
Figures 18 & 19

LOWER ARROW LAKE

Near Fauquier, British Columbia, Canada
Topographical Map Sheet: Figure 18
Geological Map Sheet: Figure 19

Category		Comments
A.	**Reservoir Potential**	
	Size/Potential/Type	• **Reservoir size:** No clearly defined area or thickness in literature, but description of multiple springs warrants an area estimate of about 5 km^2 - therefore, reservoir volume estimated at: 5.5 km^3 (most-likely area: 5 km^2; most-likely thickness*: 1.1 km) (*Reservoir thickness assumption based on most-likely value from Appendix III in GeothermEx, 2004) • **Potential:** 20 MW (WREZ, 2009) • **Type:** low-temperature resource, suitable for binary plant.
	Temperature/Water and Gas Chemistry/Mineral Indicators	**Surface features:** • Octopus Creek spring: 49°C (Fairbank and Faulkner, 1992) (Grasby & Hutcheon, 2001) (cooling likely) (Souther, 1975) • Jordan Ranch spring: 12°C (Fairbank and Faulkner, 1992) (Grasby & Hutcheon, 2001) cold spring • Snowshoe Rabbit spring: N/A • Taylor spring: 25°C (Grasby & Hutcheon, 2001) possible minor cooling (Souther, 1975) **Geothermometry:** • Octopus Creek: Na-K-Ca temperature is 87°C (Souther, 1975) • Jordan Ranch: Na-K-Ca temperature is 154°C (Souther, 1975) • Taylor: Na-K-Ca temperature is 49°C (Souther, 1975) **Exploration drilling:** • No information **Water chemistry:** hot springs in this region lie on the stable isotope meteoric water line. (Souther, 1975) • Octopus Creek: pH 7.56; Cl 44.25 mg/L; water type is Na-(HCO_3>SO_4). (Souther, 1975) • Jordan Ranch: pH 6.41; cold spring with Na-HCO_3 composition, elevated Mg (35 mg/l), HCO_3 1,400 mg/L and Cl at 92 mg/L. (Souther, 1975) • Taylor: pH 7.98; Cl 6.1 mg/L; dilute (Na>Ca)-(SO_4=HCO_3) composition (Souther, 1975) **Mineral indicators:** • No information
	Surface Flow Rates and Reservoir Recharge	Octopus Creek: small; Jordan Ranch: small (Fairbank and Faulkner, 1992)
	3D Permeability (heat exchange potential)	
	Recent Magmatism	N/A
	Structural Setting	Located at southern end of Columbia River Fault along eastern margin of regional extension complex; characterized by mylonite zone up to 1 km wide, intense folding and fracturing. (Grasby & Hutcheon, 2001)
	Geophysics	
	Reservoir Host Rock	Unknown (area by Jordan Ranch/Octopus Creek has regional Cretaceous granites intruded by Eocene Coryell intrusions (Hoy, T. and W. Jackaman, 2015) and Eocene Ladybird granite suite (Parrish et al, 1988)
	Drilling Issues	Possible hot dry rock project. (Fairbank and Faulkner, 1992)
	Brief Description of Geological Setting of Thermal Features (i.e., springs emanate from fluvial gravels; beside a river, etc.)	• Valhalla complex lies to the east of the lake on the other side of the Valkyr Shear zone (Hoy, 2014) • To the west of the central portion of Lower Arrow Lake lies the northern extension of the Grand Forks Complex, a metamorphic core complexes (one of many that make up the southern Omineca Belt), appears to be related to Eocene faulting and extension (Hoy, 2013) • Eocene Coryell intrusions (dikes, plugs, batholiths) between Greenwood and Lower Arrow Lake provide radiogenic heat source. Regional heat flow calculated at 4.8 μW/m^3 (Fairbank and Faulkner, 1992)

LOWER ARROW LAKE

Near Fauquier, British Columbia, Canada
Topographical Map Sheet: Figure 18
Geological Map Sheet: Figure 19

Category		Comments
B.	**Exploration Uncertainty (Risk)**	
	Degree of Identification of Resources/Reserves	Low
	Likelihood of Covering Reservoir with Concession	Unknown Looks possible (not within national park/restricted area)
	Expected Authorization Date	Unknown
	Specific Timing of Exploration (2 + 2 years, BC 8 years, etc.)	5 years (1 year permitting and surface exploration, possibly drilling shallow temperature gradient holes + 1 year deep gradient-well drilling + 1 year successful development drilling and testing + 1 year further development drilling and start plant construction + 1 year drilling wrap-up and finish plant construction)
	Degree of Previous Exploration (can be good or bad)	Low
	Surface Operational Capacity (enough stable area for drilling and a plant?)	Yes
	Exploration to Exploitation: A summary rating of Exploration Uncertainty (risk) on a scale of difficult (high risk) through medium (moderate risk) to easy (low risk)	Moderate A lot of unknowns, but no items identified as high risk.
C.	**Environmental Issues**	
	Protected Areas	• Arrow Lakes Provincial Park is located approx. 8 km west across the Columbia River.
	Endangered Species	• Three-leaved Lewisia (blue-listed plant) is the closest known endangered species occurrence, and can be found approx. 40 km from the proposed plant location.
	Geothermal Surface Features	• Octopus Creek Hotsprings is located 1.4 km southeast of proposed plant location.
	Other	• Proposed transmission line crosses approx. 3 streams that do not have observed fish data. • Nearest Wildlife Habitat Area allotted for Grizzly Bear approx. 7 km west, and over Columbia River, of proposed plant location.
D.	**Geothermal Area - Bidding and/or Type of Land Holding (private/government/lease/etc.)**	
	Bidding Area	No known existing active, cancelled or unsold geothermal title tracts
	Other Claim Rights (mining and/or oil)	No known coal or mineral titles. Proposed location is not within known oil and gas management area; no known tenures at proposed location.

LOWER ARROW LAKE

Near Fauquier, British Columbia, Canada
Topographical Map Sheet: Figure 18
Geological Map Sheet: Figure 19

Category		Comments
E.	**Market**	
	Main Electricity Consumers (direct sales and/or government)	General Overview 1. BC Hydro acquires power from Independent Power Producers (which would include geothermal proponents) through two main processes: • Competitive calls: when BC Hydro issues a Call for Tenders for the supply of electricity to BC Hydro, geothermal proponents can bid into those competitive calls. • Standing Offer Program (SOP): This program is presently available for clean generation projects greater than 0.1 MW but not more than 15 MW. Proponents do not compete against each other but are paid a predetermined price by BC Hydro. Depending on the specifics of each project, proponents may wish to size their projects to be under the 15 MW threshold for the SOP (BC Hydro is developing a 'mini-SOP' component within the overall SOP. This mini-SOP will apply to projects in the 0.1 MW to 1 MW range, but would not realistically apply to potential geothermal generation projects). • In addition, BC Hydro's net metering program is designed for residential and commercial customers who wish to connect a small electricity generating unit to the BC Hydro distribution system. Generating units up to 0.1 MW in capacity that utilize a clean or renewable resource are eligible to participate in the program. Given the small size, this program has no applicability to potential geothermal generation projects. The acquisition of geothermal power would contribute to BC Hydro's current target for clean energy and to the diversification of BC Hydro's resource mix, making it less reliant on snow melt and stream flow. 2. Although FortisBC is a potential customer for electricity from geothermal sources, the opportunities may be limited given FortisBC's ability to receive electricity from BC Hydro under Rate Schedule 3808. However there is a wheeling agreement in place which would facilitate a geothermal project located in FortisBC's service territory to sell electricity to BC Hydro through BC Hydro's competitive calls and/or the SOP, or to other potential customers as noted below. 3. Wholesale wheeling (whereby electricity is transmitted from electricity generators to utilities) to customers in Alberta, the US, or other wholesale customer in BC is allowed. The generation supplier must request service on the appropriate BC Hydro transmission line under the Open Access Transmission Tariff (OATT) at a regulated cost for that service. Depending on the end customer, the generation supplier will have to make similar arrangements to cover transmission access in other jurisdictions (e.g. the Bonneville Power Authority for wheeling to a US customer). This 'pancaking' of rates, along with congestion issues, affects the economic viability of the potential wholesale opportunity. 4. Retail access, defined as a market in which electricity is sold directly to consumers by competing suppliers, is generally not permitted in BC. However there may be opportunities for bilateral arrangements for direct sales of electricity from geothermal generating plants to large customers (e.g. pulp mills, large sawmills, mines) as follows: • To replace the electricity supplied at a high voltage from BC Hydro under BC Hydro Transmission Rate 1823 of the Electric Tariff. Such replacement would be challenging given the rates charged under that tariff. • To supply electricity to a remote facility (e.g. a mine, LNG plant or other industrial facility) directly from a geothermal plant located in close proximity to the facility, thereby precluding the need for a lengthy transmission line to connect to the BC Hydro electrical grid. • A potential electricity customer, Zellstoff Celgar Limited Partnership pulp mill in Castlegar, approximately 55 km from Lower Arrow Lake proposed site. • A potential electricity customer, Teck Resources Ltd. smelter in Trail, is approximately 80 km from Lower Arrow Lake proposed site.

LOWER ARROW LAKE

Near Fauquier, British Columbia, Canada
Topographical Map Sheet: Figure 18
Geological Map Sheet: Figure 19

Category		Comments
	Time Limits? (business agreements, operating/generating-by deadlines?)	• BC Hydro has issued competitive Calls for Tender for the supply of electricity in the past. • BC Hydro's SOP is presently directly available for clean energy projects which meet certain criteria, including a generation output of less than 15 MW. • Typical BC Hydro Energy Purchase Agreements from Independent Power Producers are 20-40 years in duration. • Business agreements with the owners of private transmission lines (e.g. independent power producers) for access to the market will be necessary. • The lead times to develop geothermal resources will include appropriate allowances for investigative drilling, technical and environmental studies, public consultation, transmission considerations, marketing, licencing, design, construction and commissioning. These lead times will vary from four to seven years depending on the specifics of each project. Projects with a history of exploration and analysis (e.g. Meager Creek/Pebble Creek, Lakelse, and Canoe Creek) will generally be on the shorter end of this time continuum, while other projects with less investigative work will take longer. Although the time required to drill a geothermal well and construct a power plant could conceivably be less than two years, the key uncertainties inherent in the environmental review, public consultation, transmission arrangements (either with BC Hydro or a private transmission owner), and the permitting and regulatory processes will realistically result in a further two years at a minimum for these activities.

LOWER ARROW LAKE

Near Fauquier, British Columbia, Canada
Topographical Map Sheet: Figure 18
Geological Map Sheet: Figure 19

Category		Comments
F.	**Transmission Line Infrastructure**	
	State of the Infrastructure	500 KV and 138 KV transmission line approx. 3.5 km from point location. Monashee substation is closest substation.
	Transmission Route (distance, terrain and costs)	Tie in to 138 kV transmission line via 6 km of new 138 kV transmission line via existing unpaved roads. Assume that a new substation will be required for connection as shown on the Figure.
H.	**Community Issues**	
	Indigenous Law and Indigenous Development Areas	• First Nation consultative areas include Secwepemc Nation, Westbank First Nation, Okanagan Indian Band, Splats'in First Nation, Shuswap Indian Band, Neskonlith Indian Band, Lower Similkameen Indian Band, Upper Nicola Indian Band, Penticton Indian Band, Adams Lake Indian Band, Ktunaxa Nation Council, Akisqnuk First Nation, Lower Kootenay Band, Mt. Mary's Indian Band, Tobacco Plains Indian Band. • Many of the consultative areas have community or land use plans however none are found to be near the proposed plant location. • Sinixt Nation (Arrow Lakes) is most relevant to plant location (http://sinixtnation.org/content/sinixt-territory). Requirement for "corporations, provincial and federal governments and their agents and employees consult with the Sinixt Nation is regards to development and business operations and land use and resource extraction with the territory."
	Community Action	• Perry Ridge Wilderness Initiative - united campaign with Perry Ridge Water Users Association to protect Perry Ridge in the Slocan Valley (http://www.perryridge.org/about-perry-ridge/overview/) • 2010 - Injunction against Sinixt protest for Perry Ridge overturned by Vancouver court • 2013 Sinixt Nation receives notice of trespass at Perry Ridge • Challenge to Pass Creek logging
	Surface Rights	• First Nation consultative areas include Secwepemc Nation, Westbank First Nation, Okanagan Indian Band, Splats'in First Nation, Shuswap Indian Band, Neskonlith Indian Band, Lower Similkameen Indian Band, Upper Nicola Indian Band, Penticton Indian Band, Adams Lake Indian Band, Ktunaxa Nation Council, Akisqnuk First Nation, Lower Kootenay Band, Mt. Mary's Indian Band, Tobacco Plains Indian Band. • Many of the consultative areas have community or land use plans however none are found to be near the proposed plant location. • Sinixt Nation (Arrow Lakes) is most relevant to plant location (http://sinixtnation.org/content/sinixt-territory). Requirement for "corporations, provincial and federal governments and their agents and employees consult with the Sinixt Nation is regards to development and business operations and land use and resource extraction with the territory."
	Tourism	• Lower Arrow Lakes-Needle Ferry, outdoor recreation area. Most activities are centralized near Fauquier, BC. (http://www.kootenayseh.com/nakusp/fauquier.html)

LOWER ARROW LAKE

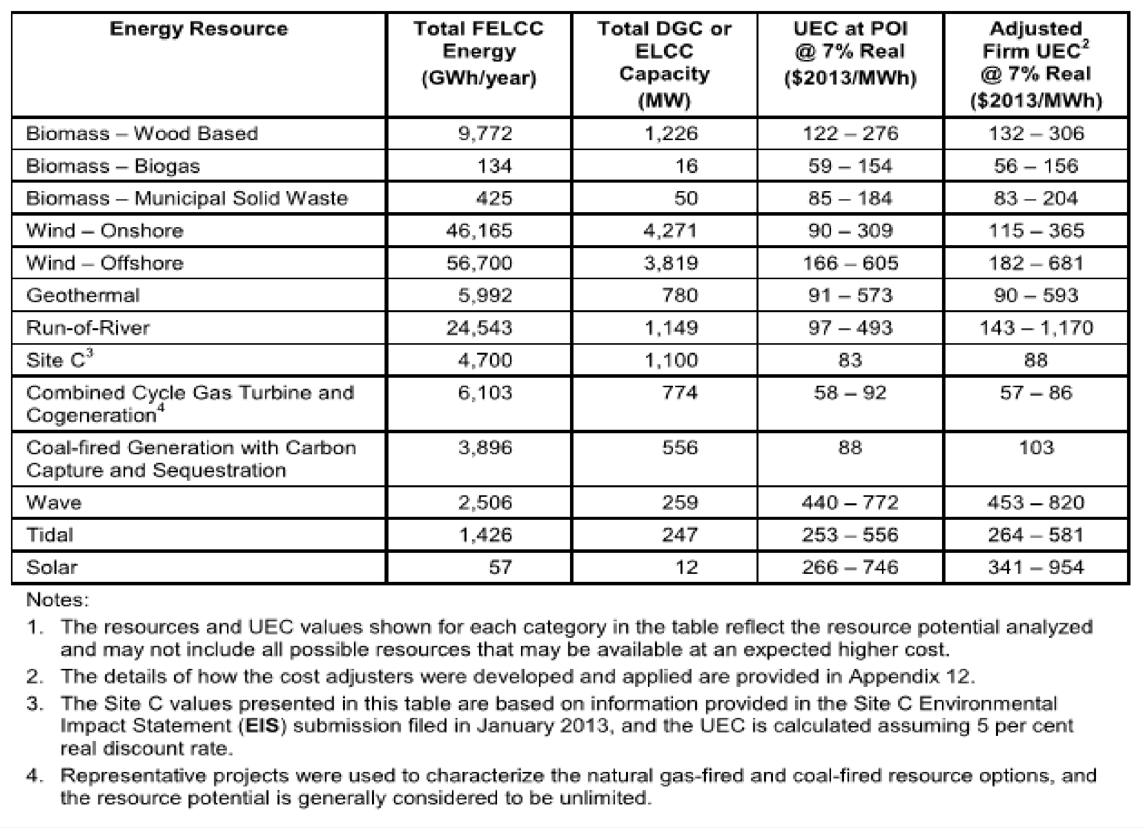
Near Fauquier, British Columbia, Canada
Topographical Map Sheet: Figure 18
Geological Map Sheet: Figure 19

Category		Comments
I.	**Water Rights**	
	Availability (for example "air-cooled required")	Plant water requirement estimated approx. 25 L/s for binary plant. MAD of 700 L/s in valley; significant flow in lake. 4 current water licences within 5 km of point location, all north of plant location on east bank of Arrow Lake across from Edgemont. Purposes include domestic, and irrigation, with average mean 0.03 L/s quantity.
	Availability for Drilling	Drilling requirement of 20 L/s. MAD of 700 L/s in valley; significant flow in lake. 4 current water licences within 5 km of point location, all north of plant location on east bank of Arrow Lake across from Edgemont. Purposes include domestic, and irrigation, with average mean 0.03 L/s quantity.
J.	**Engineering**	
	Plant Location and Design	Remote location, steep, mountainous terrain. Plant sited high on the Valhalla range to avoid steep valley access.
	Construction Issues	Plant location on Valhalla Range. Existing rough, unpaved road access,
	Transportation Issues	Existing rough, unpaved road access.
	Architectural Issues (Blend/hide into environment? Local styles? etc.)	none found
	Special Construction Issues (zero emissions)	non found
K.	**Non-Electrical Infrastructure (Roads and Habitation)**	
	Nearest Large Community > 50,000	Kelowna, BC
	Nearest Community	Fauquier, BC
	Nearest Road and Condition	Unpaved existing logging road.
	Current Access Conditions (restrictions)	Unpaved road access to plant location.
	Terrain and Distance Factor for Road Building	No requirement for new roads expected. Road access up the Valhalla Range to approx. 5400 ft.

LOWER ARROW LAKE

Near Fauquier, British Columbia, Canada
Topographical Map Sheet: Figure 18
Geological Map Sheet: Figure 19

	Category	Comments
L.	**Finance**	
	General Power Prices	BC Hydro acquires power through (1) competitive processes (Calls for Tender), (2) the Standing Offer Program (not including the mini-SOP under development), and (3) upgrades to its existing facilities or the development of new generation facilities. (Note that the net metering program targets projects less than 100 kW and is therefore not relevant to geothermal generation projects). Comments on the general price of power under each one are: • The power price paid by BC Hydro to independent power producers through Energy Purchase Agreements (EPAs) under Calls for Tender are proprietary and confidential. • The power price paid by BC Hydro to independent power producers through EPAs under the SOP are made up of a predetermined base price in 2010 dollars as determined by the region of the point of interconnection to the BC Hydro system, escalated at the Consumer Price Index annually up to the year in which an EPA is signed, and further adjusted based upon the time of day and month when the energy is delivered. For reference, the base price for the Lower Mainland region in 2010 dollars is $103.69/MWh. • BC Hydro’s current Integrated Resource Plan dated November 2013 includes details of both demand-side management options and supply-side resource options to consider in meeting the future demand for electricity. These resource options, together with their attributes of total energy and capacity and unit energy costs, are listed in Table 2-2 of the November 2013 Resource Options Report Update. That table is reproduced below for ready reference. • Table 5-7 of the above-noted November 2013 Resource Options Report Update provides a summary of the Geothermal Potential by Transmission Region.



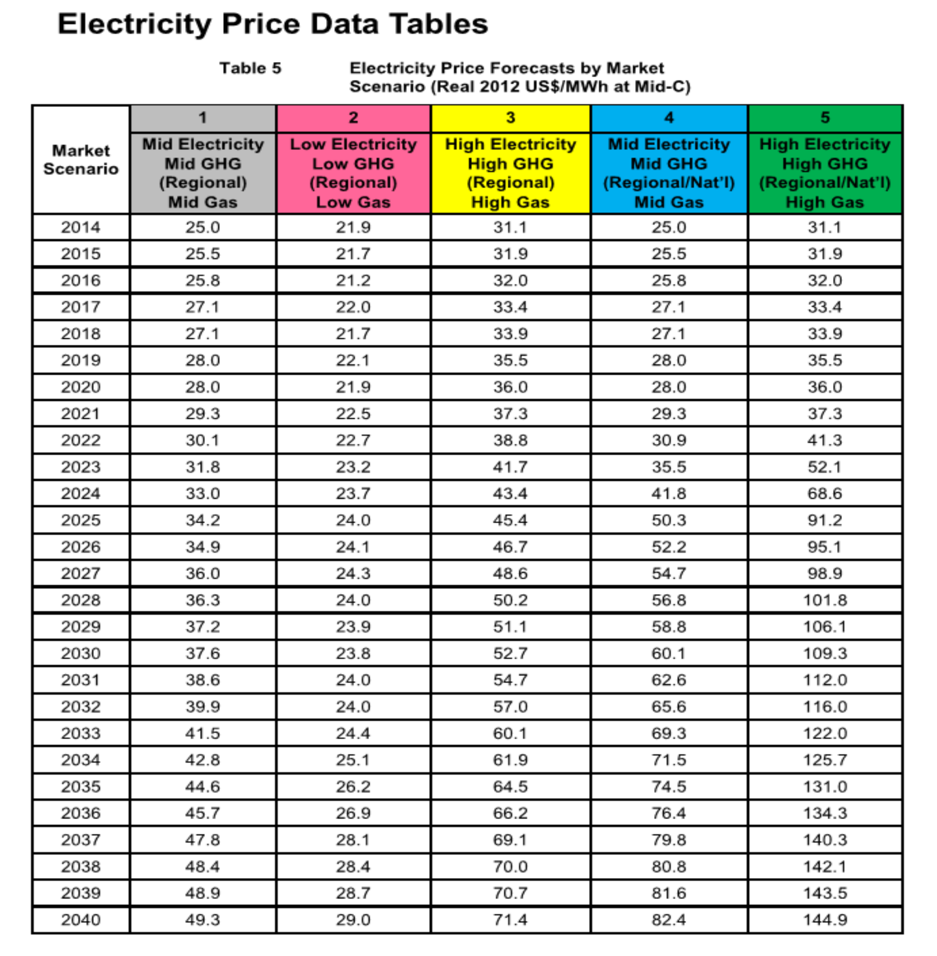
Energy Resource	Total FELCC Energy (GWh/year)	Total DGC or ELCC Capacity (MW)	UEC at POI @ 7% Real ($2013/MWh)	Adjusted Firm UEC[2] @ 7% Real ($2013/MWh)
Biomass – Wood Based	9,772	1,226	122 – 276	132 – 306
Biomass – Biogas	134	16	59 – 154	56 – 156
Biomass – Municipal Solid Waste	425	50	85 – 184	83 – 204
Wind – Onshore	46,165	4,271	90 – 309	115 – 365
Wind – Offshore	56,700	3,819	166 – 605	182 – 681
Geothermal	5,992	780	91 – 573	90 – 593
Run-of-River	24,543	1,149	97 – 493	143 – 1,170
Site C[3]	4,700	1,100	83	88
Combined Cycle Gas Turbine and Cogeneration[4]	6,103	774	58 – 92	57 – 86
Coal-fired Generation with Carbon Capture and Sequestration	3,896	556	88	103
Wave	2,506	259	440 – 772	453 – 820
Tidal	1,426	247	253 – 556	264 – 581
Solar	57	12	266 – 746	341 – 954

Notes:

1. The resources and UEC values shown for each category in the table reflect the resource potential analyzed and may not include all possible resources that may be available at an expected higher cost.
2. The details of how the cost adjusters were developed and applied are provided in Appendix 12.
3. The Site C values presented in this table are based on information provided in the Site C Environmental Impact Statement (**EIS**) submission filed in January 2013, and the UEC is calculated assuming 5 per cent real discount rate.
4. Representative projects were used to characterize the natural gas-fired and coal-fired resource options, and the resource potential is generally considered to be unlimited.

LOWER ARROW LAKE

Near Fauquier, British Columbia, Canada
Topographical Map Sheet: Figure 18
Geological Map Sheet: Figure 19

	Category	Comments
	Market Price ($/MWhr)	• As noted in the above Table 2-2 from the November 2013 Resource Options Report Update, the Unit Energy Cost for geothermal resources at a 7% real discount rate in 2013 dollars ranges from $91/MWh to 573/MWh at the point of interconnection to the BC Hydro system. • Wholesale electricity prices for trading purposes can vary greatly. In the Pacific Northwest, these prices are affected by such factors as precipitation/snowfall in the region, unforeseen generation outages and ambient temperatures. A general flavour of the wholesale electricity prices for potential export of electricity from BC can be obtained from a variety of sources. One such source is the US Energy Information Administration (www.eia.gov/electricity/wholesale/#history). This source provides current and historical electricity market data. Of particular relevance is the mid-C trading hub in the Northwest Region (one example would be a Mid-C peak price on March 17, 2015 of $19.87US weighted average cost from 72 trades). Access to that market for geothermal projects in BC would require access on both the BC Hydro transmission system to the Canada/US border, and on the appropriate transmission system (e.g. Bonneville Power Authority) in the US. • BC Hydro forecasts of market prices under various scenarios was provided in the November 2013 IRP. Table 5 in Appendix 5A – Market Forecast Data is reproduced below for ready reference. 

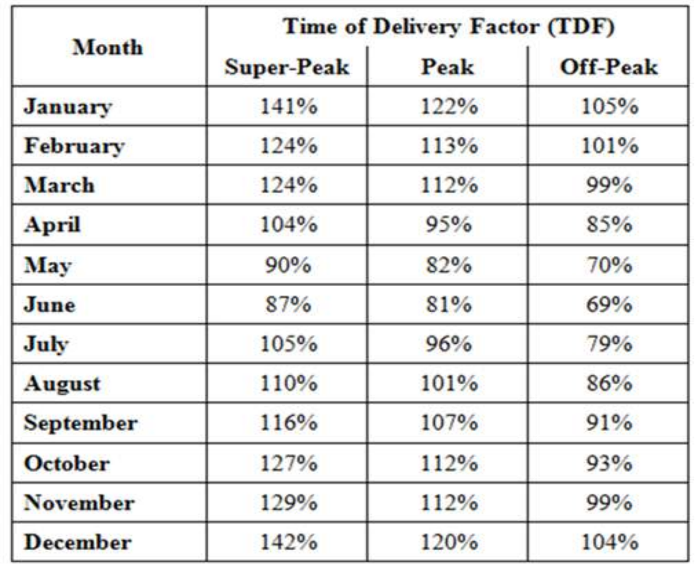
Electricity Price Data Tables

Table 5 Electricity Price Forecasts by Market Scenario (Real 2012 US$/MWh at Mid-C)

Market Scenario	1 Mid Electricity Mid GHG (Regional) Mid Gas	2 Low Electricity Low GHG (Regional) Low Gas	3 High Electricity High GHG (Regional) High Gas	4 Mid Electricity Mid GHG (Regional/Nat'l) Mid Gas	5 High Electricity High GHG (Regional/Nat'l) High Gas
2014	25.0	21.9	31.1	25.0	31.1
2015	25.5	21.7	31.9	25.5	31.9
2016	25.8	21.2	32.0	25.8	32.0
2017	27.1	22.0	33.4	27.1	33.4
2018	27.1	21.7	33.9	27.1	33.9
2019	28.0	22.1	35.5	28.0	35.5
2020	28.0	21.9	36.0	28.0	36.0
2021	29.3	22.5	37.3	29.3	37.3
2022	30.1	22.7	38.8	30.9	41.3
2023	31.8	23.2	41.7	35.5	52.1
2024	33.0	23.7	43.4	41.8	68.6
2025	34.2	24.0	45.4	50.3	91.2
2026	34.9	24.1	46.7	52.2	95.1
2027	36.0	24.3	48.6	54.7	98.9
2028	36.3	24.0	50.2	56.8	101.8
2029	37.2	23.9	51.1	58.8	106.1
2030	37.6	23.8	52.7	60.1	109.3
2031	38.6	24.0	54.7	62.6	112.0
2032	39.9	24.0	57.0	65.6	116.0
2033	41.5	24.4	60.1	69.3	122.0
2034	42.8	25.1	61.9	71.5	125.7
2035	44.6	26.2	64.5	74.5	131.0
2036	45.7	26.9	66.2	76.4	134.3
2037	47.8	28.1	69.1	79.8	140.3
2038	48.4	28.4	70.0	80.8	142.1
2039	48.9	28.7	70.7	81.6	143.5
2040	49.3	29.0	71.4	82.4	144.9

LOWER ARROW LAKE

Near Fauquier, British Columbia, Canada
Topographical Map Sheet: Figure 18
Geological Map Sheet: Figure 19

Category	Comments
Green Power Premium ($/MWhr)	• BC Hydro’s past procurement processes for the acquisition for power from independent power producers has offered a premium for green power. • Within British Columbia, there is little demand for the purchase of “green power certificates” (instruments that a customer can purchase to be assured that the electricity used is environmentally friendly) from BC Hydro. BC Hydro’s generation mix is already approximately 93% clean. • California has a goal of 33% of retail sales by 2020 to be sourced from eligible renewable energy sources. However, the opportunity for geothermal power from British Columbia, particularly “bundled” green energy with Renewable Energy Certificates (RECs), to compete in that market is low, for a number of reasons 1. The price of electricity is driven by the low cost of natural gas; 2. There are large amounts of renewables, such as wind and solar, in California; and 3. Firm transmission access to the California market through the BPA transmission system is generally not available.
Capacity Price ($/KW)	• There is no price in $/kW for capacity resource options in the market at present. • Table 3-27 entitled "UCCs of Capacity Resource Supply Options" in BC Hydro's Integrated Resource Plan dated November 2013 provided a summary of capacity resource options (e.g. pumped storage, simple cycle gas turbines and resource smart projects such as Revelstoke Unit 6). The unit capacity costs (UCCs) at the point of interconnection to the BC Hydro system in $2013/kW-year are shown in the table.
Is there a higher price for base load power?	In general, baseload power (ie firm power) is more valuable to BC Hydro and furthermore the price paid for baseload power varies by month throughout the year. As an example, the following excerpt is taken from BC Hydro’s SOP: “1. Definitions: In this Appendix 4, the following words and expressions have the following meanings: (a) “Off-Peak Hours” means all hours other than Super-Peak Hours and Peak Hours. (b) “Peak Hours” means the hours commencing at 06:00 PPT and ending at 16:00 PPT, and commencing at 20:00 PPT and ending at 22:00 PPT, Monday through Saturday inclusive, but excluding British Columbia statutory holidays. (c) “Super-Peak Hours” means the hours commencing at 16:00 PPT and ending at 20:00 PPT Monday through Saturday inclusive, but excluding British Columbia statutory holidays.” 

Month	Time of Delivery Factor (TDF)		
	Super-Peak	Peak	Off-Peak
January	141%	122%	105%
February	124%	113%	101%
March	124%	112%	99%
April	104%	95%	85%
May	90%	82%	70%
June	87%	81%	69%
July	105%	96%	79%
August	110%	101%	86%
September	116%	107%	91%
October	127%	112%	93%
November	129%	112%	99%
December	142%	120%	104%

LOWER ARROW LAKE

Near Fauquier, British Columbia, Canada
Topographical Map Sheet: Figure 18
Geological Map Sheet: Figure 19

Category		Comments
	Estimated Size of Resource	See Section A.
	Is there any green power incentives?	• The BC government created the Innovative Clean Energy (ICE) fund with an initial mandate to accelerate the commercialization of emerging clean energy technologies (now expanded to include a broad range of energy efficiency and conservation projects). British Columbia also has a program entitled Scientific Research and Experimental Development Tax credit (SR&ED). Geothermal proponents could keep a watching brief on these programs for applicability and relevance. • The BC government's First Nations Clean Energy Business Fund. This fund promotes increased Aboriginal community participation in the clean energy sector. It provides: o Capacity funding of up to $50,000 per applicant to cover the early stages (e.g. feasibility studies) of project development ; and o Equity funding of up to $500,000 per applicant to support a financially viable and resourced clean energy project. • There are a number of government of Canada programs to encourage the development of renewable power. Some of these programs may be active but not currently issuing calls for proposals. Others may be focussed on research and innovation and may not be directly applicable to geothermal technologies/resources, while others may be fully subscribed and even inactive but are noted in terms of completeness. Some of these programs include: o Natural Resources Canada ecoEnergy for Renewable Power program; o Sustainable Development Technology Canada funds; o Clean Energy Fund; o Industrial Research Assistance Program; and o Green Infrastructure Fund Geothermal proponents could keep a watching brief on these and other federal government programs for their applicability and relevance.
	Grants	See above under green power incentives
	Tax Holidays	None listed on federal and provincial websites.
	Tax Relief	• Under Classes 43.1 and 43.2 in Schedule II of the Income Tax Regulations, certain capital costs of systems that produce energy by using renewable energy sources or fuels from waste, or conserve energy by using fuel more efficiently are eligible for accelerated capital cost allowance. Under Class 43.1, eligible equipment may be written-off at 30 percent per year on a declining balance basis. In general, equipment that is eligible for Class 43.1 but is acquired after February 22, 2005 and before year 2020 may be written-off at 50 percent per year on a declining balance basis under Class 43.2. Without these accelerated write-offs, many of these assets would be depreciated for income tax purposes at annual rates between 4 and 30 percent. • In addition to Class 43.1 or 43.2 capital cost allowance, the Income Tax Regulations allow certain expenses incurred during the development and start-up of renewable energy and energy conservation projects [Canadian renewable and conservation expenses (CRCE)] to be fully deducted in the year they are incurred, carried forward indefinitely and deducted in future years, or transferred to investors through a flow-through share agreement.

LOWER ARROW LAKE

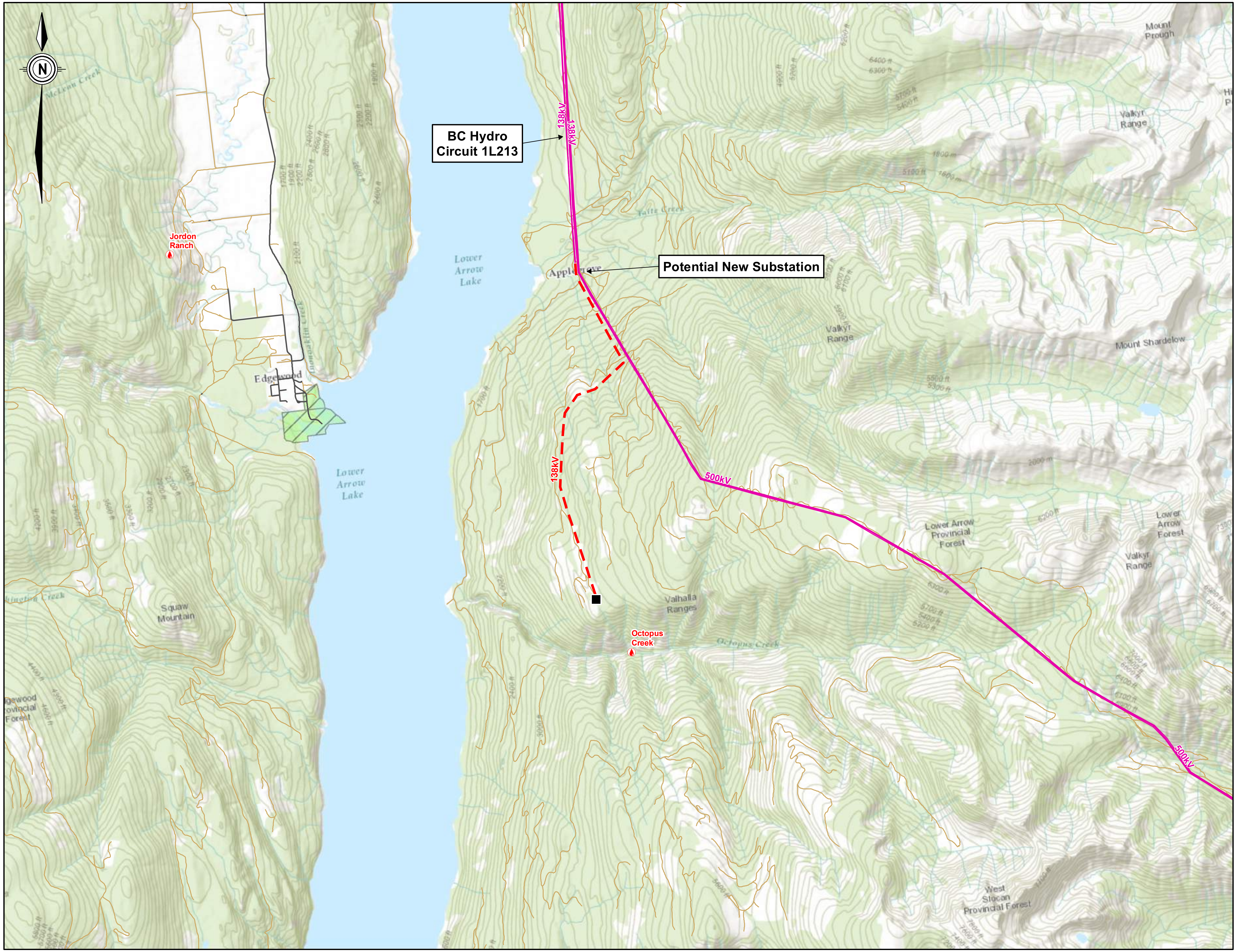
Near Fauquier, British Columbia, Canada
Topographical Map Sheet: Figure 18
Geological Map Sheet: Figure 19

	Category	Comments
	Loan Guarantees	The following is an excerpt from http://www.fnfa.ca/en/fnfa/ "The First Nations Finance Authority (FNFA) is a statutory not-for-profit organization without share capital, operating under the authority of the First Nations Fiscal Management Act, 2005. The FNFA's purposes are to provide investment options and capital planning advice and—perhaps most importantly, access to long-term loans with preferable interest rates. The FNFA is not an agent of Her Majesty or a Crown corporation and is governed solely by the First Nations communities that join as Borrowing Members. The advantages of joining the FNFA as a Borrowing Member are: 1. Access to low rate, below bank prime, loans with repayment terms up to 30 years; 2. First Nations choose the repayment terms that work best for their budget; 3. FNFA loans do not require collateral; 4. FNFA loans can be used to refinance existing debt; and 5. FNFA's interest rates and terms parallel those available to provincial and local governments. Most revenue streams are eligible to support FNFA loan requests. Eligible capital projects FNFA can finance include infrastructure, social and economic development, land purchases, independent power projects, community housing and rolling stock/heavy equipment. FNFA is a stand-alone organization separate from the Government of Canada, and its operating policies are set by its Borrowing Members, represented by the First Nation's Chief and Council appointee. The FNFA is for First Nations, by First Nations."
	Royalties/Fees	Geothermal Resources Act, [RSBC 1996] CHAPTER 171, as of March 11, 2015 Permits for well authorizations for wells to be drilled within the boundaries of the permittee's location must pay a prescribed rent for the permit (Section 5). Based on Section 17 of the Act, (1) A lessee who produces a geothermal resource for purposes other than testing must pay to the government (a) a royalty established by agreement under this section, (b) an amount agreed under this section to be paid instead of royalty, or (c) if no royalty or amount has been agreed under this section, the prescribed royalty.
	General Idea of Royalties	With regard to use of the water resources within the geothermal tract, Section 4 of the Water Sustainability Act states "This Act does not apply to geothermal resources as defined in section 1 (1) [definitions] of the Geothermal Resources Act."
	Private Land Owner or Government Land	Geothermal proponents will need to arrange financial agreements (eg leases or purchases) with private property owners for the geothermal land tract. Proponents for geothermal facilities on Crown Land must apply for the appropriate tenure under the BC Land Act (eg Statutory Right of Way, Licence of Occupation).
	Tax Rate in the Country	• Income eligible for small-business deduction (up to $500,000 income): 11% Federal tax, combined federal and provincial (British Columbia): 13.5%. • Income not eligible for small-business deduction: 15% Federal, combined federal and provincial (British Columbia): 26%
	Transmission Tariffs	Under wholesale wheeling (whereby electricity is transmitted from electricity generators to utilities) to customers in Alberta, the US, or other wholesale customers in BC, the generation supplier must request service on the appropriate BC Hydro transmission line under the Open Access Transmission Tariff (OATT) at a regulated cost for that service. Depending on the end customer, the generation supplier will have to make similar arrangements to cover transmission access in other jurisdictions (e.g. the Bonneville Power Authority for wheeling to a US customer). This 'pancaking' of rates, along with transmission congestion issues, affects the economic viability of the potential wholesale opportunity.

LOWER ARROW LAKE

Near Fauquier, British Columbia, Canada
Topographical Map Sheet: Figure 18
Geological Map Sheet: Figure 19

Category		Comments
M.	**Maps**	
	Regional topographic map showing population centres, roads and other infrastructure including electrical grid and nearest substation and/or generating station. (1:500,000?)	Topographical Map Sheet: Figure 18
	Regional map showing land tenure in area – geothermal concessions, mining concessions, private land holds, public or national lands (parks). (1:500,000?)	Topographical Map Sheet: Figure 18
	Regional geological map. (1:250 or 500,000?)	Geological Map Sheet: Figure 19
	Detailed geological map of the immediate area of the concessions. (1:50,000 or 100,000)	Geological Map Sheet: Figure 19
N.	**Other Issues and Considerations**	



Geoscience BC

Legend

■ Proposed Geothermal Plant Location
Thermal Spring
Proposed Transmission Line
Existing Transmission Line
Paved Road
Other Road
▨ Park, Eco-Reserve, Protected Area

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Service Layer Credits: Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

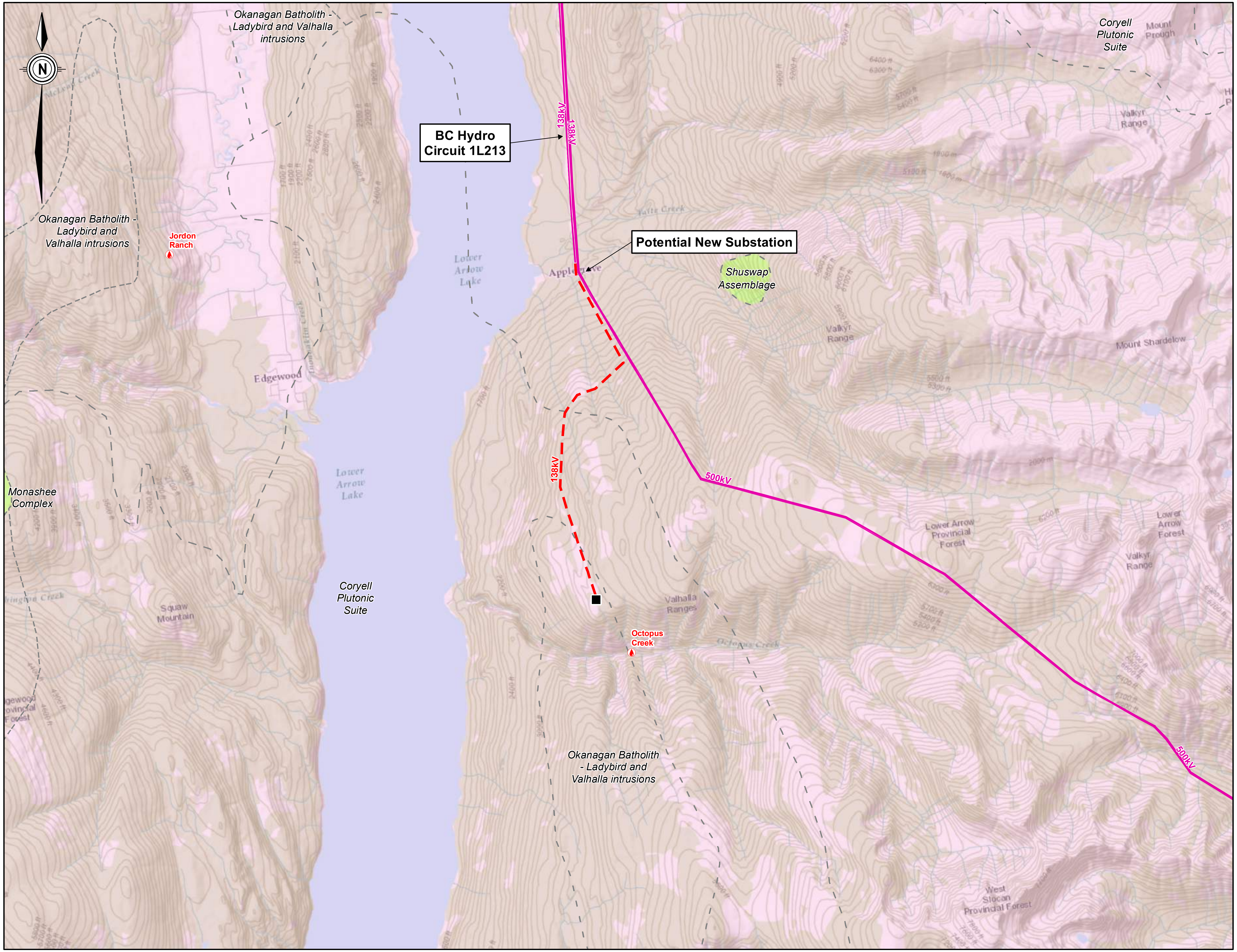
1 0 1
Kilometers

Project No.	Date
2692-004	April 30, 2015

Potential Geothermal Plant at Lower Arrow Lake 20MW

Figure 18

Path: Q:\2600-2699\2692-004\430-GIS\MXD-RP\2692004_GeothermalLocations_mapbook.mxd Date Saved: 2015-04-27 3:35:17 PM
Author: RTaylor



Geoscience BC

Legend

- ■ Proposed Geothermal Plant Location
- 🔴 Thermal Spring
- Proposed Transmission Line
- Existing Transmission Line

Bedrock Type

- Intrusive Rocks
- Metamorphic Rocks
- Rock Type Boundary

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Service Layer Credits: Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

2 0 2
Kilometers

Project No.	Date
2692-004	April 30, 2015

Geological Strata Map for Lower Arrow Lake 20MW

Figure 19

Path: Q:\2600-2699\2692-004\430-GIS\MXD-RP\2692004_GeothermalLocationsGeology_mapbook.mxd Date Saved: 2015-04-27 3:29:54 PM
Author: RTaylor

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Appendix K

Meager Creek – Pebble Creek Geothermal Development Decision Matrix and Figures 20 & 21

MEAGER CREEK - PEBBLE CREEK

Near Pemberton, British Columbia, Canada
Topographical Map Sheet: Figure 20
Geological Map Sheet: Figure 21

Category		Comments
A.	**Reservoir Potential**	
	Size/Potential/Type	• **Reservoir size:** Meager Creek (MC): 15 km^3 (area = 600 Ha; thickness = 2,500 m). Pebble Creek (PC): assumed equal to MC ==> 30 km^3 combined • **Potential:** 100 - 200 MW combined • **Type:** Assume similar temperatures for both prospects ==> Conventional (Flash Plant)
	Temperature/Water and Gas Chemistry/Mineral Indicators	**Surface features:** • Meager Creek H.S.: 45-55°C • No Good Warm Springs: 20-40°C • Pebble Creek H.S.: 55-60°C Geothermometry: • MC: up to 280°C (Ghomshei, 2004) • PC: estimated to be 200°C based on chemical geothermometry determinations of hot spring water samples (Sadlier-Brown, 2012) **Exploration drilling:** • MC: 200 - 270°C (measured at 1,200 - 3,000 meters); Two wells (MC-6 and -8) encountered significant permeability at depth. A major loss-zone near the bottom of MC-8 proved to be in close communication with MC-6, as an extended injection test into MC-6 in July and August 2005 caused a significant drop in the bottom-hole temperature of MC-8 that took over a year to recover. This suggested the presence of through-going fractures extending over 700 meters between the bottom-hole locations of MC-6 and MC-8. MC-7 had only minor losses of circulation during drilling, and it appeared to be unaffected by injection testing in the other two wells. (GeothermEx, 2009) • PC: max 103°C (measured at ~600 meters); 10 shallow TG wells, drilled to depths of 421 to 1,279 m. One gradient of 210°C/km (12°F/100 ft) was measured (Nevin, 1992a); TG well L1-78D measured 103°C at 602 m. (Nevin 1992b) **Water chemistry:** • Primarily sodium-chloride composition, with Cl at 3,000 ±50 mg/kg. Alkalinity (at 12 to 47 mg/kg as HCO$_3$) and sulfate (SO$_4$ at 89 to 93 mg/kg) are both low, with no indication of mixing or contamination by near-surface waters or any significant amount of injected water from drilling and/or testing. (GeothermEx, 2009) • All geothermal fluids show a near-neutral pH. • Average chloride of the deep fluids ~2000 mg/l. • Stable isotope data from wells and hot springs suggest a single regional origin. • PC shows mixed outflow of dilute sodium-carbonate (spring 6 km downstream from TG wells) (Nevin, 1992b)

MEAGER CREEK - PEBBLE CREEK

Near Pemberton, British Columbia, Canada
Topographical Map Sheet: Figure 20
Geological Map Sheet: Figure 21

Category	Comments
Surface Flow Rates and Reservoir Recharge	• Meager Creek H.S.: discharge rate ~40 L/s • No Good Warm Springs: < 4 L/s • Pebble Creek H.S.: between 5-10 L/s • Recharge via meteoric infiltration; residence time >30 years.
3D Permeability (heat exchange potential)	• Low formation permeabilities; natural fractures and faults are likely source of permeability in the area. • Heat exchange potential is unclear because commercial-grade permeability has yet to be demonstrated.
Recent Magmatism	• Various periods of volcanic activity from 1.9 Ma to Recent. • Last known eruption ~2,340 years before present.
Structural Setting	• Located near intersection of Garibaldi Belt and Pemberton Belt. • Meager Creek fault zone: E-W striking normal fault, dips to N ~50°. • Fracturing of basement in volcanic vent areas by rhyodacite volcanism (1.9 Ma - Recent) is likely source of permeability. • Normal faulting is likely responsible for springs seepage. • No Good fault zone trending N-S may be the western boundary of the MC thermal anomaly ("carbonate fault" encountered by hole M8).
Geophysics	Resistivity survey of Meager Creek Area shows low-resistivity anomaly extending north of Meager Creek; magnetotelluric (MT) survey conducted in 2001 shows core of anomaly further north (closer to Pylon Peak); temperature model combined with MT data indicate central upflow zone near Pylon Peak outflowing to the south.
Reservoir Host Rock	Basement complex Mesozoic quartz diorite.
Drilling Issues	Hard and abrasive formation (plutonic crystalline rock).
Brief Description of Geological Setting of Thermal Features (i.e., springs emanate from fluvial gravels; beside a river, etc.)	• Late Tertiary to Quaternary andesitic to rhyodacitic volcanic centers (north end of N-S trending Garibaldi Volcanic Belt [Quaternary]) intruding overlying plutonic rocks of Jurassic to Cretaceous age (quartz diorite basement rock [Mesozoic]) • Meager and Pebble Creek hot springs issue from the basement rock (near volcanic vents). • Meager Creek H.S. issues into sinter-lined pools in coarse fluvial sand and gravel deposits on the south bank of Meager Creek. • No Good Warm Springs consists of 6 vents issuing from N side of Meager Creek (on bank closest to exploration wells drilled by BC Hydro and Western GeoPower). • Pebble Creek H.S. issues into ochre- and sinter-lined pool on bedrock bench of NE side of Lillooet River, along with several thermal seeps and associated calcite/algae deposits.

MEAGER CREEK - PEBBLE CREEK

Near Pemberton, British Columbia, Canada
Topographical Map Sheet: Figure 20
Geological Map Sheet: Figure 21

Category		Comments
B.	**Exploration Uncertainty (Risk)**	
	Degree of Identification of Resources/Reserves	• MC: High Field reconnaissance, MT survey, several slim holes (diamond-drill) and full-diameter exploratory wells. 20-kW plant operated by BC Hydro in 1980s; additional wells drilled by Western Geocoder in 2004-2005, with well tests extending to 2008. • PC: Moderate Geologic mapping, resistivity/MT/seismic surveys; infrastructure development; 10 diamond-drill holes.
	Likelihood of Covering Reservoir with Concession	• MC: High • PC: High
	Expected Authorization Date	• MC: Unknown • PC: Unknown
	Specific Timing of Exploration (2 + 2 years, BC 8 years, etc.)	• MC: 3 years (2 years further development drilling and start plant construction [including re-construction of access road destroyed in 2010 landslide] + 1 year drilling wrap-up and finish plant construction) • PC: 5 years (1 year deep gradient-well drilling + 2 years successful development drilling and testing + 1 year further development drilling and start plant construction + 1year drilling wrap-up and finish plant construction)
	Degree of Previous Exploration (can be good or bad)	• MC: High Significant previous exploration; commercial productivity not yet demonstrated. Wellbore simulation indicates that a well targeting the permeable zone encountered in MC-6 and MC-8 but from a lower wellhead elevation could flow at the equivalent of over 6 MW of electrical output (GeothermEx, 2009) • PC: Moderate Through slim-hole stage; no full-diameter wells yet.
	Surface Operational Capacity (enough stable area for drilling and a plant?)	• MC: Sufficient level ground for power plant on north bank of Meager Creek. Several existing well pads (some close to Meager Creek, some higher on slopes of Pylon Peak). Areas of identified potential instability (located to west of project area) still leave room for plant and pad development. • PC: Sufficient level ground for power plant and well pads on SW bank of Lillooet River. Additional well pads at higher elevations are possible.
	Exploration to Exploitation: A summary rating of Exploration Uncertainty (risk) on a scale of difficult (high risk) through medium (moderate risk) to easy (low risk)	• MC: Easy A plausible resource development strategy has been defined (that is, targeting the permeability encountered in MC-6 and MC-8 but from a lower wellhead elevation), still contingent on confirmation of commercial permeability. The site has a history of previous work, and generally good access (except for slide area). • PC: Moderate Less advanced than Meager Creek, but potentially a shared heat source and similar structural style. Viable resource remains to be confirmed by full-diameter drilling.

MEAGER CREEK - PEBBLE CREEK

Near Pemberton, British Columbia, Canada
Topographical Map Sheet: Figure 20
Geological Map Sheet: Figure 21

Category		Comments
C.	**Environmental Issues**	
	Protected Areas	• Nearest protected area, Upper Lillooet Provincial Park is approx. 2 km from active title tracts; no protected areas located along potential transmission connection routes.
	Endangered Species	• Vivid Dancer (red-listed dragonfly), Grizzly Bear (blue-listed), 2 red-listed and 3 blue-listed plants within or in vicinity of active title tracts; • Spotted Owl (Endangered (SARA Schedule 1); red-listed) habitat polygon extends down lower Lillooet River valley through Pemberton Meadows area along transmission route.
	Geothermal Surface Features	• Both Meager Creek and Pebble Creek are on the lower slopes of the Mt. Meager volcano, a Holocene Cascade volcanic centre. • Several active hotsprings along Meager Creek and Upper Lillooet rivers.
	Other	• Active title tracts contain six approved Wildlife Habitat Areas allotted for Grizzly Bear and five ungulate winter range areas for Mountain Goat; Wildlife Habitat Areas allotted for Spotted Owl are located down lower Lillooet River valley.
D.	**Geothermal Area - Bidding and/or Type of Land Holding (private/government/lease/etc.)**	
	Bidding Area	• Geothermal Lease (GIS) owned by RAM Power expiring 2017 (ram-power.com) • Tecto Pebble Creek project prospect update released in 2013 .
	Other Claim Rights (mining and/or oil)	Mineral/Coal title north of Mt. Meager, minimal overlap with active geothermal tract. Proposed location is not within known oil and gas management area; no known tenures at proposed location.

MEAGER CREEK - PEBBLE CREEK

Near Pemberton, British Columbia, Canada
Topographical Map Sheet: Figure 20
Geological Map Sheet: Figure 21

Category		Comments
E.	**Market**	
	Main Electricity Consumers (direct sales and/or government)	General Overview 1. BC Hydro acquires power from Independent Power Producers (which would include geothermal proponents) through two main processes: • Competitive calls: when BC Hydro issues a Call for Tenders for the supply of electricity to BC Hydro, geothermal proponents can bid into those competitive calls. • Standing Offer Program (SOP): This program is presently available for clean generation projects greater than 0.1 MW but not more than 15 MW. Proponents do not compete against each other but are paid a predetermined price by BC Hydro. Depending on the specifics of each project, proponents may wish to size their projects to be under the 15 MW threshold for the SOP (BC Hydro is developing a 'mini-SOP' component within the overall SOP. This mini-SOP will apply to projects in the 0.1 MW to 1 MW range, but would not realistically apply to potential geothermal generation projects). • In addition, BC Hydro's net metering program is designed for residential and commercial customers who wish to connect a small electricity generating unit to the BC Hydro distribution system. Generating units up to 0.1 MW in capacity that utilize a clean or renewable resource are eligible to participate in the program. Given the small size, this program has no applicability to potential geothermal generation projects. The acquisition of geothermal power would contribute to BC Hydro's current target for clean energy and to the diversification of BC Hydro's resource mix, making it less reliant on snow melt and stream flow. 2. Although FortisBC is a potential customer for electricity from geothermal sources, the opportunities may be limited given FortisBC's ability to receive electricity from BC Hydro under Rate Schedule 3808. However there is a wheeling agreement in place which would facilitate a geothermal project located in FortisBC's service territory to sell electricity to BC Hydro through BC Hydro's competitive calls and/or the SOP, or to other potential customers as noted below. 3. Wholesale wheeling (whereby electricity is transmitted from electricity generators to utilities) to customers in Alberta, the US, or other wholesale customer in BC is allowed. The generation supplier must request service on the appropriate BC Hydro transmission line under the Open Access Transmission Tariff (OATT) at a regulated cost for that service. Depending on the end customer, the generation supplier will have to make similar arrangements to cover transmission access in other jurisdictions (e.g. the Bonneville Power Authority for wheeling to a US customer). This 'pancaking' of rates, along with congestion issues, affects the economic viability of the potential wholesale opportunity. 4. Retail access, defined as a market in which electricity is sold directly to consumers by competing suppliers, is generally not permitted in BC. However there may be opportunities for bilateral arrangements for direct sales of electricity from geothermal generating plants to large customers (e.g. pulp mills, large sawmills, mines) as follows: • To replace the electricity supplied at a high voltage from BC Hydro under BC Hydro Transmission Rate 1823 of the Electric Tariff. Such replacement would be challenging given the rates charged under that tariff. • To supply electricity to a remote facility (e.g. a mine, LNG plant or other industrial facility) directly from a geothermal plant located in close proximity to the facility, thereby precluding the need for a lengthy transmission line to connect to the BC Hydro electrical grid. • There is no large customer base within 25 km that could be directly connected to the Meager Creek / Pebble Creek geothermal site. • A potential electricity customer, Garibaldi Industrial Mineral Mine, is currently operating at approximately 50 km from the Meager Creek site. • Avino Silver & Gold Mines Ltd's Bralorne Gold Mine is located approximately 50 km away from the site. The mill is on care and maintenance mode as of 2014; exploration drilling is ongoing (2014). Should exploration drilling be successful, Avino is looking to develop a larger mine plan.

MEAGER CREEK - PEBBLE CREEK

Near Pemberton, British Columbia, Canada
Topographical Map Sheet: Figure 20
Geological Map Sheet: Figure 21

Category		Comments
	Time Limits? (business agreements, operating/generating-by deadlines?)	• BC Hydro has issued competitive Calls for Tender for the supply of electricity in the past. • BC Hydro’s SOP is presently directly available for clean energy projects which meet certain criteria, including a generation output of less than 15 MW. • Typical BC Hydro Energy Purchase Agreements from Independent Power Producers are 20-40 years in duration. • Business agreements with the owners of private transmission lines (e.g. independent power producers) for access to the market will be necessary. • The lead times to develop geothermal resources will include appropriate allowances for investigative drilling, technical and environmental studies, public consultation, transmission considerations, marketing, licencing, design, construction and commissioning. These lead times will vary from four to seven years depending on the specifics of each project. Projects with a history of exploration and analysis (e.g. Meager Creek/Pebble Creek, Lakelse, and Canoe Creek) will generally be on the shorter end of this time continuum, while other projects with less investigative work will take longer. Although the time required to drill a geothermal well and construct a power plant could conceivably be less than two years, the key uncertainties inherent in the environmental review, public consultation, transmission arrangements (either with BC Hydro or a private transmission owner), and the permitting and regulatory processes will realistically result in a further two years at a minimum for these activities.
F.	**Transmission Line Infrastructure**	
	State of the Infrastructure	New 230 kV (500 MW max. capacity) transmission line for Upper Lillooet Hydro Project to Pemberton with interconnection near Rutherford Creek IPP
	Transmission Route (distance, terrain and costs)	MC: New 230 kV transmission line 12 km to interconnection with existing 230 kV line for Upper Lillooet Hydro Project; routing through existing slide debris area, valley Creek via existing or new road. PC: New 230 kV transmission line 2 km to interconnection with existing 230 kV line for Upper Lillooet Hydro Project; routing generally via existing road through valley.
H.	**Community Issues**	
	Indigenous Law and Indigenous Development Areas	• First Nation Consultative Areas include Mount Currie Band (Lil'wat First Nation), St'at'imc Chiefs Council, Lillooet Tribal Council. St'at'imc Law applies; follows 11 principles that respect cultural traditions, respects nature and serves the St'at'imc communities.
	Community Action	• 2010 threatened community action over suspected infrastructure trespasses. • 2011 St'at'imc Hydro Agreement covers all past, present and future impacts, grievances and claims of the St'at'imc related to the planning, placement, construction, and ongoing operation of existing BC Hydro facilities within territory. • 2006 St'at'imc action (temporary closure of Hwy 1, camp "held the line for 5 years between Lillooet and Pemberton" against plans for mega ski resort between Pemberton and Lillooet).
	Surface Rights	• Significant protected habitat with St'at'imc Land and Resources Authority - SLRA (www.statimc.net) but doesn't cover extent of Meager Creek in St'at'imc Territory
	Tourism	• Significant tourism area close to the sea to sky corridor. Active hot springs in the area and lots of recreational hiking/activities. Currently there is no access to Meager Hot Springs due to road wash-out (2010). Road re-build for geothermal may increase tourism in the area. St'at'imc development plant does not specifically target tourism. Lillooet and area economic opportunity assessment names tourism as potential opportunity.

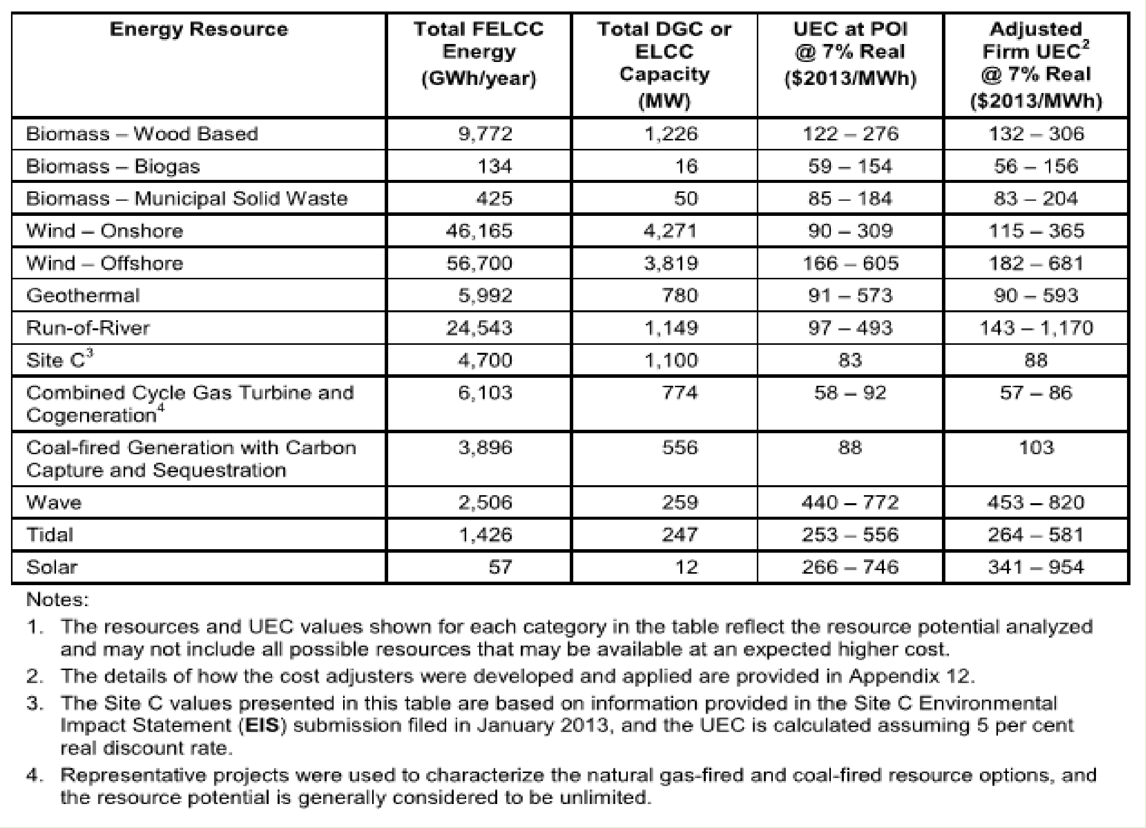
MEAGER CREEK - PEBBLE CREEK

Near Pemberton, British Columbia, Canada
Topographical Map Sheet: Figure 20
Geological Map Sheet: Figure 21

Category		Comments
I.	**Water Rights**	
	Availability (for example "air-cooled required")	Estimated approx. 0.5 L/s for flash plant (for each of Meager and Pebble). Meager MAD approx. 10000 L/s; Pebble MAD approx. 37000 L/s. No active water licences on Meager Creek. No active water licences within 5 km of point of potential geothermal location. Closest Active WL approx. 6.2 km away for quantity of 31500 L/s for purpose of Power-General on Boulder Creek.
	Availability for Drilling	Drilling requirement of 20 L/s. Meager MAD approx. 10000 L/s; Pebble MAD approx. 37000 L/s. No active water licences on Meager Creek. No active water licences within 5 km of point of potential geothermal location. Closest Active WL approx. 6.2 km away for quantity of 31500 L/s for purpose of Power-General on Boulder Creek.
J.	**Engineering**	
	Plant Location and Design	• MC: Plant location in cleared area near to existing drill sites. • PC: Plant location north of existing Upper Lillooet Hydro.
	Construction Issues	• MC: Land slide on access road in 2010, washed out approx. 6 km of road, currently no access to Meager hot springs via Pemberton Valley or any existing road. • PC: Remote access available via new hydro power project infrastructure and exploratory drilling sites.
	Transportation Issues	• MC: no access road into site (approx. location) and existing road is inaccessible after 2010 Meager Creek Landslide. • PC: Access via unpaved road for existing exploratory drilling and Upper Lillooet Hydro Project.
	Architectural Issues (Blend/hide into environment? Local styles? etc.)	Conform with St'at'imc Law and meet requirements of the St'at'imc Land and Resource Authority
	Special Construction Issues (zero emissions)	none found
K.	**Non-Electrical Infrastructure (Roads and Habitation)**	
	Nearest Large Community > 50,000	North Vancouver, BC
	Nearest Community	Pemberton, BC
	Nearest Road and Condition	• MC: Unpaved access road for logging and geothermal drilling. A portion of the access road and bridges for MC wiped out by Capricorn Creek slide (2010). • PC: Unpaved Lillooet River Forestry Road approx.. 1 km from plant location
	Current Access Conditions (restrictions)	• PC: Limited access; plant location across Lillooet River from existing road. • MC: No existing road to Meager Creek location point
	Terrain and Distance Factor for Road Building	• PC: 1 km of new road required includes Lillooet River crossing • MC: Approximately 3 km of new road required for access through exiting slide area; moderately steep, mountainous terrain.

MEAGER CREEK - PEBBLE CREEK

Near Pemberton, British Columbia, Canada
Topographical Map Sheet: Figure 20
Geological Map Sheet: Figure 21

Category		Comments
L.	**Finance**	
	General Power Prices	BC Hydro acquires power through (1) competitive processes (Calls for Tender), (2) the Standing Offer Program (not including the mini-SOP under development), and (3) upgrades to its existing facilities or the development of new generation facilities. (Note that the net metering program targets projects less than 100 kW and is therefore not relevant to geothermal generation projects). Comments on the general price of power under each one are: • The power price paid by BC Hydro to independent power producers through Energy Purchase Agreements (EPAs) under Calls for Tender are proprietary and confidential. • The power price paid by BC Hydro to independent power producers through EPAs under the SOP are made up of a predetermined base price in 2010 dollars as determined by the region of the point of interconnection to the BC Hydro system, escalated at the Consumer Price Index annually up to the year in which an EPA is signed, and further adjusted based upon the time of day and month when the energy is delivered. For reference, the base price for the Lower Mainland region in 2010 dollars is $103.69/MWh. • BC Hydro's current Integrated Resource Plan dated November 2013 includes details of both demand-side management options and supply-side resource options to consider in meeting the future demand for electricity. These resource options, together with their attributes of total energy and capacity and unit energy costs, are listed in Table 2-2 of the November 2013 Resource Options Report Update. That table is reproduced below for ready reference. • Table 5-7 of the above-noted November 2013 Resource Options Report Update provides a summary of the Geothermal Potential by Transmission Region. 

Energy Resource	Total FELCC Energy (GWh/year)	Total DGC or ELCC Capacity (MW)	UEC at POI @ 7% Real ($2013/MWh)	Adjusted Firm UEC[2] @ 7% Real ($2013/MWh)
Biomass – Wood Based	9,772	1,226	122 – 276	132 – 306
Biomass – Biogas	134	16	59 – 154	56 – 156
Biomass – Municipal Solid Waste	425	50	85 – 184	83 – 204
Wind – Onshore	46,165	4,271	90 – 309	115 – 365
Wind – Offshore	56,700	3,819	166 – 605	182 – 681
Geothermal	5,992	780	91 – 573	90 – 593
Run-of-River	24,543	1,149	97 – 493	143 – 1,170
Site C[3]	4,700	1,100	83	88
Combined Cycle Gas Turbine and Cogeneration[4]	6,103	774	58 – 92	57 – 86
Coal-fired Generation with Carbon Capture and Sequestration	3,896	556	88	103
Wave	2,506	259	440 – 772	453 – 820
Tidal	1,426	247	253 – 556	264 – 581
Solar	57	12	266 – 746	341 – 954

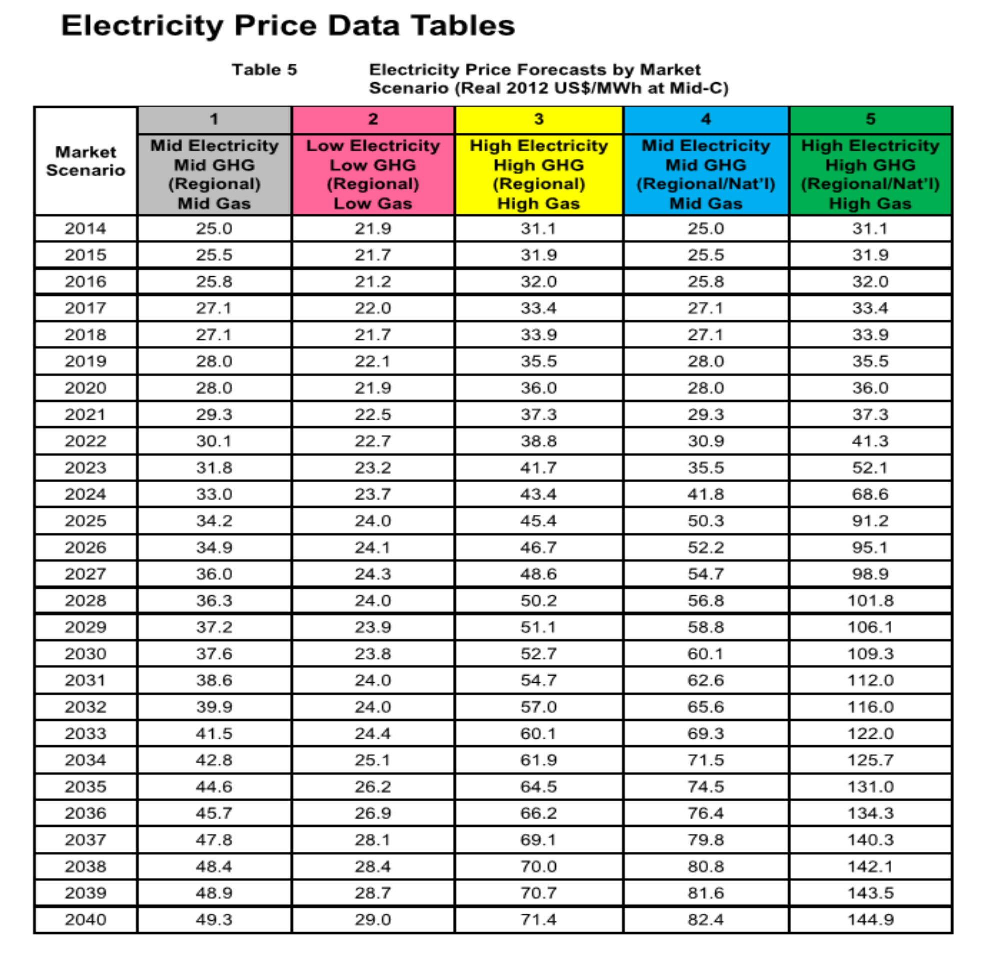
Notes:

1. The resources and UEC values shown for each category in the table reflect the resource potential analyzed and may not include all possible resources that may be available at an expected higher cost.
2. The details of how the cost adjusters were developed and applied are provided in Appendix 12.
3. The Site C values presented in this table are based on information provided in the Site C Environmental Impact Statement (**EIS**) submission filed in January 2013, and the UEC is calculated assuming 5 per cent real discount rate.
4. Representative projects were used to characterize the natural gas-fired and coal-fired resource options, and the resource potential is generally considered to be unlimited.

MEAGER CREEK - PEBBLE CREEK

Near Pemberton, British Columbia, Canada
Topographical Map Sheet: Figure 20
Geological Map Sheet: Figure 21

	Category	Comments
	Market Price ($/MWhr)	• As noted in the above Table 2-2 from the November 2013 Resource Options Report Update, the Unit Energy Cost for geothermal resources at a 7% real discount rate in 2013 dollars ranges from $91/MWh to 573/MWh at the point of interconnection to the BC Hydro system. • Wholesale electricity prices for trading purposes can vary greatly. In the Pacific Northwest, these prices are affected by such factors as precipitation/snowfall in the region, unforeseen generation outages and ambient temperatures. A general flavour of the wholesale electricity prices for potential export of electricity from BC can be obtained from a variety of sources. One such source is the US Energy Information Administration (www.eia.gov/electricity/wholesale/#history). This source provides current and historical electricity market data. Of particular relevance is the mid-C trading hub in the Northwest Region (one example would be a Mid-C peak price on March 17, 2015 of $19.87US weighted average cost from 72 trades). Access to that market for geothermal projects in BC would require access on both the BC Hydro transmission system to the Canada/US border, and on the appropriate transmission system (e.g. Bonneville Power Authority) in the US. • BC Hydro forecasts of market prices under various scenarios was provided in the November 2013 IRP. Table 5 in Appendix 5A – Market Forecast Data is reproduced below for ready reference.



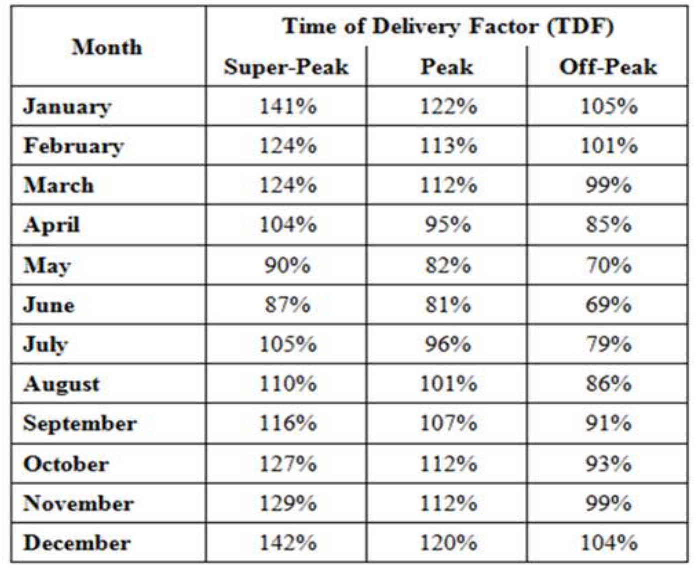
Electricity Price Data Tables

Table 5 Electricity Price Forecasts by Market Scenario (Real 2012 US$/MWh at Mid-C)

Market Scenario	1	2	3	4	5
	Mid Electricity Mid GHG (Regional) Mid Gas	Low Electricity Low GHG (Regional) Low Gas	High Electricity High GHG (Regional) High Gas	Mid Electricity Mid GHG (Regional/Nat'l) Mid Gas	High Electricity High GHG (Regional/Nat'l) High Gas
2014	25.0	21.9	31.1	25.0	31.1
2015	25.5	21.7	31.9	25.5	31.9
2016	25.8	21.2	32.0	25.8	32.0
2017	27.1	22.0	33.4	27.1	33.4
2018	27.1	21.7	33.9	27.1	33.9
2019	28.0	22.1	35.5	28.0	35.5
2020	28.0	21.9	36.0	28.0	36.0
2021	29.3	22.5	37.3	29.3	37.3
2022	30.1	22.7	38.8	30.9	41.3
2023	31.8	23.2	41.7	35.5	52.1
2024	33.0	23.7	43.4	41.8	68.6
2025	34.2	24.0	45.4	50.3	91.2
2026	34.9	24.1	46.7	52.2	95.1
2027	36.0	24.3	48.6	54.7	98.9
2028	36.3	24.0	50.2	56.8	101.8
2029	37.2	23.9	51.1	58.8	106.1
2030	37.6	23.8	52.7	60.1	109.3
2031	38.6	24.0	54.7	62.6	112.0
2032	39.9	24.0	57.0	65.6	116.0
2033	41.5	24.4	60.1	69.3	122.0
2034	42.8	25.1	61.9	71.5	125.7
2035	44.6	26.2	64.5	74.5	131.0
2036	45.7	26.9	66.2	76.4	134.3
2037	47.8	28.1	69.1	79.8	140.3
2038	48.4	28.4	70.0	80.8	142.1
2039	48.9	28.7	70.7	81.6	143.5
2040	49.3	29.0	71.4	82.4	144.9

MEAGER CREEK - PEBBLE CREEK

Near Pemberton, British Columbia, Canada
Topographical Map Sheet: Figure 20
Geological Map Sheet: Figure 21

Category	Comments
Green Power Premium ($/MWhr)	• BC Hydro’s past procurement processes for the acquisition for power from independent power producers has offered a premium for green power. • Within British Columbia, there is little demand for the purchase of “green power certificates” (instruments that a customer can purchase to be assured that the electricity used is environmentally friendly) from BC Hydro. BC Hydro’s generation mix is already approximately 93% clean. • California has a goal of 33% of retail sales by 2020 to be sourced from eligible renewable energy sources. However, the opportunity for geothermal power from British Columbia, particularly “bundled” green energy with Renewable Energy Certificates (RECs), to compete in that market is low, for a number of reasons 1. The price of electricity is driven by the low cost of natural gas; 2. There are large amounts of renewables, such as wind and solar, in California; and 3. Firm transmission access to the California market through the BPA transmission system is generally not available.
Capacity Price ($/KW)	• There is no price in $/kW for capacity resource options in the market at present. • Table 3-27 entitled "UCCs of Capacity Resource Supply Options" in BC Hydro's Integrated Resource Plan dated November 2013 provided a summary of capacity resource options (e.g. pumped storage, simple cycle gas turbines and resource smart projects such as Revelstoke Unit 6). The unit capacity costs (UCCs) at the point of interconnection to the BC Hydro system in $2013/kW-year are shown in the table.
Is there a higher price for base load power?	In general, baseload power (ie firm power) is more valuable to BC Hydro and furthermore the price paid for baseload power varies by month throughout the year. As an example, the following excerpt is taken from BC Hydro’s SOP: “1. Definitions: In this Appendix 4, the following words and expressions have the following meanings: (a) “Off-Peak Hours” means all hours other than Super-Peak Hours and Peak Hours. (b) “Peak Hours” means the hours commencing at 06:00 PPT and ending at 16:00 PPT, and commencing at 20:00 PPT and ending at 22:00 PPT, Monday through Saturday inclusive, but excluding British Columbia statutory holidays. (c) “Super-Peak Hours” means the hours commencing at 16:00 PPT and ending at 20:00 PPT Monday through Saturday inclusive, but excluding British Columbia statutory holidays.” 

Month	Time of Delivery Factor (TDF)		
	Super-Peak	Peak	Off-Peak
January	141%	122%	105%
February	124%	113%	101%
March	124%	112%	99%
April	104%	95%	85%
May	90%	82%	70%
June	87%	81%	69%
July	105%	96%	79%
August	110%	101%	86%
September	116%	107%	91%
October	127%	112%	93%
November	129%	112%	99%
December	142%	120%	104%

MEAGER CREEK - PEBBLE CREEK

Near Pemberton, British Columbia, Canada
Topographical Map Sheet: Figure 20
Geological Map Sheet: Figure 21

Category	Comments
Estimated Size of Resource	See Section A.
Is there any green power incentives?	• The BC government created the Innovative Clean Energy (ICE) fund with an initial mandate to accelerate the commercialization of emerging clean energy technologies (now expanded to include a broad range of energy efficiency and conservation projects). British Columbia also has a program entitled Scientific Research and Experimental Development Tax credit (SR&ED). Geothermal proponents could keep a watching brief on these programs for applicability and relevance. • The BC government's First Nations Clean Energy Business Fund. This fund promotes increased Aboriginal community participation in the clean energy sector. It provides: o Capacity funding of up to $50,000 per applicant to cover the early stages (e.g. feasibility studies) of project development ; and o Equity funding of up to $500,000 per applicant to support a financially viable and resourced clean energy project. • There are a number of government of Canada programs to encourage the development of renewable power. Some of these programs may be active but not currently issuing calls for proposals. Others may be focussed on research and innovation and may not be directly applicable to geothermal technologies/resources, while others may be fully subscribed and even inactive but are noted in terms of completeness. Some of these programs include: o Natural Resources Canada ecoEnergy for Renewable Power program; o Sustainable Development Technology Canada funds; o Clean Energy Fund; o Industrial Research Assistance Program; and o Green Infrastructure Fund Geothermal proponents could keep a watching brief on these and other federal government programs for their applicability and relevance.
Grants	See above under green power incentives
Tax Holidays	None listed on federal and provincial websites.
Tax Relief	• Under Classes 43.1 and 43.2 in Schedule II of the Income Tax Regulations, certain capital costs of systems that produce energy by using renewable energy sources or fuels from waste, or conserve energy by using fuel more efficiently are eligible for accelerated capital cost allowance. Under Class 43.1, eligible equipment may be written-off at 30 percent per year on a declining balance basis. In general, equipment that is eligible for Class 43.1 but is acquired after February 22, 2005 and before year 2020 may be written-off at 50 percent per year on a declining balance basis under Class 43.2. Without these accelerated write-offs, many of these assets would be depreciated for income tax purposes at annual rates between 4 and 30 percent. • In addition to Class 43.1 or 43.2 capital cost allowance, the Income Tax Regulations allow certain expenses incurred during the development and start-up of renewable energy and energy conservation projects [Canadian renewable and conservation expenses (CRCE)] to be fully deducted in the year they are incurred, carried forward indefinitely and deducted in future years, or transferred to investors through a flow-through share agreement.

MEAGER CREEK - PEBBLE CREEK

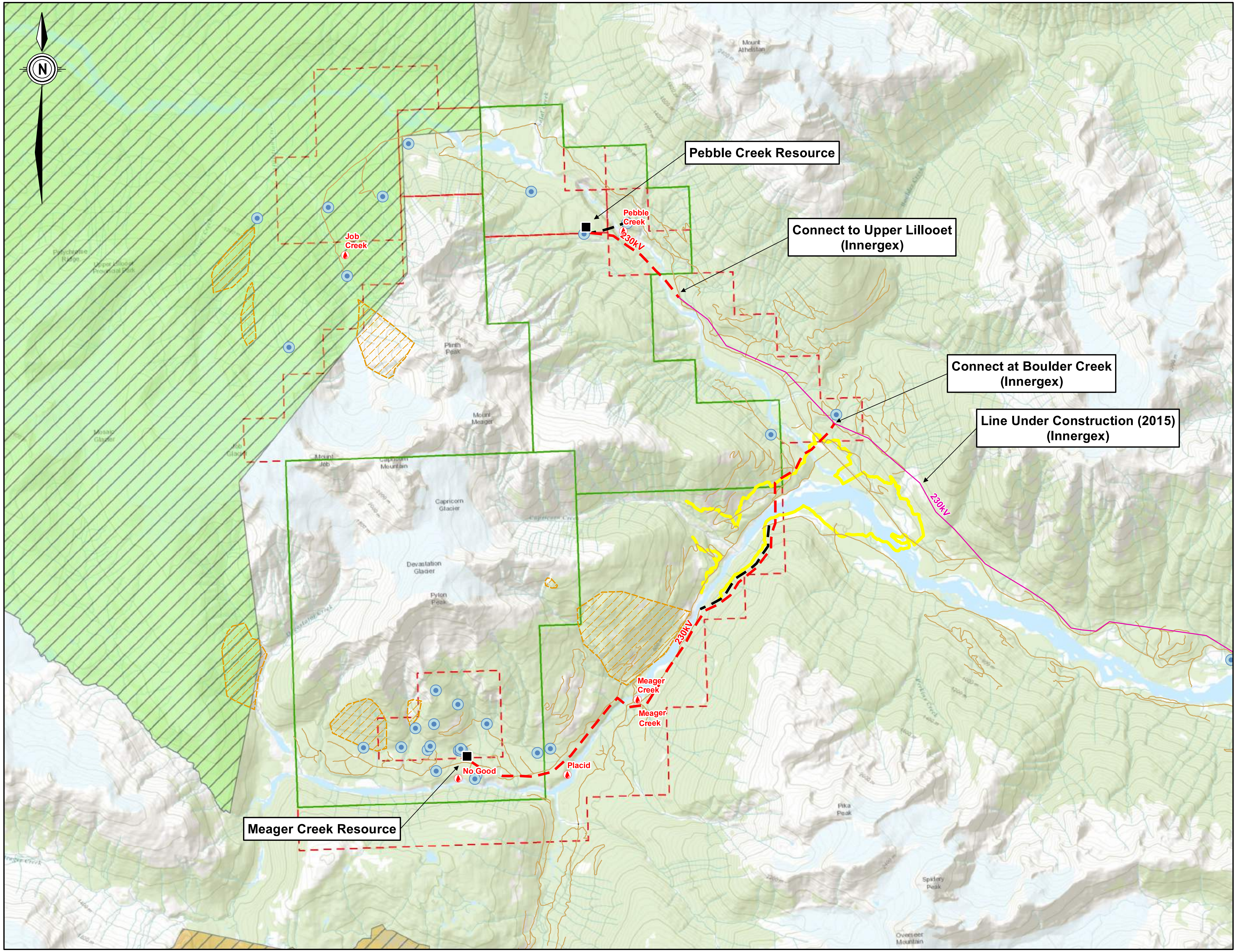
Near Pemberton, British Columbia, Canada
Topographical Map Sheet: Figure 20
Geological Map Sheet: Figure 21

Category		Comments
	Loan Guarantees	The following is an excerpt from http://www.fnfa.ca/en/fnfa/ "The First Nations Finance Authority (FNFA) is a statutory not-for-profit organization without share capital, operating under the authority of the First Nations Fiscal Management Act, 2005. The FNFA's purposes are to provide investment options and capital planning advice and—perhaps most importantly, access to long-term loans with preferable interest rates. The FNFA is not an agent of Her Majesty or a Crown corporation and is governed solely by the First Nations communities that join as Borrowing Members. The advantages of joining the FNFA as a Borrowing Member are: 1. Access to low rate, below bank prime, loans with repayment terms up to 30 years; 2. First Nations choose the repayment terms that work best for their budget; 3. FNFA loans do not require collateral; 4. FNFA loans can be used to refinance existing debt; and 5. FNFA's interest rates and terms parallel those available to provincial and local governments. Most revenue streams are eligible to support FNFA loan requests. Eligible capital projects FNFA can finance include infrastructure, social and economic development, land purchases, independent power projects, community housing and rolling stock/heavy equipment. FNFA is a stand-alone organization separate from the Government of Canada, and its operating policies are set by its Borrowing Members, represented by the First Nation's Chief and Council appointee. The FNFA is for First Nations, by First Nations."
	Royalties/Fees	Geothermal Resources Act, [RSBC 1996] CHAPTER 171, as of March 11, 2015 Permits for well authorizations for wells to be drilled within the boundaries of the permittee's location must pay a prescribed rent for the permit (Section 5). Based on Section 17 of the Act, (1) A lessee who produces a geothermal resource for purposes other than testing must pay to the government (a) a royalty established by agreement under this section, (b) an amount agreed under this section to be paid instead of royalty, or (c) if no royalty or amount has been agreed under this section, the prescribed royalty.
	General Idea of Royalties	With regard to use of the water resources within the geothermal tract, Section 4 of the Water Sustainability Act states "This Act does not apply to geothermal resources as defined in section 1 (1) [definitions] of the Geothermal Resources Act."
	Private Land Owner or Government Land	Geothermal proponents will need to arrange financial agreements (eg leases or purchases) with private property owners for the geothermal land tract. Proponents for geothermal facilities on Crown Land must apply for the appropriate tenure under the BC Land Act (eg Statutory Right of Way, Licence of Occupation).
	Tax Rate in the Country	• Income eligible for small-business deduction (up to $500,000 income): 11% Federal tax, combined federal and provincial (British Columbia): 13.5%. • Income not eligible for small-business deduction: 15% Federal, combined federal and provincial (British Columbia): 26%
	Transmission Tariffs	Under wholesale wheeling (whereby electricity is transmitted from electricity generators to utilities) to customers in Alberta, the US, or other wholesale customers in BC, the generation supplier must request service on the appropriate BC Hydro transmission line under the Open Access Transmission Tariff (OATT) at a regulated cost for that service. Depending on the end customer, the generation supplier will have to make similar arrangements to cover transmission access in other jurisdictions (e.g. the Bonneville Power Authority for wheeling to a US customer). This 'pancaking' of rates, along with transmission congestion issues, affects the economic viability of the potential wholesale opportunity.

MEAGER CREEK - PEBBLE CREEK

Near Pemberton, British Columbia, Canada
Topographical Map Sheet: Figure 20
Geological Map Sheet: Figure 21

Category		Comments
M.	**Maps**	
	Regional topographic map showing population centres, roads and other infrastructure including electrical grid and nearest substation and/or generating station. (1:500,000?)	Topographical Map Sheet: Figure 20
	Regional map showing land tenure in area – geothermal concessions, mining concessions, private land holds, public or national lands (parks). (1:500,000?)	Topographical Map Sheet: Figure 20
	Regional geological map. (1:250 or 500,000?)	Geological Map Sheet: Figure 21
	Detailed geological map of the immediate area of the concessions. (1:50,000 or 100,000)	Geological Map Sheet: Figure 21
N.	**Other Issues and Considerations**	



Geoscience BC

Legend

- ■ Proposed Geothermal Plant Location
- 🔴 Thermal Spring
- ◉ Wellbore
- Proposed Transmission Line
- Proposed Access Road
- Paved Road
- Other Road
- ▨ Potential Slope Instability
- Meager Creek Slide Extents (Approximate)
- 🟧 Conservancy
- 🟩 Park, Eco-Reserve, Protected Area

Geothermal Title Tract
- Active
- Cancelled

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consulting engineers

Service Layer Credits: Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

2 0 2
Kilometers

Project No.	Date
2692-004	April 30, 2015

Potential Geothermal Plant at Meager Creek - Pebble Creek 50-100MW (each site)

Figure 20

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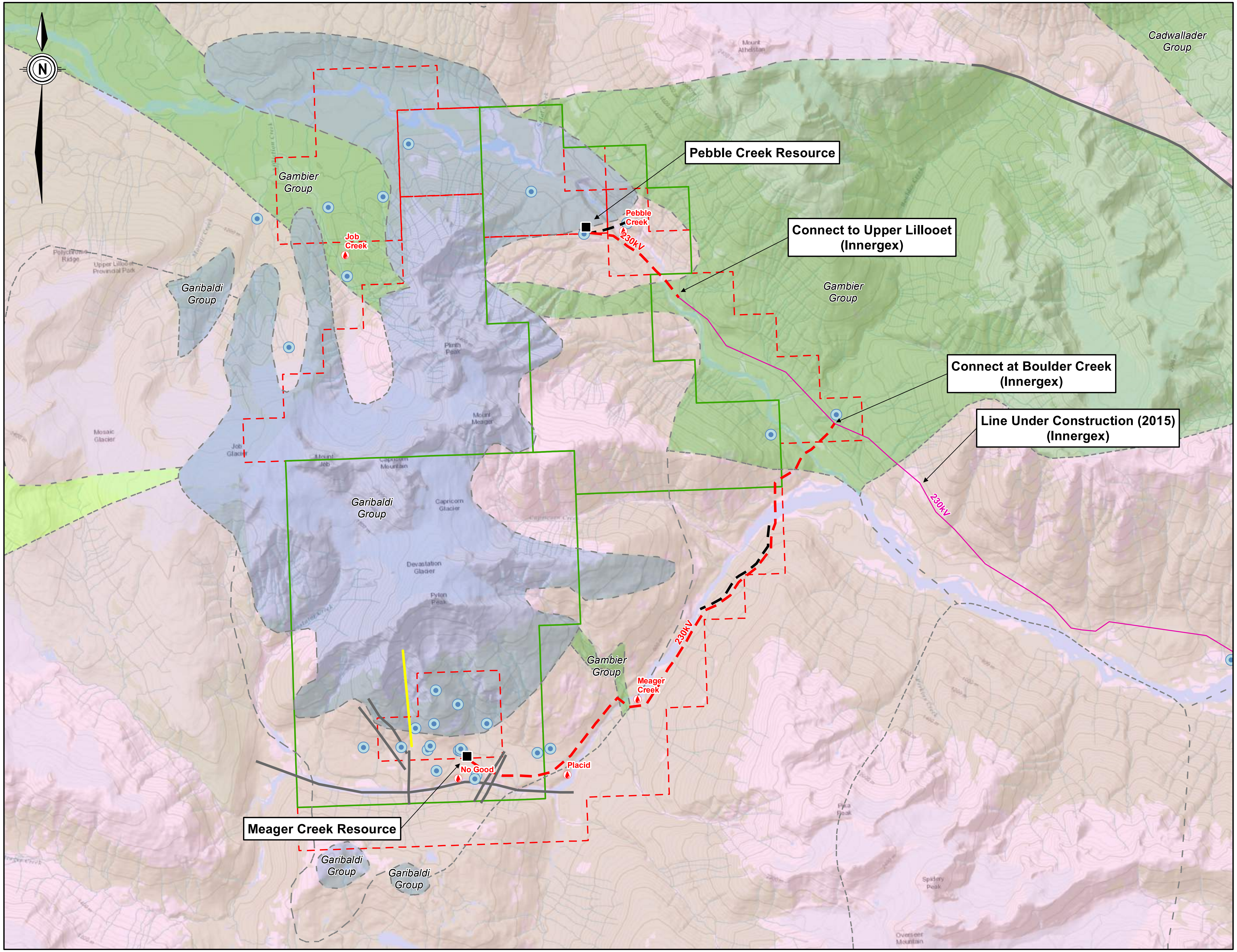
Author: RTaylor



Geoscience BC

Legend

- ■ Proposed Geothermal Plant Location
- 🌢 Thermal Spring
- ◉ Wellbore
- Proposed Transmission Line
- Proposed Access Road

Geothermal Title Tract

- 🟩 Active
- 🟥 Cancelled

Bedrock Type

- Intrusive Rocks
- Metamorphic Rocks
- Sedimentary Rocks
- Volcanic Rocks
- Rock Type Boundary
- Fault
- No Good Fault Zone

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consulting engineers

Service Layer Credits: Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

2 0 2
Kilometers

Project No.	Date
2692-004	April 30, 2015

Geological Strata Map for Meager Creek - Pebble Creek 50-100MW (each site)

Figure 21

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Author: RTaylor

Appendix L

Mt. Cayley Geothermal Development Decision Matrix and Figures 22 & 23

MT. CAYLEY

Near Whistler, British Columbia, Canada
Topographical Map Sheet: Figure 22
Geological Map Sheet: Figure 23

Category		Comments
A.	**Reservoir Potential**	
	Size/Potential/Type	• **Reservoir size:** N/A (no area or depth defined in literature) - therefore, reservoir volume estimated* at between: 2.2 km^3 and 6.5 km^3 (with a most-likely area for any single spring of 2 km^2 and most-likely thickness of 1.1 km. The minimum estimate is calculated for a single spring, and the maximum estimate is calculated using two hot springs [Shovelnose and Turbid Creek springs, based on temperature and fluids chemistry] and a separation of 2.1 km). (*Reservoir assumptions made using Appendix III in GeothermEx, 2004) • **Potential:** 50 MW (Lovekin & Pletka, 2009). This MW capacity was based on the size of the volcanic complex, and may be overly optimistic. • **Type:** Low-temperature resource (based on limited geothermometry data), suitable for binary power plant.
	Temperature/Water and Gas Chemistry/Mineral Indicators	**Surface features:** • Shovelnose: 30°C (Fairbank & Faulkner, 1992) • Turbid Creek hot springs: 28.8°C (Ryder, 1983) • The main thermal springs (Shovelnose/Turbid) have built extensive tufa and sinter deposits, whereas the cold seeps are precipitating bright red ferruginous ochre (Souther, 1980) • EMR Seep: 17°C (Ryder, 1983) **Geothermometry:** • SN-2: SiO_2 85.3°C and 115.7°C in two samples (Reader and Croft, 1983) Exploration drilling by Natural Resources Canada (Souther and Dellechaie, 1984): • Squamish Valley (304-1): 210 m total depth (TD); 33°C/km temperature gradient (TG) • Squamish Valley (304-2): 240 m TD; 65°C/km TG; • Cayley (309-1) or CA-1: 49.8°C BHT; 450 m TD; 95°C/km TG; small fluid entries in borehole; located 460 m downslope from Turbid Creek hot springs • Cayley (309-2) or CA-2: 445 m TD; 59°C/km TG; • Brandywine (343) or BW-1: 440 m TD; 48°C/km TG; • Shovelnose (344) or SN-2: 48.9°C BHT; 465 m TD; 105°C/km TG; located at the head of Shovelnose creek at the eastern edge of the resistivity anomaly, near seeps of high SO_4 and HCO_3 water. **Water chemistry** (Souther and Dellechaie, 1984): • Near-neutral pH sodium-bicarbonate waters at high elevations (SN-2), sodium chloride/bicarbonate/sulphate waters at Turbid Creek hot springs, and sodium sulphate waters at EMR (304-2) (Souther, 1980) • A variety of mixed cation and mixed anion compositions which include HCO_3 alkalinity as high as ~2,300 mg/L, SO_4 as high as 1,260 mg/L, and Cl as high as ~1,200 mg/L. Hydrogeochemistry and geothermometry studies of spring, surface and borehole waters and isotope hydrology confirm the presence of a chemically distinctive hydrothermal fluid eminating from the Mt . Cayley reservoir. (Souther & Dellechaie, 1984) • SN-2: highly saline with Na , Cl-, Mg++, $HC0_3$- being the dominant ions (Reader and Croft, 1983) **Mineral indicators:** • SN-2: minor to moderate degree of hydrothermal alteration consistent with the proximity to units of the Mount Cayley volcanic complex (Reader and Croft, 1983)
	Surface Flow Rates and Reservoir Recharge	Well EMR 304-2: observed artesian flow ~10 L/min from a depth of 140 m. (Ryder, 1983)
	3D Permeability (heat exchange potential)	Permeability (where present) is likely associated with fractures in granitic host rock. Unclear how extensive this fracturing is, or whether permeability may be diminished by gouge and hydrothermal alteration.
	Recent Magmatism	Mt. Cayley Complex consists of three eruptive episodes between 2.5 and 0.31 Ma (Fairbank & Faulkner, 1992)

MT. CAYLEY

Near Whistler, British Columbia, Canada
Topographical Map Sheet: Figure 22
Geological Map Sheet: Figure 23

Category	Comments
Structural Setting	Cretaceous granite beneath volcanic unis intersected by many conjugate faults (BC Hydro, 1974) Observed basement structures that appear to be related to the volcanic belt are north-northwesterly trending, gouge-filled fractures and are associated with hydrothermal alteration at Mt. Cayley (Souther, 1980)
Geophysics	• Thermal anomaly detected by thermal infrared flight at base of ash lens where maximum thickness ~300 m (on west side in gorge of Turbid Creek) (BC Hydro, 1974) In 1980 a DC resistivitiy survey (using dipole-dipole array) was carried out along two lines parallel to upper Shovelnose Creek with penetration to a depth of about 600 m, which defined a zone of lower resistivity (100~500 ohm-m) along the central portion of the survey line. The Geological Survey conducted a more detailed survey in 1982 using a multiple pole-pole array, which defined the eastern edge of a conductive anomaly (~150 ohmmeters) that is open westward, toward the zone of intense alteration surrounding the Turbid Creek warm springs (west of the dipole-dipole coverage, and with north and south boundaries firmly identified, [Shore, 1983]). Magnetotelluric (MT) data collected by Phoenix Geophysics Ltd. in 1983 suggested that resistivity at depth is an order of magnitude lower beneath the central part of the complex than around its periphery. (Souther and Dellechaie, 1984) • A deep seismic reflection study across the southern Canadian Cordillera shows a midcrustal “bright spot” under the vicinity of Mt. Cayley at a depth of approximately 13 km (exact horizontal position uncertain). The interpretation of the feature is uncertain - possibly a fossil sill complex (plutonic rocks intruded in a horizontal layer) or one or more lenses of melted rock or of aqueous fluid (Hammer and Clowes, 1996). • Beneath the eastern side of Mount Cayley are shallow (100-500 m) zones of enhanced electrical conductivity due to a clay layer with montmorillonite as the dominant clay alteration mineral, interpreted to be an electrically conductive sealing cap rock (low resistivity/low permeability) above a geothermal reservoir (Jones and Dumas, 1993).
Reservoir Host Rock	• Likely the basement complex - springs issue from the volcanic-basement contact (BC Hydro, 1982). • Temperature-gradient holes penetrated quartz diorite, numerous dykes of dacitic and andesitic composition visible throughout core. (Reader and Croft, 1983) • The basement rocks at Mt. Cayley can be divided into distinct assemblages: The oldest (unit 1) is a large pendant of metasediments including quartz mica schist, greenstone, amphibolite gneiss and (intensely deformed) crystalline limestone; a hornblende-rich complex (unit 2) of quartz diorite, diorite and minor amphibolite (commonly foliated, contain numerous mafic inclusions and dyke swarms, and locally have distinct gneissic layering); hornblende, biotite granodiorite (unit 3) that is relatively uniform, poorly foliated and underlies much of the northern part of the Garibaldi Volcanic Belt. Unit 3 is cut by a large pluton of clean, pinkish white, coarse- to medium-grained quartz monzonite (Souther, 1980).
Drilling Issues	• The slopes of Mt. Cayley are known to be poorly consolidated - two major historical debris avalanches (1963, 1984) (Kelman et al., 2001) • Risk of landslides, flash floods and avalanches present in young volcanic terrane, where poorly consolidated and intensely fractured flows and tephra are much less stable than comparable slopes on competent rock (Souther, 1980) • Severe terrain noted for restricting access in multiple papers.
Brief Description of Geological Setting of Thermal Features (i.e., springs emanate from fluvial gravels; beside a river, etc.)	• Volcanic complex composed of dacitic flows, tuffs and breccias (Fairbank & Faulkner, 1992) • Mt Cayley is a composite volcano comprised of poorly lithified pyroclastic rocks and lavas which erupted during most recently between 310,000 (Kelman et al., 2001) and 180,000 (Souther and Dellechaie, 1984) years ago. • Cayley volcanics are andesitic to dacitic in composition, flow and ash unit thicknesses up to 90 m, generally lens-shaped, and can range up to 300 m thick; two units with enhanced permeability (basal dacite with columnar joining and andesite on western slope with numerous lava tubes); numerous volcanic vents; (BC Hydro, 1974) basement rocks along Shovelnose Creek and Turbid Creek are granodiorite with overlying metasediments (gneiss, schist, crystalline limestone) that extend to elevations as high as 1,200 m asl (Kelman et al., 2001). • Springs: A group of three springs and numerous seeps in upper Turbid Creek are associated with cupolas of Vulcan's Thumb dacite (each issuing from fractures in the contact zones of the cupolas). The group of two springs and associated seeps in Shovelnose Creek issue from basement rocks near the southern intrusive margin of the Shovelnose endogenous dome (Souther, 1980).

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Category		Comments
B.	**Exploration Uncertainty (Risk)**	
	Degree of Identification of Resources/Reserves	Low No clearly identified development target, despite geochemical sampling of springs, several geophysical surveys, and several temperature-gradient wells drilled.
	Likelihood of Covering Reservoir with Concession	Moderate Current concession largely covers explored areas of Mount Cayley resource. Concession largely on non-conservancy land, all previously drilled wells and springs lie outside of conservancy as well. Some land titles in-held in vicinity of Cayley wells.
	Expected Authorization Date	Unknown
	Specific Timing of Exploration (2 + 2 years, BC 8 years, etc.)	5 years (1 year additional drilling of shallow temperature-gradient holes + 1 year deep gradient-well drilling + 1 year successful development drilling and testing + 1 year further development drilling and start plant construction + 1 year drilling wrap-up and finish plant construction)
	Degree of Previous Exploration (can be good or bad)	Moderate • Several temperature gradient wells drilled, geochemical sampling and analysis of springs, and a number of geophysical surveys (dipole-dipole and multiple pole-pole resistivitiy surveys, MT survey, seismic reflection survey) conducted in area. • No deep exploration wells drilled or tested. Resource area location not fully defined/identified. Further exploration needed.
	Surface Operational Capacity (enough stable area for drilling and a plant?)	Not likely in vicinity of Turbid Creek or Shovelnose hot springs due to remote location and potential for slope instability. Much more likely in area of the EMR Seep near Squamish river.
	Exploration to Exploitation: A summary rating of Exploration Uncertainty (risk) on a scale of difficult (high risk) through medium (moderate risk) to easy (low risk)	Moderate Successful identification of the reservoir (location/boundaries) needed.
C.	**Environmental Issues**	
	Protected Areas	• Callaghan Lake Provincial Park 23 km northeast of proposed plant. • Brandywine Falls Provincial Park 25 km east of proposed plant. • Tantalus Provincial Park 6 km south of proposed transmission connection. • Garibaldi Provincial Park 18 km east of proposed transmission connection.
	Endangered Species	• Nodding Semaphoregrass (blue-listed plant) occurrence polygon in Callaghan Lake Provincial Park, 23 km northeast of proposed plant. • Peacock Vinyl (red-listed plant) occurrence polygon in Brandywine Falls Provincial Park, approx. 25 km east of proposed plant. • Coastal Tailed Frog (Special Concern (SARA Schedule 1; blue-listed) occurrence polygon approx. 28 km northwest of proposed plant location.
	Geothermal Surface Features	• Proposed plant location is approx. 4 km from EMR Seep Hotsprings, approx. 6 km from Turbid Creek Hotspring, and approx. 8 km from Shovelnose Hotsprings. The site is expected to be located on or near the lower slope of a Quarternary Cascade volcanic centre. • Shallow wells drilled in the area by EMR produced low flows of warm water. Drill sites were selected on the basis of limited geophysical data.
	Other	• Proposed powerline crosses two creeks draining into of the Squamish River. • Northern unnamed creek contains Coho Salmon, Sockeye Salmon, Chinook Salmon, Chum Salmon and Steelhead Trout. • Southern unnamed creek contains Coho Salmon, Chinook Salmon and Steelhead Trout. • Squamish River flows parallel to the proposed powerline route and contains Coho Salmon, Sockeye Salmon, Chinook Salmon, Chum Salmon and Steelhead Trout.

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Category		Comments
D.	**Geothermal Area - Bidding and/or Type of Land Holding (private/government/lease/etc.)**	
	Bidding Area	Location within cancelled geothermal tract area. Protected conservancy area north-east of point location.
	Other Claim Rights (mining and/or oil)	Mineral/coal title south-west of location. Proposed location is not within known oil and gas management area; no known tenures at proposed location.
E.	**Market**	
	Main Electricity Consumers (direct sales and/or government)	General Overview 1. BC Hydro acquires power from Independent Power Producers (which would include geothermal proponents) through two main processes: • Competitive calls: when BC Hydro issues a Call for Tenders for the supply of electricity to BC Hydro, geothermal proponents can bid into those competitive calls. • Standing Offer Program (SOP): This program is presently available for clean generation projects greater than 0.1 MW but not more than 15 MW. Proponents do not compete against each other but are paid a predetermined price by BC Hydro. Depending on the specifics of each project, proponents may wish to size their projects to be under the 15 MW threshold for the SOP (BC Hydro is developing a 'mini-SOP' component within the overall SOP. This mini-SOP will apply to projects in the 0.1 MW to 1 MW range, but would not realistically apply to potential geothermal generation projects). • In addition, BC Hydro's net metering program is designed for residential and commercial customers who wish to connect a small electricity generating unit to the BC Hydro distribution system. Generating units up to 0.1 MW in capacity that utilize a clean or renewable resource are eligible to participate in the program. Given the small size, this program has no applicability to potential geothermal generation projects. The acquisition of geothermal power would contribute to BC Hydro's current target for clean energy and to the diversification of BC Hydro's resource mix, making it less reliant on snow melt and stream flow. 2. Although FortisBC is a potential customer for electricity from geothermal sources, the opportunities may be limited given FortisBC's ability to receive electricity from BC Hydro under Rate Schedule 3808. However there is a wheeling agreement in place which would facilitate a geothermal project located in FortisBC's service territory to sell electricity to BC Hydro through BC Hydro's competitive calls and/or the SOP, or to other potential customers as noted below. 3. Wholesale wheeling (whereby electricity is transmitted from electricity generators to utilities) to customers in Alberta, the US, or other wholesale customer in BC is allowed. The generation supplier must request service on the appropriate BC Hydro transmission line under the Open Access Transmission Tariff (OATT) at a regulated cost for that service. Depending on the end customer, the generation supplier will have to make similar arrangements to cover transmission access in other jurisdictions (e.g. the Bonneville Power Authority for wheeling to a US customer). This 'pancaking' of rates, along with congestion issues, affects the economic viability of the potential wholesale opportunity. 4. Retail access, defined as a market in which electricity is sold directly to consumers by competing suppliers, is generally not permitted in BC. However there may be opportunities for bilateral arrangements for direct sales of electricity from geothermal generating plants to large customers (e.g. pulp mills, large sawmills, mines) as follows: • To replace the electricity supplied at a high voltage from BC Hydro under BC Hydro Transmission Rate 1823 of the Electric Tariff. Such replacement would be challenging given the rates charged under that tariff. • To supply electricity to a remote facility (e.g. a mine, LNG plant or other industrial facility) directly from a geothermal plant located in close proximity to the facility, thereby precluding the need for a lengthy transmission line to connect to the BC Hydro electrical grid. • A potential electricity customer, Woodfibre LNG which is not an operating facility but still in the preliminary planning phase, is located approximately 50 km from the Mt. Cayley site. On December 22, 2014, the Ministry of Environment issued two Certificates of Compliance to Western Forest Products for the Woodfibre site.

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Category		Comments
	Time Limits? (business agreements, operating/generating-by deadlines?)	• BC Hydro has issued competitive Calls for Tender for the supply of electricity in the past. • BC Hydro’s SOP is presently directly available for clean energy projects which meet certain criteria, including a generation output of less than 15 MW. • Typical BC Hydro Energy Purchase Agreements from Independent Power Producers are 20-40 years in duration. • Business agreements with the owners of private transmission lines (e.g. independent power producers) for access to the market will be necessary. • The lead times to develop geothermal resources will include appropriate allowances for investigative drilling, technical and environmental studies, public consultation, transmission considerations, marketing, licencing, design, construction and commissioning. These lead times will vary from four to seven years depending on the specifics of each project. Projects with a history of exploration and analysis (e.g. Meager Creek/Pebble Creek, Lakelse, and Canoe Creek) will generally be on the shorter end of this time continuum, while other projects with less investigative work will take longer. Although the time required to drill a geothermal well and construct a power plant could conceivably be less than two years, the key uncertainties inherent in the environmental review, public consultation, transmission arrangements (either with BC Hydro or a private transmission owner), and the permitting and regulatory processes will realistically result in a further two years at a minimum for these activities.
F.	**Transmission Line Infrastructure**	
	State of the Infrastructure	230 kV and 500 kV existing transmission lines are located at approximately 15 km east site location. The closest accessible transmission line is a 230 kV line to Cheakamus hydroelectric generating station (HGS).
	Transmission Route (distance, terrain and costs)	New 230 kV transmission line 20 km to Cheakamus HGS via existing unpaved road.
H.	**Community Issues**	
	Indigenous Law and Indigenous Development Areas	• First Nation consultative areas include Squamish Nation. • Governed by Squamish Nation (16 councilors). (http://www.squamish.net/about-us/governance/) • In 2001, Squamish Nation developed the sacred land use plan that identifies four types of land use zones: forest stewardship zones, sensitive areas, restoration areas and wild spirit places. (http://www.squamish.net/about-us/our-land/xay-temixw-sacred-land-land-use-plan/) No actual maps or PDFs of the plan are provided. • Squamish Community Development Plan provides priority development areas along with method of funding. (httpsquamishfamilymeeting.com) • Government of BC provided funding in 2013 to assess renewable energy potential in the Traditional Territory of Squamish Nation. (http://www.newsroom.gov.bc.ca/2013/03/clean-energy-opportunities-for-11-first-nations-communities.html).
	Community Action	• Whistler (closest community) Community Plan boundaries include only Resort Municipality development areas; however, plan includes guidelines for water and energy efficiency to reduce GHG emissions (Whistler Official Community Plan). • Squamish and Lil'wat First Nation want Whistler Official Community Plan overturned because it does not provided Lil'wat any opportunity to participate in future economic growth
	Surface Rights	• First Nation consultative areas include Squamish Nation.
	Tourism	• Squamish Nation traditional territory encompasses significant existing tourism areas. The majority of tourism opportunities are related to outdoor recreation and includes sacred sites such as the popular hiking area of Stawamus Chief. The Squamish Nation Land use plan emphasizes the "need for more training and meaningful employment opportunities for Squamish Nation Members, especially from forestry and Tourism" (http://www.squamish.net/about-us/our-land/xay-temixw-sacred-land-land-use-plan/)

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Category		Comments
I.	**Water Rights**	
	Availability (for example "air-cooled required")	Plant water requirement estimated approx. 63 L/s for binary plant. MAD of 150,000 L/s in closest Elaho River. Few current water licences in area. Only 1 existing water licence within 10 km radius: 1 on Shovelnose Creek for purpose of conservation, construction works filed under Forest, Lands and Natural Resources Operations.
	Availability for Drilling	Drilling requirement of 20 L/s. MAD of 150,000 L/s in closest Elaho River. Few current water licences in area. Only 1 existing water licence within 10 km radius: 1 on Shovelnose Creek for purpose of conservation, construction works filed under Forest, Lands and Natural Resources Operations.
J.	**Engineering**	
	Plant Location and Design	Remote location accessed via existing unpaved roads.
	Construction Issues	Plant location in proximity to river.
	Transportation Issues	No new road requirements expected; existing unpaved road.
	Architectural Issues (Blend/hide into environment? Local styles? etc.)	None found.
	Special Construction Issues (zero emissions)	None found.
K.	**Non-Electrical Infrastructure (Roads and Habitation)**	
	Nearest Large Community > 50,000	North Vancouver, BC
	Nearest Community	Whistler, BC by straight distance; Squamish, BC by road
	Nearest Road and Condition	Unpaved logging/access road.
	Current Access Conditions (restrictions)	Moderately sloped terrain, remote unpaved road conditions.
	Terrain and Distance Factor for Road Building	No new road requirements expected; existing unpaved road. Moderately sloped terrain.

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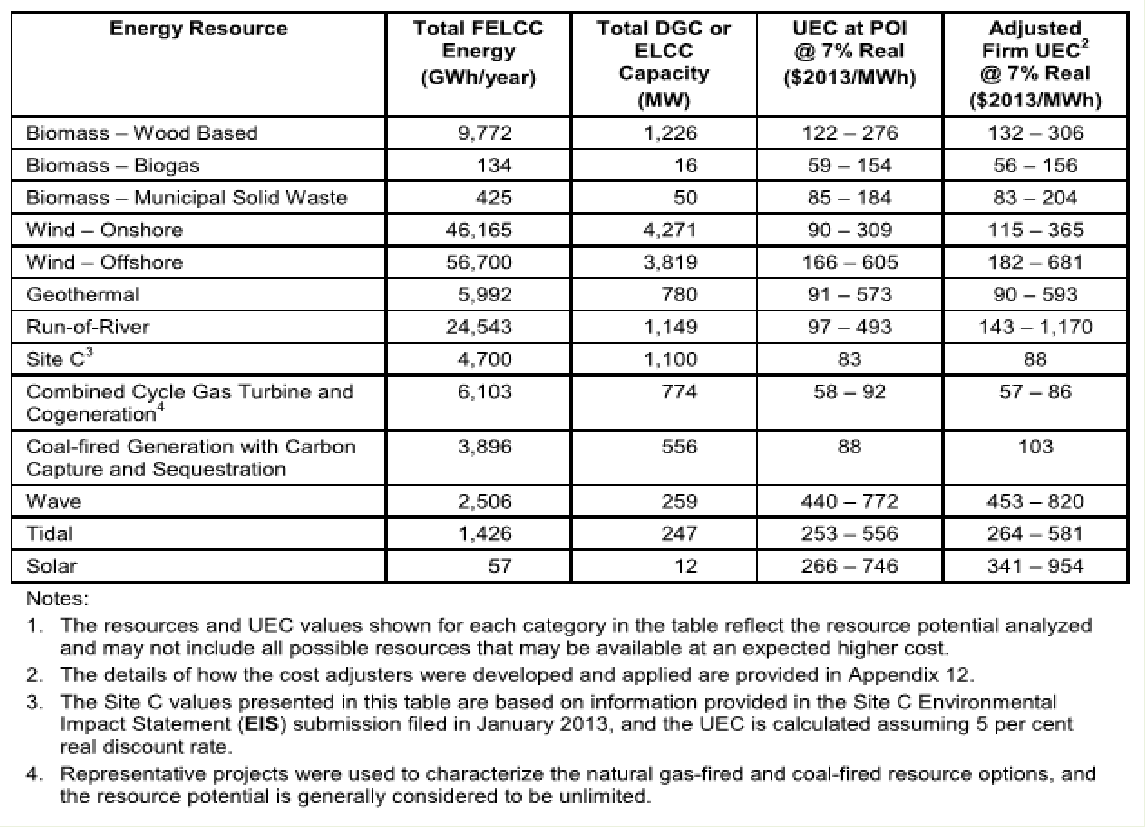
Category		Comments
L.	**Finance**	
	General Power Prices	BC Hydro acquires power through (1) competitive processes (Calls for Tender), (2) the Standing Offer Program (not including the mini-SOP under development), and (3) upgrades to its existing facilities or the development of new generation facilities. (Note that the net metering program targets projects less than 100 kW and is therefore not relevant to geothermal generation projects). Comments on the general price of power under each one are: • The power price paid by BC Hydro to independent power producers through Energy Purchase Agreements (EPAs) under Calls for Tender are proprietary and confidential. • The power price paid by BC Hydro to independent power producers through EPAs under the SOP are made up of a predetermined base price in 2010 dollars as determined by the region of the point of interconnection to the BC Hydro system, escalated at the Consumer Price Index annually up to the year in which an EPA is signed, and further adjusted based upon the time of day and month when the energy is delivered. For reference, the base price for the Lower Mainland region in 2010 dollars is $103.69/MWh. • BC Hydro's current Integrated Resource Plan dated November 2013 includes details of both demand-side management options and supply-side resource options to consider in meeting the future demand for electricity. These resource options, together with their attributes of total energy and capacity and unit energy costs, are listed in Table 2-2 of the November 2013 Resource Options Report Update. That table is reproduced below for ready reference. • Table 5-7 of the above-noted November 2013 Resource Options Report Update provides a summary of the Geothermal Potential by Transmission Region. 

Energy Resource	Total FELCC Energy (GWh/year)	Total DGC or ELCC Capacity (MW)	UEC at POI @ 7% Real ($2013/MWh)	Adjusted Firm UEC[2] @ 7% Real ($2013/MWh)
Biomass – Wood Based	9,772	1,226	122 – 276	132 – 306
Biomass – Biogas	134	16	59 – 154	56 – 156
Biomass – Municipal Solid Waste	425	50	85 – 184	83 – 204
Wind – Onshore	46,165	4,271	90 – 309	115 – 365
Wind – Offshore	56,700	3,819	166 – 605	182 – 681
Geothermal	5,992	780	91 – 573	90 – 593
Run-of-River	24,543	1,149	97 – 493	143 – 1,170
Site C[3]	4,700	1,100	83	88
Combined Cycle Gas Turbine and Cogeneration[4]	6,103	774	58 – 92	57 – 86
Coal-fired Generation with Carbon Capture and Sequestration	3,896	556	88	103
Wave	2,506	259	440 – 772	453 – 820
Tidal	1,426	247	253 – 556	264 – 581
Solar	57	12	266 – 746	341 – 954

Notes:

1. The resources and UEC values shown for each category in the table reflect the resource potential analyzed and may not include all possible resources that may be available at an expected higher cost.
2. The details of how the cost adjusters were developed and applied are provided in Appendix 12.
3. The Site C values presented in this table are based on information provided in the Site C Environmental Impact Statement (**EIS**) submission filed in January 2013, and the UEC is calculated assuming 5 per cent real discount rate.
4. Representative projects were used to characterize the natural gas-fired and coal-fired resource options, and the resource potential is generally considered to be unlimited.

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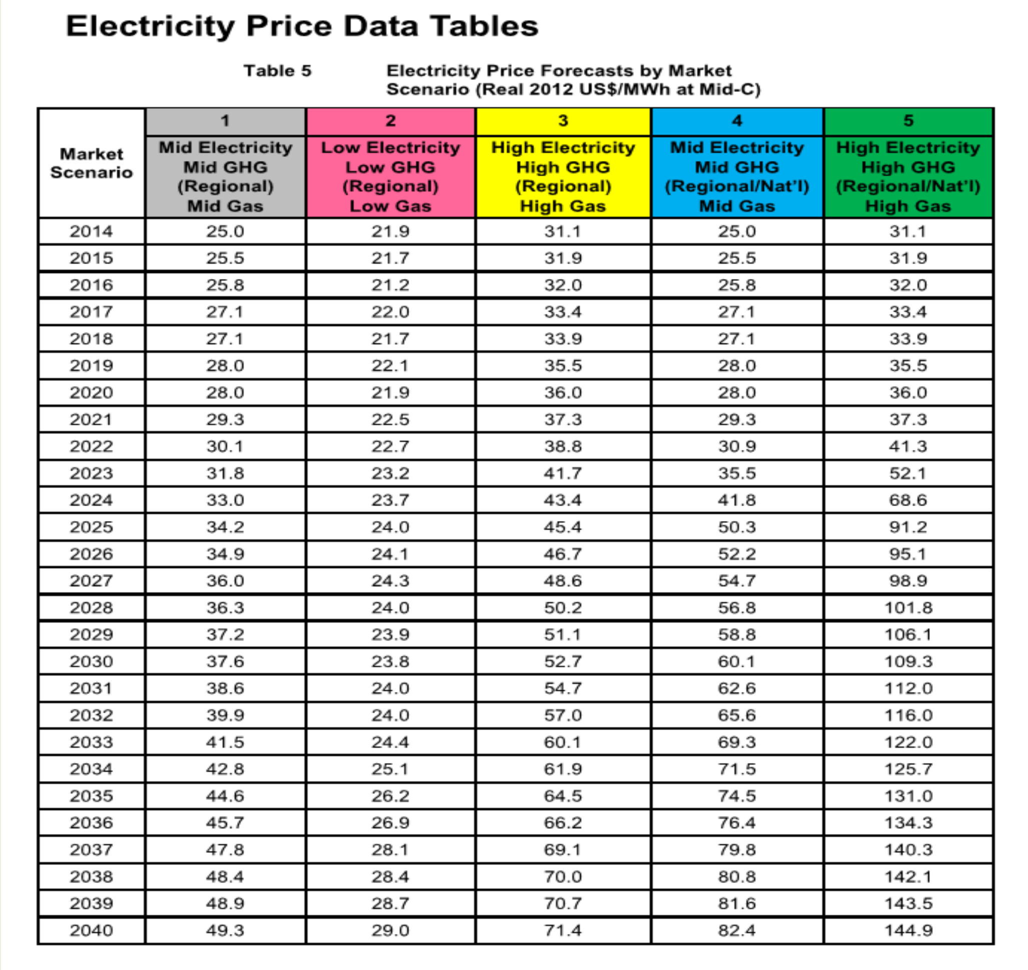
Category	Comments
Market Price ($/MWhr)	• As noted in the above Table 2-2 from the November 2013 Resource Options Report Update, the Unit Energy Cost for geothermal resources at a 7% real discount rate in 2013 dollars ranges from $91/MWh to 573/MWh at the point of interconnection to the BC Hydro system. • Wholesale electricity prices for trading purposes can vary greatly. In the Pacific Northwest, these prices are affected by such factors as precipitation/snowfall in the region, unforeseen generation outages and ambient temperatures. A general flavour of the wholesale electricity prices for potential export of electricity from BC can be obtained from a variety of sources. One such source is the US Energy Information Administration (www.eia.gov/electricity/wholesale/#history). This source provides current and historical electricity market data. Of particular relevance is the mid-C trading hub in the Northwest Region (one example would be a Mid-C peak price on March 17, 2015 of $19.87US weighted average cost from 72 trades). Access to that market for geothermal projects in BC would require access on both the BC Hydro transmission system to the Canada/US border, and on the appropriate transmission system (e.g. Bonneville Power Authority) in the US. • BC Hydro forecasts of market prices under various scenarios was provided in the November 2013 IRP. Table 5 in Appendix 5A – Market Forecast Data is reproduced below for ready reference.



Electricity Price Data Tables

Table 5 Electricity Price Forecasts by Market Scenario (Real 2012 US$/MWh at Mid-C)

Market Scenario	1 Mid Electricity Mid GHG (Regional) Mid Gas	2 Low Electricity Low GHG (Regional) Low Gas	3 High Electricity High GHG (Regional) High Gas	4 Mid Electricity Mid GHG (Regional/Nat'l) Mid Gas	5 High Electricity High GHG (Regional/Nat'l) High Gas
2014	25.0	21.9	31.1	25.0	31.1
2015	25.5	21.7	31.9	25.5	31.9
2016	25.8	21.2	32.0	25.8	32.0
2017	27.1	22.0	33.4	27.1	33.4
2018	27.1	21.7	33.9	27.1	33.9
2019	28.0	22.1	35.5	28.0	35.5
2020	28.0	21.9	36.0	28.0	36.0
2021	29.3	22.5	37.3	29.3	37.3
2022	30.1	22.7	38.8	30.9	41.3
2023	31.8	23.2	41.7	35.5	52.1
2024	33.0	23.7	43.4	41.8	68.6
2025	34.2	24.0	45.4	50.3	91.2
2026	34.9	24.1	46.7	52.2	95.1
2027	36.0	24.3	48.6	54.7	98.9
2028	36.3	24.0	50.2	56.8	101.8
2029	37.2	23.9	51.1	58.8	106.1
2030	37.6	23.8	52.7	60.1	109.3
2031	38.6	24.0	54.7	62.6	112.0
2032	39.9	24.0	57.0	65.6	116.0
2033	41.5	24.4	60.1	69.3	122.0
2034	42.8	25.1	61.9	71.5	125.7
2035	44.6	26.2	64.5	74.5	131.0
2036	45.7	26.9	66.2	76.4	134.3
2037	47.8	28.1	69.1	79.8	140.3
2038	48.4	28.4	70.0	80.8	142.1
2039	48.9	28.7	70.7	81.6	143.5
2040	49.3	29.0	71.4	82.4	144.9

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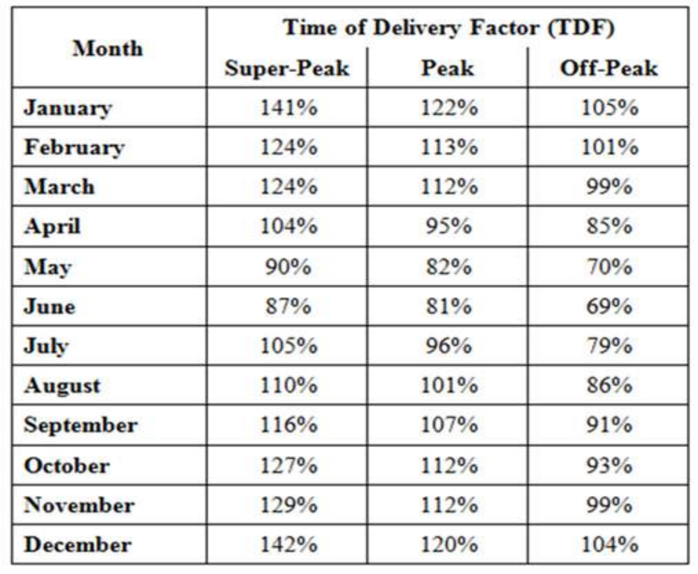
<table>
<tr><th>Category</th><th>Comments</th></tr>
<tr><td>Green Power Premium ($/MWhr)</td><td>• BC Hydro’s past procurement processes for the acquisition for power from independent power producers has offered a premium for green power.
• Within British Columbia, there is little demand for the purchase of “green power certificates” (instruments that a customer can purchase to be assured that the electricity used is environmentally friendly) from BC Hydro. BC Hydro’s generation mix is already approximately 93% clean.
• California has a goal of 33% of retail sales by 2020 to be sourced from eligible renewable energy sources. However, the opportunity for geothermal power from British Columbia, particularly “bundled” green energy with Renewable Energy Certificates (RECs), to compete in that market is low, for a number of reasons
1. The price of electricity is driven by the low cost of natural gas;
2. There are large amounts of renewables, such as wind and solar, in California; and
3. Firm transmission access to the California market through the BPA transmission system is generally not available</td></tr>
<tr><td>Capacity Price ($/KW)</td><td>• There is no price in $/kW for capacity resource options in the market at present.
• Table 3-27 entitled "UCCs of Capacity Resource Supply Options" in BC Hydro’s Integrated Resource Plan dated November 2013 provided a summary of capacity resource options (e.g. pumped storage, simple cycle gas turbines and resource smart projects such as Revelstoke Unit 6). The unit capacity costs (UCCs) at the point of interconnection to the BC Hydro system in $2013/kW-year are shown in the table.</td></tr>
<tr><td>Is there a higher price for base load power?</td><td>In general, baseload power (ie firm power) is more valuable to BC Hydro and furthermore the price paid for baseload power varies by month throughout the year. As an example, the following excerpt is taken from BC Hydro’s SOP:

“1. Definitions: In this Appendix 4, the following words and expressions have the following meanings:
(a) “Off-Peak Hours” means all hours other than Super-Peak Hours and Peak Hours.
(b) “Peak Hours” means the hours commencing at 06:00 PPT and ending at 16:00 PPT, and commencing at 20:00 PPT and ending at 22:00 PPT, Monday through Saturday inclusive, but excluding British Columbia statutory holidays.
(c) “Super-Peak Hours” means the hours commencing at 16:00 PPT and ending at 20:00 PPT Monday through Saturday inclusive, but excluding British Columbia statutory holidays.”

<table>
<tr><th rowspan="2">Month</th><th colspan="3">Time of Delivery Factor (TDF)</th></tr>
<tr><th>Super-Peak</th><th>Peak</th><th>Off-Peak</th></tr>
<tr><td>January</td><td>141%</td><td>122%</td><td>105%</td></tr>
<tr><td>February</td><td>124%</td><td>113%</td><td>101%</td></tr>
<tr><td>March</td><td>124%</td><td>112%</td><td>99%</td></tr>
<tr><td>April</td><td>104%</td><td>95%</td><td>85%</td></tr>
<tr><td>May</td><td>90%</td><td>82%</td><td>70%</td></tr>
<tr><td>June</td><td>87%</td><td>81%</td><td>69%</td></tr>
<tr><td>July</td><td>105%</td><td>96%</td><td>79%</td></tr>
<tr><td>August</td><td>110%</td><td>101%</td><td>86%</td></tr>
<tr><td>September</td><td>116%</td><td>107%</td><td>91%</td></tr>
<tr><td>October</td><td>127%</td><td>112%</td><td>93%</td></tr>
<tr><td>November</td><td>129%</td><td>112%</td><td>99%</td></tr>
<tr><td>December</td><td>142%</td><td>120%</td><td>104%</td></tr>
</table></td></tr>
<tr><td>Estimated Size of Resource</td><td>See Section A.</td></tr>
</table>

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Category	Comments
Is there any green power incentives?	• The BC government created the Innovative Clean Energy (ICE) fund with an initial mandate to accelerate the commercialization of emerging clean energy technologies (now expanded to include a broad range of energy efficiency and conservation projects). British Columbia also has a program entitled Scientific Research and Experimental Development Tax credit (SR&ED). Geothermal proponents could keep a watching brief on these programs for applicability and relevance. • The BC government's First Nations Clean Energy Business Fund. This fund promotes increased Aboriginal community participation in the clean energy sector. It provides: o Capacity funding of up to $50,000 per applicant to cover the early stages (e.g. feasibility studies) of project development ; and o Equity funding of up to $500,000 per applicant to support a financially viable and resourced clean energy project. • There are a number of government of Canada programs to encourage the development of renewable power. Some of these programs may be active but not currently issuing calls for proposals. Others may be focussed on research and innovation and may not be directly applicable to geothermal technologies/resources, while others may be fully subscribed and even inactive but are noted in terms of completeness. Some of these programs include: o Natural Resources Canada ecoEnergy for Renewable Power program; o Sustainable Development Technology Canada funds; o Clean Energy Fund; o Industrial Research Assistance Program; and o Green Infrastructure Fund Geothermal proponents could keep a watching brief on these and other federal government programs for their applicability and relevance.
Grants	See above under green power incentives
Tax Holidays	None listed on federal and provincial websites.
Tax Relief	• Under Classes 43.1 and 43.2 in Schedule II of the Income Tax Regulations, certain capital costs of systems that produce energy by using renewable energy sources or fuels from waste, or conserve energy by using fuel more efficiently are eligible for accelerated capital cost allowance. Under Class 43.1, eligible equipment may be written-off at 30 percent per year on a declining balance basis. In general, equipment that is eligible for Class 43.1 but is acquired after February 22, 2005 and before year 2020 may be written-off at 50 percent per year on a declining balance basis under Class 43.2. Without these accelerated write-offs, many of these assets would be depreciated for income tax purposes at annual rates between 4 and 30 percent. • In addition to Class 43.1 or 43.2 capital cost allowance, the Income Tax Regulations allow certain expenses incurred during the development and start-up of renewable energy and energy conservation projects [Canadian renewable and conservation expenses (CRCE)] to be fully deducted in the year they are incurred, carried forward indefinitely and deducted in future years, or transferred to investors through a flow-through share agreement.

MT. CAYLEY

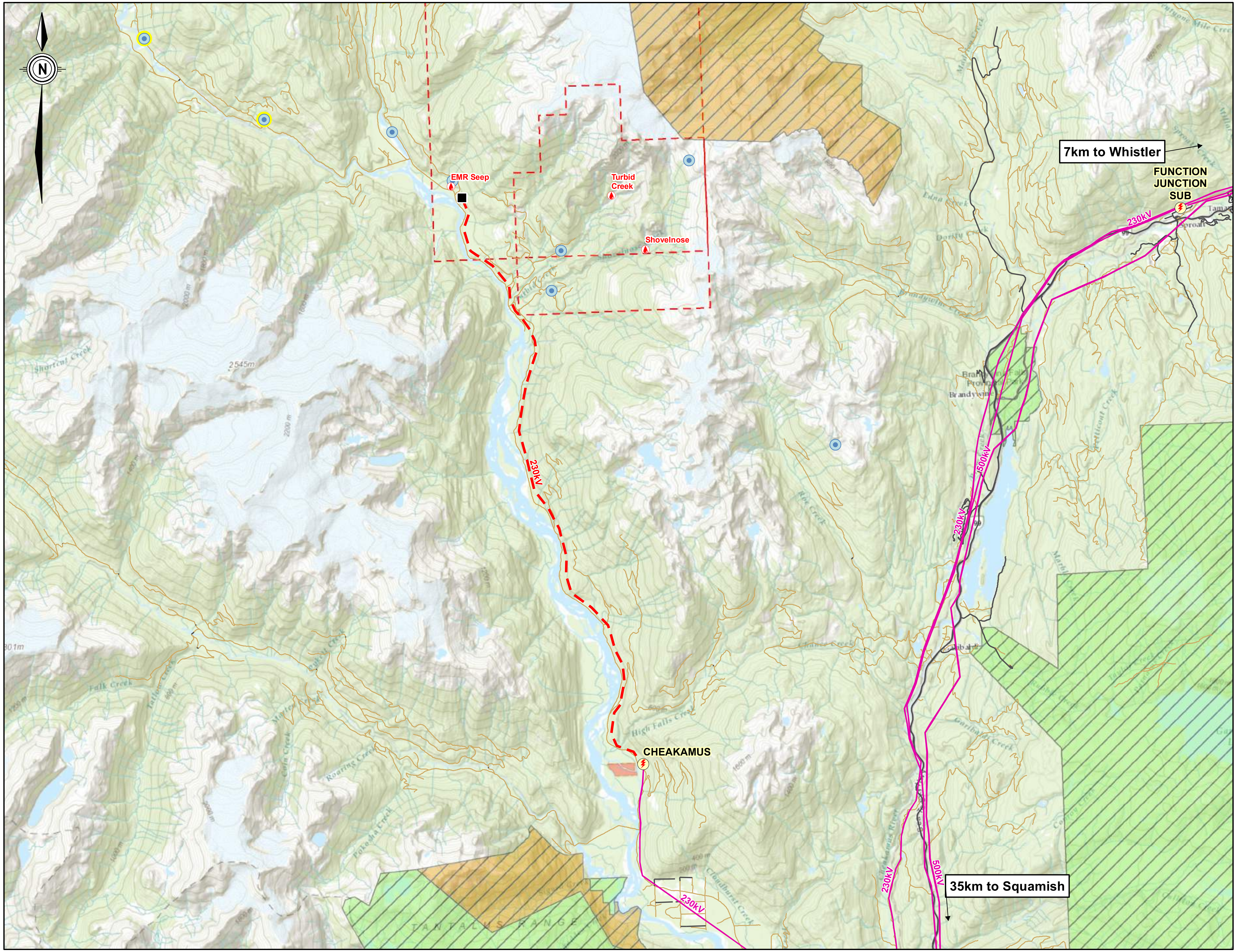
Near Whistler, British Columbia, Canada
Topographical Map Sheet: Figure 22
Geological Map Sheet: Figure 23

Category	Comments
Loan Guarantees	The following is an excerpt from http://www.fnfa.ca/en/fnfa/ "The First Nations Finance Authority (FNFA) is a statutory not-for-profit organization without share capital, operating under the authority of the First Nations Fiscal Management Act, 2005. The FNFA's purposes are to provide investment options and capital planning advice and—perhaps most importantly, access to long-term loans with preferable interest rates. The FNFA is not an agent of Her Majesty or a Crown corporation and is governed solely by the First Nations communities that join as Borrowing Members. The advantages of joining the FNFA as a Borrowing Member are: 1. Access to low rate, below bank prime, loans with repayment terms up to 30 years; 2. First Nations choose the repayment terms that work best for their budget; 3. FNFA loans do not require collateral; 4. FNFA loans can be used to refinance existing debt; and 5. FNFA's interest rates and terms parallel those available to provincial and local governments. Most revenue streams are eligible to support FNFA loan requests. Eligible capital projects FNFA can finance include infrastructure, social and economic development, land purchases, independent power projects, community housing and rolling stock/heavy equipment. FNFA is a stand-alone organization separate from the Government of Canada, and its operating policies are set by its Borrowing Members, represented by the First Nation's Chief and Council appointee. The FNFA is for First Nations, by First Nations."
Royalties/Fees	Geothermal Resources Act, [RSBC 1996] CHAPTER 171, as of March 11, 2015 Permits for well authorizations for wells to be drilled within the boundaries of the permittee's location must pay a prescribed rent for the permit (Section 5). Based on Section 17 of the Act, (1) A lessee who produces a geothermal resource for purposes other than testing must pay to the government (a) a royalty established by agreement under this section, (b) an amount agreed under this section to be paid instead of royalty, or (c) if no royalty or amount has been agreed under this section, the prescribed royalty.
General Idea of Royalties	With regard to use of the water resources within the geothermal tract, Section 4 of the Water Sustainability Act states "This Act does not apply to geothermal resources as defined in section 1 (1) [definitions] of the Geothermal Resources Act."
Private Land Owner or Government Land	Geothermal proponents will need to arrange financial agreements (eg leases or purchases) with private property owners for the geothermal land tract. Proponents for geothermal facilities on Crown Land must apply for the appropriate tenure under the BC Land Act (eg Statutory Right of Way, Licence of Occupation).
Tax Rate in the Country	• Income eligible for small-business deduction (up to $500,000 income): 11% Federal tax, combined federal and provincial (British Columbia): 13.5%. • Income not eligible for small-business deduction: 15% Federal, combined federal and provincial (British Columbia): 26%
Transmission Tariffs	Under wholesale wheeling (whereby electricity is transmitted from electricity generators to utilities) to customers in Alberta, the US, or other wholesale customers in BC, the generation supplier must request service on the appropriate BC Hydro transmission line under the Open Access Transmission Tariff (OATT) at a regulated cost for that service. Depending on the end customer, the generation supplier will have to make similar arrangements to cover transmission access in other jurisdictions (e.g. the Bonneville Power Authority for wheeling to a US customer). This 'pancaking' of rates, along with transmission congestion issues, affects the economic viability of the potential wholesale opportunity.

MT. CAYLEY

Near Whistler, British Columbia, Canada
Topographical Map Sheet: Figure 22
Geological Map Sheet: Figure 23

Category		Comments
M.	**Maps**	
	Regional topographic map showing population centres, roads and other infrastructure including electrical grid and nearest substation and/or generating station. (1:500,000?)	Topographical Map Sheet: Figure 22
	Regional map showing land tenure in area – geothermal concessions, mining concessions, private land holds, public or national lands (parks). (1:500,000?)	Topographical Map Sheet: Figure 22
	Regional geological map. (1:250 or 500,000?)	Geological Map Sheet: Figure 23
	Detailed geological map of the immediate area of the concessions. (1:50,000 or 100,000)	Geological Map Sheet: Figure 23
N.	**Other Issues and Considerations**	



Geoscience BC

Legend

- ■ Proposed Geothermal Plant Location
- 🔥 Thermal Spring
- ● Wellbore
- ◉ Wellbore (Shallow)
- ╌ Proposed Transmission Line
- ⚡ Existing Substation
- ─ Existing Transmission Line
- ─ Paved Road
- ─ Other Road
- ▨ Conservancy
- ▨ Park, Eco-Reserve, Protected Area
- 🟥 First Nations Reserve

Geothermal Title Tract

- ⌜⌟ Cancelled

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Service Layer Credits: Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

3 0 3
Kilometers

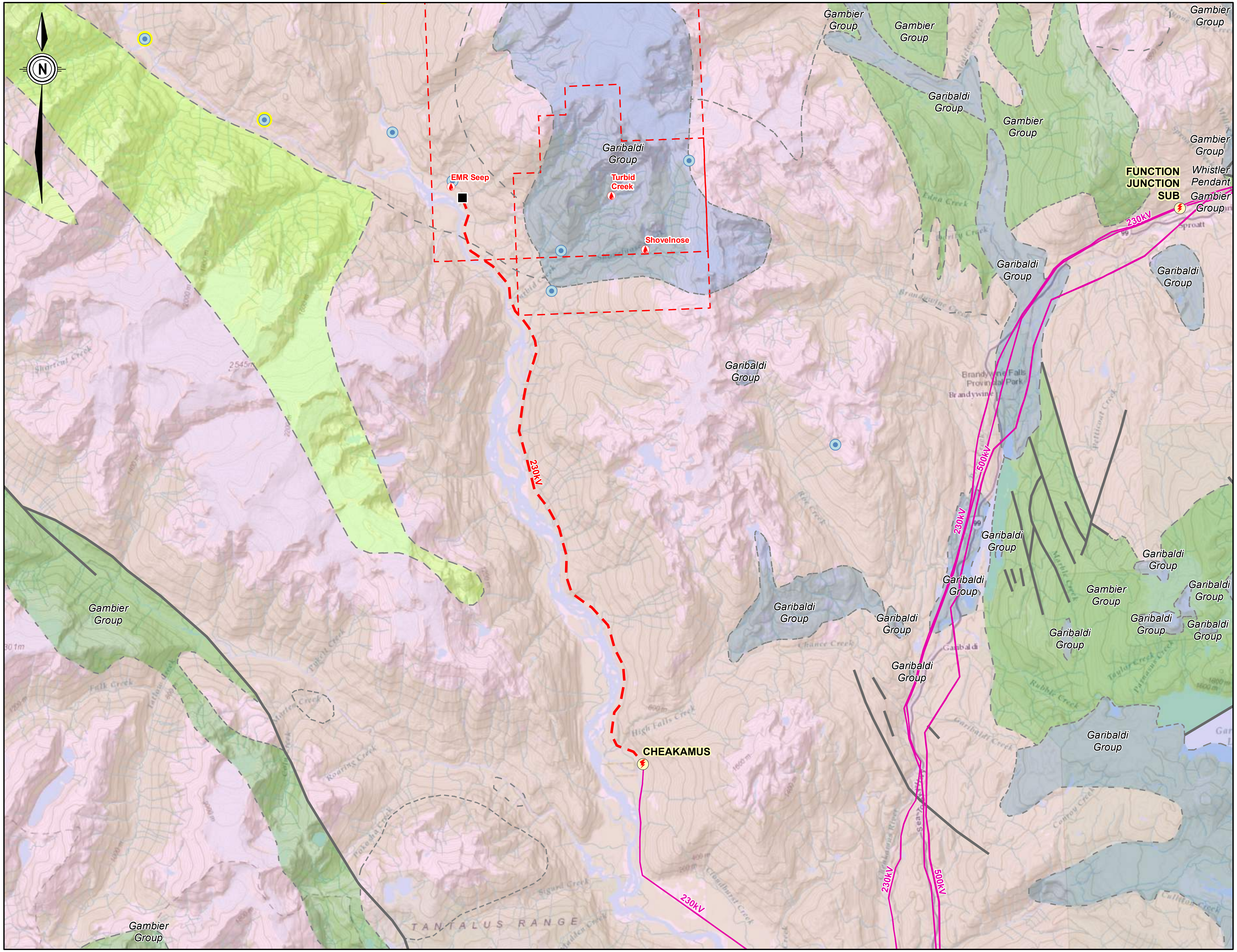
Project No.
2692-004

Date
April 30, 2015

Potential Geothermal Plant at Mt. Cayley 50MW

Figure 22

Path: Q:\2600-2699\2692-004\430-GIS\MXD-RP\2692004_GeothermalLocations_mapbook.mxd Date Saved: 2015-04-27 3:55:23 PM
Author: RTaylor



Legend

- ■ Proposed Geothermal Plant Location
- Thermal Spring
- ◉ Wellbore
- ◉ Wellbore (Shallow)
- Proposed Transmission Line
- Existing Substation
- Existing Transmission Line

Geothermal Title Tract

- Cancelled

Bedrock Type

- Intrusive Rocks
- Metamorphic Rocks
- Sedimentary Rocks
- Volcanic Rocks
- Rock Type Boundary
- Fault

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Service Layer Credits: Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

4 0 4
Kilometers

Project No.	Date
2692-004	April 30, 2015

Geological Strata Map for Mt. Cayley 50MW

Figure 23

Path: Q:\2600-2699\2692-004\430-GIS\MXD-RP\2692004_GeothermalLocationsGeology_mapbook.mxd Date Saved: 2015-04-27 3:08:11 PM
Author: RTaylor

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Appendix M

Mount Garibaldi Geothermal Development Decision Matrix and Figures 24 & 25

MT. GARIBALDI

Near Squamish, British Columbia, Canada
Topographical Map Sheet: Figure 24
Geological Map Sheet: Figure 25

Category		Comments
A.	**Reservoir Potential**	
	Size/Potential/Type	• **Reservoir size:** unknown • **Potential:** 50 MW (Lovekin & Pletka, 2009). This MW capacity was based on the size of the volcanic complex, and may be overly optimistic. • **Type:** Possible blind geothermal system (no surface manifestations). In absence of any clear evidence of high temperatures, assume low-temperature resource, suitable for binary power plant.
	Temperature/Water and Gas Chemistry/Mineral Indicators	**Surface features:** • No known springs or other thermal features (BC Hydro, 1974) **Geothermometry:** • No information **Exploration drilling:** • No information **Water chemistry:** • Fluids emanating from bedrock fractures east of Brohm Lake show highest conductivity in Garibaldi area (BC Hydro, 1982). **Mineral indicators:** • High soil values for arsenic and mercury were measured in the same area as the Brohm Lake fluid fractures, below cliffs of quartz diorite (BC Hydro, 1982).
	Surface Flow Rates and Reservoir Recharge	Fluids emanating at ~1,000 L/min from bedrock fractures east of Brohm Lake on the east side of Hwy 99 (BC Hydro, 1982).
	3D Permeability (heat exchange potential)	Permeability (where present) is likely associated with fractures in plutonic and metamorphic rocks. Unclear how extensive this fracturing is, or whether permeability may be diminished by gouge and hydrothermal alteration.
	Recent Magmatism	• Recent cinder cones present with older Pleistocene (age unconfirmed) necks (BC Hydro, 1974) • Youngest volcanic activity likely the post-glacial Ring Creek lava flow (erupted around 10,700 years ago) (Brooks and Friele, 1992). • There is evidence of anomalously high heat flow in Table Meadows (near the southern flank of Mount Price) and elsewhere (Woodsworth, 2003).
	Structural Setting	Much of the basement rock, even at considerable distances from known volcanic centers (within the Garbaldi Mountain complex) are subject to diking by andesitic and dacitic members of the Garibaldi Group, and these dykes were subject to moderately intense alteration (BC Hydro, 1982).
	Geophysics	No information
	Reservoir Host Rock	Unknown - no thermal features at surface. Possibly similar to other similar volcanic settings in the Garibaldi Complex (Meager, Cayley).
	Drilling Issues	The Garibaldi at Squamish Project was planned as a ski resort development in the late 1990s on the slopes of Mt Garibaldi. At that time, there were plans for an investigation of geothermal heating as part of the development (Garibaldi Alpen Resorts, 1997). (This project does not appear to have been constructed) The modern Cheekye River channel is most likely to be affected by future debris flows in this area caused by instabilities on the western slopes of Mt. Garibaldi (Clague et al., 2003).

MT. GARIBALDI

Near Squamish, British Columbia, Canada
Topographical Map Sheet: Figure 24
Geological Map Sheet: Figure 25

Category		Comments
	Brief Description of Geological Setting of Thermal Features (i.e., springs emanate from fluvial gravels; beside a river, etc.)	• The central Garibaldi Belt is underlain by plutonic rocks (mainly quartz diorite) and metamorphic rocks of the Mesozoic to early Tertiary Coast Plutonic Complex (Ryder, 1983), overlain by Cenozoic volcanic rocks that consist of lava flows and pyroclastics of variable composition (basalt, andesite, dacite, rhyodacite) (BC Hydro, 1974). • The basement in the Mt. Garibaldi area largely of variably altered and foliated quartz diorite (upper Cretaceous) with lesser amounts of younger quartz monzonite and granodiorite (BC Hydro, 1982). • The overlying Mt. Garibaldi Volcanic Complex is composed of mainly andesitic flows and domes (some lesser basalt, dacite, rhyodacite), some of which is believed to be younger than 10,000 years (BC Hydro, 1982). • Numerous Pleistocene-Holocene volcanic complexes constructed on eroded surface of basement rock (foliated to massive Cretaceous quartz diorite, granodiorite and quartz monzonites). Only the most recent eruptive complexes contain basalt and basaltic-andesite lavas. Most recent activity is at Opal Cone on southeast slope of Mt. Garibaldi. (Green, 1990). • The western slopes of Mt Garibaldi (immediately east of the project location) are composed of interbedded dacitic and andesitic flows and pyroclastic rocks, and the volcanic sequence overlies hydrothermally altered metamorphic rocks. Pyroclastic deposits and lava flows on the western flank of the volcano were built out onto a glacier filling Cheakamus Valley about 12,800 years ago. As the ice melted, volcanic materials collapsed and were reworked by glacial streams flowing along the eastern side of Cheakamus Valley and re-deposited along the lower reaches of Cheekye River. (Clague et al., 2003). • Chekamus Valley basalts (along Hwy 99 west of Mt. Garibaldi) are composed of a sequence of episodic lavas, from an unknown (likely sub-glacial) vent. Columnar jointing is present throughout and is horizontal along steep sides of lavas and vertical beneath blocky flows. Several outcrops show pillow-like features and some hyaloclastic breccia. Lavas are relatively thin with fine-scale jointing. (Stelling and Tucker, 2007)
B.	**Exploration Uncertainty (Risk)**	
	Degree of Identification of Resources/Reserves	Low Exploration in area includes water conductivity measurements, soil sampling and analysis (BC Hydro, 1982)
	Likelihood of Covering Reservoir with Concession	Low Mt. Garibaldi itself is located within the Garibaldi Provincial Park, as is the majority of the Mt. Garibaldi Volcanic Complex. The park boundary is at higher elevations, and the surrounding valleys (outside of the park boundary) are the focus of interest (BC Hydro, 1982). However, lack of a clear resource target makes it uncertain where concession boundaries should be.
	Expected Authorization Date	Unknown
	Specific Timing of Exploration (2 + 2 years, BC 8 years, etc.)	7 years (2 years permitting and surface exploration, possibly drilling shallow temperature-gradient holes + 2 years deep gradient-well drilling + 1 year successful development drilling and testing + 1 year further development drilling and start plant construction + 1 year drilling wrap-up and finish plant construction)
	Degree of Previous Exploration (can be good or bad)	Low No surface features in area. Possible blind geothermal system. Would need to drill TG holes or slim holes to collect further data.
	Surface Operational Capacity (enough stable area for drilling and a plant?)	Likely As there are no surface features to guide exploration, one could in principal conduct resource development from a favorable surface location - assuming a resource is actually there.
	Exploration to Exploitation: A summary rating of Exploration Uncertainty (risk) on a scale of difficult (high risk) through medium (moderate risk) to easy (low risk)	Difficult Very little is known to guide geothermal exploration of resource. Absence of surface features entails higher reliance on drilling to define subsurface temperatures.

MT. GARIBALDI

Near Squamish, British Columbia, Canada
Topographical Map Sheet: Figure 24
Geological Map Sheet: Figure 25

Category		Comments
C.	**Environmental Issues**	
	Protected Areas	• Brackendale Eagles Provincial park approx. 2 km from proposed transmission connection. • Garibaldi Provincial Park approx. 8 km east of proposed plant location.
	Endangered Species	• Roell's Brotherella (red-listed plant) approximately 3.8 km south of proposed transmission connection. • Nodding Semaphoregrass (blue-listed plant) approx. 9.8 km from proposed plant location.
	Geothermal Surface Features	• Nearest hot springs approximately 48 km east of proposed plant location. • This is a Cascade Volcanic centre with evidence of Quaternary or maybe Holocene activity.
	Other	• Wildlife Habitata Area allotment for Marbled Murrelet is approx. 2 km east of proposed plant location. • Proposed power line makes approximately four major stream crossings. The Brohm River contains Sockeye Salmon, Coho Salmon and Steelhead trout. The Cheekye contains Sockeye Salmon, Coho Salmon, Chinook Salmon and Steelhead Trout.
D.	**Geothermal Area - Bidding and/or Type of Land Holding (private/government/lease/etc.)**	
	Bidding Area	No existing geothermal tracts.
	Other Claim Rights (mining and/or oil)	No existing mineral or coal titles at plant location. Proposed location is not within known oil and gas management area; no known tenures at proposed location.

MT. GARIBALDI

Near Squamish, British Columbia, Canada
Topographical Map Sheet: Figure 24
Geological Map Sheet: Figure 25

Category		Comments
E.	**Market**	
	Main Electricity Consumers (direct sales and/or government)	General Overview 1. BC Hydro acquires power from Independent Power Producers (which would include geothermal proponents) through two main processes: • Competitive calls: when BC Hydro issues a Call for Tenders for the supply of electricity to BC Hydro, geothermal proponents can bid into those competitive calls. • Standing Offer Program (SOP): This program is presently available for clean generation projects greater than 0.1 MW but not more than 15 MW. Proponents do not compete against each other but are paid a predetermined price by BC Hydro. Depending on the specifics of each project, proponents may wish to size their projects to be under the 15 MW threshold for the SOP (BC Hydro is developing a ‘mini-SOP’ component within the overall SOP. This mini-SOP will apply to projects in the 0.1 MW to 1 MW range, but would not realistically apply to potential geothermal generation projects). • In addition, BC Hydro's net metering program is designed for residential and commercial customers who wish to connect a small electricity generating unit to the BC Hydro distribution system. Generating units up to 0.1 MW in capacity that utilize a clean or renewable resource are eligible to participate in the program. Given the small size, this program has no applicability to potential geothermal generation projects. The acquisition of geothermal power would contribute to BC Hydro’s current target for clean energy and to the diversification of BC Hydro’s resource mix, making it less reliant on snow melt and stream flow. 2. Although FortisBC is a potential customer for electricity from geothermal sources, the opportunities may be limited given FortisBC’s ability to receive electricity from BC Hydro under Rate Schedule 3808. However there is a wheeling agreement in place which would facilitate a geothermal project located in FortisBC’s service territory to sell electricity to BC Hydro through BC Hydro’s competitive calls and/or the SOP, or to other potential customers as noted below. 3. Wholesale wheeling (whereby electricity is transmitted from electricity generators to utilities) to customers in Alberta, the US, or other wholesale customer in BC is allowed. The generation supplier must request service on the appropriate BC Hydro transmission line under the Open Access Transmission Tariff (OATT) at a regulated cost for that service. Depending on the end customer, the generation supplier will have to make similar arrangements to cover transmission access in other jurisdictions (e.g. the Bonneville Power Authority for wheeling to a US customer). This ‘pancaking’ of rates, along with congestion issues, affects the economic viability of the potential wholesale opportunity. 4. Retail access, defined as a market in which electricity is sold directly to consumers by competing suppliers, is generally not permitted in BC. However there may be opportunities for bilateral arrangements for direct sales of electricity from geothermal generating plants to large customers (e.g. pulp mills, large sawmills, mines) as follows: • To replace the electricity supplied at a high voltage from BC Hydro under BC Hydro Transmission Rate 1823 of the Electric Tariff. Such replacement would be challenging given the rates charged under that tariff. • To supply electricity to a remote facility (e.g. a mine, LNG plant or other industrial facility) directly from a geothermal plant located in close proximity to the facility, thereby precluding the need for a lengthy transmission line to connect to the BC Hydro electrical grid. • A potential electricity customer, Woodfibre LNG which is not an operating facility but still in the preliminary planning phase, is located approximately 25km from the Mt. Garibaldi site. On December 22, 2014, the Ministry of Environment issued two Certificates of Compliance to Western Forest Products for the Woodfibre site.

MT. GARIBALDI

Near Squamish, British Columbia, Canada
Topographical Map Sheet: Figure 24
Geological Map Sheet: Figure 25

Category		Comments
	Time Limits? (business agreements, operating/generating-by deadlines?)	• BC Hydro has issued competitive Calls for Tender for the supply of electricity in the past. • BC Hydro's SOP is presently directly available for clean energy projects which meet certain criteria, including a generation output of less than 15 MW. • Typical BC Hydro Energy Purchase Agreements from Independent Power Producers are 20-40 years in duration. • Business agreements with the owners of private transmission lines (e.g. independent power producers) for access to the market will be necessary. • The lead times to develop geothermal resources will include appropriate allowances for investigative drilling, technical and environmental studies, public consultation, transmission considerations, marketing, licencing, design, construction and commissioning. These lead times will vary from four to seven years depending on the specifics of each project. Projects with a history of exploration and analysis (e.g. Meager Creek/Pebble Creek, Lakelse, and Canoe Creek) will generally be on the shorter end of this time continuum, while other projects with less investigative work will take longer. Although the time required to drill a geothermal well and construct a power plant could conceivably be less than two years, the key uncertainties inherent in the environmental review, public consultation, transmission arrangements (either with BC Hydro or a private transmission owner), and the permitting and regulatory processes will realistically result in a further two years at a minimum for these activities.
F.	**Transmission Line Infrastructure**	
	State of the Infrastructure	Nearest transmission lines are 500 KV and 230 kV. Closest substation is Cheekye 500 kV and Cheekye 230 kV .
	Transmission Route (distance, terrain and costs)	A new 138 kV transmission line from 230 kV Cheekye substation to plant location via existing transmission line corridor. The transmission line length would be approximately 5km over moderate to steep terrain.
H.	**Community Issues**	
	Indigenous Law and Indigenous Development Areas	• First Nation consultative areas include Squamish Nation. • Governed by Squamish Nation (16 councilors). (http://www.squamish.net/about-us/governance/) • In 2001, Squamish Nation developed the sacred land use plan that identifies four types of land use zones: forest stewardship zones, sensitive areas, restoration areas and wild spirit places. (http://www.squamish.net/about-us/our-land/xay-temixw-sacred-land-land-use-plan/) No actual maps or PDFs of the plan are provided. • Squamish Community Development Plan provides priority development areas along with method of funding. (httpsquamishfamilymeeting.com) • Government of BC provided funding in 2013 to assess renewable energy potential in the Traditional Territory of Squamish Nation. (http://www.newsroom.gov.bc.ca/2013/03/clean-energy-opportunities-for-11-first-nations-communities.html).
	Community Action	• Squamish Official Community Plan vision includes being leaders in fostering social integrity, economic development, and environmental sustainability (Squamish Official Community Plan). • Squamish CAN (Climate Action Network) is a community action group that operates many environmental projects related to energy, food, transportation (http://squamishcan.net/category/projects/completed-projects/energy/).
	Surface Rights	• First Nation consultative areas include Squamish Nation.
	Tourism	• Squamish Nation traditional territory encompasses significant existing tourism areas. The majority of tourism opportunities are related to outdoor recreation and includes sacred sites such as the popular hiking area of Stawamus Chief. The Squamish Nation Land use plan emphasizes the "need for more training and meaningful employment opportunities for Squamish Nation Members, especially from forestry and Tourism" (http://www.squamish.net/about-us/our-land/xay-temixw-sacred-land-land-use-plan/) • Proposed plant location is within 2 km of popular outdoor recreation area of Cat Lake and Alice Lake Provincial Park.

MT. GARIBALDI

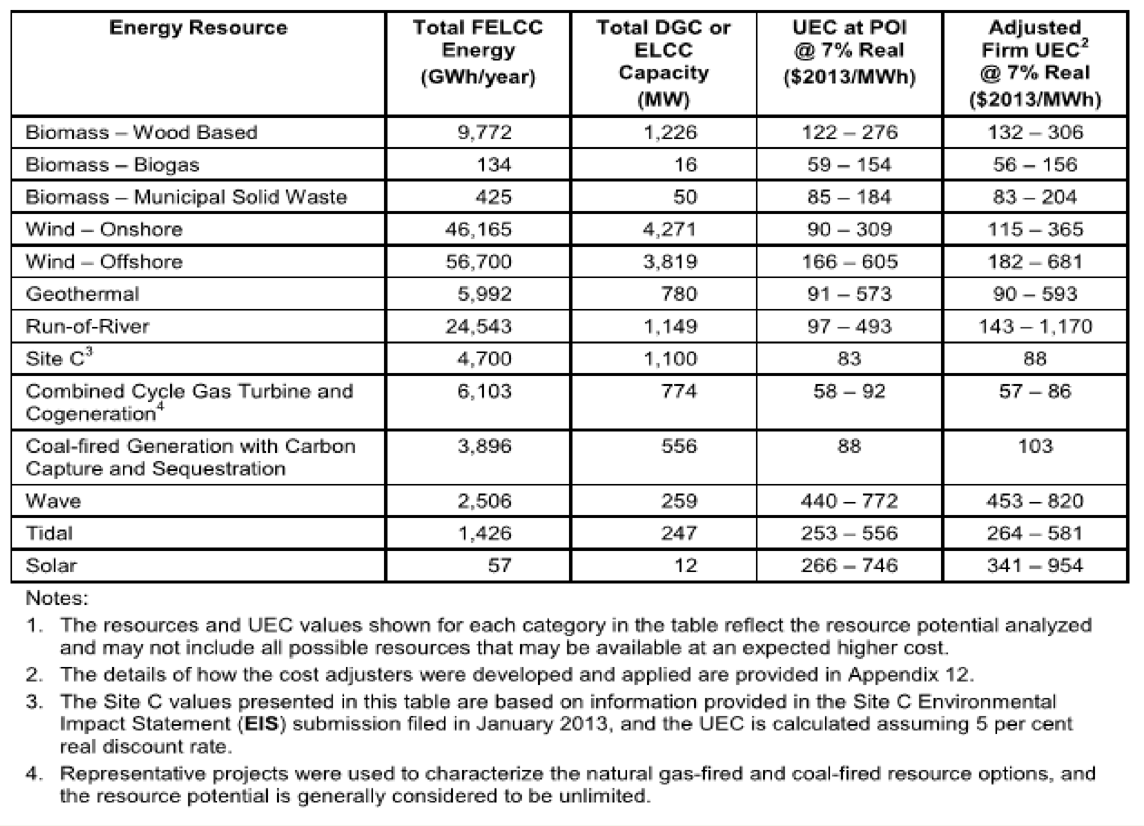
Near Squamish, British Columbia, Canada
Topographical Map Sheet: Figure 24
Geological Map Sheet: Figure 25

Category		Comments
I.	**Water Rights**	
	Availability (for example "air-cooled required")	Plant water requirement estimated approx. 63 L/s for binary plant. MAD of 2100 L/s on Cheekeye River. Few water licences on Mt Garibaldi; several existing water licences Cheakamus River. Water licences within 5 km and not on Cheakamus river include 2 current water licences with 8 active applications for domestic, power-general and snowmaking, watering, irrigation respectively.
	Availability for Drilling	Drilling requirement of 20 L/s. MAD of 2100 L/s on Cheekeye River. Few water licences on Mt Garibaldi; several existing water licences Cheakamus River. water licences within 5 km and not on Cheakamus river include 2 current water licences with 8 active applications for domestic, power-general and snowmaking, watering, irrigation respectively.
J.	**Engineering**	
	Plant Location and Design	Plant location proposed on moderately sloped, forested mountain terrain.
	Construction Issues	Unpaved, switchback roads up
	Transportation Issues	Unpaved, switchback roads to plant location; forested mountain terrain.
	Architectural Issues (Blend/hide into environment? Local styles? etc.)	None found. Proposed plant location is within 2 km of popular outdoor recreation area Cat Lake and Alice Lake Provincial Park.
	Special Construction Issues (zero emissions)	None found.
K.	**Non-Electrical Infrastructure (Roads and Habitation)**	
	Nearest Large Community > 50,000	North Vancouver, BC
	Nearest Community	Squamish, BC
	Nearest Road and Condition	Unpaved mountain access road.
	Current Access Conditions (restrictions)	Location is surround by several BC Parks protected areas (Alice Lake, Garibaldi) on the north, east and south.)
	Terrain and Distance Factor for Road Building	No new road requirement expected. Extensive existing unpaved road network.

MT. GARIBALDI

Near Squamish, British Columbia, Canada
Topographical Map Sheet: Figure 24
Geological Map Sheet: Figure 25

Category		Comments
L.	**Finance**	
	General Power Prices	BC Hydro acquires power through (1) competitive processes (Calls for Tender), (2) the Standing Offer Program (not including the mini-SOP under development), and (3) upgrades to its existing facilities or the development of new generation facilities. (Note that the net metering program targets projects less than 100 kW and is therefore not relevant to geothermal generation projects). Comments on the general price of power under each one are: • The power price paid by BC Hydro to independent power producers through Energy Purchase Agreements (EPAs) under Calls for Tender are proprietary and confidential. • The power price paid by BC Hydro to independent power producers through EPAs under the SOP are made up of a predetermined base price in 2010 dollars as determined by the region of the point of interconnection to the BC Hydro system, escalated at the Consumer Price Index annually up to the year in which an EPA is signed, and further adjusted based upon the time of day and month when the energy is delivered. For reference, the base price for the Lower Mainland region in 2010 dollars is $103.69/MWh. • BC Hydro's current Integrated Resource Plan dated November 2013 includes details of both demand-side management options and supply-side resource options to consider in meeting the future demand for electricity. These resource options, together with their attributes of total energy and capacity and unit energy costs, are listed in Table 2-2 of the November 2013 Resource Options Report Update. That table is reproduced below for ready reference. • Table 5-7 of the above-noted November 2013 Resource Options Report Update provides a summary of the Geothermal Potential by Transmission Region.



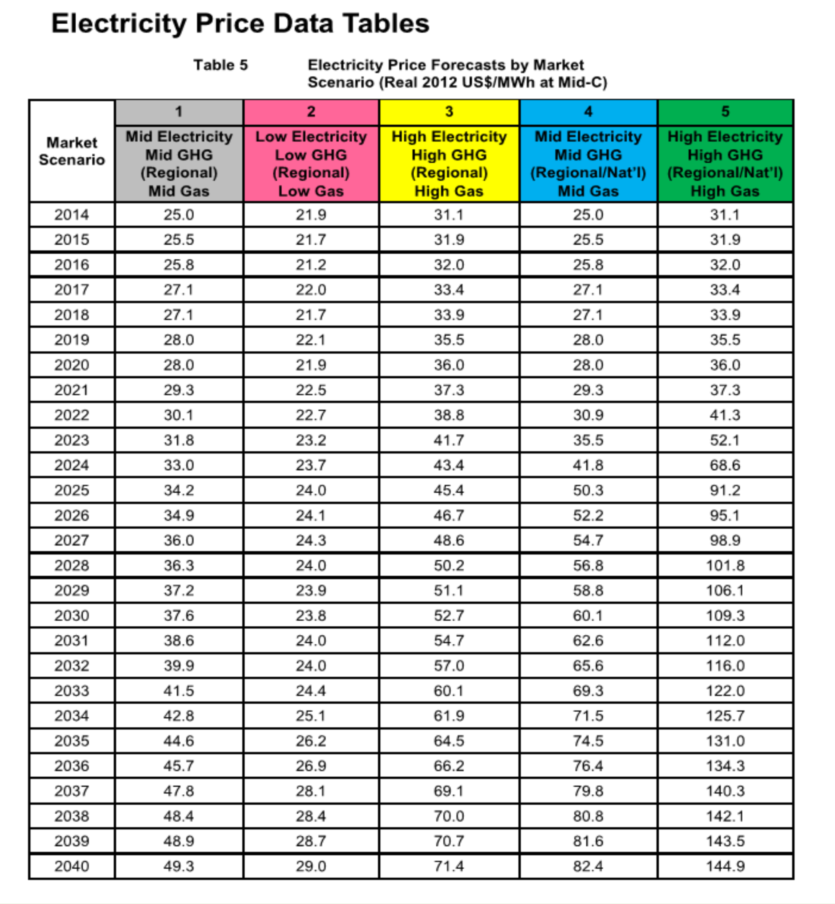
Energy Resource	Total FELCC Energy (GWh/year)	Total DGC or ELCC Capacity (MW)	UEC at POI @ 7% Real ($2013/MWh)	Adjusted Firm UEC[2] @ 7% Real ($2013/MWh)
Biomass – Wood Based	9,772	1,226	122 – 276	132 – 306
Biomass – Biogas	134	16	59 – 154	56 – 156
Biomass – Municipal Solid Waste	425	50	85 – 184	83 – 204
Wind – Onshore	46,165	4,271	90 – 309	115 – 365
Wind – Offshore	56,700	3,819	166 – 605	182 – 681
Geothermal	5,992	780	91 – 573	90 – 593
Run-of-River	24,543	1,149	97 – 493	143 – 1,170
Site C[3]	4,700	1,100	83	88
Combined Cycle Gas Turbine and Cogeneration[4]	6,103	774	58 – 92	57 – 86
Coal-fired Generation with Carbon Capture and Sequestration	3,896	556	88	103
Wave	2,506	259	440 – 772	453 – 820
Tidal	1,426	247	253 – 556	264 – 581
Solar	57	12	266 – 746	341 – 954

Notes:

1. The resources and UEC values shown for each category in the table reflect the resource potential analyzed and may not include all possible resources that may be available at an expected higher cost.
2. The details of how the cost adjusters were developed and applied are provided in Appendix 12.
3. The Site C values presented in this table are based on information provided in the Site C Environmental Impact Statement (**EIS**) submission filed in January 2013, and the UEC is calculated assuming 5 per cent real discount rate.
4. Representative projects were used to characterize the natural gas-fired and coal-fired resource options, and the resource potential is generally considered to be unlimited.

MT. GARIBALDI

Near Squamish, British Columbia, Canada
Topographical Map Sheet: Figure 24
Geological Map Sheet: Figure 25

	Category	Comments
	Market Price ($/MWhr)	• As noted in the above Table 2-2 from the November 2013 Resource Options Report Update, the Unit Energy Cost for geothermal resources at a 7% real discount rate in 2013 dollars ranges from $91/MWh to 573/MWh at the point of interconnection to the BC Hydro system. • Wholesale electricity prices for trading purposes can vary greatly. In the Pacific Northwest, these prices are affected by such factors as precipitation/snowfall in the region, unforeseen generation outages and ambient temperatures. A general flavour of the wholesale electricity prices for potential export of electricity from BC can be obtained from a variety of sources. One such source is the US Energy Information Administration (www.eia.gov/electricity/wholesale/#history). This source provides current and historical electricity market data. Of particular relevance is the mid-C trading hub in the Northwest Region (one example would be a Mid-C peak price on March 17, 2015 of $19.87US weighted average cost from 72 trades). Access to that market for geothermal projects in BC would require access on both the BC Hydro transmission system to the Canada/US border, and on the appropriate transmission system (e.g. Bonneville Power Authority) in the US. • BC Hydro forecasts of market prices under various scenarios was provided in the November 2013 IRP. Table 5 in Appendix 5A – Market Forecast Data is reproduced below for ready reference. 

Electricity Price Data Tables

Table 5 Electricity Price Forecasts by Market Scenario (Real 2012 US$/MWh at Mid-C)

Market Scenario	1 Mid Electricity Mid GHG (Regional) Mid Gas	2 Low Electricity Low GHG (Regional) Low Gas	3 High Electricity High GHG (Regional) High Gas	4 Mid Electricity Mid GHG (Regional/Nat'l) Mid Gas	5 High Electricity High GHG (Regional/Nat'l) High Gas
2014	25.0	21.9	31.1	25.0	31.1
2015	25.5	21.7	31.9	25.5	31.9
2016	25.8	21.2	32.0	25.8	32.0
2017	27.1	22.0	33.4	27.1	33.4
2018	27.1	21.7	33.9	27.1	33.9
2019	28.0	22.1	35.5	28.0	35.5
2020	28.0	21.9	36.0	28.0	36.0
2021	29.3	22.5	37.3	29.3	37.3
2022	30.1	22.7	38.8	30.9	41.3
2023	31.8	23.2	41.7	35.5	52.1
2024	33.0	23.7	43.4	41.8	68.6
2025	34.2	24.0	45.4	50.3	91.2
2026	34.9	24.1	46.7	52.2	95.1
2027	36.0	24.3	48.6	54.7	98.9
2028	36.3	24.0	50.2	56.8	101.8
2029	37.2	23.9	51.1	58.8	106.1
2030	37.6	23.8	52.7	60.1	109.3
2031	38.6	24.0	54.7	62.6	112.0
2032	39.9	24.0	57.0	65.6	116.0
2033	41.5	24.4	60.1	69.3	122.0
2034	42.8	25.1	61.9	71.5	125.7
2035	44.6	26.2	64.5	74.5	131.0
2036	45.7	26.9	66.2	76.4	134.3
2037	47.8	28.1	69.1	79.8	140.3
2038	48.4	28.4	70.0	80.8	142.1
2039	48.9	28.7	70.7	81.6	143.5
2040	49.3	29.0	71.4	82.4	144.9

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Near Squamish, British Columbia, Canada
Topographical Map Sheet: Figure 24
Geological Map Sheet: Figure 25

	Category	Comments
	Green Power Premium ($/MWhr)	• BC Hydro's past procurement processes for the acquisition for power from independent power producers has offered a premium for green power. • Within British Columbia, there is little demand for the purchase of "green power certificates" (instruments that a customer can purchase to be assured that the electricity used is environmentally friendly) from BC Hydro. BC Hydro's generation mix is already approximately 93% clean. • California has a goal of 33% of retail sales by 2020 to be sourced from eligible renewable energy sources. However, the opportunity for geothermal power from British Columbia, particularly "bundled" green energy with Renewable Energy Certificates (RECs), to compete in that market is low, for a number of reasons 1. The price of electricity is driven by the low cost of natural gas; 2. There are large amounts of renewables, such as wind and solar, in California; and 3. Firm transmission access to the California market through the BPA transmission system is generally not available.
	Capacity Price ($/KW)	• There is no price in $/kW for capacity resource options in the market at present. • Table 3-27 entitled "UCCs of Capacity Resource Supply Options" in BC Hydro's Integrated Resource Plan dated November 2013 provided a summary of capacity resource options (e.g. pumped storage, simple cycle gas turbines and resource smart projects such as Revelstoke Unit 6). The unit capacity costs (UCCs) at the point of interconnection to the BC Hydro system in $2013/kW-year are shown in the table.

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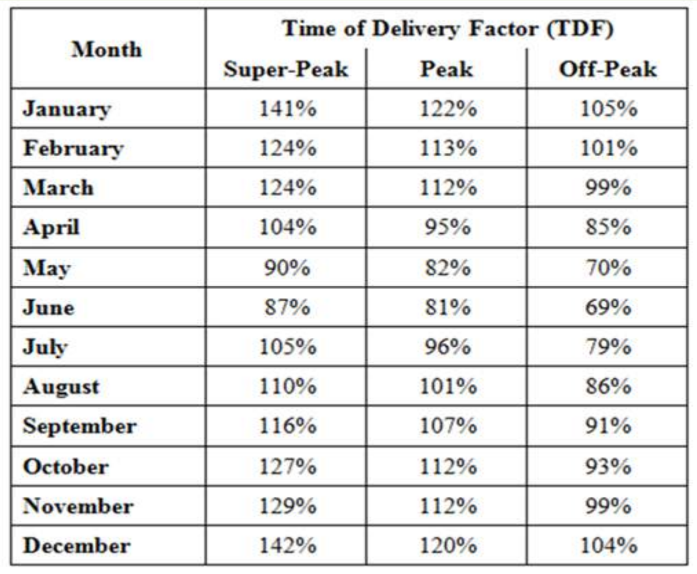
Near Squamish, British Columbia, Canada
Topographical Map Sheet: Figure 24
Geological Map Sheet: Figure 25

<table>
<tr><th></th><th>Category</th><th>Comments</th></tr>
<tr><td></td><td>Is there a higher price for base load power?</td><td>In general, baseload power (ie firm power) is more valuable to BC Hydro and furthermore the price paid for baseload power varies by month throughout the year. As an example, the following excerpt is taken from BC Hydro’s SOP:

“1. Definitions: In this Appendix 4, the following words and expressions have the following meanings:
(a) “Off-Peak Hours” means all hours other than Super-Peak Hours and Peak Hours.
(b) “Peak Hours” means the hours commencing at 06:00 PPT and ending at 16:00 PPT, and commencing at 20:00 PPT and ending at 22:00 PPT, Monday through Saturday inclusive, but excluding British Columbia statutory holidays.
(c) “Super-Peak Hours” means the hours commencing at 16:00 PPT and ending at 20:00 PPT Monday through Saturday inclusive, but excluding British Columbia statutory holidays.”

<table>
<tr><th rowspan="2">Month</th><th colspan="3">Time of Delivery Factor (TDF)</th></tr>
<tr><th>Super-Peak</th><th>Peak</th><th>Off-Peak</th></tr>
<tr><td>January</td><td>141%</td><td>122%</td><td>105%</td></tr>
<tr><td>February</td><td>124%</td><td>113%</td><td>101%</td></tr>
<tr><td>March</td><td>124%</td><td>112%</td><td>99%</td></tr>
<tr><td>April</td><td>104%</td><td>95%</td><td>85%</td></tr>
<tr><td>May</td><td>90%</td><td>82%</td><td>70%</td></tr>
<tr><td>June</td><td>87%</td><td>81%</td><td>69%</td></tr>
<tr><td>July</td><td>105%</td><td>96%</td><td>79%</td></tr>
<tr><td>August</td><td>110%</td><td>101%</td><td>86%</td></tr>
<tr><td>September</td><td>116%</td><td>107%</td><td>91%</td></tr>
<tr><td>October</td><td>127%</td><td>112%</td><td>93%</td></tr>
<tr><td>November</td><td>129%</td><td>112%</td><td>99%</td></tr>
<tr><td>December</td><td>142%</td><td>120%</td><td>104%</td></tr>
</table>
</td></tr>
</table>

MT. GARIBALDI

Near Squamish, British Columbia, Canada
Topographical Map Sheet: Figure 24
Geological Map Sheet: Figure 25

Category	Comments
Estimated Size of Resource	See Section A.
Is there any green power incentives?	• The BC government created the Innovative Clean Energy (ICE) fund with an initial mandate to accelerate the commercialization of emerging clean energy technologies (now expanded to include a broad range of energy efficiency and conservation projects). British Columbia also has a program entitled Scientific Research and Experimental Development Tax credit (SR&ED). Geothermal proponents could keep a watching brief on these programs for applicability and relevance. • The BC government's First Nations Clean Energy Business Fund. This fund promotes increased Aboriginal community participation in the clean energy sector. It provides: o Capacity funding of up to $50,000 per applicant to cover the early stages (e.g. feasibility studies) of project development ; and o Equity funding of up to $500,000 per applicant to support a financially viable and resourced clean energy project. • There are a number of government of Canada programs to encourage the development of renewable power. Some of these programs may be active but not currently issuing calls for proposals. Others may be focussed on research and innovation and may not be directly applicable to geothermal technologies/resources, while others may be fully subscribed and even inactive but are noted in terms of completeness. Some of these programs include: o Natural Resources Canada ecoEnergy for Renewable Power program; o Sustainable Development Technology Canada funds; o Clean Energy Fund; o Industrial Research Assistance Program; and o Green Infrastructure Fund Geothermal proponents could keep a watching brief on these and other federal government programs for their applicability and relevance.
Grants	See above under green power incentives
Tax Holidays	None listed on federal and provincial websites.
Tax Relief	• Under Classes 43.1 and 43.2 in Schedule II of the Income Tax Regulations, certain capital costs of systems that produce energy by using renewable energy sources or fuels from waste, or conserve energy by using fuel more efficiently are eligible for accelerated capital cost allowance. Under Class 43.1, eligible equipment may be written-off at 30 percent per year on a declining balance basis. In general, equipment that is eligible for Class 43.1 but is acquired after February 22, 2005 and before year 2020 may be written-off at 50 percent per year on a declining balance basis under Class 43.2. Without these accelerated write-offs, many of these assets would be depreciated for income tax purposes at annual rates between 4 and 30 percent. • In addition to Class 43.1 or 43.2 capital cost allowance, the Income Tax Regulations allow certain expenses incurred during the development and start-up of renewable energy and energy conservation projects [Canadian renewable and conservation expenses (CRCE)] to be fully deducted in the year they are incurred, carried forward indefinitely and deducted in future years, or transferred to investors through a flow-through share agreement.

MT. GARIBALDI

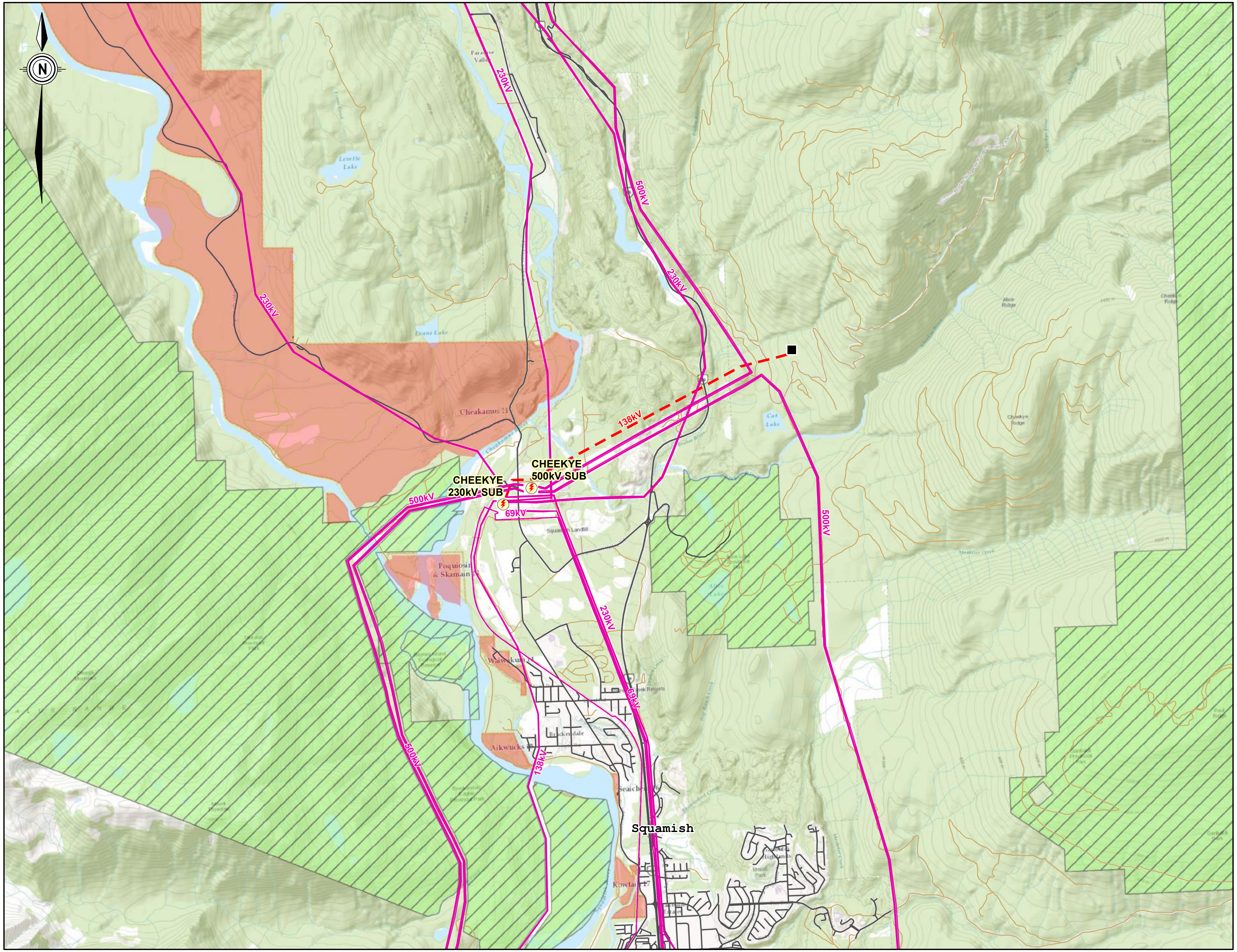
Near Squamish, British Columbia, Canada
Topographical Map Sheet: Figure 24
Geological Map Sheet: Figure 25

Category	Comments
Loan Guarantees	The following is an excerpt from http://www.fnfa.ca/en/fnfa/ "The First Nations Finance Authority (FNFA) is a statutory not-for-profit organization without share capital, operating under the authority of the First Nations Fiscal Management Act, 2005. The FNFA's purposes are to provide investment options and capital planning advice and—perhaps most importantly, access to long-term loans with preferable interest rates. The FNFA is not an agent of Her Majesty or a Crown corporation and is governed solely by the First Nations communities that join as Borrowing Members. The advantages of joining the FNFA as a Borrowing Member are: 1. Access to low rate, below bank prime, loans with repayment terms up to 30 years; 2. First Nations choose the repayment terms that work best for their budget; 3. FNFA loans do not require collateral; 4. FNFA loans can be used to refinance existing debt; and 5. FNFA's interest rates and terms parallel those available to provincial and local governments. Most revenue streams are eligible to support FNFA loan requests. Eligible capital projects FNFA can finance include infrastructure, social and economic development, land purchases, independent power projects, community housing and rolling stock/heavy equipment. FNFA is a stand-alone organization separate from the Government of Canada, and its operating policies are set by its Borrowing Members, represented by the First Nation's Chief and Council appointee. The FNFA is for First Nations, by First Nations."
Royalties/Fees	Geothermal Resources Act, [RSBC 1996] CHAPTER 171, as of March 11, 2015 Permits for well authorizations for wells to be drilled within the boundaries of the permittee's location must pay a prescribed rent for the permit (Section 5). Based on Section 17 of the Act, (1) A lessee who produces a geothermal resource for purposes other than testing must pay to the government (a) a royalty established by agreement under this section, (b) an amount agreed under this section to be paid instead of royalty, or (c) if no royalty or amount has been agreed under this section, the prescribed royalty.
General Idea of Royalties	With regard to use of the water resources within the geothermal tract, Section 4 of the Water Sustainability Act states "This Act does not apply to geothermal resources as defined in section 1 (1) [definitions] of the Geothermal Resources Act."
Private Land Owner or Government Land	Geothermal proponents will need to arrange financial agreements (eg leases or purchases) with private property owners for the geothermal land tract. Proponents for geothermal facilities on Crown Land must apply for the appropriate tenure under the BC Land Act (eg Statutory Right of Way, Licence of Occupation).
Tax Rate in the Country	• Income eligible for small-business deduction (up to $500,000 income): 11% Federal tax, combined federal and provincial (British Columbia): 13.5%. • Income not eligible for small-business deduction: 15% Federal, combined federal and provincial (British Columbia): 26%
Transmission Tariffs	Under wholesale wheeling (whereby electricity is transmitted from electricity generators to utilities) to customers in Alberta, the US, or other wholesale customers in BC, the generation supplier must request service on the appropriate BC Hydro transmission line under the Open Access Transmission Tariff (OATT) at a regulated cost for that service. Depending on the end customer, the generation supplier will have to make similar arrangements to cover transmission access in other jurisdictions (e.g. the Bonneville Power Authority for wheeling to a US customer). This 'pancaking' of rates, along with transmission congestion issues, affects the economic viability of the potential wholesale opportunity.

MT. GARIBALDI

Near Squamish, British Columbia, Canada
Topographical Map Sheet: Figure 24
Geological Map Sheet: Figure 25

Category		Comments
M.	**Maps**	
	Regional topographic map showing population centres, roads and other infrastructure including electrical grid and nearest substation and/or generating station. (1:500,000?)	Topographical Map Sheet: Figure 24
	Regional map showing land tenure in area – geothermal concessions, mining concessions, private land holds, public or national lands (parks). (1:500,000?)	Topographical Map Sheet: Figure 24
	Regional geological map. (1:250 or 500,000?)	Geological Map Sheet: Figure 25
	Detailed geological map of the immediate area of the concessions. (1:50,000 or 100,000)	Geological Map Sheet: Figure 25
N.	**Other Issues and Considerations**	



Geoscience BC

Legend

- ■ Proposed Geothermal Plant Location
- Proposed Transmission Line
- Existing Substation
- Existing Transmission Line
- Paved Road
- Other Road
- 🟩 Park, Eco-Reserve, Protected Area
- 🟥 First Nations Reserve

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Service Layer Credits: Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

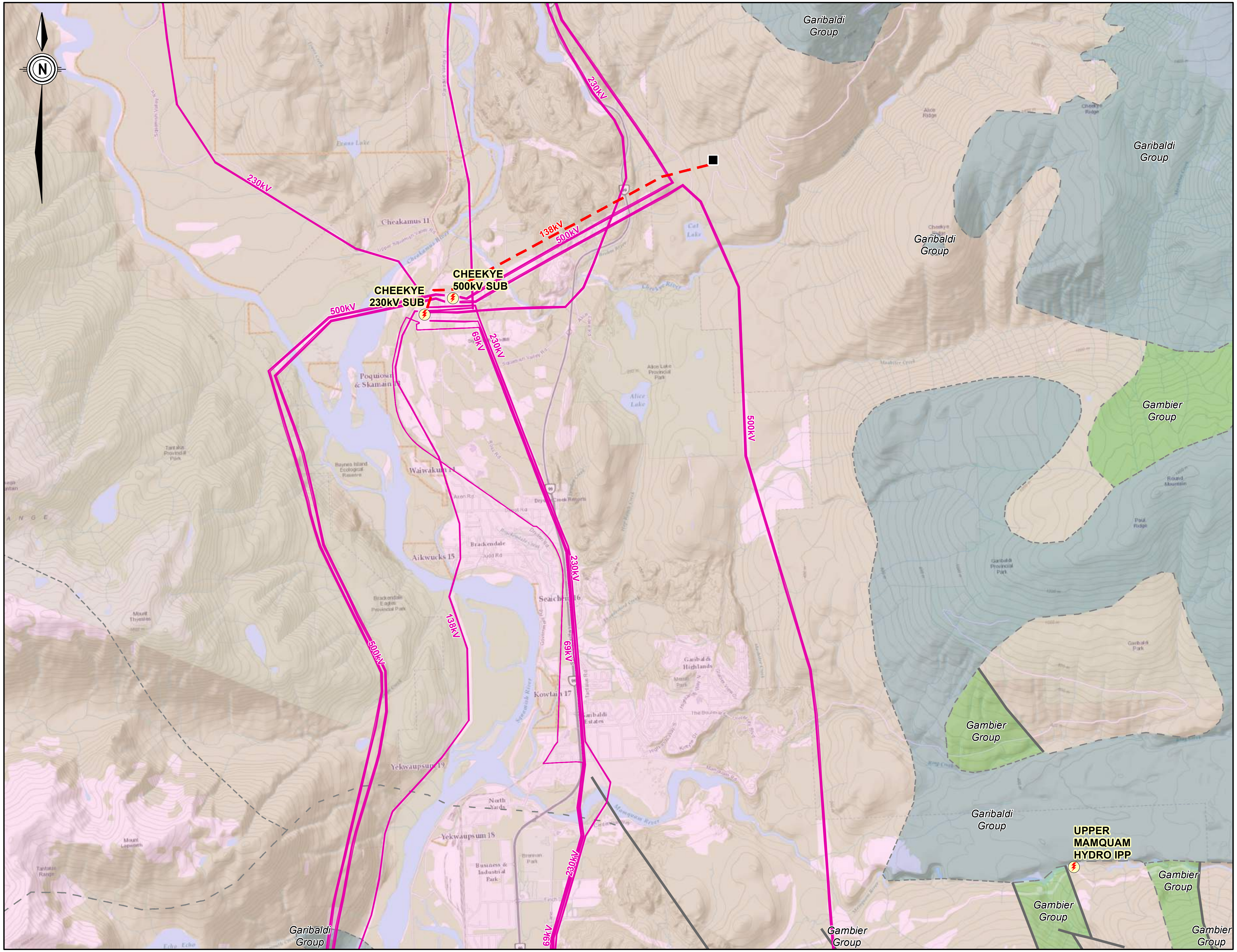
1 0 1
Kilometers

Project No.	Date
2692-004	April 30, 2015

Potential Geothermal Plant at Mt. Garibaldi 50MW

Figure 24

Path: Q:\2600-2699\2692-004\430-GIS\MXD-RP\2692004_GeothermalLocations_mapbook.mxd Date Saved: 2015-04-27 2:55:05 PM
Author: RTaylor



Geoscience BC

Legend

■ Proposed Geothermal Plant Location

Proposed Transmission Line

Existing Substation

Existing Transmission Line

Bedrock Type

Intrusive Rocks

Sedimentary Rocks

Volcanic Rocks

Rock Type Boundary

Fault

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Service Layer Credits: Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

1 0 1
Kilometers

Project No.
2692-004

Date
April 30, 2015

Geological Strata Map for Mt. Garibaldi 50MW

Figure 25

Path: Q:\2600-2699\2692-004\430-GIS\MXD-RP\2692004_GeothermalLocationsGeology_mapbook.mxd Date Saved: 2015-04-27 3:08:11 PM
Author: RTaylor

Appendix N

Mount Silverthrone – Knight Inlet Geothermal Development Decision Matrix and Figures 26 & 27

MT. SILVERTHRONE - KNIGHT INLET

Near Kleena Kleene, British Columbia, Canada
Topographical Map Sheet: Figure 26
Geological Map Sheet: Figure 27

Category		Comments
A.	**Reservoir Potential**	
	Size/Potential/Type	• **Reservoir size:** N/A (no area or depth defined in literature) - therefore, reservoir volume estimated* at between: 2.2 km^3 and 7.0 km^3 (with a most-likely area for any single spring of 2 km^2 and most-likely thickness of 1.1 km). The minimum estimate is calculated for a single spring, and the maximum estimate is calculated using two hot springs (Canyon Lake and Pinter springs) and a separation of 2.4 km. (*Reservoir assumptions made using Appendix III in GeothermEx, 2004) • **Potential:** 50 MW (Lovekin & Pletka, 2009). This MW capacity was based on the size of the volcanic complex, and may be overly optimistic. • **Type:** Most likely a low-temperature resource, suitable for binary power plant.
	Temperature/Water and Gas Chemistry/Mineral Indicators	**Surface features:** • Canyon Lake Spring: 58°C - spring seeps from the ground over a large area (MacDonald, 1978) • Pinter Spring: unknown • Hoodoo Creek Spring: unknown **Geothermometry:** • No information **Exploration drilling:** • None performed **Water chemistry:** • No information **Mineral indicators:** • No information
	Surface Flow Rates and Reservoir Recharge	Canyon Lake spring: ~2 L/s from a spring, forms a small stream and flows down into the southeast end of the lake (MacDonald, 1978)
	3D Permeability (heat exchange potential)	Permeability is likely related to faulting, with good heat-exchange potential.
	Recent Magmatism	The lava flows that form Mt. Silverthrone date to between 80,000 and 750,000 years old (Orr and Orr, 2006). Tertiary volcanic outcroppings have also been mapped ~65 km to the west and north of the project area (Roddick and Tipper, 1985).
	Structural Setting	A NNW-SSE trending fault runs along the east side of the Klinaklini River valley, forming a chain of lakes along the range front (Devereux, Laura, and Canyon Lakes) (BC MEM, 2013). On the NW flank of Lancers Mountain (about 15 km east of Canyon Lake Spring), there is a mapped dike swarm trending NW-SE.
	Geophysics	No information
	Reservoir Host Rock	Unknown - possibly fractured/faulted plutonic or metamorphosed units.
	Drilling Issues	• Road access to the area is limited - any existing roads would likely need improvement to handle drilling equipment. No apparent roads to Hoodoo Creek spring in the valley north of Lancers Mountain. • A water-rafting company advertises that it makes a stop for soaking in the natural hot springs in the area, although the specific spring and its location are not noted (Gordon's Travel Guide, 2015). • The Dzawadi/Upper Klinaklini River Conservancy lands begin ~ 10 km north of the present geothermal title tract boundary. The Dzawadi/Klinaklini Estuary Conservancy lies at the head of Knight Inlet where it meets the river. It is not apparent whether either would affect access to the Mt. Silverthrone prospect.

MT. SILVERTHRONE - KNIGHT INLET

Near Kleena Kleene, British Columbia, Canada
Topographical Map Sheet: Figure 26
Geological Map Sheet: Figure 27

Category		Comments
	Brief Description of Geological Setting of Thermal Features (i.e., springs emanate from fluvial gravels; beside a river, etc.)	• Mt. Silverthrone lies within the Coast Plutonic Complex, a complex plutonic and metamorphic belt Triassic to Tertiary in age (Monger and Journeay, 1994). The Silverthrone caldera is part of the Pemberton Volcanic Belt, which is circumscribed by a group of epizonal intrusions (Jessop, 1991). At another deeply eroded caldera complex called Franklin Glacier Volcano (FGV), the Pemberton Volcanic Belt merges with the Garibaldi Volcanic Belt at its NW-most end. The granites of the Franklin Glacier volcanic complex underlie an area of ~130 km^2, near Mt. Silverthrone and were intruded in two phases between 8 and 2 million years ago (Orr and Orr, 2006). • The Silverthrone volcanics range in composition from basaltic andesite to rhyolite, and the Franklin Glacier volcanics are dacitic and andesitic (Smellie and Chapman, 2003). • The springs are located in the valley immediately west of the FGV and ESE of Mt. Silverthrone. • The Canyon Lake spring and Pinter spring are all mapped within the Central Gneiss Complex, with Canyon Lake Spring more specifically in dioritic granitoid gneiss, and Hoodoo Creek in siliceous granitoid gneiss. The dioritic complex (which Canyon Lake Spring lies within) dips steeply to moderately beneath the main body of the Central Gneiss Complex to the east. Central Gneiss Complex exhibits steep structural dips, and likely much isoclinal folding, which appears to be related to movement along the faults in the area (Roddick and Tipper, 1985).
B.	**Exploration Uncertainty (Risk)**	
	Degree of Identification of Resources/Reserves	Low • Only moderate geologic mapping done, no known geophysical or geochemical studies conducted. No drilling in area known. • In 2009, Sierra Geothermal signed an MOU with the Da'naxda'xw/Awaetlala Nation to develop geothermal power projects on their traditional lands, covering approximately 800,000 hectares at Knight Inlet (Richter, 2009). • In 2010, Sierra Geothermal Power Corp. submitted the winning bid in the BC Ministry of Energy, Mines, & Petroleum Resources permit auction for the Knight Inlet parcel of 8,000
	Likelihood of Covering Reservoir with Concession	Moderate Concession covers Canyon Lake and Pinter Springs which are about 2.4 km apart. Hoodoo Creek Spring (about 15 km NE of Canyon Lake Spring) is about 5 km east of the concession.
	Expected Authorization Date	Unknown
	Specific Timing of Exploration (2 + 2 years, BC 8 years, etc.)	5-6 years (1 year deep gradient-well drilling + 2 year successful development drilling and testing + 1 year further development drilling and start plant construction + 1 year drilling wrap-up and finish plant construction). Possible delays due to issues of access.
	Degree of Previous Exploration (can be good or bad)	Low Geologic mapping only known exploration in area.
	Surface Operational Capacity (enough stable area for drilling and a plant?)	Unknown Area has little infrastructure. Any work would involve construction of roads and clearing areas for well pads/drilling. Area for surface operations would need to be assessed - unclear if river valley would be suitable or if area uphill would need to be constructed for a suitable plant location.
	Exploration to Exploitation: A summary rating of Exploration Uncertainty (risk) on a scale of difficult (high risk) through medium (moderate risk) to easy (low risk)	Difficult Area may largely only accessible by boat or helicopter at present. Roads conditions in lower river valley unknown.

MT. SILVERTHRONE - KNIGHT INLET

Near Kleena Kleene, British Columbia, Canada
Topographical Map Sheet: Figure 26
Geological Map Sheet: Figure 27

Category		Comments
C.	**Environmental Issues**	
	Protected Areas	• Proposed transmission line in section of Elk Falls Provincial Park. • Rock bay Marine Provincial Park is less than 1km from proposed transmission line. • Thurston Bay Marine Provincial Park, the next nearest protected area, is approx. 12 km away.
	Endangered Species	• Northern Red-legged Frog (Special Concern (SARA Schedule 1); blue-listed) occurrence polygon located directly under proposed transmission line. • Approximately eight plant species at risk located within a 5 km radius of the proposed transmission line and proposed plant.
	Geothermal Surface Features	• Canyon Lake Hostsprings approx. 2 km from proposed plant location. • Pinter Hotsprings approx. 3 km from proposed plant location. • Franklin Hotsprings approx. 7 km from proposed transmission line. • Phillips Arm Hotsprings approx. 18 km from transmission line.
	Other	• Proposed transmission line crosses approximately 9 water bodies with observed fish. Campbell River contains Coho Salmon, Chinook Salmon, Pink Salmon and Steelhead trout. Devereux contains Coho Salmon, Sockeye Salmon, Chinook Salmon, Pink Salmon, Chum Salmon and Steelhead Trout. Franklin River which has observed Chinook Salmon, Chum Salmon and Coho Salmon. Frazer Creek contains Pink Salmon, Chum Salmon, and Coho Salmon. Grassy Creek and Gray Creek contain Coho Salmon, Pink Salmon and Chum Salmon. • Proposed Wildlife Habitat Area allotment for Marbled Murrelet is approx 2.7 km form proposed transmission line.
D.	**Geothermal Area - Bidding and/or Type of Land Holding (private/government/lease/etc.)**	
	Bidding Area	Site location within existing cancelled geothermal tract.
	Other Claim Rights (mining and/or oil)	No existing mineral or coal titles at plant location. Proposed location is not within known oil and gas management area; no known tenures at proposed location.

MT. SILVERTHRONE - KNIGHT INLET

Near Kleena Kleene, British Columbia, Canada
Topographical Map Sheet: Figure 26
Geological Map Sheet: Figure 27

Category		Comments
E.	**Market**	
	Main Electricity Consumers (direct sales and/or government)	General Overview 1. BC Hydro acquires power from Independent Power Producers (which would include geothermal proponents) through two main processes: • Competitive calls: when BC Hydro issues a Call for Tenders for the supply of electricity to BC Hydro, geothermal proponents can bid into those competitive calls. • Standing Offer Program (SOP): This program is presently available for clean generation projects greater than 0.1 MW but not more than 15 MW. Proponents do not compete against each other but are paid a predetermined price by BC Hydro. Depending on the specifics of each project, proponents may wish to size their projects to be under the 15 MW threshold for the SOP (BC Hydro is developing a 'mini-SOP' component within the overall SOP. This mini-SOP will apply to projects in the 0.1 MW to 1 MW range, but would not realistically apply to potential geothermal generation projects). • In addition, BC Hydro's net metering program is designed for residential and commercial customers who wish to connect a small electricity generating unit to the BC Hydro distribution system. Generating units up to 0.1 MW in capacity that utilize a clean or renewable resource are eligible to participate in the program. Given the small size, this program has no applicability to potential geothermal generation projects. The acquisition of geothermal power would contribute to BC Hydro's current target for clean energy and to the diversification of BC Hydro's resource mix, making it less reliant on snow melt and stream flow. 2. Although FortisBC is a potential customer for electricity from geothermal sources, the opportunities may be limited given FortisBC's ability to receive electricity from BC Hydro under Rate Schedule 3808. However there is a wheeling agreement in place which would facilitate a geothermal project located in FortisBC's service territory to sell electricity to BC Hydro through BC Hydro's competitive calls and/or the SOP, or to other potential customers as noted below. 3. Wholesale wheeling (whereby electricity is transmitted from electricity generators to utilities) to customers in Alberta, the US, or other wholesale customer in BC is allowed. The generation supplier must request service on the appropriate BC Hydro transmission line under the Open Access Transmission Tariff (OATT) at a regulated cost for that service. Depending on the end customer, the generation supplier will have to make similar arrangements to cover transmission access in other jurisdictions (e.g. the Bonneville Power Authority for wheeling to a US customer). This 'pancaking' of rates, along with congestion issues, affects the economic viability of the potential wholesale opportunity. 4. Retail access, defined as a market in which electricity is sold directly to consumers by competing suppliers, is generally not permitted in BC. However there may be opportunities for bilateral arrangements for direct sales of electricity from geothermal generating plants to large customers (e.g. pulp mills, large sawmills, mines) as follows: • To replace the electricity supplied at a high voltage from BC Hydro under BC Hydro Transmission Rate 1823 of the Electric Tariff. Such replacement would be challenging given the rates charged under that tariff. • To supply electricity to a remote facility (e.g. a mine, LNG plant or other industrial facility) directly from a geothermal plant located in close proximity to the facility, thereby precluding the need for a lengthy transmission line to connect to the BC Hydro electrical grid. • Taseko's Gibraltar Mine is located approximately 300 km from the Mt. Silverthrone – Knight Inlet site.

MT. SILVERTHRONE - KNIGHT INLET

Near Kleena Kleene, British Columbia, Canada
Topographical Map Sheet: Figure 26
Geological Map Sheet: Figure 27

Category		Comments
	Time Limits? (business agreements, operating/generating-by deadlines?)	• BC Hydro has issued competitive Calls for Tender for the supply of electricity in the past. • BC Hydro's SOP is presently directly available for clean energy projects which meet certain criteria, including a generation output of less than 15 MW. • Typical BC Hydro Energy Purchase Agreements from Independent Power Producers are 20-40 years in duration. • Business agreements with the owners of private transmission lines (e.g. independent power producers) for access to the market will be necessary. • The lead times to develop geothermal resources will include appropriate allowances for investigative drilling, technical and environmental studies, public consultation, transmission considerations, marketing, licencing, design, construction and commissioning. These lead times will vary from four to seven years depending on the specifics of each project. Projects with a history of exploration and analysis (e.g. Meager Creek/Pebble Creek, Lakelse, and Canoe Creek) will generally be on the shorter end of this time continuum, while other projects with less investigative work will take longer. Although the time required to drill a geothermal well and construct a power plant could conceivably be less than two years, the key uncertainties inherent in the environmental review, public consultation, transmission arrangements (either with BC Hydro or a private transmission owner), and the permitting and regulatory processes will realistically result in a further two years at a minimum for these activities.
F.	**Transmission Line Infrastructure**	
	State of the Infrastructure	Closest Substation is Island Cogen substation near Campbell River.
	Transmission Route (distance, terrain and costs)	New 138 kV transmission line 165 km with interconnection at Island Cogen Substation. Extremely remote, routing following shoreline for majority of routing and following existing unpaved roads where possible.

MT. SILVERTHRONE - KNIGHT INLET

Near Kleena Kleene, British Columbia, Canada
Topographical Map Sheet: Figure 26
Geological Map Sheet: Figure 27

Category		Comments
H.	**Community Issues**	
	Indigenous Law and Indigenous Development Areas	• First Nation Consultative Areas include Da'naxda'xw/Awaetlala First Nation, Nanwakolas First Nation, Toosey Indian Band, Ulkatcho First Nations, Tsilhqot'in National Government, Tl'etinqox-T'in Government Office (Anaham Indian Band). • Powerline routing will impact We Wai Kai and We Wai Kum First Nation as well. • The Kwakiutl District Council is a political organization ensuring the "Kwakwaka'wakw are the rightful owners and managers of the lands, waters and natural resources" of the territory. (http://danaxdaxw.com/index.php/page,7.html)
	Community Action	• Da'naxda'xw First Nation is challenging BC Ministry of Mines and Natural Gas in relation to a hydro-electric power project within traditional territory (2015) (http://www.blg.com/en/newsandpublications/publication_3667) • Campbell River Official Community Plan includes community energy and emissions plan reference to reduce greenhouse gas emissions, more sustainably manage energy and explore renewable energy opportunities in Campbell River; includes renewable energy under economic development (Campbell River Official Community Plan)
	Surface Rights	• First Nation Consultative Areas include Da'naxda'xw/Awaetlala First Nation, Nanwakolas First Nation, Toosey Indian Band, Ulkatcho First Nations, Tsilhqot'in National Government, Tl'etinqox-T'in Government Office (Anaham Indian Band)
	Tourism	• Knight Inlet Special Management Zone provides grizzly bear viewing potential; grizzly tours are available from a number of tour companies (http://grizzlycanada.com/knightinlet/) • Ecotourism area includes hiking, kayaking, wildlife tours.
I.	**Water Rights**	
	Availability (for example "air-cooled required")	Plant water requirement estimated approx. 63 L/s for binary plant. MAD of 355,000 L/s in Klinaklini River. No Existing water licences in vicinity of plant.
	Availability for Drilling	Drilling requirement of 20 L/s. MAD of 355,000 L/s in Klinaklini River. No Existing water licences in vicinity of plant.
J.	**Engineering**	
	Plant Location and Design	Very remote plant location. Binary geothermal plant design.
	Construction Issues	Access via 165 km of existing unpaved logging roads with unknown condition. Requirement for camp for workers likely during construction.
	Transportation Issues	Access via boat/barge and 40 km of unpaved logging roads with unknown conditions.
	Architectural Issues (Blend/hide into environment? Local styles? etc.)	None found.
	Special Construction Issues (zero emissions)	None found.
K.	**Non-Electrical Infrastructure (Roads and Habitation)**	
	Nearest Large Community > 50,000	Nanaimo, BC
	Nearest Community	Kleena Kleene, BC by distance, Campbell River is most accessible closest community by boat.
	Nearest Road and Condition	Unpaved road; logging/access road. Condition of road is unknown.
	Current Access Conditions (restrictions)	Approx. 165 km on existing unpaved logging road access to plant location. Unknown conditions of existing roads. Creek and water crossings possible.
	Terrain and Distance Factor for Road Building	No new road requirement expected. Extensive network of existing unpaved roads (logging and access)

MT. SILVERTHRONE - KNIGHT INLET

Near Kleena Kleene, British Columbia, Canada
Topographical Map Sheet: Figure 26
Geological Map Sheet: Figure 27

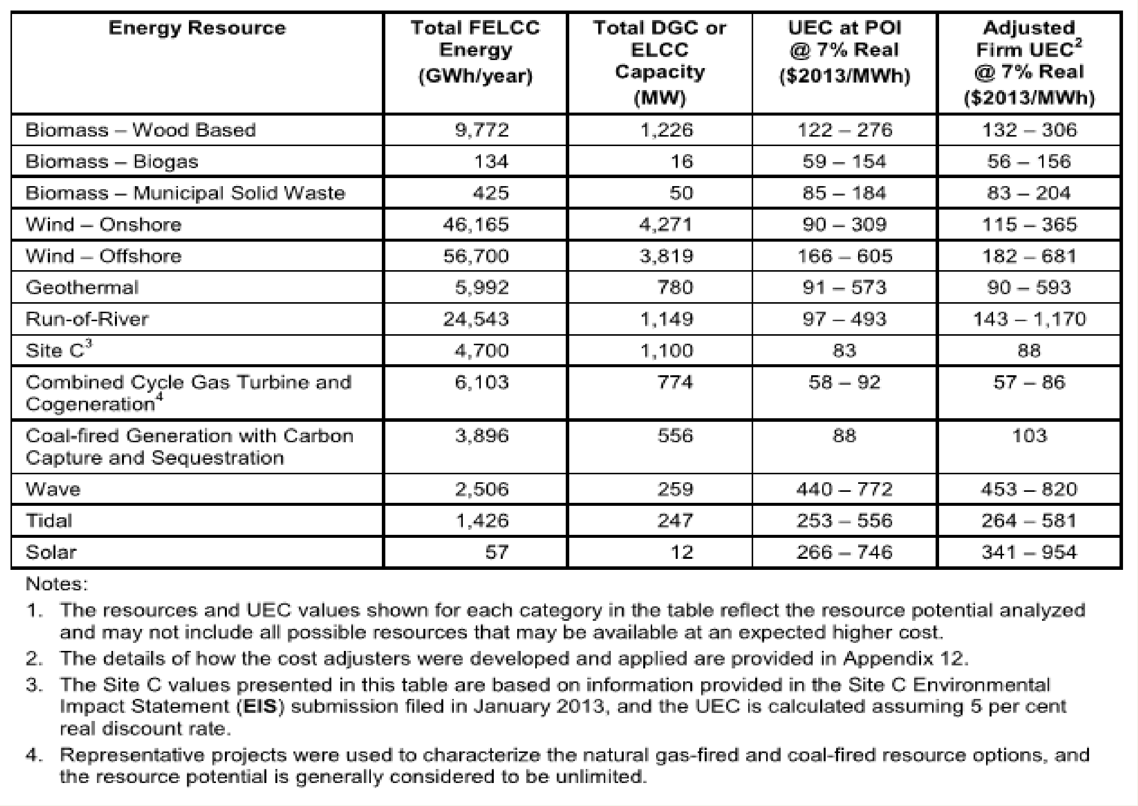
Category		Comments
L.	**Finance**	
	General Power Prices	See below

Category: General Power Prices

Comments:

BC Hydro acquires power through (1) competitive processes (Calls for Tender), (2) the Standing Offer Program (not including the mini-SOP under development), and (3) upgrades to its existing facilities or the development of new generation facilities. (Note that the net metering program targets projects less than 100 kW and is therefore not relevant to geothermal generation projects). Comments on the general price of power under each one are:

- The power price paid by BC Hydro to independent power producers through Energy Purchase Agreements (EPAs) under Calls for Tender are proprietary and confidential.
- The power price paid by BC Hydro to independent power producers through EPAs under the SOP are made up of a predetermined base price in 2010 dollars as determined by the region of the point of interconnection to the BC Hydro system, escalated at the Consumer Price Index annually up to the year in which an EPA is signed, and further adjusted based upon the time of day and month when the energy is delivered. For reference, the base price for the Lower Mainland region in 2010 dollars is $103.69/MWh.
- BC Hydro’s current Integrated Resource Plan dated November 2013 includes details of both demand-side management options and supply-side resource options to consider in meeting the future demand for electricity. These resource options, together with their attributes of total energy and capacity and unit energy costs, are listed in Table 2-2 of the November 2013 Resource Options Report Update. That table is reproduced below for ready reference.
- Table 5-7 of the above-noted November 2013 Resource Options Report Update provides a summary of the Geothermal Potential by Transmission Region.



Energy Resource	Total FELCC Energy (GWh/year)	Total DGC or ELCC Capacity (MW)	UEC at POI @ 7% Real ($2013/MWh)	Adjusted Firm UEC[2] @ 7% Real ($2013/MWh)
Biomass – Wood Based	9,772	1,226	122 – 276	132 – 306
Biomass – Biogas	134	16	59 – 154	56 – 156
Biomass – Municipal Solid Waste	425	50	85 – 184	83 – 204
Wind – Onshore	46,165	4,271	90 – 309	115 – 365
Wind – Offshore	56,700	3,819	166 – 605	182 – 681
Geothermal	5,992	780	91 – 573	90 – 593
Run-of-River	24,543	1,149	97 – 493	143 – 1,170
Site C[3]	4,700	1,100	83	88
Combined Cycle Gas Turbine and Cogeneration[4]	6,103	774	58 – 92	57 – 86
Coal-fired Generation with Carbon Capture and Sequestration	3,896	556	88	103
Wave	2,506	259	440 – 772	453 – 820
Tidal	1,426	247	253 – 556	264 – 581
Solar	57	12	266 – 746	341 – 954

Notes:

1. The resources and UEC values shown for each category in the table reflect the resource potential analyzed and may not include all possible resources that may be available at an expected higher cost.
2. The details of how the cost adjusters were developed and applied are provided in Appendix 12.
3. The Site C values presented in this table are based on information provided in the Site C Environmental Impact Statement (**EIS**) submission filed in January 2013, and the UEC is calculated assuming 5 per cent real discount rate.
4. Representative projects were used to characterize the natural gas-fired and coal-fired resource options, and the resource potential is generally considered to be unlimited.

MT. SILVERTHRONE - KNIGHT INLET

Near Kleena Kleene, British Columbia, Canada
Topographical Map Sheet: Figure 26
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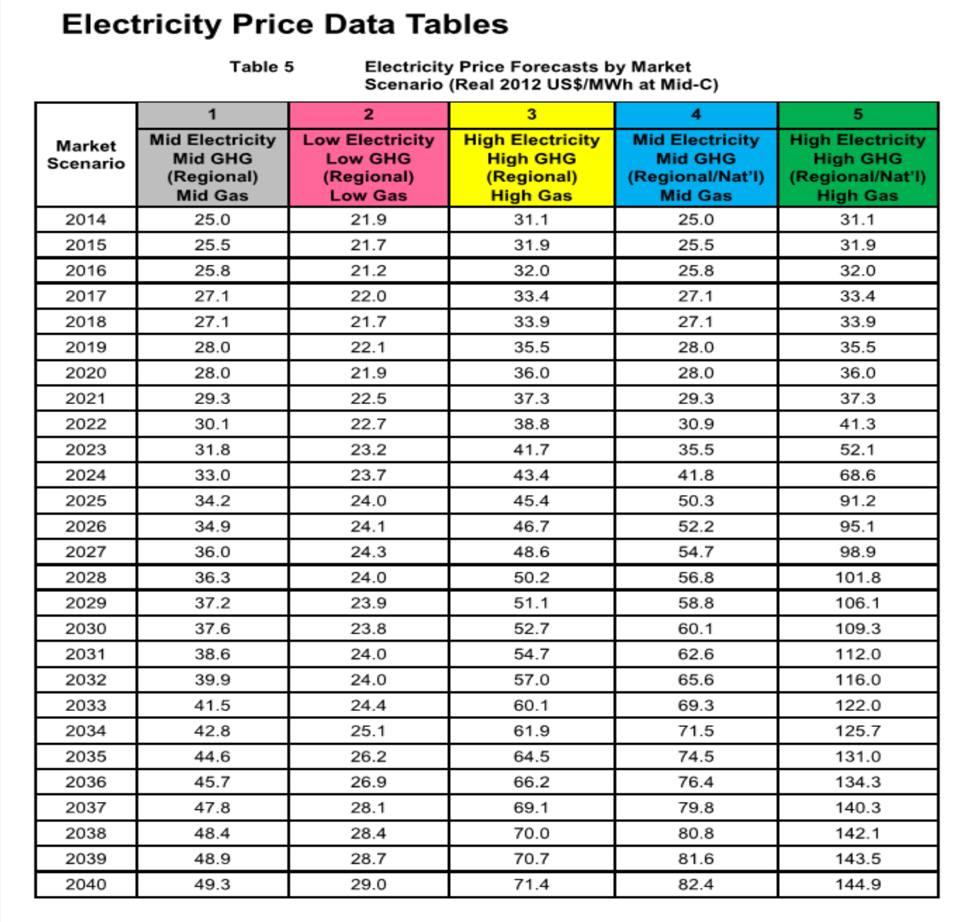
	Category	Comments
	Market Price ($/MWhr)	• As noted in the above Table 2-2 from the November 2013 Resource Options Report Update, the Unit Energy Cost for geothermal resources at a 7% real discount rate in 2013 dollars ranges from $91/MWh to 573/MWh at the point of interconnection to the BC Hydro system. • Wholesale electricity prices for trading purposes can vary greatly. In the Pacific Northwest, these prices are affected by such factors as precipitation/snowfall in the region, unforeseen generation outages and ambient temperatures. A general flavour of the wholesale electricity prices for potential export of electricity from BC can be obtained from a variety of sources. One such source is the US Energy Information Administration (www.eia.gov/electricity/wholesale/#history). This source provides current and historical electricity market data. Of particular relevance is the mid-C trading hub in the Northwest Region (one example would be a Mid-C peak price on March 17, 2015 of $19.87US weighted average cost from 72 trades). Access to that market for geothermal projects in BC would require access on both the BC Hydro transmission system to the Canada/US border, and on the appropriate transmission system (e.g. Bonneville Power Authority) in the US. • BC Hydro forecasts of market prices under various scenarios was provided in the November 2013 IRP. Table 5 in Appendix 5A – Market Forecast Data is reproduced below for ready reference.



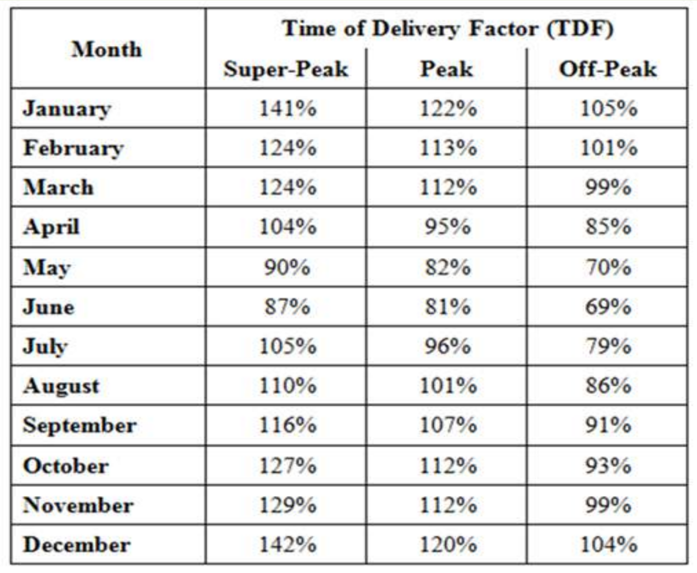
Electricity Price Data Tables

Table 5 Electricity Price Forecasts by Market Scenario (Real 2012 US$/MWh at Mid-C)

Market Scenario	1 Mid Electricity Mid GHG (Regional) Mid Gas	2 Low Electricity Low GHG (Regional) Low Gas	3 High Electricity High GHG (Regional) High Gas	4 Mid Electricity Mid GHG (Regional/Nat'l) Mid Gas	5 High Electricity High GHG (Regional/Nat'l) High Gas
2014	25.0	21.9	31.1	25.0	31.1
2015	25.5	21.7	31.9	25.5	31.9
2016	25.8	21.2	32.0	25.8	32.0
2017	27.1	22.0	33.4	27.1	33.4
2018	27.1	21.7	33.9	27.1	33.9
2019	28.0	22.1	35.5	28.0	35.5
2020	28.0	21.9	36.0	28.0	36.0
2021	29.3	22.5	37.3	29.3	37.3
2022	30.1	22.7	38.8	30.9	41.3
2023	31.8	23.2	41.7	35.5	52.1
2024	33.0	23.7	43.4	41.8	68.6
2025	34.2	24.0	45.4	50.3	91.2
2026	34.9	24.1	46.7	52.2	95.1
2027	36.0	24.3	48.6	54.7	98.9
2028	36.3	24.0	50.2	56.8	101.8
2029	37.2	23.9	51.1	58.8	106.1
2030	37.6	23.8	52.7	60.1	109.3
2031	38.6	24.0	54.7	62.6	112.0
2032	39.9	24.0	57.0	65.6	116.0
2033	41.5	24.4	60.1	69.3	122.0
2034	42.8	25.1	61.9	71.5	125.7
2035	44.6	26.2	64.5	74.5	131.0
2036	45.7	26.9	66.2	76.4	134.3
2037	47.8	28.1	69.1	79.8	140.3
2038	48.4	28.4	70.0	80.8	142.1
2039	48.9	28.7	70.7	81.6	143.5
2040	49.3	29.0	71.4	82.4	144.9

MT. SILVERTHRONE - KNIGHT INLET

Near Kleena Kleene, British Columbia, Canada
Topographical Map Sheet: Figure 26
Geological Map Sheet: Figure 27

Category	Comments
Green Power Premium ($/MWhr)	• BC Hydro’s past procurement processes for the acquisition for power from independent power producers has offered a premium for green power. • Within British Columbia, there is little demand for the purchase of “green power certificates” (instruments that a customer can purchase to be assured that the electricity used is environmentally friendly) from BC Hydro. BC Hydro’s generation mix is already approximately 93% clean. • California has a goal of 33% of retail sales by 2020 to be sourced from eligible renewable energy sources. However, the opportunity for geothermal power from British Columbia, particularly “bundled” green energy with Renewable Energy Certificates (RECs), to compete in that market is low, for a number of reasons 1. The price of electricity is driven by the low cost of natural gas; 2. There are large amounts of renewables, such as wind and solar, in California; and 3. Firm transmission access to the California market through the BPA transmission system is generally not available.
Capacity Price ($/KW)	• There is no price in $/kW for capacity resource options in the market at present. • Table 3-27 entitled "UCCs of Capacity Resource Supply Options" in BC Hydro's Integrated Resource Plan dated November 2013 provided a summary of capacity resource options (e.g. pumped storage, simple cycle gas turbines and resource smart projects such as Revelstoke Unit 6). The unit capacity costs (UCCs) at the point of interconnection to the BC Hydro system in $2013/kW-year are shown in the table.
Is there a higher price for base load power?	In general, baseload power (ie firm power) is more valuable to BC Hydro and furthermore the price paid for baseload power varies by month throughout the year. As an example, the following excerpt is taken from BC Hydro’s SOP: “1. Definitions: In this Appendix 4, the following words and expressions have the following meanings: (a) “Off-Peak Hours” means all hours other than Super-Peak Hours and Peak Hours. (b) “Peak Hours” means the hours commencing at 06:00 PPT and ending at 16:00 PPT, and commencing at 20:00 PPT and ending at 22:00 PPT, Monday through Saturday inclusive, but excluding British Columbia statutory holidays. (c) “Super-Peak Hours” means the hours commencing at 16:00 PPT and ending at 20:00 PPT Monday through Saturday inclusive, but excluding British Columbia statutory holidays.” 

Month	Time of Delivery Factor (TDF)		
	Super-Peak	Peak	Off-Peak
January	141%	122%	105%
February	124%	113%	101%
March	124%	112%	99%
April	104%	95%	85%
May	90%	82%	70%
June	87%	81%	69%
July	105%	96%	79%
August	110%	101%	86%
September	116%	107%	91%
October	127%	112%	93%
November	129%	112%	99%
December	142%	120%	104%

MT. SILVERTHRONE - KNIGHT INLET

Near Kleena Kleene, British Columbia, Canada
Topographical Map Sheet: Figure 26
Geological Map Sheet: Figure 27

Category		Comments
	Estimated Size of Resource	See Section A.
	Is there any green power incentives?	• The BC government created the Innovative Clean Energy (ICE) fund with an initial mandate to accelerate the commercialization of emerging clean energy technologies (now expanded to include a broad range of energy efficiency and conservation projects). British Columbia also has a program entitled Scientific Research and Experimental Development Tax credit (SR&ED). Geothermal proponents could keep a watching brief on these programs for applicability and relevance. • The BC government's First Nations Clean Energy Business Fund. This fund promotes increased Aboriginal community participation in the clean energy sector. It provides: o Capacity funding of up to $50,000 per applicant to cover the early stages (e.g. feasibility studies) of project development ; and o Equity funding of up to $500,000 per applicant to support a financially viable and resourced clean energy project. • There are a number of government of Canada programs to encourage the development of renewable power. Some of these programs may be active but not currently issuing calls for proposals. Others may be focussed on research and innovation and may not be directly applicable to geothermal technologies/resources, while others may be fully subscribed and even inactive but are noted in terms of completeness. Some of these programs include: o Natural Resources Canada ecoEnergy for Renewable Power program; o Sustainable Development Technology Canada funds; o Clean Energy Fund; o Industrial Research Assistance Program; and o Green Infrastructure Fund Geothermal proponents could keep a watching brief on these and other federal government programs for their applicability and relevance.
	Grants	See above under green power incentives
	Tax Holidays	None listed on federal and provincial websites.
	Tax Relief	• Under Classes 43.1 and 43.2 in Schedule II of the Income Tax Regulations, certain capital costs of systems that produce energy by using renewable energy sources or fuels from waste, or conserve energy by using fuel more efficiently are eligible for accelerated capital cost allowance. Under Class 43.1, eligible equipment may be written-off at 30 percent per year on a declining balance basis. In general, equipment that is eligible for Class 43.1 but is acquired after February 22, 2005 and before year 2020 may be written-off at 50 percent per year on a declining balance basis under Class 43.2. Without these accelerated write-offs, many of these assets would be depreciated for income tax purposes at annual rates between 4 and 30 percent. • In addition to Class 43.1 or 43.2 capital cost allowance, the Income Tax Regulations allow certain expenses incurred during the development and start-up of renewable energy and energy conservation projects [Canadian renewable and conservation expenses (CRCE)] to be fully deducted in the year they are incurred, carried forward indefinitely and deducted in future years, or transferred to investors through a flow-through share agreement.

MT. SILVERTHRONE - KNIGHT INLET

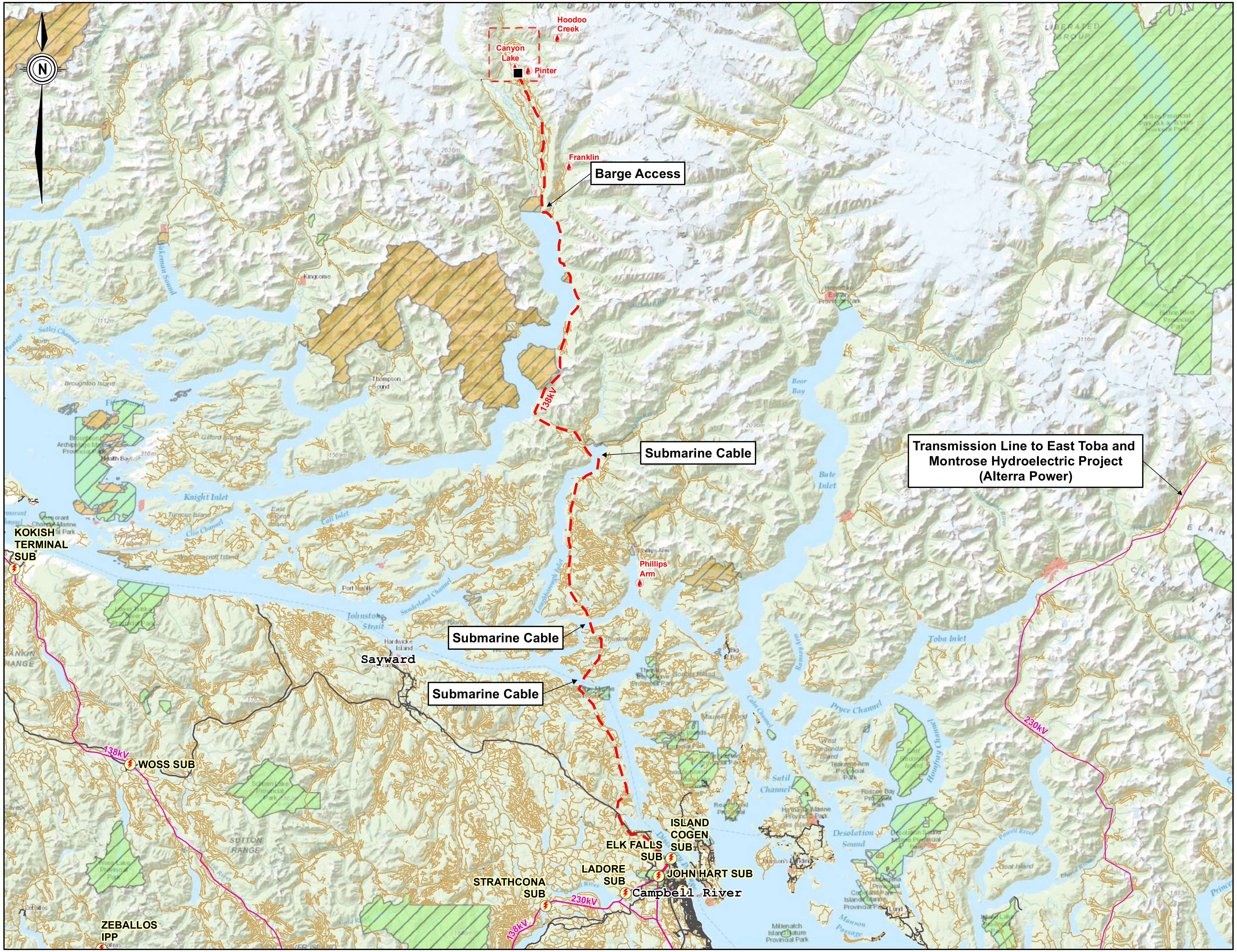
Near Kleena Kleene, British Columbia, Canada
Topographical Map Sheet: Figure 26
Geological Map Sheet: Figure 27

	Category	Comments
	Loan Guarantees	The following is an excerpt from http://www.fnfa.ca/en/fnfa/ “The First Nations Finance Authority (FNFA) is a statutory not-for-profit organization without share capital, operating under the authority of the First Nations Fiscal Management Act, 2005. The FNFA’s purposes are to provide investment options and capital planning advice and—perhaps most importantly, access to long-term loans with preferable interest rates. The FNFA is not an agent of Her Majesty or a Crown corporation and is governed solely by the First Nations communities that join as Borrowing Members. The advantages of joining the FNFA as a Borrowing Member are: 1. Access to low rate, below bank prime, loans with repayment terms up to 30 years; 2. First Nations choose the repayment terms that work best for their budget; 3. FNFA loans do not require collateral; 4. FNFA loans can be used to refinance existing debt; and 5. FNFA’s interest rates and terms parallel those available to provincial and local governments. Most revenue streams are eligible to support FNFA loan requests. Eligible capital projects FNFA can finance include infrastructure, social and economic development, land purchases, independent power projects, community housing and rolling stock/heavy equipment. FNFA is a stand-alone organization separate from the Government of Canada, and its operating policies are set by its Borrowing Members, represented by the First Nation’s Chief and Council appointee. The FNFA is for First Nations, by First Nations.”
	Royalties/Fees	Geothermal Resources Act, [RSBC 1996] CHAPTER 171, as of March 11, 2015 Permits for well authorizations for wells to be drilled within the boundaries of the permittee's location must pay a prescribed rent for the permit (Section 5). Based on Section 17 of the Act, (1) A lessee who produces a geothermal resource for purposes other than testing must pay to the government (a) a royalty established by agreement under this section, (b) an amount agreed under this section to be paid instead of royalty, or (c) if no royalty or amount has been agreed under this section, the prescribed royalty.
	General Idea of Royalties	With regard to use of the water resources within the geothermal tract, Section 4 of the Water Sustainability Act states “This Act does not apply to geothermal resources as defined in section 1 (1) [definitions] of the Geothermal Resources Act.”
	Private Land Owner or Government Land	Geothermal proponents will need to arrange financial agreements (eg leases or purchases) with private property owners for the geothermal land tract. Proponents for geothermal facilities on Crown Land must apply for the appropriate tenure under the BC Land Act (eg Statutory Right of Way, Licence of Occupation).
	Tax Rate in the Country	• Income eligible for small-business deduction (up to $500,000 income): 11% Federal tax, combined federal and provincial (British Columbia): 13.5%. • Income not eligible for small-business deduction: 15% Federal, combined federal and provincial (British Columbia): 26%
	Transmission Tariffs	Under wholesale wheeling (whereby electricity is transmitted from electricity generators to utilities) to customers in Alberta, the US, or other wholesale customers in BC, the generation supplier must request service on the appropriate BC Hydro transmission line under the Open Access Transmission Tariff (OATT) at a regulated cost for that service. Depending on the end customer, the generation supplier will have to make similar arrangements to cover transmission access in other jurisdictions (e.g. the Bonneville Power Authority for wheeling to a US customer). This ‘pancaking’ of rates, along with transmission congestion issues, affects the economic viability of the potential wholesale opportunity.

MT. SILVERTHRONE - KNIGHT INLET

Near Kleena Kleene, British Columbia, Canada
Topographical Map Sheet: Figure 26
Geological Map Sheet: Figure 27

Category		Comments
M.	**Maps**	
	Regional topographic map showing population centres, roads and other infrastructure including electrical grid and nearest substation and/or generating station. (1:500,000?)	Topographical Map Sheet: Figure 26
	Regional map showing land tenure in area – geothermal concessions, mining concessions, private land holds, public or national lands (parks). (1:500,000?)	Topographical Map Sheet: Figure 26
	Regional geological map. (1:250 or 500,000?)	Geological Map Sheet: Figure 27
	Detailed geological map of the immediate area of the concessions. (1:50,000 or 100,000)	Geological Map Sheet: Figure 27
N.	**Other Issues and Considerations**	



Geoscience BC

Legend

■	Proposed Geothermal Plant Location
●	Thermal Spring
— —	Proposed Transmission Line
⚡	Existing Substation
—	Existing Transmission Line
—	Paved Road
—	Other Road
▨	Conservancy
▨	Park, Eco-Reserve, Protected Area
🟥	First Nations Reserve

Geothermal Title Tract

⌜⌟	Cancelled

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Service Layer Credits: Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

10 0 10
Kilometers

Project No.	Date
2692-004	April 30, 2015

Potential Geothermal Plant at Mt. Silverthrone - Knight Inlet 50MW

Figure 26

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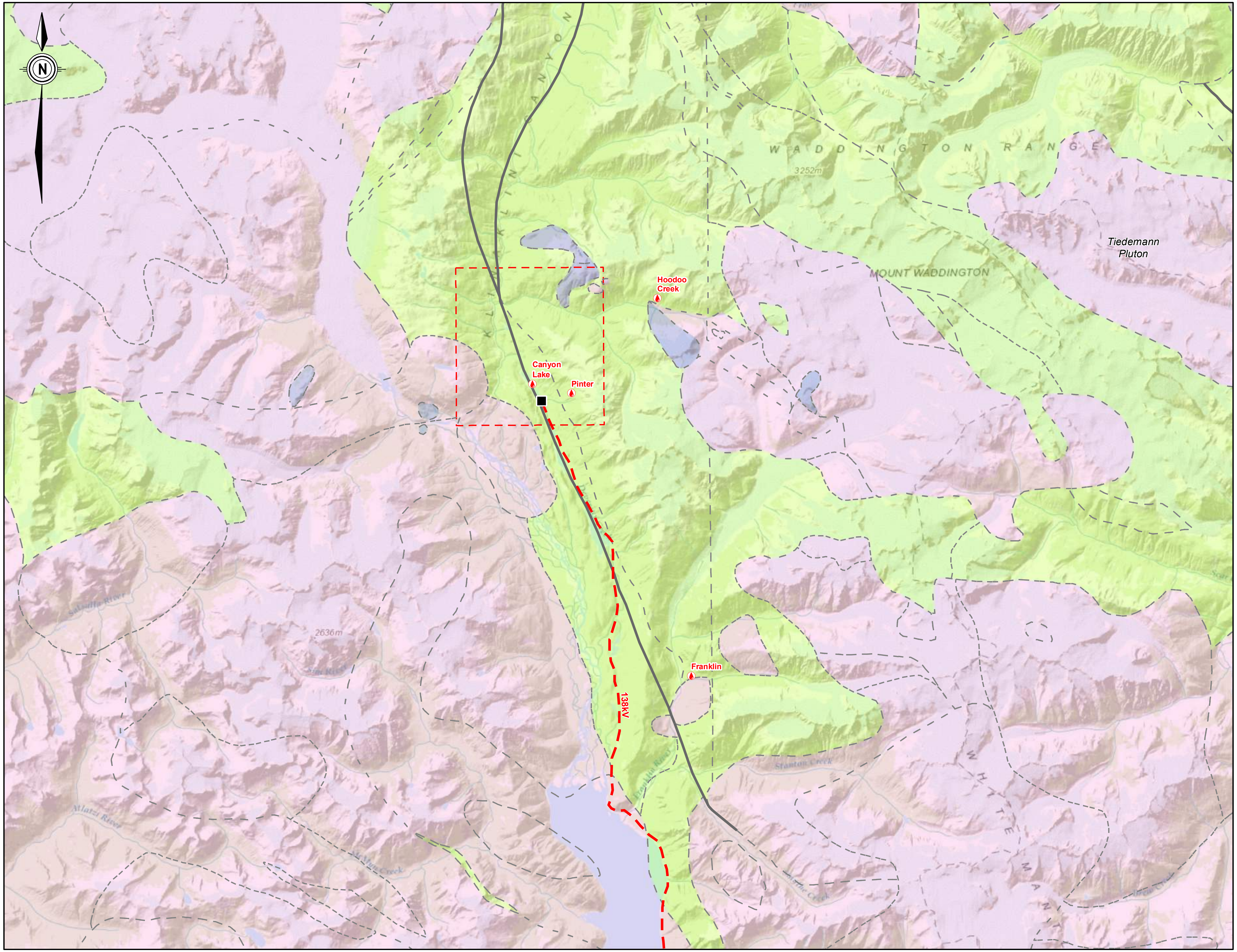
Author: RTaylor



Geoscience BC

Legend

■ Proposed Geothermal Plant Location

Thermal Spring

Proposed Transmission Line

Geothermal Title Tract

Cancelled

Bedrock Type

Intrusive Rocks

Metamorphic Rocks

Volcanic Rocks

Rock Type Boundary

Fault

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6 0 6
Kilometers

Project No.	Date
2692-004	April 30, 2015

Geological Strata Map for Mt. Silverthrone - Knight Inlet 50MW

Figure 27

Path: Q:\2600-2699\2692-004\430-GIS\MXD-RP\2692004_GeothermalLocationsGeology_mapbook.mxd Date Saved: 2015-04-27 3:18:32 PM
Author: RTaylor

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Appendix O

Nazko Cone Geothermal Development Decision Matrix and Figures 28 & 29

NAZKO CONE

Near Quesnel, British Columbia, Canada
Topographical Map Sheet: Figure 28
Geological Map Sheet: Figure 29

Category		Comments
A.	**Reservoir Potential**	
	Size/Potential/Type	• **Reservoir size:** N/A (no area or depth defined in literature) - therefore, reservoir volume estimated* at: 2.2 km^3 (most-likely area: 2 km^2; most-likely thickness: 1.1 km) (*Reservoir assumptions made using Appendix III in GeothermEx, 2004) • **Potential:** Assume 10 MW, compatible with generic reservoir volume (above) in vicinity of single spring, for reservoir temperatures in range of 150˚C to 200˚C. • **Type:** unknown, likely binary
	Temperature/Water and Gas Chemistry/Mineral Indicators	**Surface features:** • Surface features include travertine deposits, soil gas seepages, organic soil mixed with calcium carbonate mud and pools of stagnant or slow-flowing water. These features observed in two wetlands (the North and South bogs) NW of the Nazko cone. In the carbonate-mud-dominated parts of the bog, carbon dioxide can be observed as bubbles seeping through the bottom sediment of stagnant ponds and a calcium-carbonate (possibly aragonite) precipitate often occurs on the water surface. Travertine is typically a rusty to white-colored rubble forming small, isolated and elevated areas in the bogs. Near the northern edge of the North bog, there is a small, 35-cm-high inverted cone-shaped travertine deposit concealed by undergrowth. This cone encloses a partially submerged vent from which there is a steady flow of carbon dioxide. There is a less active carbon dioxide seep from another vent on a rusty travertine mound close to the east edge of the South bog. The area also experiences snow-free wetland areas in winter. (Lett & Jackaman, 2014). **Geothermometry:** • None available. **Exploration drilling:** • No known drilling or boreholes in or around Nazko cone (closest known borehole ~ 60 km SW). **Water chemistry:** • Previous sampling by Alterra Power Corp of gas seepage in the bogs revealed that CO_2 had negative $^{\delta}$13C values in addition to traces of CH_4 and He, suggesting a magmatic and possibly geothermal source for the gas. However, median bog-water temperatures of 14.5°C, measured in 2013, suggested that surface upwelling of thermal water from depth is unlikely (Lett & Jackaman, 2015). **Mineral indicators:** • Analysis of the carbonate mud in the bogs revealed a dominance of aragonite (66%), with equal parts remaining of calcite and dolomite, precipitated from the carbon-enriched surface water (Lett & Jackaman, 2014).
	Surface Flow Rates and Reservoir Recharge	Unknown
	3D Permeability (heat exchange potential)	Unknown
	Recent Magmatism	• Nazko cone was formed by at least 3 episodes of Quaternary volcanic activity (Middle Pleistocene to Holocene)with the last eruption ~ 7,200 years ago (Souther et al., 1987). • A seismic swarm occurred in 2007-8 near Nazko cone (the first recorded seismicity in this region), with initial indications that these earthquakes originated ~30 km west of Nazko cone, at a depth of 25-35 km. Over 1,000 earthquakes were observed within three weeks of 2007 Oct 2007, with reported magnitudes between 0 and 3. It is unresolved whether the quakes are due to brittle failure of rock at the tip of a dike and/or by the activation of nearby faults from changes in the local stress regime by the expansion and movement of nearby magma. Several temporary seismometers were deployed from September 2007 to June 2008 and showed significantly larger numbers of earthquakes (with 597 earthquakes observed within one six-hour period). (Hutchinson, 2009) • The seismic events were likely initiated by the migration and expansion of magma bodies at the base of the crust as a result of underplating (Hutchinson, 2012).

NAZKO CONE

Near Quesnel, British Columbia, Canada
Topographical Map Sheet: Figure 28
Geological Map Sheet: Figure 29

Category	Comments
Structural Setting	• Quaternary drift thickness in Nazko area: ~20-30 m. Chilcotin Group basalts thickness in Nazko area: likely <30 m (Andrews & Russel, 2006). The thickest accumulations of the underlying Eocene Ootsa Lake Group (OLG) rocks range from 1000 to 2000 m and are imaged in the Chilcotin Plateau southwest of Nazko (Bordet et al., 2013). In the immediate area around Nazko, the OLG is likely between 100 and 1,000 m thick. • The Cretaceous to Early Cenozoic regional structure in the area is characterized by a series of north-trending horsts and grabens that occupy a region between two regional-scale northwest- and north-trending dextral strike-slip faults, the Yalakom and Fraser faults, respectively. In the immediate area around Nazko, to the south of the cone, lie normal faults trending nearly N-S, and just north of the cone is a NNW-trending normal fault (Bordet et al., 2013).
Geophysics	• Many geophysical studies have been carried out in the Nechako Basin, including magnetotelluric (MT) surveys, seismic, airborne electromagnetic, vibroseis, bouger, and RTP (reduction to pole) magnetic. • Regional tomography shows a low-velocity anomaly is visible to a depth of ~400 km directly beneath Nazko Cone, suggesting that a deep-seated low-velocity anomaly is the source of magmatism in the Anahim volcanic belt and Chilcotin Basalt group, and that a mantle-scale process rather than lithospheric-scale process controls surface volcanism (model favors an origin for the hotspot track in the form of a mantle plume over slab edge flow) (Mercier et al., 2009).
Reservoir Host Rock	Unknown - potentially basement rock in the general area or sedimentary layers beneath the cone
Drilling Issues	None apparent - pumice/lava rock operations in area ongoing, exiting infrastructure likely adequate. Land ownership at drilling site needs to be evaluated for necessary permissions (ranchers and first-nations bands control lands in area)
Brief Description of Geological Setting of Thermal Features (i.e., springs emanate from fluvial gravels; beside a river, etc.)	• The Nazko cone is located in the Nechako basin, which is largely composed of basaltic flows of the Neogene Chilcotin Group basalts unconformably overlie volcanic rocks of the Eocene Endako and Ootsa Lake Groups (Farquharson et al., 2010). Eocene OLG strata (comprised mainly of rhyolite and dacite lavas) host low-sulphidation epithermal Au-Ag occurrences and also overlie Mesozoic volcanic and sedimentary successions containing mineral and hydrocarbon resources (Bordet et al., 2013). • The basement rocks in the area include accreted terrane successions of the Stikine (volcanic arc) and Cache Creek terranes (subduction-related accretionary complex), as well as postaccretion Jurassic to Cretaceous rock packages. In particular, Cretaceous strata of the Skeena Group (Stikine terrane) occur in the Chilcotin Plateau near Nazko. (Bordet et al., 2013) • The Nechako basin has several possible magmatic sources, including a hot spot, the edge-effects of a slab window, or extension (Hutchinson, 2012). • The 120-m tall Nazko cone is a polygenic cinder cone located at the far eastern end of the Anahim Volcanic Belt, with the base of the cone ~1,000 m in diameter (Hora & Hancock, 1995). It is the result of at least 3 episodes of Quaternary volcanic activity (Middle Pleistocene to Holocene). An eroded Pleistocene subaerial flow at the base of the pile is overlain by a subglacial mound of hyaloclastite that is, in turn, partly covered by a younger composite pyroclastic cone and associated lava flows. The oldest flow is consistent with a hot-spot model for the Anahim Belt and radiocarbon dating suggests the last eruption was ~ 7,200 years ago (Souther et al., 1987). The Nazko cone is comprised of a pyroclastic mound at its base (a subaerial, flow-layered, nonvesicular basalt), which is partially covered by a blocky, highly vesicular basalt and tuff breccia forming the western part of the cone. Postglacial deposition of red pyroclastic ash, lapilli and volcanic bombs ejected from vents in the cone created the present-day edifice (also during this eruption event, two olivine basalt lava streams flowed for several hundred meters from the volcano to the south and west) (Lett & Jackaman, 2014). • The contact between Nazko tephra and underlying glacial deposits is well exposed in numerous road cuts. The contact is sharp: basal tephra fragments rest directly on till and glaciofluvial sediments (Souther et al., 1987). • Canada Pumice Corp has mined three areas of the cone for various types of scoria and pumice (Hora & Hancock, 1995).

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Category		Comments
B.	**Exploration Uncertainty (Risk)**	
	Degree of Identification of Resources/Reserves	Low Location and size of geothermal resource has not been identified or defined. Alterra Power Corp. conducted preliminary geothermal exploration in the wetlands to the NW of the cone in 2012 (Lett & Jackaman, 2014).
	Likelihood of Covering Reservoir with Concession	Moderate Existing Crown quarry for black pumice and vesicular basalt on flanks of Nazko (Pynn, 2010). Ranchers and three first-nations bands, the Chuntezni’i, Euchinico and Lhoosk’uzt’en, control most land in the Nazko Valley, though the area is still fairly isolated (Adderly et al., 2007).
	Expected Authorization Date	Unknown
	Specific Timing of Exploration (2 + 2 years, BC 8 years, etc.)	5 years (1 year permitting and surface exploration, possibly drilling shallow temperature-gradient holes + 1 year deep gradient-well drilling + 1 year successful development drilling and testing + 1 year further development drilling and start plant construction + 1 year drilling wrap-up and finish plant construction).
	Degree of Previous Exploration (can be good or bad)	Moderate Numerous geophysical/geological studies conducted in the area; little known/published exploration data specifically for geothermal. Closest known well drilled ~60 km SW of Nazko cone.
	Surface Operational Capacity (enough stable area for drilling and a plant?)	Yes
	Exploration to Exploitation: A summary rating of Exploration Uncertainty (risk) on a scale of difficult (high risk) through medium (moderate risk) to easy (low risk)	Moderate Recent research and exploration conducted in area shows high level of interest and activity. Efforts focused on temperature gradient or slim-hole drilling to establish/define geothermal resource need to be conducted.
C.	**Environmental Issues**	
	Protected Areas	• Nearest protected area, Puntchesakut Lake Provincial Park, approx. 2 km from proposed transmission line. • Pinnacles Provincial Park approx. 2 km from proposed transmission line.
	Endangered Species	• Proposed transmission line crosses the Fraser River which contains White Sturgeon, Upper Fraser River population (Endangered (SARA Schedule 1); red-listed). • Proposed transmission line and connection in Sprengel's Sedge (red-listed plant)and Riverbank Anemone (blue-listed plant) occurrence polygons.
	Geothermal Surface Features	• Nearest surface feature hotsprings (Riske Hotsprings) are approx. 200 km from proposed infrastructure.
	Other	• Transmission line crosses approx. 20 stream crossings including the Fraser River, Nazko River and Snakin River and Uddy Creek. • Fraser River contains Sockeye Salmon, Chinook Salmon, Pink Salmon, Coho Salmon, Rainbow Trout, Dolly Varden. • Nazko River contains Chinook Salmon and Rainbow Trout. • Snaking River contains Chinook Salmon and Rainbow Trout. • Uddy Creek contains Rainbow Trout. • Nearest Wildlife Habitat Area is approx. 6 km from proposed transmission line.
D.	**Geothermal Area - Bidding and/or Type of Land Holding (private/government/lease/etc.)**	
	Bidding Area	No known existing active, cancelled or unsold geothermal title tracts
	Other Claim Rights (mining and/or oil)	Proposed geothermal plant location is within existing mineral/coal title. Proposed location is not within known oil and gas management area; no known tenures at proposed location.

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Category		Comments
E.	**Market**	
	Main Electricity Consumers (direct sales and/or government)	General Overview 1. BC Hydro acquires power from Independent Power Producers (which would include geothermal proponents) through two main processes: • Competitive calls: when BC Hydro issues a Call for Tenders for the supply of electricity to BC Hydro, geothermal proponents can bid into those competitive calls. • Standing Offer Program (SOP): This program is presently available for clean generation projects greater than 0.1 MW but not more than 15 MW. Proponents do not compete against each other but are paid a predetermined price by BC Hydro. Depending on the specifics of each project, proponents may wish to size their projects to be under the 15 MW threshold for the SOP (BC Hydro is developing a ‘mini-SOP’ component within the overall SOP. This mini-SOP will apply to projects in the 0.1 MW to 1 MW range, but would not realistically apply to potential geothermal generation projects). • In addition, BC Hydro's net metering program is designed for residential and commercial customers who wish to connect a small electricity generating unit to the BC Hydro distribution system. Generating units up to 0.1 MW in capacity that utilize a clean or renewable resource are eligible to participate in the program. Given the small size, this program has no applicability to potential geothermal generation projects. The acquisition of geothermal power would contribute to BC Hydro’s current target for clean energy and to the diversification of BC Hydro’s resource mix, making it less reliant on snow melt and stream flow. 2. Although FortisBC is a potential customer for electricity from geothermal sources, the opportunities may be limited given FortisBC’s ability to receive electricity from BC Hydro under Rate Schedule 3808. However there is a wheeling agreement in place which would facilitate a geothermal project located in FortisBC’s service territory to sell electricity to BC Hydro through BC Hydro’s competitive calls and/or the SOP, or to other potential customers as noted below. 3. Wholesale wheeling (whereby electricity is transmitted from electricity generators to utilities) to customers in Alberta, the US, or other wholesale customer in BC is allowed. The generation supplier must request service on the appropriate BC Hydro transmission line under the Open Access Transmission Tariff (OATT) at a regulated cost for that service. Depending on the end customer, the generation supplier will have to make similar arrangements to cover transmission access in other jurisdictions (e.g. the Bonneville Power Authority for wheeling to a US customer). This ‘pancaking’ of rates, along with congestion issues, affects the economic viability of the potential wholesale opportunity. 4. Retail access, defined as a market in which electricity is sold directly to consumers by competing suppliers, is generally not permitted in BC. However there may be opportunities for bilateral arrangements for direct sales of electricity from geothermal generating plants to large customers (e.g. pulp mills, large sawmills, mines) as follows: • To replace the electricity supplied at a high voltage from BC Hydro under BC Hydro Transmission Rate 1823 of the Electric Tariff. Such replacement would be challenging given the rates charged under that tariff. • To supply electricity to a remote facility (e.g. a mine, LNG plant or other industrial facility) directly from a geothermal plant located in close proximity to the facility, thereby precluding the need for a lengthy transmission line to connect to the BC Hydro electrical grid. • Two pulp mills in Quesnel may be potential direction connection consumers: Cariboo Pulp & Paper Company and West Fraser Timber Co. Ltd. The operations are approximately 110 km from the Nazko Cone site. • Pinnacle Pellet Meadowbank Inc., a wood pellet manufacturing facility, is a possible direct consumer. The facility is located approximately 110 km from the Nazko Cone site.

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Category		Comments
	Time Limits? (business agreements, operating/generating-by deadlines?)	• BC Hydro has issued competitive Calls for Tender for the supply of electricity in the past. • BC Hydro's SOP is presently directly available for clean energy projects which meet certain criteria, including a generation output of less than 15 MW. • Typical BC Hydro Energy Purchase Agreements from Independent Power Producers are 20-40 years in duration. • Business agreements with the owners of private transmission lines (e.g. independent power producers) for access to the market will be necessary. • The lead times to develop geothermal resources will include appropriate allowances for investigative drilling, technical and environmental studies, public consultation, transmission considerations, marketing, licencing, design, construction and commissioning. These lead times will vary from four to seven years depending on the specifics of each project. Projects with a history of exploration and analysis (e.g. Meager Creek/Pebble Creek, Lakelse, and Canoe Creek) will generally be on the shorter end of this time continuum, while other projects with less investigative work will take longer. Although the time required to drill a geothermal well and construct a power plant could conceivably be less than two years, the key uncertainties inherent in the environmental review, public consultation, transmission arrangements (either with BC Hydro or a private transmission owner), and the permitting and regulatory processes will realistically result in a further two years at a minimum for these activities.
F.	**Transmission Line Infrastructure**	
	State of the Infrastructure	Closest transmission line is 69 kV and 230 kV line and Red Bluff substation.
	Transmission Route (distance, terrain and costs)	New 69 kV transmission line 97 km with interconnection at existing Red Bluff substation. Routing follows existing paved road until turn off to Nazko Indian Reserve 20 km before proposed plant location then follows existing unpaved logging access roads. Varying terrain.
H.	**Community Issues**	
	Indigenous Law and Indigenous Development Areas	• First Nation consultative areas include Tsilhqot'in National Government, Toosey Indian Band, Lhoosk'uz Dene Nation, Carrier Chilcotin Tribal Council, Nazko First Nation. • Nazko First Nation is reliant of forestry activities to provide employment, development and revenue. Nazko entered into treaty agreement in 1994 to "have self-government, and implementation of traditional law and governing policies that reflect the culture of the southern Carrier people. Nazko is dedicated to long term community planning." (http://nazkoband.ca/) Note that no official community plan is currently available online. • Nazko Economic Development Corporation develops and implements economic development strategies (http://www.nazkoecdev.ca/).
	Community Action	• Quesnel Climate Change Group was developed in 2007 to mitigate the effects of climate change in their environment (http://www.bakercreek.org/Climate-Change-Group.html). • City of Quesnel CHP community energy system feasibility study (http://www.toolkit.bc.ca/success-story/city-quesnel-conducts-final-feasiblity-study-innovative-community-energy-system-north-cariboo)
	Surface Rights	• First Nation consultative areas include Tsilhqot'in National Government, Toosey Indian Band, Lhoosk'uz Dene Nation, Carrier Chilcotin Tribal Council, Nazko First Nation
	Tourism	• Several Provincial Parks surround Quesnel and the proposed project location. Significant ecotourism industry including fly-fishing, canoeing, cross-country skiing, kayaking (http://www.tourismquesnel.com/home/)

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Category		Comments
I.	**Water Rights**	
	Availability (for example "air-cooled required")	Plant water requirement estimated approx. 13 L/s for binary plant. 1 current water licence at plant location for .15 L/s for purpose of processing (licencee is Can Lava Mining Corp.).
	Availability for Drilling	Drilling requirement of 20 L/s. MAD of approx. 3000 L/s in Baker Creek. 1 current water licence at plant location for 0.15 L/s for purpose of processing (licencee is Can Lava Mining Corp.).
J.	**Engineering**	
	Plant Location and Design	Plant located in flat terrain outside of surrounding reserve land, within reasonable distance from existing paved road.
	Construction Issues	Significant distance of new transmission line to be built; no existing transmission line corridor.
	Transportation Issues	Plant location is approx. 100 km from nearest significate population centre: Quesnel.
	Architectural Issues (Blend/hide into environment? Local styles? etc.)	None found.
	Special Construction Issues (zero emissions)	None found.
K.	**Non-Electrical Infrastructure (Roads and Habitation)**	
	Nearest Large Community > 50,000	Prince George, BC
	Nearest Community	Quesnel, BC
	Nearest Road and Condition	Unpaved logging road; condition is unknown.
	Current Access Conditions (restrictions)	Approx. 100 km from closest significant population of Quesnel.
	Terrain and Distance Factor for Road Building	No new road requirement is expected.

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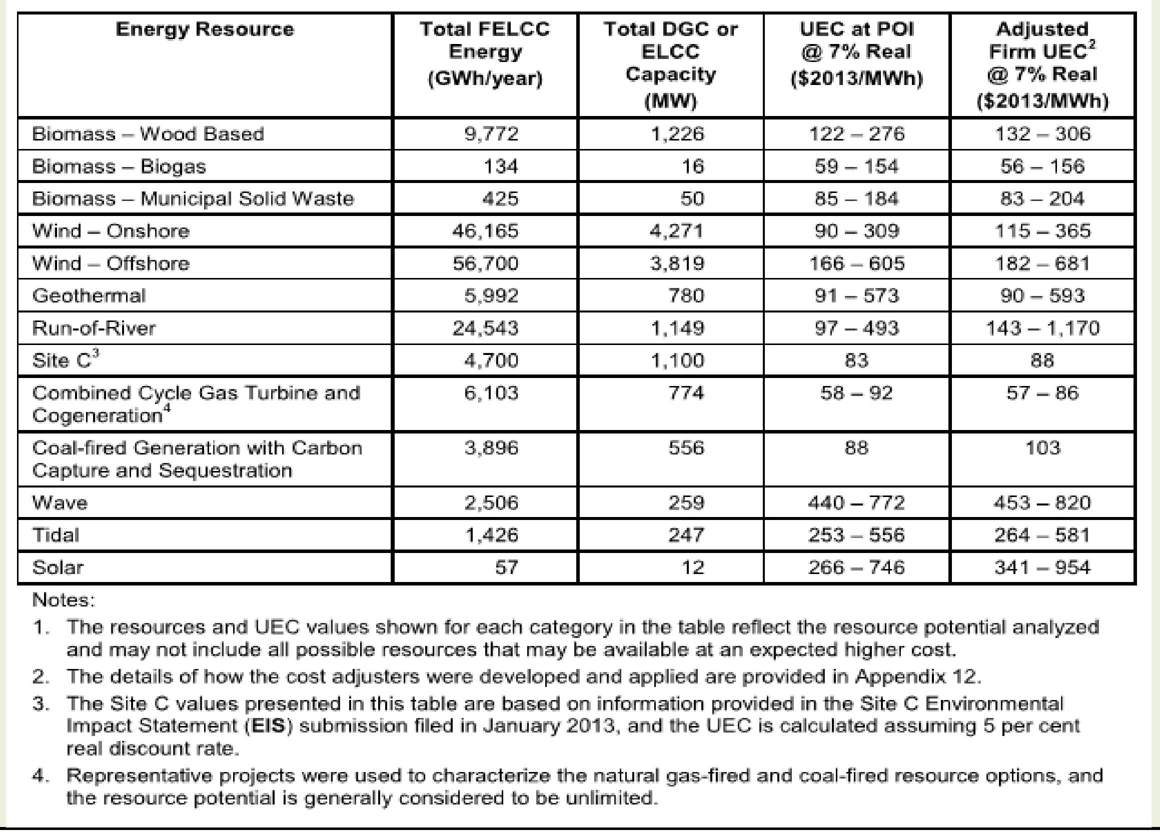
Category		Comments
L.	**Finance**	
	General Power Prices	BC Hydro acquires power through (1) competitive processes (Calls for Tender), (2) the Standing Offer Program (not including the mini-SOP under development), and (3) upgrades to its existing facilities or the development of new generation facilities. (Note that the net metering program targets projects less than 100 kW and is therefore not relevant to geothermal generation projects). Comments on the general price of power under each one are: • The power price paid by BC Hydro to independent power producers through Energy Purchase Agreements (EPAs) under Calls for Tender are proprietary and confidential. • The power price paid by BC Hydro to independent power producers through EPAs under the SOP are made up of a predetermined base price in 2010 dollars as determined by the region of the point of interconnection to the BC Hydro system, escalated at the Consumer Price Index annually up to the year in which an EPA is signed, and further adjusted based upon the time of day and month when the energy is delivered. For reference, the base price for the Lower Mainland region in 2010 dollars is $103.69/MWh. • BC Hydro's current Integrated Resource Plan dated November 2013 includes details of both demand-side management options and supply-side resource options to consider in meeting the future demand for electricity. These resource options, together with their attributes of total energy and capacity and unit energy costs, are listed in Table 2-2 of the November 2013 Resource Options Report Update. That table is reproduced below for ready reference. • Table 5-7 of the above-noted November 2013 Resource Options Report Update provides a summary of the Geothermal Potential by Transmission Region.



Energy Resource	Total FELCC Energy (GWh/year)	Total DGC or ELCC Capacity (MW)	UEC at POI @ 7% Real ($2013/MWh)	Adjusted Firm UEC^2 @ 7% Real ($2013/MWh)
Biomass – Wood Based	9,772	1,226	122 – 276	132 – 306
Biomass – Biogas	134	16	59 – 154	56 – 156
Biomass – Municipal Solid Waste	425	50	85 – 184	83 – 204
Wind – Onshore	46,165	4,271	90 – 309	115 – 365
Wind – Offshore	56,700	3,819	166 – 605	182 – 681
Geothermal	5,992	780	91 – 573	90 – 593
Run-of-River	24,543	1,149	97 – 493	143 – 1,170
Site C^3	4,700	1,100	83	88
Combined Cycle Gas Turbine and Cogeneration^4	6,103	774	58 – 92	57 – 86
Coal-fired Generation with Carbon Capture and Sequestration	3,896	556	88	103
Wave	2,506	259	440 – 772	453 – 820
Tidal	1,426	247	253 – 556	264 – 581
Solar	57	12	266 – 746	341 – 954

Notes:

1. The resources and UEC values shown for each category in the table reflect the resource potential analyzed and may not include all possible resources that may be available at an expected higher cost.
2. The details of how the cost adjusters were developed and applied are provided in Appendix 12.
3. The Site C values presented in this table are based on information provided in the Site C Environmental Impact Statement (**EIS**) submission filed in January 2013, and the UEC is calculated assuming 5 per cent real discount rate.
4. Representative projects were used to characterize the natural gas-fired and coal-fired resource options, and the resource potential is generally considered to be unlimited.

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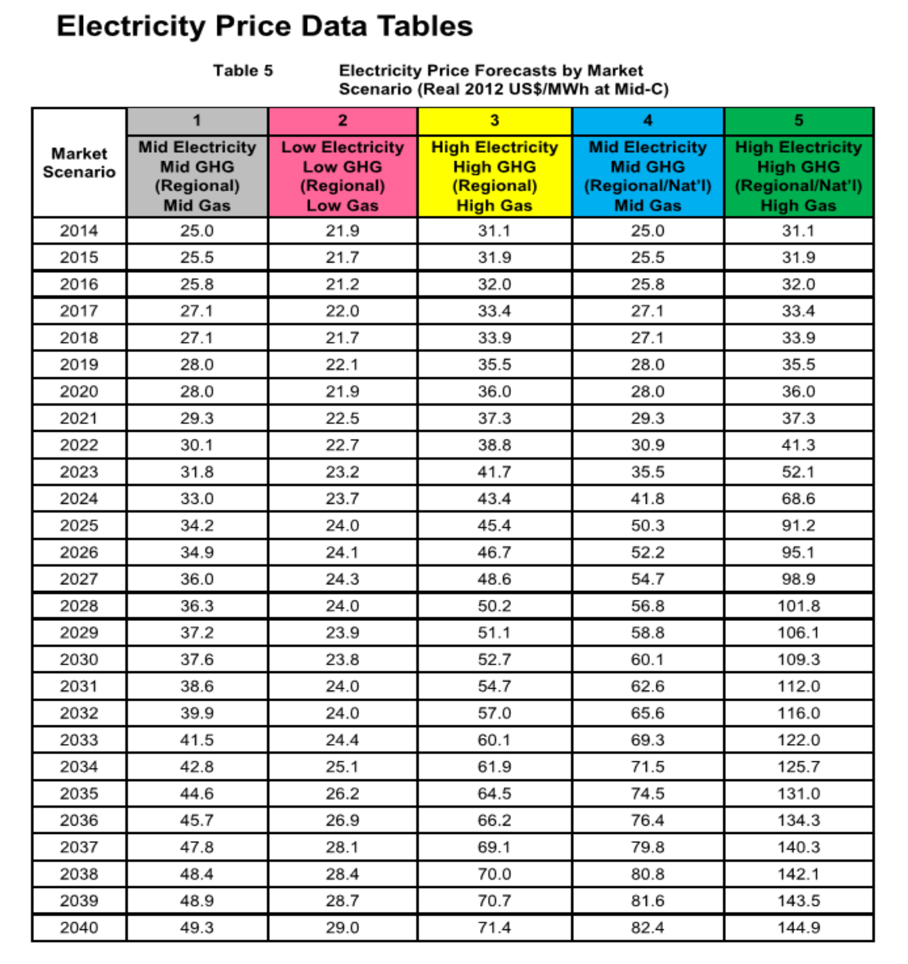
Category	Comments
Market Price ($/MWhr)	• As noted in the above Table 2-2 from the November 2013 Resource Options Report Update, the Unit Energy Cost for geothermal resources at a 7% real discount rate in 2013 dollars ranges from $91/MWh to 573/MWh at the point of interconnection to the BC Hydro system. • Wholesale electricity prices for trading purposes can vary greatly. In the Pacific Northwest, these prices are affected by such factors as precipitation/snowfall in the region, unforeseen generation outages and ambient temperatures. A general flavour of the wholesale electricity prices for potential export of electricity from BC can be obtained from a variety of sources. One such source is the US Energy Information Administration (www.eia.gov/electricity/wholesale/#history). This source provides current and historical electricity market data. Of particular relevance is the mid-C trading hub in the Northwest Region (one example would be a Mid-C peak price on March 17, 2015 of $19.87US weighted average cost from 72 trades). Access to that market for geothermal projects in BC would require access on both the BC Hydro transmission system to the Canada/US border, and on the appropriate transmission system (e.g. Bonneville Power Authority) in the US. • BC Hydro forecasts of market prices under various scenarios was provided in the November 2013 IRP. Table 5 in Appendix 5A – Market Forecast Data is reproduced below for ready reference. 

Electricity Price Data Tables

Table 5 Electricity Price Forecasts by Market Scenario (Real 2012 US$/MWh at Mid-C)

Market Scenario	1 Mid Electricity Mid GHG (Regional) Mid Gas	2 Low Electricity Low GHG (Regional) Low Gas	3 High Electricity High GHG (Regional) High Gas	4 Mid Electricity Mid GHG (Regional/Nat'l) Mid Gas	5 High Electricity High GHG (Regional/Nat'l) High Gas
2014	25.0	21.9	31.1	25.0	31.1
2015	25.5	21.7	31.9	25.5	31.9
2016	25.8	21.2	32.0	25.8	32.0
2017	27.1	22.0	33.4	27.1	33.4
2018	27.1	21.7	33.9	27.1	33.9
2019	28.0	22.1	35.5	28.0	35.5
2020	28.0	21.9	36.0	28.0	36.0
2021	29.3	22.5	37.3	29.3	37.3
2022	30.1	22.7	38.8	30.9	41.3
2023	31.8	23.2	41.7	35.5	52.1
2024	33.0	23.7	43.4	41.8	68.6
2025	34.2	24.0	45.4	50.3	91.2
2026	34.9	24.1	46.7	52.2	95.1
2027	36.0	24.3	48.6	54.7	98.9
2028	36.3	24.0	50.2	56.8	101.8
2029	37.2	23.9	51.1	58.8	106.1
2030	37.6	23.8	52.7	60.1	109.3
2031	38.6	24.0	54.7	62.6	112.0
2032	39.9	24.0	57.0	65.6	116.0
2033	41.5	24.4	60.1	69.3	122.0
2034	42.8	25.1	61.9	71.5	125.7
2035	44.6	26.2	64.5	74.5	131.0
2036	45.7	26.9	66.2	76.4	134.3
2037	47.8	28.1	69.1	79.8	140.3
2038	48.4	28.4	70.0	80.8	142.1
2039	48.9	28.7	70.7	81.6	143.5
2040	49.3	29.0	71.4	82.4	144.9

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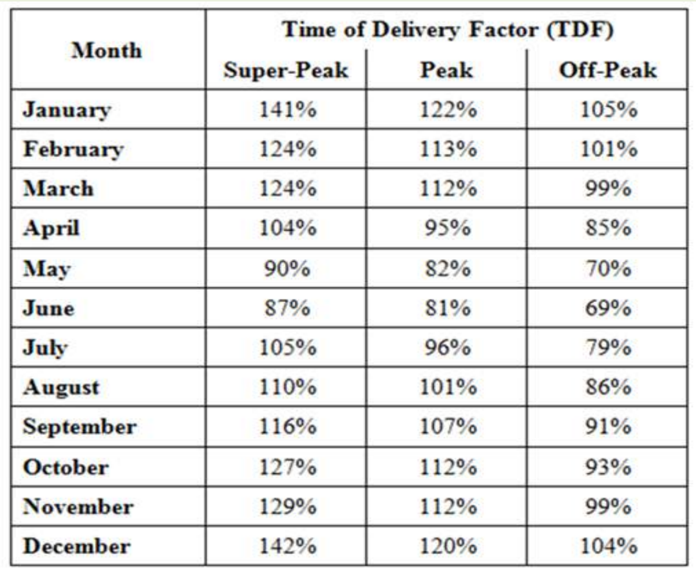
Category	Comments
Green Power Premium ($/MWhr)	• BC Hydro's past procurement processes for the acquisition for power from independent power producers has offered a premium for green power. • Within British Columbia, there is little demand for the purchase of "green power certificates" (instruments that a customer can purchase to be assured that the electricity used is environmentally friendly) from BC Hydro. BC Hydro's generation mix is already approximately 93% clean. • California has a goal of 33% of retail sales by 2020 to be sourced from eligible renewable energy sources. However, the opportunity for geothermal power from British Columbia, particularly "bundled" green energy with Renewable Energy Certificates (RECs), to compete in that market is low, for a number of reasons 1. The price of electricity is driven by the low cost of natural gas; 2. There are large amounts of renewables, such as wind and solar, in California; and 3. Firm transmission access to the California market through the BPA transmission system is generally not available.
Capacity Price ($/KW)	• There is no price in $/kW for capacity resource options in the market at present. • Table 3-27 entitled "UCCs of Capacity Resource Supply Options" in BC Hydro's Integrated Resource Plan dated November 2013 provided a summary of capacity resource options (e.g. pumped storage, simple cycle gas turbines and resource smart projects such as Revelstoke Unit 6). The unit capacity costs (UCCs) at the point of interconnection to the BC Hydro system in $2013/kW-year are shown in the table.
Is there a higher price for base load power?	In general, baseload power (ie firm power) is more valuable to BC Hydro and furthermore the price paid for baseload power varies by month throughout the year. As an example, the following excerpt is taken from BC Hydro's SOP: "1. Definitions: In this Appendix 4, the following words and expressions have the following meanings: (a) "Off-Peak Hours" means all hours other than Super-Peak Hours and Peak Hours. (b) "Peak Hours" means the hours commencing at 06:00 PPT and ending at 16:00 PPT, and commencing at 20:00 PPT and ending at 22:00 PPT, Monday through Saturday inclusive, but excluding British Columbia statutory holidays. (c) "Super-Peak Hours" means the hours commencing at 16:00 PPT and ending at 20:00 PPT Monday through Saturday inclusive, but excluding British Columbia statutory holidays." 

Month	Time of Delivery Factor (TDF)		
	Super-Peak	Peak	Off-Peak
January	141%	122%	105%
February	124%	113%	101%
March	124%	112%	99%
April	104%	95%	85%
May	90%	82%	70%
June	87%	81%	69%
July	105%	96%	79%
August	110%	101%	86%
September	116%	107%	91%
October	127%	112%	93%
November	129%	112%	99%
December	142%	120%	104%

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Category	Comments
Estimated Size of Resource	See Section A.
Is there any green power incentives?	• The BC government created the Innovative Clean Energy (ICE) fund with an initial mandate to accelerate the commercialization of emerging clean energy technologies (now expanded to include a broad range of energy efficiency and conservation projects). British Columbia also has a program entitled Scientific Research and Experimental Development Tax credit (SR&ED). Geothermal proponents could keep a watching brief on these programs for applicability and relevance. • The BC government's First Nations Clean Energy Business Fund. This fund promotes increased Aboriginal community participation in the clean energy sector. It provides: o Capacity funding of up to $50,000 per applicant to cover the early stages (e.g. feasibility studies) of project development ; and o Equity funding of up to $500,000 per applicant to support a financially viable and resourced clean energy project. • There are a number of government of Canada programs to encourage the development of renewable power. Some of these programs may be active but not currently issuing calls for proposals. Others may be focussed on research and innovation and may not be directly applicable to geothermal technologies/resources, while others may be fully subscribed and even inactive but are noted in terms of completeness. Some of these programs include: o Natural Resources Canada ecoEnergy for Renewable Power program; o Sustainable Development Technology Canada funds; o Clean Energy Fund; o Industrial Research Assistance Program; and o Green Infrastructure Fund Geothermal proponents could keep a watching brief on these and other federal government programs for their applicability and relevance.
Grants	See above under green power incentives
Tax Holidays	None listed on federal and provincial websites.
Tax Relief	• Under Classes 43.1 and 43.2 in Schedule II of the Income Tax Regulations, certain capital costs of systems that produce energy by using renewable energy sources or fuels from waste, or conserve energy by using fuel more efficiently are eligible for accelerated capital cost allowance. Under Class 43.1, eligible equipment may be written-off at 30 percent per year on a declining balance basis. In general, equipment that is eligible for Class 43.1 but is acquired after February 22, 2005 and before year 2020 may be written-off at 50 percent per year on a declining balance basis under Class 43.2. Without these accelerated write-offs, many of these assets would be depreciated for income tax purposes at annual rates between 4 and 30 percent. • In addition to Class 43.1 or 43.2 capital cost allowance, the Income Tax Regulations allow certain expenses incurred during the development and start-up of renewable energy and energy conservation projects [Canadian renewable and conservation expenses (CRCE)] to be fully deducted in the year they are incurred, carried forward indefinitely and deducted in future years, or transferred to investors through a flow-through share agreement.

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Category		Comments
	Loan Guarantees	The following is an excerpt from http://www.fnfa.ca/en/fnfa/ “The First Nations Finance Authority (FNFA) is a statutory not-for-profit organization without share capital, operating under the authority of the First Nations Fiscal Management Act, 2005. The FNFA’s purposes are to provide investment options and capital planning advice and—perhaps most importantly, access to long-term loans with preferable interest rates. The FNFA is not an agent of Her Majesty or a Crown corporation and is governed solely by the First Nations communities that join as Borrowing Members. The advantages of joining the FNFA as a Borrowing Member are: 1. Access to low rate, below bank prime, loans with repayment terms up to 30 years; 2. First Nations choose the repayment terms that work best for their budget; 3. FNFA loans do not require collateral; 4. FNFA loans can be used to refinance existing debt; and 5. FNFA’s interest rates and terms parallel those available to provincial and local governments. Most revenue streams are eligible to support FNFA loan requests. Eligible capital projects FNFA can finance include infrastructure, social and economic development, land purchases, independent power projects, community housing and rolling stock/heavy equipment. FNFA is a stand-alone organization separate from the Government of Canada, and its operating policies are set by its Borrowing Members, represented by the First Nation’s Chief and Council appointee. The FNFA is for First Nations, by First Nations.”
	Royalties/Fees	Geothermal Resources Act, [RSBC 1996] CHAPTER 171, as of March 11, 2015 Permits for well authorizations for wells to be drilled within the boundaries of the permittee's location must pay a prescribed rent for the permit (Section 5). Based on Section 17 of the Act, (1) A lessee who produces a geothermal resource for purposes other than testing must pay to the government (a) a royalty established by agreement under this section, (b) an amount agreed under this section to be paid instead of royalty, or (c) if no royalty or amount has been agreed under this section, the prescribed royalty.
	General Idea of Royalties	With regard to use of the water resources within the geothermal tract, Section 4 of the Water Sustainability Act states “This Act does not apply to geothermal resources as defined in section 1 (1) [definitions] of the Geothermal Resources Act.”
	Private Land Owner or Government Land	Geothermal proponents will need to arrange financial agreements (eg leases or purchases) with private property owners for the geothermal land tract. Proponents for geothermal facilities on Crown Land must apply for the appropriate tenure under the BC Land Act (eg Statutory Right of Way, Licence of Occupation).
	Tax Rate in the Country	• Income eligible for small-business deduction (up to $500,000 income): 11% Federal tax, combined federal and provincial (British Columbia): 13.5%. • Income not eligible for small-business deduction: 15% Federal, combined federal and provincial (British Columbia): 26%
	Transmission Tariffs	Under wholesale wheeling (whereby electricity is transmitted from electricity generators to utilities) to customers in Alberta, the US, or other wholesale customers in BC, the generation supplier must request service on the appropriate BC Hydro transmission line under the Open Access Transmission Tariff (OATT) at a regulated cost for that service. Depending on the end customer, the generation supplier will have to make similar arrangements to cover transmission access in other jurisdictions (e.g. the Bonneville Power Authority for wheeling to a US customer). This ‘pancaking’ of rates, along with transmission congestion issues, affects the economic viability of the potential wholesale opportunity.

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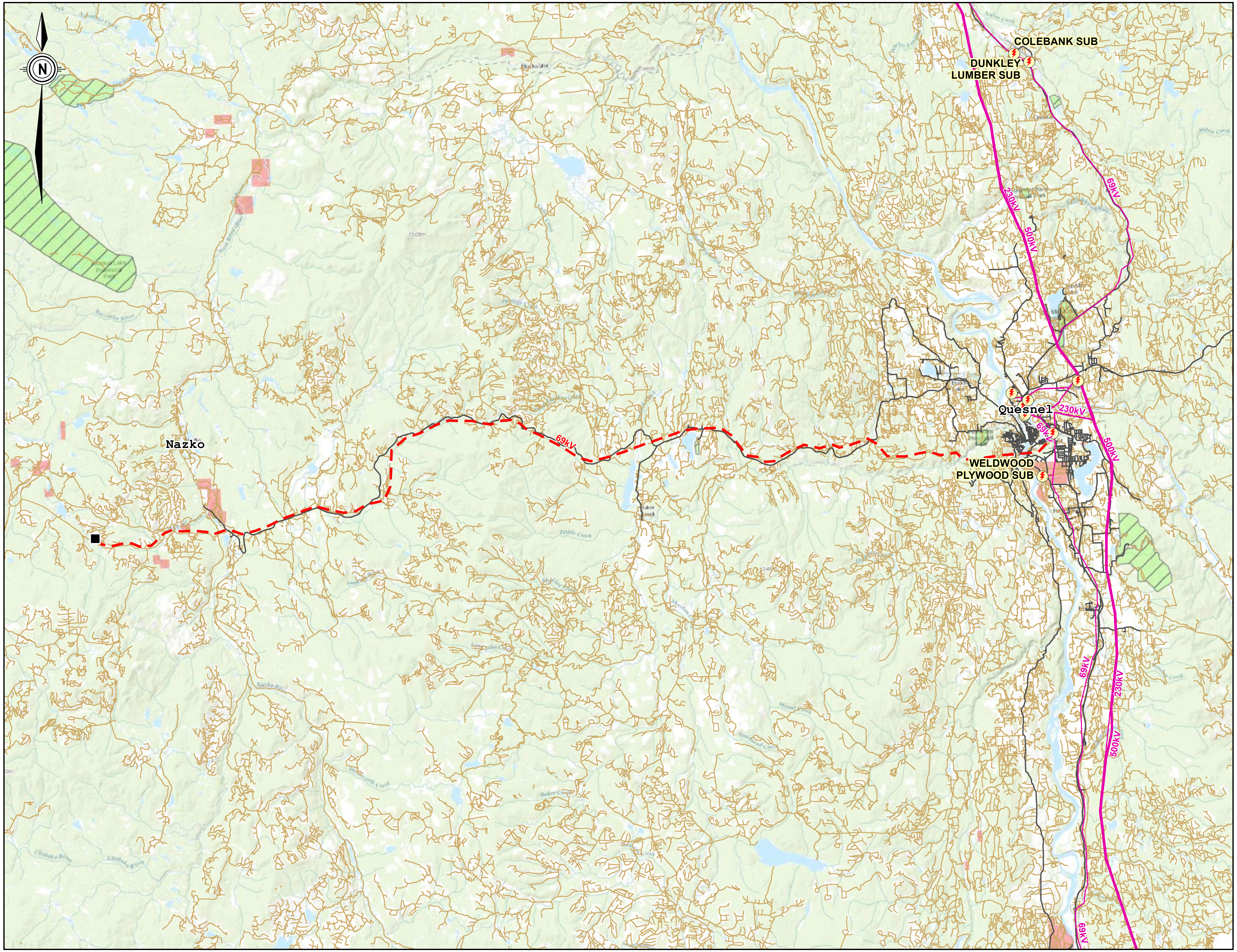
Near Quesnel, British Columbia, Canada
Topographical Map Sheet: Figure 28
Geological Map Sheet: Figure 29

Category		Comments
M.	**Maps**	
	Regional topographic map showing population centres, roads and other infrastructure including electrical grid and nearest substation and/or generating station. (1:500,000?)	Topographical Map Sheet: Figure 28
	Regional map showing land tenure in area – geothermal concessions, mining concessions, private land holds, public or national lands (parks). (1:500,000?)	Topographical Map Sheet: Figure 28
	Regional geological map. (1:250 or 500,000?)	Geological Map Sheet: Figure 29
	Detailed geological map of the immediate area of the concessions. (1:50,000 or 100,000)	Geological Map Sheet: Figure 29
N.	**Other Issues and Considerations**	



Geoscience BC

Legend

- ■ Proposed Geothermal Plant Location
- Proposed Transmission Line
- Existing Substation
- Existing Transmission Line
- Paved Road
- Other Road
- 🟩 Park, Eco-Reserve, Protected Area
- 🟥 First Nations Reserve

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Service Layer Credits: Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

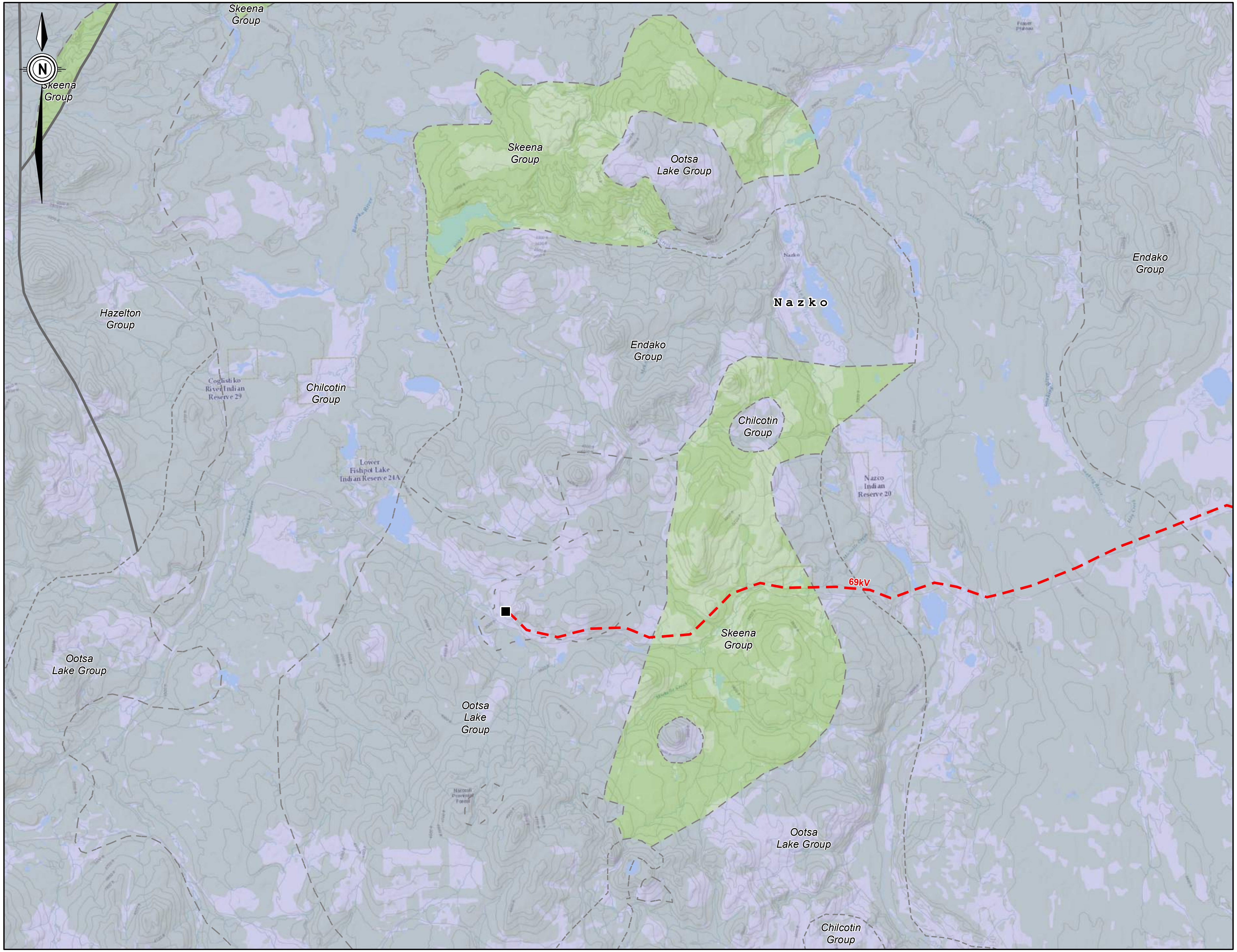
8 0 8
Kilometers

Project No.	Date
2692-004	April 30, 2015

Potential Geothermal Plant at Nazko Cone 10MW

Figure 28

Path: Q:\2600-2699\2692-004\430-GIS\MXD-RP\2692004_GeothermalLocations_mapbook.mxd Date Saved: 2015-04-27 3:55:23 PM
Author: RTaylor



Geoscience BC

Legend

■ Proposed Geothermal Plant Location

Proposed Transmission Line

Bedrock Type

🟩 Sedimentary Rocks

🟪 Volcanic Rocks

Rock Type Boundary

Fault

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3 0 3
Kilometers

Project No.	Date
2692-004	April 30, 2015

Geological Strata Map for Nazko Cone 10MW

Figure 29

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Author: RTaylor

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Appendix P

Okanagan Geothermal Development Decision Matrix and Figures 30 & 31

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Near Peachland, British Columbia, Canada
Topographical Map Sheet: Figure 30
Geological Map Sheet: Figure 31

Category		Comments
A.	**Reservoir Potential**	
	Size/Potential/Type	• **Reservoir size:** Springbook Formation (basal conglomerate within White Lake basin ~40 km south of Summerland) estimated at 60 m thick, over area of 100 km^2 (Lewis, 1982) • **Potential:** 20 MW (Lovekin & Pletka, 2009) • **Type:** low-temperature resource, suitable for binary plant
	Temperature/Water and Gas Chemistry/Mineral Indicators	**Surface features:** • Angel spring (aka KLO): 22.7°C (Grasby et al., 2000); located 50 km NE of Summerland borehole EPB/GSC 495 **Geothermometry:** • Angel (KLO): Maximum temperature given as 137°C (Grasby et al., 2000) **Exploration drilling:** • One diamond-drilled borehole drilled as part of Geothermal Energy Program (1982) (originally intended to test geophysical & geological properties of granitic basement). (Church et al., 1991) • Mraz Well (second hole) drilled to 200 m in southern part of the basin (to test bedded Tertiary rocks) (Church et al., 1991) • Hole No. EPB/GSC 495 (1990) west of town of Summerland, on Boreboon farm just south of Eneas Creek on the west limb of the basin - drilled to total depth 712 m, preliminary BHT 33°C (at 706 m) (Church et al., 1991); basal conglomerate not reached. Well deepened in 1992 to 956 m, bedding dipping ~50°; highest temperature observed at 946.5 m ~41°C; no aquifer intersected (Jessop, 2008) • Two other wells drilled in granitic rock to determine heat flow at Paynter Lake and Trout Creek with observed geothermal gradients of 29.6 mK/m and 30.0 mK/m, respectively. (Jessop, 2008) • Geothermal potential of Summerland caldera tested via drilling in 1992 with heat-flow values as follows: Penticton outlier (Tertiary volcanics WSW of the town of Penticton at south end of Lake Okanagan): 72 mW/m^2; 70°C/km; Summerland caldera: 85 mW/m^2. Geothermal gradient estimated at 50°C/km (Fairbank & Faulkner, 1992). **Water chemistry:** • Hot spring lies on the stable isotope meteoric water line; water type is (Ca>Na)-HCO$_3$ with HCO$_3$ at 815 mg/L, Mg at 27 mg/L and Cl at 4 mg/L (Grasby et al., 2000).
	Surface Flow Rates and Reservoir Recharge	• Fluids in basin driven by artesian conditions. (Fairbank & Faulkner, 1992) • Fluid moves down-dip/down-structure into the structural trough. Stream entering basin terminates & likely is a component of recharge for the resource (% unknown). (Church et al., 1990) • Piteau and Associates (1984) concluded that "a geothermal well drilled to the base of the Summerland Basin should have a reasonable chance of producing between 3 and 10 L/s of groundwater." (Jessop, 2008)
	3D Permeability (heat exchange potential)	• Conduction or deep fluid flow systems within sedimentary and volcanic formations. (Fairbank & Faulkner, 1992) • Fluid conduits likely thin permeable interbedded layers, the tops of the basic lavas, the basal conglomerate and along faults. (Lewis, 1982)
	Recent Magmatism	N/A - Volcanics of White Lake Basin region ~ 50 million years old. (Lewis, 1982)
	Structural Setting	• Beds are uplifted and tilted into a synclinal trough. Fluid moves down-dip/down-structure, likely through fractures, into the structural trough towards the Summerland (normal) Fault, which juxtaposes the dacitic domes and breccias against the impermeable granitic basement. (Church et al., 1991) (Jessop & Church, 1991) • Northerly trending faults control structures in the Penticton Outlier - controlled by NS stress scheme responsible for numerous N-trending grabens in southern BC. (Church, 2002a) • Vertical movement on graben-type faults is commonly hundreds of meters for these Tertiary basins. Folds and fractures are the result of NS-directed stress thought to be responsible for the many graben-like structures and overall basin-and-range style of this region. (Lewis, 1984)

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Near Peachland, British Columbia, Canada
Topographical Map Sheet: Figure 30
Geological Map Sheet: Figure 31

Category		Comments
	Geophysics	Unknown
	Reservoir Host Rock	• Likely the basal conglomerate, also possibly in breccia lenses in fault zones. Some fluid accumulation possible in sandstone formations, but presence of interstitial ash and carbonate cement likely reducing porosity (Church et al., 1991). • Silicate hosted (Grasby et al., 2000)
	Drilling Issues	Naturally radioactive (heavy metal) minerals present in area previously detected in groundwater (Church et al., 1991).
	Brief Description of Geological Setting of Thermal Features (i.e., springs emanate from fluvial gravels; beside a river, etc.)	• Southeastern Cordillera was affected by a regional extension in the Eocene that exposed a core zone of high-grade metamorphic rocks. The bounding faults on the eastern and western margins of the metamorphosed zone tend to be low-angle (20-30°) and have kilometers of displacement. The Okanagan Valley Fault (OVF), a bounding fault on the western margin, is a 1 to 2 km thick shear zone characterized by mylonite and micro-breccia. • Only one known thermal spring (KLO or Angel) is associated with the OVF. (Grasby & Hutcheon, 2001) • The last known volcanism in the region (~ 50 million years old) is closely associated with block faulting, and many deposits are preserved in grabens, half grabens, and cauldron - subsidence complexes (Lewis, 1984). These three basins (Tertiary Kelowna and Penticton outliers and Summerland caldera) contain sedimentary and volcanic beds with varying porosity, permeability and thermal conductivity (Fairbank & Faulkner, 1992), have thicknesses of over 1 km, and are of the porous, permeable type of formation which allows the possibility of significant hot-water resources (Lewis, 1984) • Summerland basin is an Eocene volcanic caldera (previously part of larger contiguous mass of volcanic and sedimentary rocks known as the Penticton Tertiary Outlier" [Penticton Tertiary Outlier aka White Lake Basin {Lewis, 1982}]). A granitic basement is overlain by the Penticton Group which is composed of basal conglomerates, massive volcanic beds, lavas and ash flows, dacitic domes and breccias, and fluvial and lacustrine sedimentary rocks (>1,000 m total thickness). (Church et al., 1991) (Jessop & Church, 1991)
B.	**Exploration Uncertainty (Risk)**	
	Degree of Identification of Resources/Reserves	Low Small Tertiary basins in the Okanagan area showed a good probability of containing usable low-grade geothermal resources. Anomalous temperature gradient measured, no viable aquifers found (Jessop, 2008)
	Likelihood of Covering Reservoir with Concession	Low Angel spring is located within the Myra-Bellevue Provincial Park. Other areas appear to be available (for instance, near Summerland), but permeable formations have not been identified in drilling as deep as 956 meters near Summerland. This leads to uncertainty as to just what concession boundaries should be.
	Expected Authorization Date	Unknown
	Specific Timing of Exploration (2 + 2 years, BC 8 years, etc.)	5 years (1 year permitting and surface exploration, possibly drilling shallow temperature gradient holes + 1 year deep gradient-well drilling + 1 year successful development drilling and testing + 1 year further development drilling and start plant construction + 1 year drilling wrap-up and finish plant construction)
	Degree of Previous Exploration (can be good or bad)	Low Few gradient/exploration wells drilled - widely dispersed throughout basin areas
	Surface Operational Capacity (enough stable area for drilling and a plant?)	Likely No obvious impediments
	Exploration to Exploitation: A summary rating of Exploration Uncertainty (risk) on a scale of difficult (high risk) through medium (moderate risk) to easy (low risk)	Moderate to Difficult Lack of resource definition is biggest impediment, though additional exploration (geophysics and slim-hole drilling) could improve this picture.

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Near Peachland, British Columbia, Canada
Topographical Map Sheet: Figure 30
Geological Map Sheet: Figure 31

Category		Comments
C.	**Environmental Issues**	
	Protected Areas	• Wildlife Habitat Area (#365770, labelled for a "Data Sensitive" species) is approx 3 km from proposed transmission line. • Nearest provincial park, Darke Lake Provincial Park, approx. 9 km from proposed plant location.
	Endangered Species	• Proposed transmission line crosses through American Badger (Endangered (SARA Schedule 1); red-listed), Western Screech-Owl, *macfarlanei* subspecies (Endangered (SARA Schedule 1); red-listed) and Prairie Gentian (blue-listed plant) occurrence polygons. • Flammulated Owl (Special Concern (SARA Schedule 1); blue-listed) is less than 1 km from proposed transmission line.
	Geothermal Surface Features	• Nearest hotsprings approx. 70 km from proposed infrastructure.
	Other	• Proposed transmission line crosses Darke Creek which contains Rainbow Trout. Proposed creek crosses Trout Creek, Bull Creek, Bearpaw Creek, and Isintok Creek, all which have unnamed fish observations.
D.	**Geothermal Area - Bidding and/or Type of Land Holding (private/government/lease/etc.)**	
	Bidding Area	No existing geothermal title tract
	Other Claim Rights (mining and/or oil)	Several mineral/coal titles in surrounding area. Proposed location is not within known oil and gas management area; no known tenures at proposed location.

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Near Peachland, British Columbia, Canada
Topographical Map Sheet: Figure 30
Geological Map Sheet: Figure 31

Category		Comments
E.	**Market**	
	Main Electricity Consumers (direct sales and/or government)	General Overview 1. BC Hydro acquires power from Independent Power Producers (which would include geothermal proponents) through two main processes: • Competitive calls: when BC Hydro issues a Call for Tenders for the supply of electricity to BC Hydro, geothermal proponents can bid into those competitive calls. • Standing Offer Program (SOP): This program is presently available for clean generation projects greater than 0.1 MW but not more than 15 MW. Proponents do not compete against each other but are paid a predetermined price by BC Hydro. Depending on the specifics of each project, proponents may wish to size their projects to be under the 15 MW threshold for the SOP (BC Hydro is developing a 'mini-SOP' component within the overall SOP. This mini-SOP will apply to projects in the 0.1 MW to 1 MW range, but would not realistically apply to potential geothermal generation projects). • In addition, BC Hydro's net metering program is designed for residential and commercial customers who wish to connect a small electricity generating unit to the BC Hydro distribution system. Generating units up to 0.1 MW in capacity that utilize a clean or renewable resource are eligible to participate in the program. Given the small size, this program has no applicability to potential geothermal generation projects. The acquisition of geothermal power would contribute to BC Hydro's current target for clean energy and to the diversification of BC Hydro's resource mix, making it less reliant on snow melt and stream flow. 2. Although FortisBC is a potential customer for electricity from geothermal sources, the opportunities may be limited given FortisBC's ability to receive electricity from BC Hydro under Rate Schedule 3808. However there is a wheeling agreement in place which would facilitate a geothermal project located in FortisBC's service territory to sell electricity to BC Hydro through BC Hydro's competitive calls and/or the SOP, or to other potential customers as noted below. 3. Wholesale wheeling (whereby electricity is transmitted from electricity generators to utilities) to customers in Alberta, the US, or other wholesale customer in BC is allowed. The generation supplier must request service on the appropriate BC Hydro transmission line under the Open Access Transmission Tariff (OATT) at a regulated cost for that service. Depending on the end customer, the generation supplier will have to make similar arrangements to cover transmission access in other jurisdictions (e.g. the Bonneville Power Authority for wheeling to a US customer). This 'pancaking' of rates, along with congestion issues, affects the economic viability of the potential wholesale opportunity. 4. Retail access, defined as a market in which electricity is sold directly to consumers by competing suppliers, is generally not permitted in BC. However there may be opportunities for bilateral arrangements for direct sales of electricity from geothermal generating plants to large customers (e.g. pulp mills, large sawmills, mines) as follows: • To replace the electricity supplied at a high voltage from BC Hydro under BC Hydro Transmission Rate 1823 of the Electric Tariff. Such replacement would be challenging given the rates charged under that tariff. • To supply electricity to a remote facility (e.g. a mine, LNG plant or other industrial facility) directly from a geothermal plant located in close proximity to the facility, thereby precluding the need for a lengthy transmission line to connect to the BC Hydro electrical grid. • A potential electricity customer, Okanagan Pellet Company, is located approximately 35 km from the Okanagan site. • A potential electricity customer, Princeton Cogeneration Corp, is located approximately 50 km from the Okanagan site. • A potential electricity customer, Kettle Valley quarries, is located approximately 120 km from the Okanagan site. • A potential electricity customer, Pinnacle Renewable Energy group pellet facility, is located approximately 120 km from the Okanagan site.

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Near Peachland, British Columbia, Canada
Topographical Map Sheet: Figure 30
Geological Map Sheet: Figure 31

Category		Comments
	Time Limits? (business agreements, operating/generating-by deadlines?)	• BC Hydro has issued competitive Calls for Tender for the supply of electricity in the past. • BC Hydro’s SOP is presently directly available for clean energy projects which meet certain criteria, including a generation output of less than 15 MW. • Typical BC Hydro Energy Purchase Agreements from Independent Power Producers are 20-40 years in duration. • Business agreements with the owners of private transmission lines (e.g. independent power producers) for access to the market will be necessary. • The lead times to develop geothermal resources will include appropriate allowances for investigative drilling, technical and environmental studies, public consultation, transmission considerations, marketing, licencing, design, construction and commissioning. These lead times will vary from four to seven years depending on the specifics of each project. Projects with a history of exploration and analysis (e.g. Meager Creek/Pebble Creek, Lakelse, and Canoe Creek) will generally be on the shorter end of this time continuum, while other projects with less investigative work will take longer. Although the time required to drill a geothermal well and construct a power plant could conceivably be less than two years, the key uncertainties inherent in the environmental review, public consultation, transmission arrangements (either with BC Hydro or a private transmission owner), and the permitting and regulatory processes will realistically result in a further two years at a minimum for these activities.
F.	**Transmission Line Infrastructure**	
	State of the Infrastructure	Closest transmission line is 500 kV. Closest transmission line with accessibility for interconnection is 63 kV line to FortisBC Summerland substation.
	Transmission Route (distance, terrain and costs)	Routing to FortisBC Summerland substation via new 63 kV transmission line approx. 23 km along existing paved road to plant location.
H.	**Community Issues**	
	Indigenous Law and Indigenous Development Areas	• First Nation consultative areas include Nlaka'pamux Nation, Nicola Tribal Association, Lower Nicola Indian Band, Lytton First Nation, Oregon Jack Creek Indian Band, Cook's Ferry Indian Band, Siska Indian Band, Coldwater Indian Band, Nooaitch Indian Band, Westbank First Nation, Okanagan Indian Band, Lower Similkameen Indian Band, Penticton Indian Band. • Okanagan Nation Alliance include South Upper Nicola Band, Okanagan Indian Band, Westbank First Nation, Penticton Indian Band, Upper Similkameen Indian Band, Lower Similkameen Indian Band, Osoyoos Indian Band and Solville Confederation Tribes; First Nations government in the Okanagan to represent tribes in areas of concern (http://www.syilx.org/who-we-are/). • The Okanagan Nation Alliance is developing processes to ensure "communities are not mere stakeholders to a resource...[but] are stewards of our lands and waters." (http://www.syilx.org/operations/natural-resourcesland-use/). • Westbank First Nation provides Land Use Plan for communities including Summerland • Westbank First Nation Community Plan supports the protection and enhancement of sensitive natural environmental areas
	Community Action	• Summerland created Climate Action Plan in 2011 and signed onto the BC Climate Action Charter (http://www.summerland.ca/planning-building/climate-action)
	Surface Rights	• First Nation consultative areas include Nlaka'pamux Nation, Nicola Tribal Association, Lower Nicola Indian Band, Lytton First Nation, Oregon Jack Creek Indian Band, Cook's Ferry Indian Band, Siska Indian Band, Coldwater Indian Band, Nooaitch Indian Band, Westbank First Nation, Okanagan Indian Band, Lower Similkameen Indian Band, Penticton Indian Band. • Summerland Official Community Plan provides growth areas (See Summerland Official Community Plan and maps)
	Tourism	• Summerland has a significant ecotourism industry; four Provincial Park protected areas are within 6 km of the location of the proposed plant and transmission line.

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Near Peachland, British Columbia, Canada
Topographical Map Sheet: Figure 30
Geological Map Sheet: Figure 31

Category		Comments
I.	**Water Rights**	
	Availability (for example "air-cooled required")	Plant water requirement estimated approx. 25 L/s for binary plant. MAD of 2100 L/s in Trout Creek. No existing water licences in vicinity. Closest water licences approx. 7 km from proposed location.
	Availability for Drilling	Drilling requirement of 20 L/s. MAD of 2100 L/s in Trout Creek. No existing water licences in vicinity. Closest water licences approx. 7 km from proposed location.
J.	**Engineering**	
	Plant Location and Design	Adequate footprint, low to moderately sloping, forested terrain.
	Construction Issues	New road (approx. 500 m) from nearest road to plant location.
	Transportation Issues	Access via existing paved roads and unpaved access roads (less than 1 km).
	Architectural Issues (Blend/hide into environment? Local styles? etc.)	None found.
	Special Construction Issues (zero emissions)	None found.
K.	**Non-Electrical Infrastructure (Roads and Habitation)**	
	Nearest Large Community > 50,000	Kelowna, BC
	Nearest Community	Peachland, BC
	Nearest Road and Condition	Unpaved logging/access road; gently sloping terrain.
	Current Access Conditions (restrictions)	Access via existing paved roads and unpaved access roads (less than 1 km).
	Terrain and Distance Factor for Road Building	Remote, forested terrain, gently to moderately sloped.

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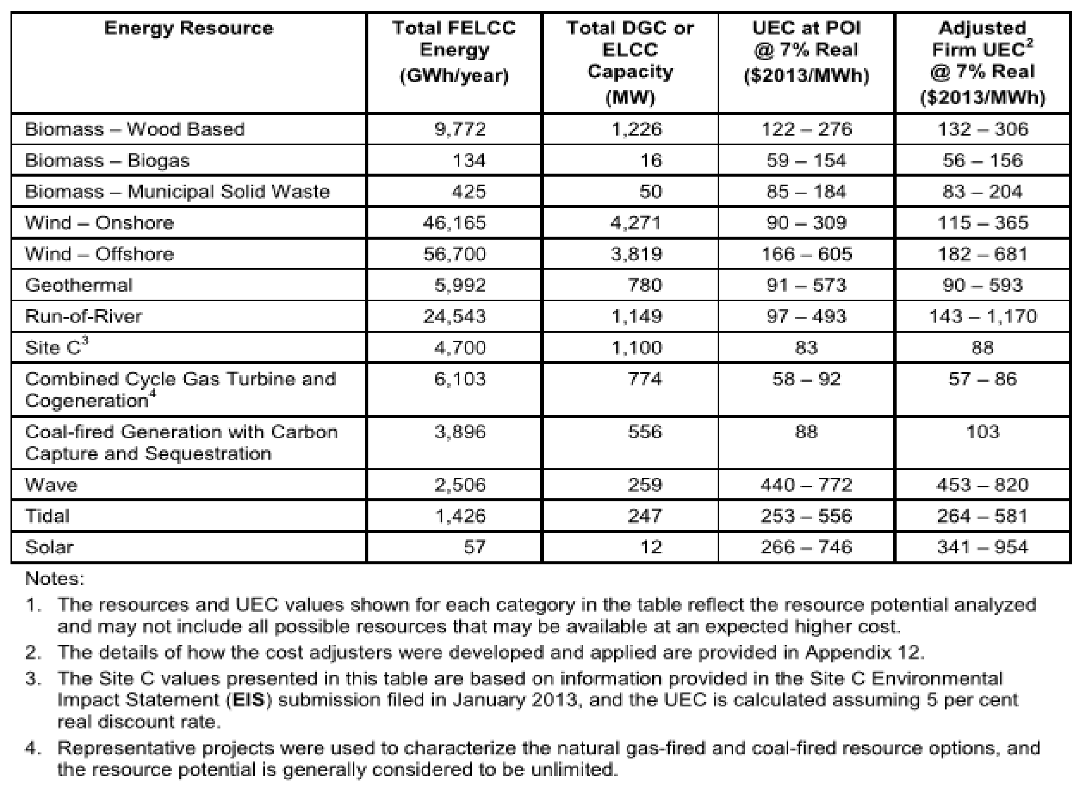
Near Peachland, British Columbia, Canada
Topographical Map Sheet: Figure 30
Geological Map Sheet: Figure 31

Category		Comments
L.	**Finance**	
	General Power Prices	BC Hydro acquires power through (1) competitive processes (Calls for Tender), (2) the Standing Offer Program (not including the mini-SOP under development), and (3) upgrades to its existing facilities or the development of new generation facilities. (Note that the net metering program targets projects less than 100 kW and is therefore not relevant to geothermal generation projects). Comments on the general price of power under each one are: • The power price paid by BC Hydro to independent power producers through Energy Purchase Agreements (EPAs) under Calls for Tender are proprietary and confidential. • The power price paid by BC Hydro to independent power producers through EPAs under the SOP are made up of a predetermined base price in 2010 dollars as determined by the region of the point of interconnection to the BC Hydro system, escalated at the Consumer Price Index annually up to the year in which an EPA is signed, and further adjusted based upon the time of day and month when the energy is delivered. For reference, the base price for the Lower Mainland region in 2010 dollars is $103.69/MWh. • BC Hydro's current Integrated Resource Plan dated November 2013 includes details of both demand-side management options and supply-side resource options to consider in meeting the future demand for electricity. These resource options, together with their attributes of total energy and capacity and unit energy costs, are listed in Table 2-2 of the November 2013 Resource Options Report Update. That table is reproduced below for ready reference. • Table 5-7 of the above-noted November 2013 Resource Options Report Update provides a summary of the Geothermal Potential by Transmission Region. 

Energy Resource	Total FELCC Energy (GWh/year)	Total DGC or ELCC Capacity (MW)	UEC at POI @ 7% Real ($2013/MWh)	Adjusted Firm UEC[2] @ 7% Real ($2013/MWh)
Biomass – Wood Based	9,772	1,226	122 – 276	132 – 306
Biomass – Biogas	134	16	59 – 154	56 – 156
Biomass – Municipal Solid Waste	425	50	85 – 184	83 – 204
Wind – Onshore	46,165	4,271	90 – 309	115 – 365
Wind – Offshore	56,700	3,819	166 – 605	182 – 681
Geothermal	5,992	780	91 – 573	90 – 593
Run-of-River	24,543	1,149	97 – 493	143 – 1,170
Site C[3]	4,700	1,100	83	88
Combined Cycle Gas Turbine and Cogeneration[4]	6,103	774	58 – 92	57 – 86
Coal-fired Generation with Carbon Capture and Sequestration	3,896	556	88	103
Wave	2,506	259	440 – 772	453 – 820
Tidal	1,426	247	253 – 556	264 – 581
Solar	57	12	266 – 746	341 – 954

Notes:

1. The resources and UEC values shown for each category in the table reflect the resource potential analyzed and may not include all possible resources that may be available at an expected higher cost.
2. The details of how the cost adjusters were developed and applied are provided in Appendix 12.
3. The Site C values presented in this table are based on information provided in the Site C Environmental Impact Statement (**EIS**) submission filed in January 2013, and the UEC is calculated assuming 5 per cent real discount rate.
4. Representative projects were used to characterize the natural gas-fired and coal-fired resource options, and the resource potential is generally considered to be unlimited.

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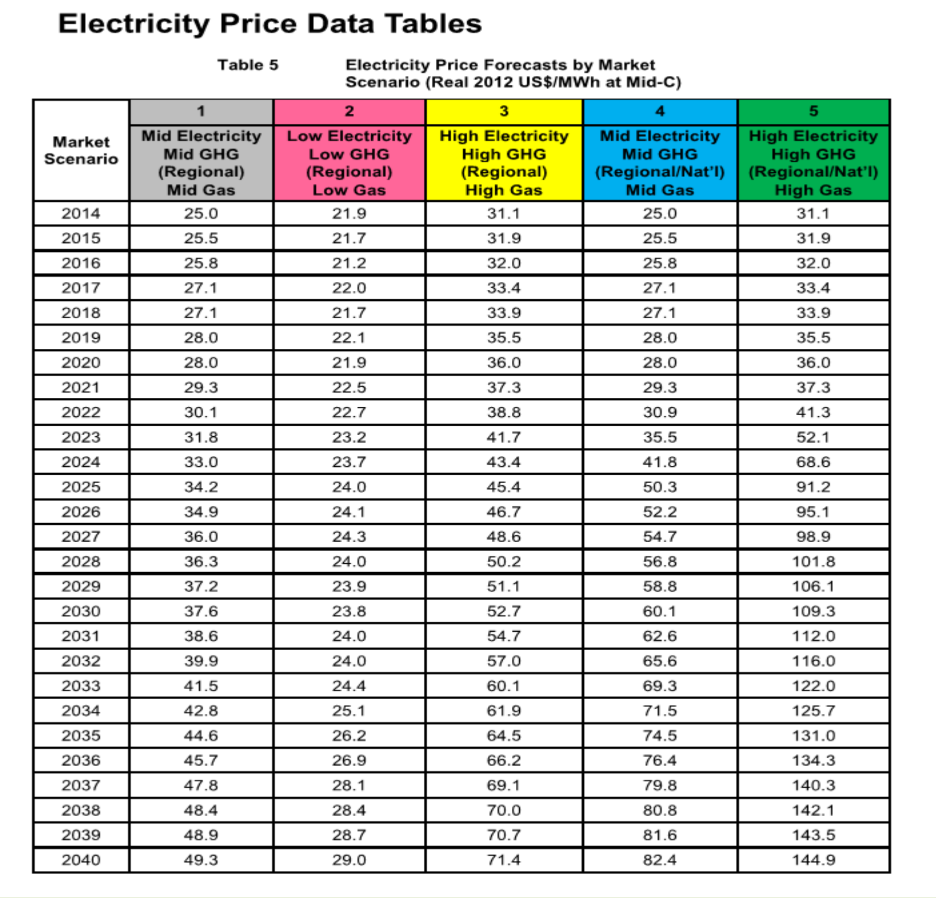
Near Peachland, British Columbia, Canada
Topographical Map Sheet: Figure 30
Geological Map Sheet: Figure 31

Category	Comments
Market Price ($/MWhr)	• As noted in the above Table 2-2 from the November 2013 Resource Options Report Update, the Unit Energy Cost for geothermal resources at a 7% real discount rate in 2013 dollars ranges from $91/MWh to 573/MWh at the point of interconnection to the BC Hydro system. • Wholesale electricity prices for trading purposes can vary greatly. In the Pacific Northwest, these prices are affected by such factors as precipitation/snowfall in the region, unforeseen generation outages and ambient temperatures. A general flavour of the wholesale electricity prices for potential export of electricity from BC can be obtained from a variety of sources. One such source is the US Energy Information Administration (www.eia.gov/electricity/wholesale/#history). This source provides current and historical electricity market data. Of particular relevance is the mid-C trading hub in the Northwest Region (one example would be a Mid-C peak price on March 17, 2015 of $19.87US weighted average cost from 72 trades). Access to that market for geothermal projects in BC would require access on both the BC Hydro transmission system to the Canada/US border, and on the appropriate transmission system (e.g. Bonneville Power Authority) in the US. • BC Hydro forecasts of market prices under various scenarios was provided in the November 2013 IRP. Table 5 in Appendix 5A – Market Forecast Data is reproduced below for ready reference. 

Electricity Price Data Tables

Table 5 Electricity Price Forecasts by Market Scenario (Real 2012 US$/MWh at Mid-C)

Market Scenario	1 Mid Electricity Mid GHG (Regional) Mid Gas	2 Low Electricity Low GHG (Regional) Low Gas	3 High Electricity High GHG (Regional) High Gas	4 Mid Electricity Mid GHG (Regional/Nat'l) Mid Gas	5 High Electricity High GHG (Regional/Nat'l) High Gas
2014	25.0	21.9	31.1	25.0	31.1
2015	25.5	21.7	31.9	25.5	31.9
2016	25.8	21.2	32.0	25.8	32.0
2017	27.1	22.0	33.4	27.1	33.4
2018	27.1	21.7	33.9	27.1	33.9
2019	28.0	22.1	35.5	28.0	35.5
2020	28.0	21.9	36.0	28.0	36.0
2021	29.3	22.5	37.3	29.3	37.3
2022	30.1	22.7	38.8	30.9	41.3
2023	31.8	23.2	41.7	35.5	52.1
2024	33.0	23.7	43.4	41.8	68.6
2025	34.2	24.0	45.4	50.3	91.2
2026	34.9	24.1	46.7	52.2	95.1
2027	36.0	24.3	48.6	54.7	98.9
2028	36.3	24.0	50.2	56.8	101.8
2029	37.2	23.9	51.1	58.8	106.1
2030	37.6	23.8	52.7	60.1	109.3
2031	38.6	24.0	54.7	62.6	112.0
2032	39.9	24.0	57.0	65.6	116.0
2033	41.5	24.4	60.1	69.3	122.0
2034	42.8	25.1	61.9	71.5	125.7
2035	44.6	26.2	64.5	74.5	131.0
2036	45.7	26.9	66.2	76.4	134.3
2037	47.8	28.1	69.1	79.8	140.3
2038	48.4	28.4	70.0	80.8	142.1
2039	48.9	28.7	70.7	81.6	143.5
2040	49.3	29.0	71.4	82.4	144.9

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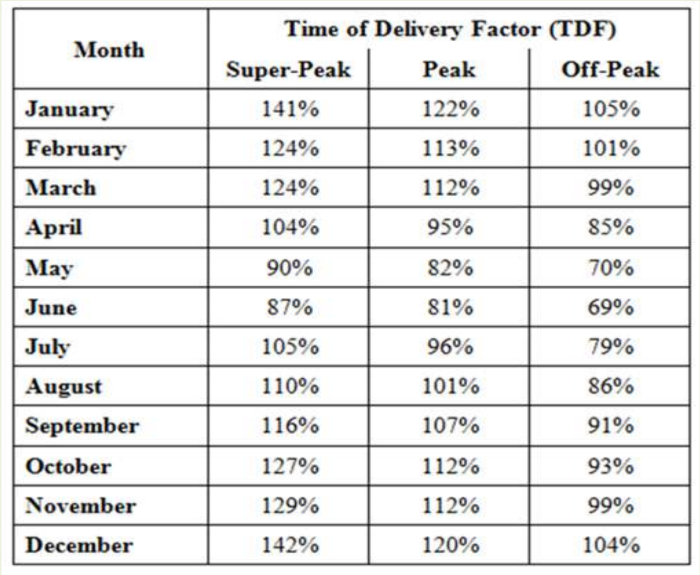
Near Peachland, British Columbia, Canada
Topographical Map Sheet: Figure 30
Geological Map Sheet: Figure 31

Category	Comments
Green Power Premium ($/MWhr)	• BC Hydro's past procurement processes for the acquisition for power from independent power producers has offered a premium for green power. • Within British Columbia, there is little demand for the purchase of "green power certificates" (instruments that a customer can purchase to be assured that the electricity used is environmentally friendly) from BC Hydro. BC Hydro's generation mix is already approximately 93% clean. • California has a goal of 33% of retail sales by 2020 to be sourced from eligible renewable energy sources. However, the opportunity for geothermal power from British Columbia, particularly "bundled" green energy with Renewable Energy Certificates (RECs), to compete in that market is low, for a number of reasons 1. The price of electricity is driven by the low cost of natural gas; 2. There are large amounts of renewables, such as wind and solar, in California; and 3. Firm transmission access to the California market through the BPA transmission system is generally not available.
Capacity Price ($/KW)	• There is no price in $/kW for capacity resource options in the market at present. • Table 3-27 entitled "UCCs of Capacity Resource Supply Options" in BC Hydro's Integrated Resource Plan dated November 2013 provided a summary of capacity resource options (e.g. pumped storage, simple cycle gas turbines and resource smart projects such as Revelstoke Unit 6). The unit capacity costs (UCCs) at the point of interconnection to the BC Hydro system in $2013/kW-year are shown in the table.
Is there a higher price for base load power?	In general, baseload power (ie firm power) is more valuable to BC Hydro and furthermore the price paid for baseload power varies by month throughout the year. As an example, the following excerpt is taken from BC Hydro's SOP: "1. Definitions: In this Appendix 4, the following words and expressions have the following meanings: (a) "Off-Peak Hours" means all hours other than Super-Peak Hours and Peak Hours. (b) "Peak Hours" means the hours commencing at 06:00 PPT and ending at 16:00 PPT, and commencing at 20:00 PPT and ending at 22:00 PPT, Monday through Saturday inclusive, but excluding British Columbia statutory holidays. (c) "Super-Peak Hours" means the hours commencing at 16:00 PPT and ending at 20:00 PPT Monday through Saturday inclusive, but excluding British Columbia statutory holidays." 

Month	Time of Delivery Factor (TDF)		
	Super-Peak	Peak	Off-Peak
January	141%	122%	105%
February	124%	113%	101%
March	124%	112%	99%
April	104%	95%	85%
May	90%	82%	70%
June	87%	81%	69%
July	105%	96%	79%
August	110%	101%	86%
September	116%	107%	91%
October	127%	112%	93%
November	129%	112%	99%
December	142%	120%	104%

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Near Peachland, British Columbia, Canada
Topographical Map Sheet: Figure 30
Geological Map Sheet: Figure 31

	Category	Comments
	Estimated Size of Resource	See Section A.
	Is there any green power incentives?	• The BC government created the Innovative Clean Energy (ICE) fund with an initial mandate to accelerate the commercialization of emerging clean energy technologies (now expanded to include a broad range of energy efficiency and conservation projects). British Columbia also has a program entitled Scientific Research and Experimental Development Tax credit (SR&ED). Geothermal proponents could keep a watching brief on these programs for applicability and relevance. • The BC government's First Nations Clean Energy Business Fund. This fund promotes increased Aboriginal community participation in the clean energy sector. It provides: o Capacity funding of up to $50,000 per applicant to cover the early stages (e.g. feasibility studies) of project development ; and o Equity funding of up to $500,000 per applicant to support a financially viable and resourced clean energy project. • There are a number of government of Canada programs to encourage the development of renewable power. Some of these programs may be active but not currently issuing calls for proposals. Others may be focussed on research and innovation and may not be directly applicable to geothermal technologies/resources, while others may be fully subscribed and even inactive but are noted in terms of completeness. Some of these programs include: o Natural Resources Canada ecoEnergy for Renewable Power program; o Sustainable Development Technology Canada funds; o Clean Energy Fund; o Industrial Research Assistance Program; and o Green Infrastructure Fund Geothermal proponents could keep a watching brief on these and other federal government programs for their applicability and relevance.
	Grants	See above under green power incentives
	Tax Holidays	None listed on federal and provincial websites.
	Tax Relief	• Under Classes 43.1 and 43.2 in Schedule II of the Income Tax Regulations, certain capital costs of systems that produce energy by using renewable energy sources or fuels from waste, or conserve energy by using fuel more efficiently are eligible for accelerated capital cost allowance. Under Class 43.1, eligible equipment may be written-off at 30 percent per year on a declining balance basis. In general, equipment that is eligible for Class 43.1 but is acquired after February 22, 2005 and before year 2020 may be written-off at 50 percent per year on a declining balance basis under Class 43.2. Without these accelerated write-offs, many of these assets would be depreciated for income tax purposes at annual rates between 4 and 30 percent. • In addition to Class 43.1 or 43.2 capital cost allowance, the Income Tax Regulations allow certain expenses incurred during the development and start-up of renewable energy and energy conservation projects [Canadian renewable and conservation expenses (CRCE)] to be fully deducted in the year they are incurred, carried forward indefinitely and deducted in future years, or transferred to investors through a flow-through share agreement.

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Near Peachland, British Columbia, Canada
Topographical Map Sheet: Figure 30
Geological Map Sheet: Figure 31

	Category	Comments
	Loan Guarantees	The following is an excerpt from http://www.fnfa.ca/en/fnfa/ "The First Nations Finance Authority (FNFA) is a statutory not-for-profit organization without share capital, operating under the authority of the First Nations Fiscal Management Act, 2005. The FNFA's purposes are to provide investment options and capital planning advice and—perhaps most importantly, access to long-term loans with preferable interest rates. The FNFA is not an agent of Her Majesty or a Crown corporation and is governed solely by the First Nations communities that join as Borrowing Members. The advantages of joining the FNFA as a Borrowing Member are: 1. Access to low rate, below bank prime, loans with repayment terms up to 30 years; 2. First Nations choose the repayment terms that work best for their budget; 3. FNFA loans do not require collateral; 4. FNFA loans can be used to refinance existing debt; and 5. FNFA's interest rates and terms parallel those available to provincial and local governments. Most revenue streams are eligible to support FNFA loan requests. Eligible capital projects FNFA can finance include infrastructure, social and economic development, land purchases, independent power projects, community housing and rolling stock/heavy equipment. FNFA is a stand-alone organization separate from the Government of Canada, and its operating policies are set by its Borrowing Members, represented by the First Nation's Chief and Council appointee. The FNFA is for First Nations, by First Nations."
	Royalties/Fees	Geothermal Resources Act, [RSBC 1996] CHAPTER 171, as of March 11, 2015 Permits for well authorizations for wells to be drilled within the boundaries of the permittee's location must pay a prescribed rent for the permit (Section 5). Based on Section 17 of the Act, (1) A lessee who produces a geothermal resource for purposes other than testing must pay to the government (a) a royalty established by agreement under this section, (b) an amount agreed under this section to be paid instead of royalty, or (c) if no royalty or amount has been agreed under this section, the prescribed royalty.
	General Idea of Royalties	With regard to use of the water resources within the geothermal tract, Section 4 of the Water Sustainability Act states "This Act does not apply to geothermal resources as defined in section 1 (1) [definitions] of the Geothermal Resources Act."
	Private Land Owner or Government Land	Geothermal proponents will need to arrange financial agreements (eg leases or purchases) with private property owners for the geothermal land tract. Proponents for geothermal facilities on Crown Land must apply for the appropriate tenure under the BC Land Act (eg Statutory Right of Way, Licence of Occupation).
	Tax Rate in the Country	• Income eligible for small-business deduction (up to $500,000 income): 11% Federal tax, combined federal and provincial (British Columbia): 13.5%. • Income not eligible for small-business deduction: 15% Federal, combined federal and provincial (British Columbia): 26%
	Transmission Tariffs	Under wholesale wheeling (whereby electricity is transmitted from electricity generators to utilities) to customers in Alberta, the US, or other wholesale customers in BC, the generation supplier must request service on the appropriate BC Hydro transmission line under the Open Access Transmission Tariff (OATT) at a regulated cost for that service. Depending on the end customer, the generation supplier will have to make similar arrangements to cover transmission access in other jurisdictions (e.g. the Bonneville Power Authority for wheeling to a US customer). This 'pancaking' of rates, along with transmission congestion issues, affects the economic viability of the potential wholesale opportunity.

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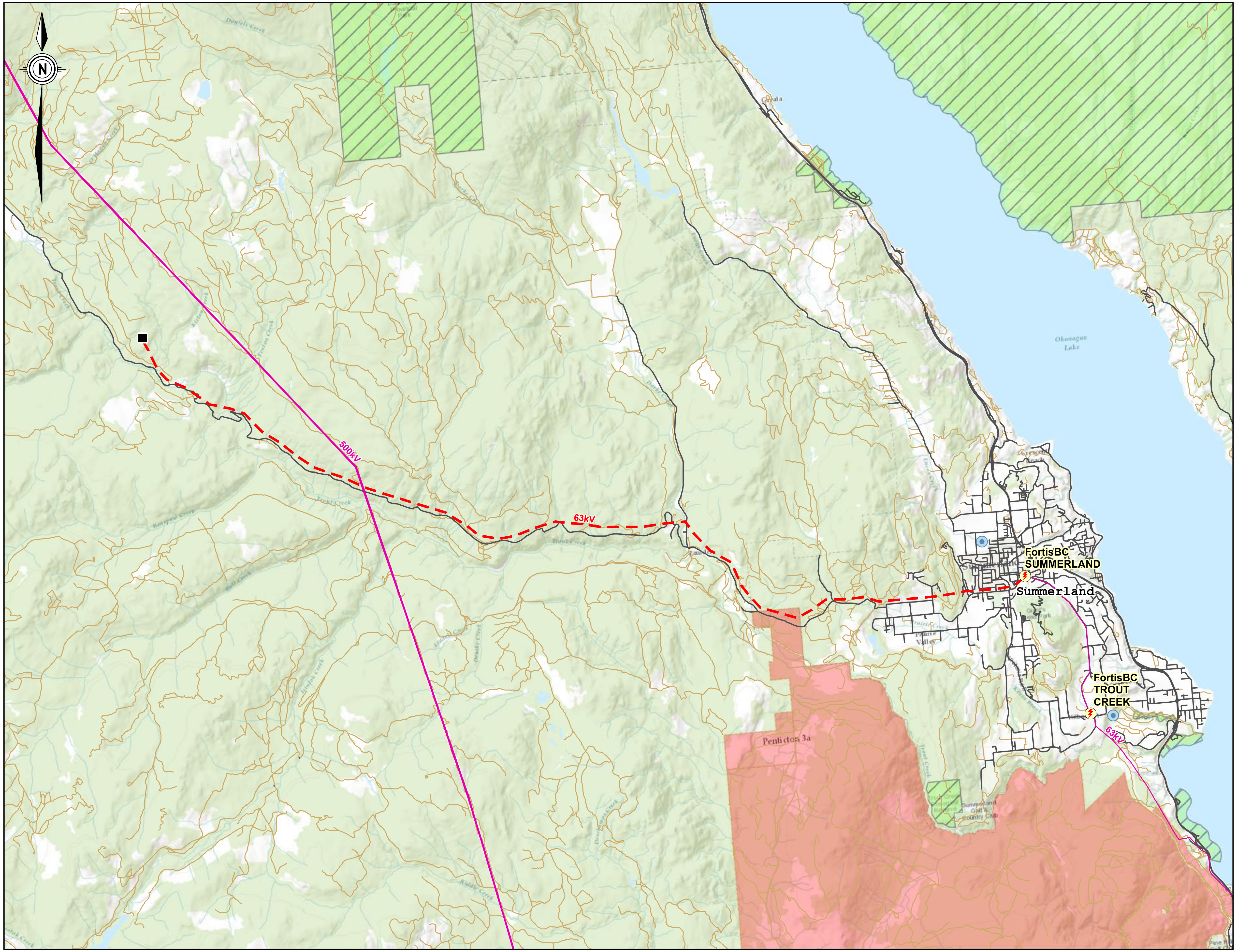
Near Peachland, British Columbia, Canada
Topographical Map Sheet: Figure 30
Geological Map Sheet: Figure 31

Category		Comments
M.	**Maps**	
	Regional topographic map showing population centres, roads and other infrastructure including electrical grid and nearest substation and/or generating station. (1:500,000?)	Topographical Map Sheet: Figure 30
	Regional map showing land tenure in area – geothermal concessions, mining concessions, private land holds, public or national lands (parks). (1:500,000?)	Topographical Map Sheet: Figure 30
	Regional geological map. (1:250 or 500,000?)	Geological Map Sheet: Figure 31
	Detailed geological map of the immediate area of the concessions. (1:50,000 or 100,000)	Geological Map Sheet: Figure 31
N.	**Other Issues and Considerations**	



Geoscience BC

Legend

■	Proposed Geothermal Plant Location
◉	Wellbore
- -	Proposed Transmission Line
—	Existing Transmission Line
—	Paved Road
—	Other Road
▨	Park, Eco-Reserve, Protected Area
🟥	First Nations Reserve

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Service Layer Credits: Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

2 0 2
Kilometers

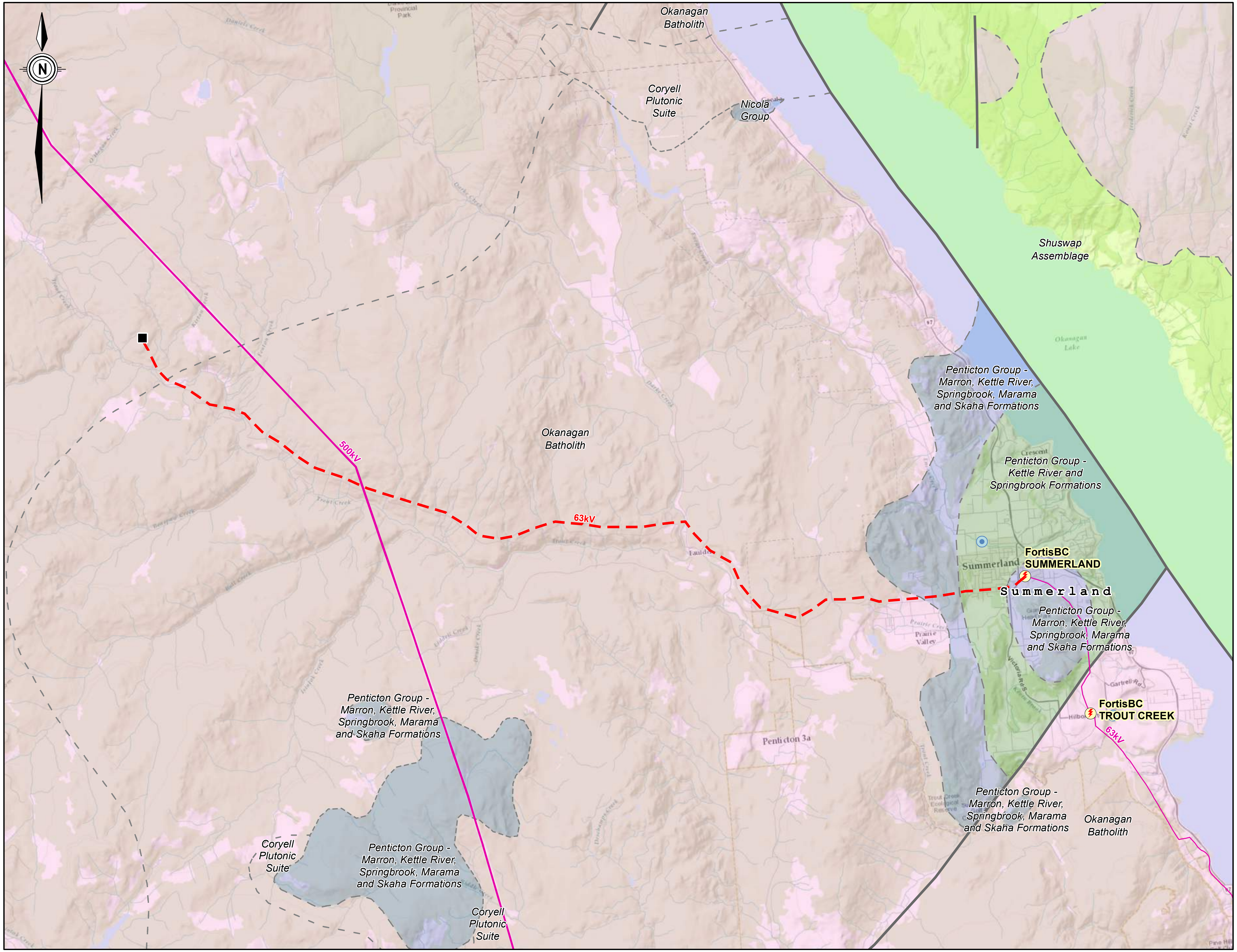
Project No.
2692-004

Date
April 30, 2015

Potential Geothermal Plant at Okanagan 20MW

Figure 30

Path: Q:\2600-2699\2692-004\430-GIS\MXD-RP\2692004_GeothermalLocations_mapbook.mxd Date Saved: 2015-04-27 2:55:05 PM
Author: RTaylor



Geoscience BC

Legend

■ Proposed Geothermal Plant Location

◉ Wellbore

Proposed Transmission Line

Existing Transmission Line

Bedrock Type

Intrusive Rocks

Metamorphic Rocks

Sedimentary Rocks

Volcanic Rocks

Rock Type Boundary

Fault

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2 0 2
Kilometers

Project No.	Date
2692-004	April 30, 2015

Geological Strata Map for Okanagan 20MW

Figure 31

Path: Q:\2600-2699\2692-004\430-GIS\MXD-RP\2692004_GeothermalLocationsGeology_mapbook.mxd Date Saved: 2015-04-27 3:18:32 PM
Author: RTaylor

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Appendix Q

Sloquet Creek Geothermal Development Decision Matrix and Figures 32 & 33

SLOQUET CREEK

Near Mission, British Columbia, Canada
Topographical Map Sheet: Figure 32
Geological Map Sheet: Figure 33

Category		Comments
A.	**Reservoir Potential**	
	Size/Potential/Type	• **Reservoir size:** N/A (no area or depth defined in literature) - therefore, reservoir volume estimated* at: 2.2 km^3 (most-likely area: 2 km^2; most-likely thickness: 1.1 km) (*Reservoir assumptions made using Appendix III in GeothermEx, 2004) • **Potential:** Assume 10 MW, compatible with generic reservoir volume (above) in vicinity of single spring, for reservoir temperatures in range of 150˚C to 200˚C. • **Type:** unknown, likely binary
	Temperature/Water and Gas Chemistry/Mineral Indicators	**Surface features:** • Sloquet Creek: 64°C (BC Hydro, 1974); 71°C (Souther and Halstead, 1973); 60.8°C (Grasby & Hutcheon, 2001) • August Jacob's Creek: 49°C (Souther and Halstead, 1973; Grasby & Hutcheon, 2001) **Geothermometry:** • Sloquet Creek: Na-K-Ca 135°C; SiO_2 110°C (BC Hydro, 1974); SiO_2 121°C; Na-K-Ca 105°C (Grasby et al., 2000) • SiO_2 geothermometry indicates 113°C (BC Hydro, 1982) **Exploration drilling:** • 7 shallow holes and an additional 11 holes along the axis of the ridge (aggregate length of 1,951 meters) were drilled along the ridge within the Quet Mineral Property looking for zones of higher-grade gold mineralization associated with dikes. **Water chemistry:** • Sloquet Creek: 440 ppm SO_4 (BC Hydro, 1974); pH 8.6, 375 mg/L SO_4 • Water chemistry indicates high silica, sodium, calcium, bicarbonate and sulphate ions (BC Hydro, 1982) • Sloquet has (Na>Ca)-SO_4 composition with Cl at about 60 mg/l. Springs tend to be Na rich and show a wide range of anion compositions (Grasby et al., 2000). **Mineral indicators:** • Sloquet Creek: opal and gypsum present (BC Hydro, 1974)
	Surface Flow Rates and Reservoir Recharge	• Sloquet Creek: 100 L/min (BC Hydro, 1974); large flow from Jurassic sedimentary strata (Souther and Halstead, 1973); issuing at rate of 100 L/sec from calculated depth of 2.3 km (Grasby & Hutcheon, 2001). • August Jacob's Creek: low flow issuing from between large bodies of granodiorite (Souther and Halstead, 1973). • Water flowing from vertical fractures parallel to Sloquet Creek, accompanied by sulfurous odor and substantial sinter deposits. Most fractures sealed by sinter. (BC Hydro, 1982)
	3D Permeability (heat exchange potential)	No information
	Recent Magmatism	Pemberton Belt - 18-7.9 million-year-old calc-alkaline epizonal plutons and caldera complexes. (Fairbank and Faulkner, 1992)
	Structural Setting	• Two phases of thrusting related to Late Cretaceous oblique convergence along the continental margin and Tertiary dextral/normal dip-slip faulting are the major structural events. The gold mineralization in the area is related to Tertiary-age major faulting along Harrison Lake Fracture Zone. The Harrison Lake shear zone is offset to the north by younger northeast-striking trans-current faults. These northeast-striking trans-current faults may also be important structures in controlling the emplacement of Late Tertiary plutons (Shearer, 1998). • A major dextral northeast-trending fault controls the orientation of Sloquet Creek and cuts the nose of the ridge between North Sloquet and Simpson Creeks. The hot springs in Sloquet Creek may be related to this fault. Several sub-parallel northeast- to north-trending faults may lie to the west. One such structure exposed by trenching is strongly altered and mineralized. Several southwest dipping structures have also been recognized in the area (Shearer, 1998).
	Geophysics	Resistivity survey ran in two parallel lines along a 4.5 km (2.8 mile) profile - results at the time indicated there was nothing of note (BC Hydro, 1974).

SLOQUET CREEK

Near Mission, British Columbia, Canada
Topographical Map Sheet: Figure 32
Geological Map Sheet: Figure 33

Category		Comments
	Reservoir Host Rock	Reservoir host rock unknown. The springs issue from Jurassic sedimentary strata at the surface (Souther and Halstead, 1973). However, volcanic hosted springs tend to be Na rich, and show a wide range of anion compositions (Grasby et al., 2000), which may indicate a volcanic host rock.
	Drilling Issues	Recreational pools built at the springs along the river - used by tourists and hikers. This could present a challenge to finding drilling locations acceptable to spring users
	Brief Description of Geological Setting of Thermal Features (i.e., springs emanate from fluvial gravels; beside a river, etc.)	• Sloquet Springs: Flow issues from Jurassic sedimentary strata along Sloquet Creek (Souther and Halstead, 1973). Water flowing from vertical fractures parallel to Sloquet Creek, accompanied by sulfurous odor and substantial sinter deposits (BC Hydro, 1982). Location of springs possibly controlled by dextral, northeast-trending fault along trend of creek (Shearer, 1998). Airborne magnetic data at the Quet Mineral Property suggest the volcanic Gambier Group package is underlain by plutonic rocks at relatively shallow depth (MEM, 1997). • August Jacob's Creek: Flow issues from between large bodies of granodiorite (Souther and Halstead, 1973).
B.	**Exploration Uncertainty (Risk)**	
	Degree of Identification of Resources/Reserves	Low • Geological, geochemical and geophysical surveys in area (including shallow drilling) have been for gold exploration, not focused on geothermal potential. Exploration in area includes water conductivity measurements, soil sampling and analysis, springs geochemistry (BC Hydro, 1982). • For the Quet mineral property along Sloquet Creek (and along the ridge on the north side of the creek) - airborne geophysical survey, geophysical and geochemical sampling and drilled 7 shallow holes into a gold occurrence. Additional surveys were later conducted, and 11 additional diamond-drilled holes were drilled along the axis of the ridge looking for zones of higher-grade gold mineralization associated with dikes (MEM, 1997). • Ongoing gold exploitation/exploration by Electra Gold Ltd. (Electra Gold, Ltd., 2015)
	Likelihood of Covering Reservoir with Concession	Moderate Mineral titles held to the north and east of the hot spring by gold exploration company. Possible availability of land for geothermal development on SW side of hot springs. Not located within protected park areas.
	Expected Authorization Date	Unknown
	Specific Timing of Exploration (2 + 2 years, BC 8 years, etc.)	5 years (1 year permitting and surface exploration, possibly drilling shallow temperature gradient holes + 1 year deep gradient-well drilling + 1 year successful development drilling and testing + 1 year further development drilling and start plant construction + 1 year drilling wrap-up and finish plant construction)
	Degree of Previous Exploration (can be good or bad)	Moderate Exploration in area has focused on the gold deposits to the north of the springs. Higher amount of exploration data available for that area, but also focused on mineral deposits, not hydrothermal mechanisms or reservoir definition.
	Surface Operational Capacity (enough stable area for drilling and a plant?)	Highly likely River valley is heavily forested. Logging activity in area may provide cleared location opportunities and access roads.
	Exploration to Exploitation: A summary rating of Exploration Uncertainty (risk) on a scale of difficult (high risk) through medium (moderate risk) to easy (low risk)	Moderate Already have mineral exploration ongoing in area, access and community acceptance should be largely established (dependent on proximity to recreational thermal pools); reservoir still needs to be defined and confirmed.

SLOQUET CREEK

Near Mission, British Columbia, Canada
Topographical Map Sheet: Figure 32
Geological Map Sheet: Figure 33

Category		Comments
C.	**Environmental Issues**	
	Protected Areas	• Garibaldi Provincial Park approx. 8 km west of proposed plant location • Golden Ears Provincial Park is approx. 8 km west of proposed plant location • Mehatl Creek Provincial Park 44 km northeast of proposed plant location
	Endangered Species	• Pygmy Longfin Smelt (red-listed fish) 8 km from proposed transmission line connection.
	Geothermal Surface Features	• Sloquet Hot Springs 3.1 km from proposed plant location. • Glacier Creek Hotsprings approx. 23 km from proposed plant location. • August Jacob's Hot Spring approx. 26 km from proposed plant location. • The hotsprings appear to be related to a northeast striking fault, which is one of a series in a general Lillooet Valley Area. The strike may also control the location of the August Jacob's Hot Spring which is northeast along its general strike.
	Other	• Nearest Wildlife Habitat Area (#367461, allotted for Spotted Owl) is approx. 14 km from proposed infrastructure. • Proposed plant location approx. 50 m from Sloquet Creek which contains spawning locations for Coho, Sockeye, Chinook, Pink and Chum salmon. • Transmission line crosses Sloquet Creek twice and three other unnamed creeks. • Winter ungulate range habitat polygon for Mountain Goat approx. 2 km northwest of proposed plant location. • Multiple winter ungulate ranges for Mule Deer approx. 2-10 km from proposed transmission line and plant.
D.	**Geothermal Area - Bidding and/or Type of Land Holding (private/government/lease/etc.)**	
	Bidding Area	No known existing active, cancelled or unsold geothermal title tracts
	Other Claim Rights (mining and/or oil)	Proposed geothermal plant location is within existing mineral/coal title. Proposed location is not within known oil and gas management area; no known tenures at proposed location.

SLOQUET CREEK

Near Mission, British Columbia, Canada
Topographical Map Sheet: Figure 32
Geological Map Sheet: Figure 33

Category		Comments
E.	**Market**	
	Main Electricity Consumers (direct sales and/or government)	General Overview 1. BC Hydro acquires power from Independent Power Producers (which would include geothermal proponents) through two main processes: • Competitive calls: when BC Hydro issues a Call for Tenders for the supply of electricity to BC Hydro, geothermal proponents can bid into those competitive calls. • Standing Offer Program (SOP): This program is presently available for clean generation projects greater than 0.1 MW but not more than 15 MW. Proponents do not compete against each other but are paid a predetermined price by BC Hydro. Depending on the specifics of each project, proponents may wish to size their projects to be under the 15 MW threshold for the SOP (BC Hydro is developing a ‘mini-SOP’ component within the overall SOP. This mini-SOP will apply to projects in the 0.1 MW to 1 MW range, but would not realistically apply to potential geothermal generation projects). • In addition, BC Hydro's net metering program is designed for residential and commercial customers who wish to connect a small electricity generating unit to the BC Hydro distribution system. Generating units up to 0.1 MW in capacity that utilize a clean or renewable resource are eligible to participate in the program. Given the small size, this program has no applicability to potential geothermal generation projects. The acquisition of geothermal power would contribute to BC Hydro’s current target for clean energy and to the diversification of BC Hydro’s resource mix, making it less reliant on snow melt and stream flow. 2. Although FortisBC is a potential customer for electricity from geothermal sources, the opportunities may be limited given FortisBC’s ability to receive electricity from BC Hydro under Rate Schedule 3808. However there is a wheeling agreement in place which would facilitate a geothermal project located in FortisBC’s service territory to sell electricity to BC Hydro through BC Hydro’s competitive calls and/or the SOP, or to other potential customers as noted below. 3. Wholesale wheeling (whereby electricity is transmitted from electricity generators to utilities) to customers in Alberta, the US, or other wholesale customer in BC is allowed. The generation supplier must request service on the appropriate BC Hydro transmission line under the Open Access Transmission Tariff (OATT) at a regulated cost for that service. Depending on the end customer, the generation supplier will have to make similar arrangements to cover transmission access in other jurisdictions (e.g. the Bonneville Power Authority for wheeling to a US customer). This ‘pancaking’ of rates, along with congestion issues, affects the economic viability of the potential wholesale opportunity. 4. Retail access, defined as a market in which electricity is sold directly to consumers by competing suppliers, is generally not permitted in BC. However there may be opportunities for bilateral arrangements for direct sales of electricity from geothermal generating plants to large customers (e.g. pulp mills, large sawmills, mines) as follows: • To replace the electricity supplied at a high voltage from BC Hydro under BC Hydro Transmission Rate 1823 of the Electric Tariff. Such replacement would be challenging given the rates charged under that tariff. • To supply electricity to a remote facility (e.g. a mine, LNG plant or other industrial facility) directly from a geothermal plant located in close proximity to the facility, thereby precluding the need for a lengthy transmission line to connect to the BC Hydro electrical grid.

SLOQUET CREEK

Near Mission, British Columbia, Canada
Topographical Map Sheet: Figure 32
Geological Map Sheet: Figure 33

Category		Comments
	Time Limits? (business agreements, operating/generating-by deadlines?)	• BC Hydro has issued competitive Calls for Tender for the supply of electricity in the past. • BC Hydro’s SOP is presently directly available for clean energy projects which meet certain criteria, including a generation output of less than 15 MW. • Typical BC Hydro Energy Purchase Agreements from Independent Power Producers are 20-40 years in duration. • Business agreements with the owners of private transmission lines (e.g. independent power producers) for access to the market will be necessary. • The lead times to develop geothermal resources will include appropriate allowances for investigative drilling, technical and environmental studies, public consultation, transmission considerations, marketing, licencing, design, construction and commissioning. These lead times will vary from four to seven years depending on the specifics of each project. Projects with a history of exploration and analysis (e.g. Meager Creek/Pebble Creek, Lakelse, and Canoe Creek) will generally be on the shorter end of this time continuum, while other projects with less investigative work will take longer. Although the time required to drill a geothermal well and construct a power plant could conceivably be less than two years, the key uncertainties inherent in the environmental review, public consultation, transmission arrangements (either with BC Hydro or a private transmission owner), and the permitting and regulatory processes will realistically result in a further two years at a minimum for these activities.
F.	**Transmission Line Infrastructure**	
	State of the Infrastructure	Closest transmission line is 138 kV to Upper Stave Hydroelectric Project. Closest substation is Upper Harrison Terminal.
	Transmission Route (distance, terrain and costs)	Connects to 138 kV Innergex transmission line running by site via <1 km new 138 kV transmission line.
H.	**Community Issues**	
	Indigenous Law and Indigenous Development Areas	• First Nation consultative areas include St'at'imc Chiefs Council, Lillooet Tribal Council, Sto:lo Nation, Seabird Island Band, Samahquam First Nation, In-SHUCK-ch Nation, Skatin Nations, Kwantlen First Nation, Douglas First Nation, Sts'ailes. • St'at'imc Law applies; follows 11 principles that respect cultural traditions, respects nature and serves the St'at'imc communities.
	Community Action	• Sloquet Hot Springs is run as a joint venture between the Government of BC and First Nations. In 2010 improvement benefits to the Harrison West Forest Service Road were investigated. • St'at'imc community upgrades to the hot springs are ongoing (http://www.indigenousworkforce.org/projects/weekend-warrior-projects/) • Mission Official Community Plan completed in 2008 includes goal to achieve sustainable growth; balancing economic, environmental and social principals (Mission Official Community Plan).
	Surface Rights	• First Nation consultative areas include St'at'imc Chiefs Council, Lillooet Tribal Council, Sto:lo Nation, Seabird Island Band, Samahquam First Nation, In-SHUCK-ch Nation, Skatin Nations, Kwantlen First Nation, Douglas First Nation, Sts'ailes. • Significant protected habitat with St'at'imc Land and Resources Authority - SLRA (www.statimc.net)
	Tourism	• Sloquest Hot Springs is an existing tourist destination with campground and hiking trails. (http://whistlerhiatus.com/driving/sloquet-hot-springs-126k.html) • Proposed location is accessed via remote forest service roads, however, is relatively close to densely populated greater Vancouver; potential for more use pending reliable access roads.

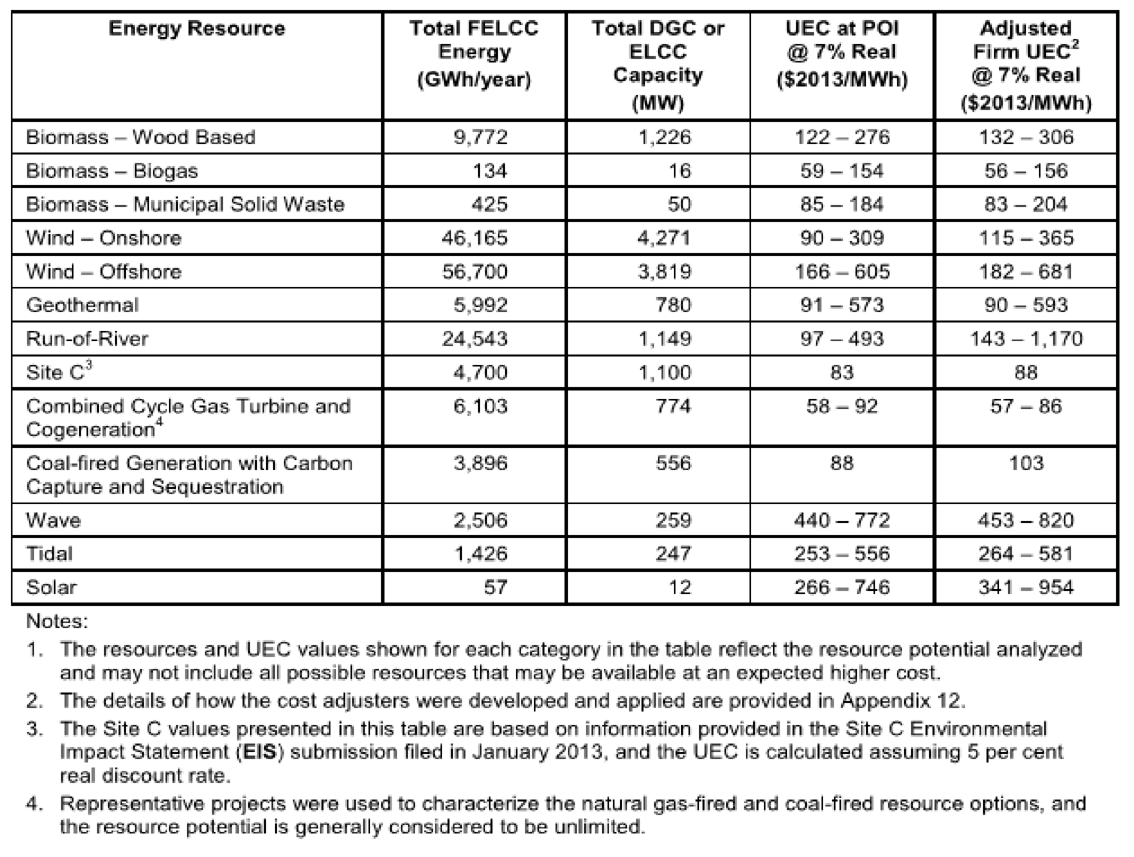
SLOQUET CREEK

Near Mission, British Columbia, Canada
Topographical Map Sheet: Figure 32
Geological Map Sheet: Figure 33

Category		Comments
I.	**Water Rights**	
	Availability (for example "air-cooled required")	Plant water requirement estimated approx. 13 L/s for binary plant. MAD of 10,900 L/s in Sloquet Creek. No water licences in vicinity of plant.
	Availability for Drilling	Drilling requirement of 20 L/s. MAD of 10,900 L/s in Sloquet Creek. No water licences in vicinity of plant.
J.	**Engineering**	
	Plant Location and Design	Plant located near Sloquet Creek on relatively flat terrain in treed area.
	Construction Issues	Access via existing unpaved logging roads of unknown condition. Mission BC is closest community with all necessities required for temporary workers. Workers for existing run-of-river projects access is largely fly-in and out from Spring Creek at the head of Harrison Lake.
	Transportation Issues	Access via existing unpaved logging roads of unknown condition.
	Architectural Issues (Blend/hide into environment? Local styles? etc.)	None found.
	Special Construction Issues (zero emissions)	None found.
K.	**Non-Electrical Infrastructure (Roads and Habitation)**	
	Nearest Large Community > 50,000	Maple Ridge, BC
	Nearest Community	Mission, BC
	Nearest Road and Condition	Nearest road is unpaved logging/access road within 1 km of proposed plant location; condition is unknown.
	Current Access Conditions (restrictions)	Construction access via existing unpaved logging roads of unknown condition.
	Terrain and Distance Factor for Road Building	No new road construction required.

SLOQUET CREEK

Near Mission, British Columbia, Canada
Topographical Map Sheet: Figure 32
Geological Map Sheet: Figure 33

Category		Comments
L.	**Finance**	
	General Power Prices	BC Hydro acquires power through (1) competitive processes (Calls for Tender), (2) the Standing Offer Program (not including the mini-SOP under development), and (3) upgrades to its existing facilities or the development of new generation facilities. (Note that the net metering program targets projects less than 100 kW and is therefore not relevant to geothermal generation projects). Comments on the general price of power under each one are: • The power price paid by BC Hydro to independent power producers through Energy Purchase Agreements (EPAs) under Calls for Tender are proprietary and confidential. • The power price paid by BC Hydro to independent power producers through EPAs under the SOP are made up of a predetermined base price in 2010 dollars as determined by the region of the point of interconnection to the BC Hydro system, escalated at the Consumer Price Index annually up to the year in which an EPA is signed, and further adjusted based upon the time of day and month when the energy is delivered. For reference, the base price for the Lower Mainland region in 2010 dollars is $103.69/MWh. • BC Hydro's current Integrated Resource Plan dated November 2013 includes details of both demand-side management options and supply-side resource options to consider in meeting the future demand for electricity. These resource options, together with their attributes of total energy and capacity and unit energy costs, are listed in Table 2-2 of the November 2013 Resource Options Report Update. That table is reproduced below for ready reference. • Table 5-7 of the above-noted November 2013 Resource Options Report Update provides a summary of the Geothermal Potential by Transmission Region. 

Energy Resource	Total FELCC Energy (GWh/year)	Total DGC or ELCC Capacity (MW)	UEC at POI @ 7% Real ($2013/MWh)	Adjusted Firm UEC[2] @ 7% Real ($2013/MWh)
Biomass – Wood Based	9,772	1,226	122 – 276	132 – 306
Biomass – Biogas	134	16	59 – 154	56 – 156
Biomass – Municipal Solid Waste	425	50	85 – 184	83 – 204
Wind – Onshore	46,165	4,271	90 – 309	115 – 365
Wind – Offshore	56,700	3,819	166 – 605	182 – 681
Geothermal	5,992	780	91 – 573	90 – 593
Run-of-River	24,543	1,149	97 – 493	143 – 1,170
Site C[3]	4,700	1,100	83	88
Combined Cycle Gas Turbine and Cogeneration[4]	6,103	774	58 – 92	57 – 86
Coal-fired Generation with Carbon Capture and Sequestration	3,896	556	88	103
Wave	2,506	259	440 – 772	453 – 820
Tidal	1,426	247	253 – 556	264 – 581
Solar	57	12	266 – 746	341 – 954

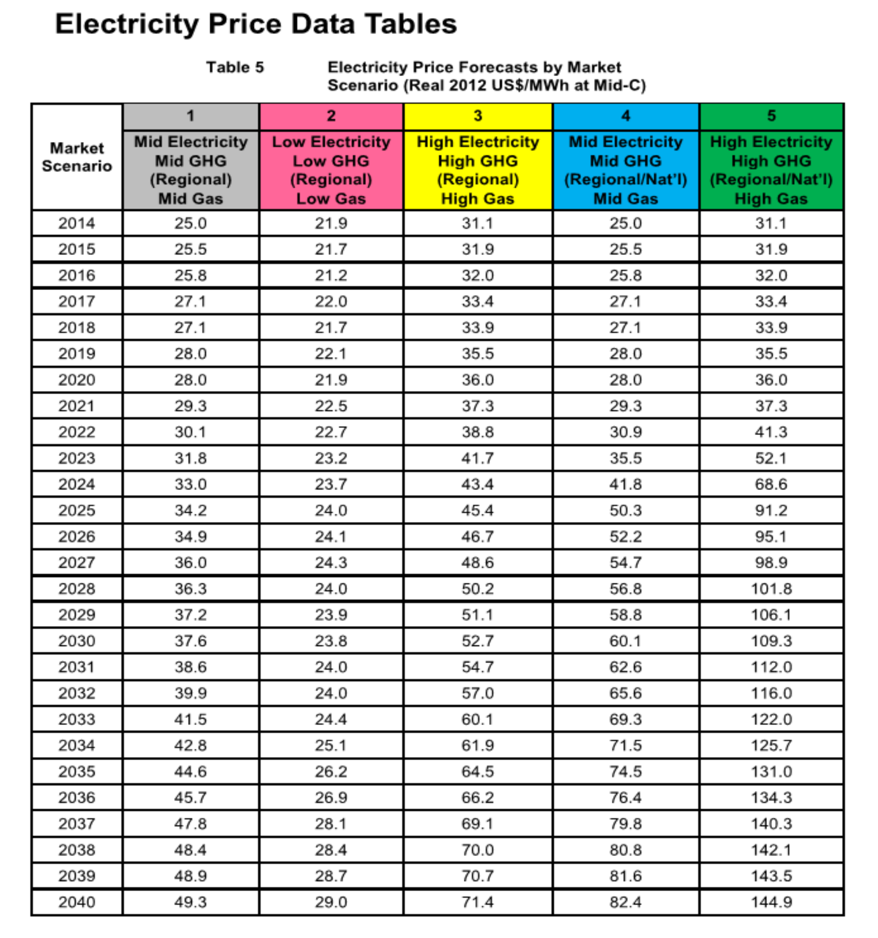
Notes:

1. The resources and UEC values shown for each category in the table reflect the resource potential analyzed and may not include all possible resources that may be available at an expected higher cost.
2. The details of how the cost adjusters were developed and applied are provided in Appendix 12.
3. The Site C values presented in this table are based on information provided in the Site C Environmental Impact Statement (**EIS**) submission filed in January 2013, and the UEC is calculated assuming 5 per cent real discount rate.
4. Representative projects were used to characterize the natural gas-fired and coal-fired resource options, and the resource potential is generally considered to be unlimited.

SLOQUET CREEK

Near Mission, British Columbia, Canada
Topographical Map Sheet: Figure 32
Geological Map Sheet: Figure 33

Category	Comments
Market Price ($/MWhr)	• As noted in the above Table 2-2 from the November 2013 Resource Options Report Update, the Unit Energy Cost for geothermal resources at a 7% real discount rate in 2013 dollars ranges from $91/MWh to 573/MWh at the point of interconnection to the BC Hydro system. • Wholesale electricity prices for trading purposes can vary greatly. In the Pacific Northwest, these prices are affected by such factors as precipitation/snowfall in the region, unforeseen generation outages and ambient temperatures. A general flavour of the wholesale electricity prices for potential export of electricity from BC can be obtained from a variety of sources. One such source is the US Energy Information Administration (www.eia.gov/electricity/wholesale/#history). This source provides current and historical electricity market data. Of particular relevance is the mid-C trading hub in the Northwest Region (one example would be a Mid-C peak price on March 17, 2015 of $19.87US weighted average cost from 72 trades). Access to that market for geothermal projects in BC would require access on both the BC Hydro transmission system to the Canada/US border, and on the appropriate transmission system (e.g. Bonneville Power Authority) in the US. • BC Hydro forecasts of market prices under various scenarios was provided in the November 2013 IRP. Table 5 in Appendix 5A – Market Forecast Data is reproduced below for ready reference



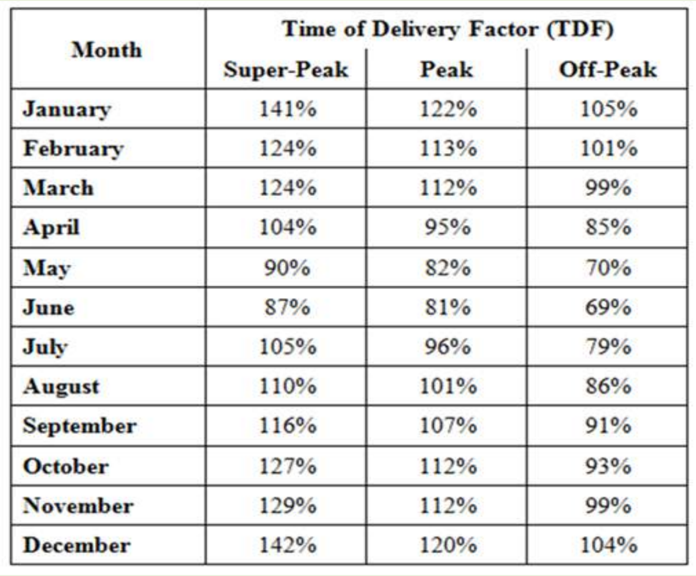
Electricity Price Data Tables

Table 5 Electricity Price Forecasts by Market Scenario (Real 2012 US$/MWh at Mid-C)

Market Scenario	1 Mid Electricity Mid GHG (Regional) Mid Gas	2 Low Electricity Low GHG (Regional) Low Gas	3 High Electricity High GHG (Regional) High Gas	4 Mid Electricity Mid GHG (Regional/Nat'l) Mid Gas	5 High Electricity High GHG (Regional/Nat'l) High Gas
2014	25.0	21.9	31.1	25.0	31.1
2015	25.5	21.7	31.9	25.5	31.9
2016	25.8	21.2	32.0	25.8	32.0
2017	27.1	22.0	33.4	27.1	33.4
2018	27.1	21.7	33.9	27.1	33.9
2019	28.0	22.1	35.5	28.0	35.5
2020	28.0	21.9	36.0	28.0	36.0
2021	29.3	22.5	37.3	29.3	37.3
2022	30.1	22.7	38.8	30.9	41.3
2023	31.8	23.2	41.7	35.5	52.1
2024	33.0	23.7	43.4	41.8	68.6
2025	34.2	24.0	45.4	50.3	91.2
2026	34.9	24.1	46.7	52.2	95.1
2027	36.0	24.3	48.6	54.7	98.9
2028	36.3	24.0	50.2	56.8	101.8
2029	37.2	23.9	51.1	58.8	106.1
2030	37.6	23.8	52.7	60.1	109.3
2031	38.6	24.0	54.7	62.6	112.0
2032	39.9	24.0	57.0	65.6	116.0
2033	41.5	24.4	60.1	69.3	122.0
2034	42.8	25.1	61.9	71.5	125.7
2035	44.6	26.2	64.5	74.5	131.0
2036	45.7	26.9	66.2	76.4	134.3
2037	47.8	28.1	69.1	79.8	140.3
2038	48.4	28.4	70.0	80.8	142.1
2039	48.9	28.7	70.7	81.6	143.5
2040	49.3	29.0	71.4	82.4	144.9

SLOQUET CREEK

Near Mission, British Columbia, Canada
Topographical Map Sheet: Figure 32
Geological Map Sheet: Figure 33

Category	Comments
Green Power Premium ($/MWhr)	• BC Hydro's past procurement processes for the acquisition for power from independent power producers has offered a premium for green power. • Within British Columbia, there is little demand for the purchase of "green power certificates" (instruments that a customer can purchase to be assured that the electricity used is environmentally friendly) from BC Hydro. BC Hydro's generation mix is already approximately 93% clean. • California has a goal of 33% of retail sales by 2020 to be sourced from eligible renewable energy sources. However, the opportunity for geothermal power from British Columbia, particularly "bundled" green energy with Renewable Energy Certificates (RECs), to compete in that market is low, for a number of reasons 1. The price of electricity is driven by the low cost of natural gas; 2. There are large amounts of renewables, such as wind and solar, in California; and 3. Firm transmission access to the California market through the BPA transmission system is generally not available.
Capacity Price ($/KW)	• There is no price in $/kW for capacity resource options in the market at present. • Table 3-27 entitled "UCCs of Capacity Resource Supply Options" in BC Hydro's Integrated Resource Plan dated November 2013 provided a summary of capacity resource options (e.g. pumped storage, simple cycle gas turbines and resource smart projects such as Revelstoke Unit 6). The unit capacity costs (UCCs) at the point of interconnection to the BC Hydro system in $2013/kW-year are shown in the table.
Is there a higher price for base load power?	In general, baseload power (ie firm power) is more valuable to BC Hydro and furthermore the price paid for baseload power varies by month throughout the year. As an example, the following excerpt is taken from BC Hydro's SOP: "1. Definitions: In this Appendix 4, the following words and expressions have the following meanings: (a) "Off-Peak Hours" means all hours other than Super-Peak Hours and Peak Hours. (b) "Peak Hours" means the hours commencing at 06:00 PPT and ending at 16:00 PPT, and commencing at 20:00 PPT and ending at 22:00 PPT, Monday through Saturday inclusive, but excluding British Columbia statutory holidays. (c) "Super-Peak Hours" means the hours commencing at 16:00 PPT and ending at 20:00 PPT Monday through Saturday inclusive, but excluding British Columbia statutory holidays." 

Month	Time of Delivery Factor (TDF)		
	Super-Peak	Peak	Off-Peak
January	141%	122%	105%
February	124%	113%	101%
March	124%	112%	99%
April	104%	95%	85%
May	90%	82%	70%
June	87%	81%	69%
July	105%	96%	79%
August	110%	101%	86%
September	116%	107%	91%
October	127%	112%	93%
November	129%	112%	99%
December	142%	120%	104%

SLOQUET CREEK

Near Mission, British Columbia, Canada
Topographical Map Sheet: Figure 32
Geological Map Sheet: Figure 33

Category		Comments
	Estimated Size of Resource	See Section A.
	Is there any green power incentives?	• The BC government created the Innovative Clean Energy (ICE) fund with an initial mandate to accelerate the commercialization of emerging clean energy technologies (now expanded to include a broad range of energy efficiency and conservation projects). British Columbia also has a program entitled Scientific Research and Experimental Development Tax credit (SR&ED). Geothermal proponents could keep a watching brief on these programs for applicability and relevance. • The BC government's First Nations Clean Energy Business Fund. This fund promotes increased Aboriginal community participation in the clean energy sector. It provides: o Capacity funding of up to $50,000 per applicant to cover the early stages (e.g. feasibility studies) of project development ; and o Equity funding of up to $500,000 per applicant to support a financially viable and resourced clean energy project. • There are a number of government of Canada programs to encourage the development of renewable power. Some of these programs may be active but not currently issuing calls for proposals. Others may be focussed on research and innovation and may not be directly applicable to geothermal technologies/resources, while others may be fully subscribed and even inactive but are noted in terms of completeness. Some of these programs include: o Natural Resources Canada ecoEnergy for Renewable Power program; o Sustainable Development Technology Canada funds; o Clean Energy Fund; o Industrial Research Assistance Program; and o Green Infrastructure Fund Geothermal proponents could keep a watching brief on these and other federal government programs for their applicability and relevance.
	Grants	See above under green power incentives
	Tax Holidays	None listed on federal and provincial websites.
	Tax Relief	• Under Classes 43.1 and 43.2 in Schedule II of the Income Tax Regulations, certain capital costs of systems that produce energy by using renewable energy sources or fuels from waste, or conserve energy by using fuel more efficiently are eligible for accelerated capital cost allowance. Under Class 43.1, eligible equipment may be written-off at 30 percent per year on a declining balance basis. In general, equipment that is eligible for Class 43.1 but is acquired after February 22, 2005 and before year 2020 may be written-off at 50 percent per year on a declining balance basis under Class 43.2. Without these accelerated write-offs, many of these assets would be depreciated for income tax purposes at annual rates between 4 and 30 percent. • In addition to Class 43.1 or 43.2 capital cost allowance, the Income Tax Regulations allow certain expenses incurred during the development and start-up of renewable energy and energy conservation projects [Canadian renewable and conservation expenses (CRCE)] to be fully deducted in the year they are incurred, carried forward indefinitely and deducted in future years, or transferred to investors through a flow-through share agreement.

SLOQUET CREEK

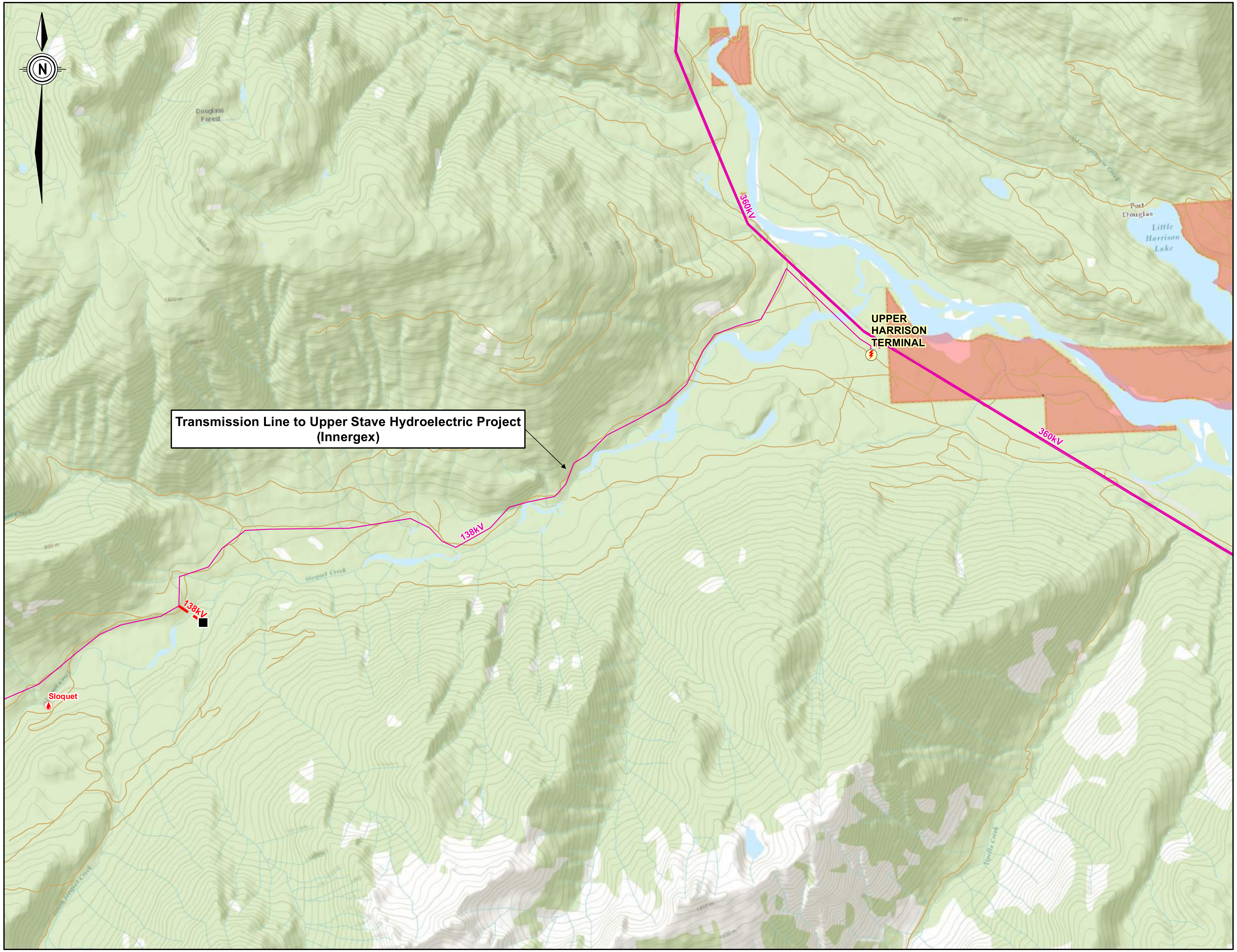
Near Mission, British Columbia, Canada
Topographical Map Sheet: Figure 32
Geological Map Sheet: Figure 33

Category		Comments
	Loan Guarantees	The following is an excerpt from http://www.fnfa.ca/en/fnfa/ "The First Nations Finance Authority (FNFA) is a statutory not-for-profit organization without share capital, operating under the authority of the First Nations Fiscal Management Act, 2005. The FNFA's purposes are to provide investment options and capital planning advice and—perhaps most importantly, access to long-term loans with preferable interest rates. The FNFA is not an agent of Her Majesty or a Crown corporation and is governed solely by the First Nations communities that join as Borrowing Members. The advantages of joining the FNFA as a Borrowing Member are: 1. Access to low rate, below bank prime, loans with repayment terms up to 30 years; 2. First Nations choose the repayment terms that work best for their budget; 3. FNFA loans do not require collateral; 4. FNFA loans can be used to refinance existing debt; and 5. FNFA's interest rates and terms parallel those available to provincial and local governments. Most revenue streams are eligible to support FNFA loan requests. Eligible capital projects FNFA can finance include infrastructure, social and economic development, land purchases, independent power projects, community housing and rolling stock/heavy equipment. FNFA is a stand-alone organization separate from the Government of Canada, and its operating policies are set by its Borrowing Members, represented by the First Nation's Chief and Council appointee. The FNFA is for First Nations, by First Nations."
	Royalties/Fees	Geothermal Resources Act, [RSBC 1996] CHAPTER 171, as of March 11, 2015 Permits for well authorizations for wells to be drilled within the boundaries of the permittee's location must pay a prescribed rent for the permit (Section 5). Based on Section 17 of the Act, (1) A lessee who produces a geothermal resource for purposes other than testing must pay to the government (a) a royalty established by agreement under this section, (b) an amount agreed under this section to be paid instead of royalty, or (c) if no royalty or amount has been agreed under this section, the prescribed royalty.
	General Idea of Royalties	With regard to use of the water resources within the geothermal tract, Section 4 of the Water Sustainability Act states "This Act does not apply to geothermal resources as defined in section 1 (1) [definitions] of the Geothermal Resources Act."
	Private Land Owner or Government Land	Geothermal proponents will need to arrange financial agreements (eg leases or purchases) with private property owners for the geothermal land tract. Proponents for geothermal facilities on Crown Land must apply for the appropriate tenure under the BC Land Act (eg Statutory Right of Way, Licence of Occupation).
	Tax Rate in the Country	• Income eligible for small-business deduction (up to $500,000 income): 11% Federal tax, combined federal and provincial (British Columbia): 13.5%. • Income not eligible for small-business deduction: 15% Federal, combined federal and provincial (British Columbia): 26%
	Transmission Tariffs	Under wholesale wheeling (whereby electricity is transmitted from electricity generators to utilities) to customers in Alberta, the US, or other wholesale customers in BC, the generation supplier must request service on the appropriate BC Hydro transmission line under the Open Access Transmission Tariff (OATT) at a regulated cost for that service. Depending on the end customer, the generation supplier will have to make similar arrangements to cover transmission access in other jurisdictions (e.g. the Bonneville Power Authority for wheeling to a US customer). This 'pancaking' of rates, along with transmission congestion issues, affects the economic viability of the potential wholesale opportunity.

SLOQUET CREEK

Near Mission, British Columbia, Canada
Topographical Map Sheet: Figure 32
Geological Map Sheet: Figure 33

Category		Comments
M.	**Maps**	
	Regional topographic map showing population centres, roads and other infrastructure including electrical grid and nearest substation and/or generating station. (1:500,000?)	Topographical Map Sheet: Figure 32
	Regional map showing land tenure in area – geothermal concessions, mining concessions, private land holds, public or national lands (parks). (1:500,000?)	Topographical Map Sheet: Figure 32
	Regional geological map. (1:250 or 500,000?)	Geological Map Sheet: Figure 33
	Detailed geological map of the immediate area of the concessions. (1:50,000 or 100,000)	Geological Map Sheet: Figure 33
N.	**Other Issues and Considerations**	



Geoscience BC

Legend

- ■ Proposed Geothermal Plant Location
- 🔥 Thermal Spring
- Proposed Transmission Line
- ⚡ Existing Substation
- Existing Transmission Line
- Paved Road
- Other Road
- 🟥 First Nations Reserve

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Service Layer Credits: Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

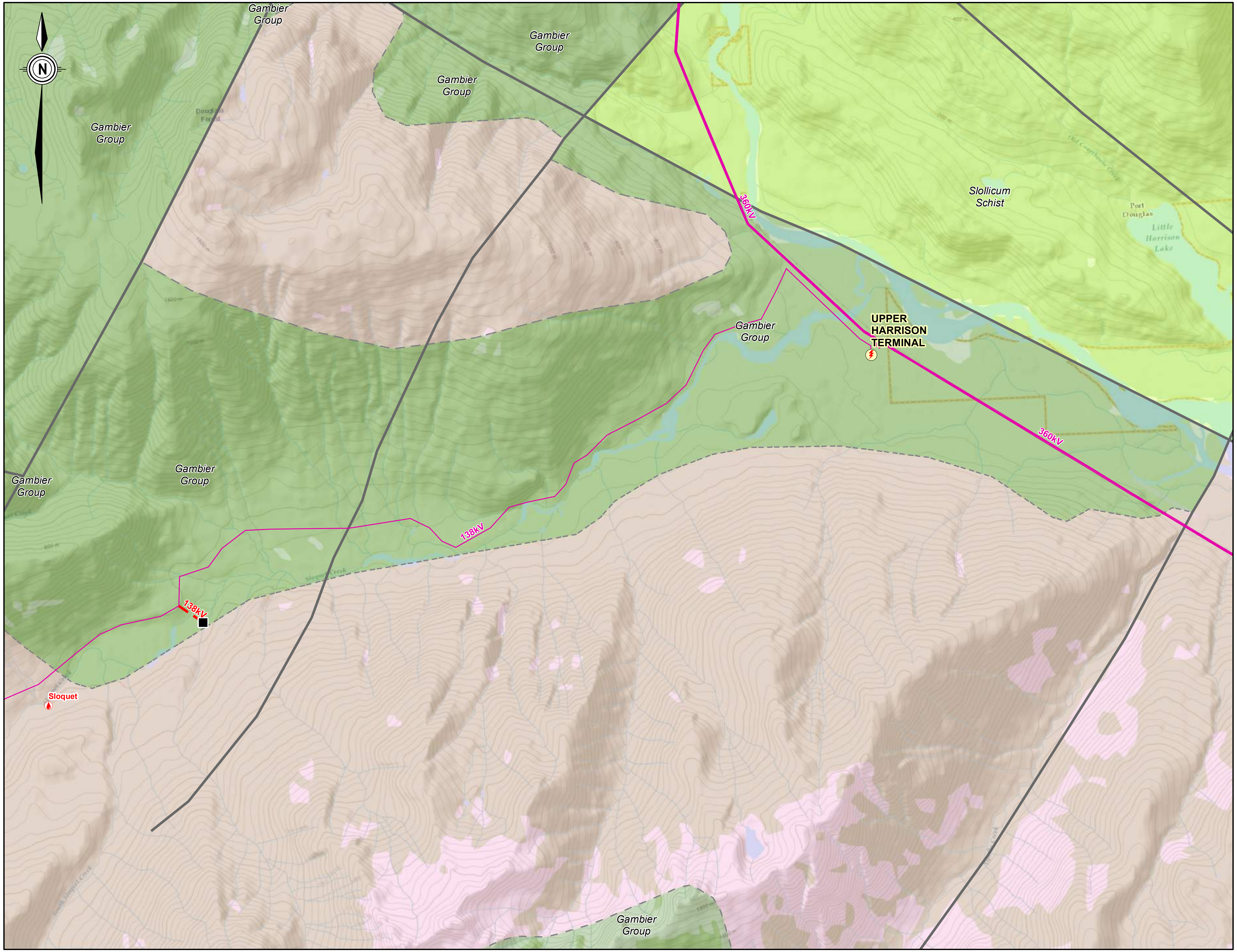
1 0 1
Kilometers

Project No.	Date
2692-004	April 30, 2015

Potential Geothermal Plant at Sloquet Hot Springs 10MW

Figure 32

Path: Q:\2600-2699\2692-004\430-GIS\MXD-RP\2692004_GeothermalLocations_mapbook.mxd Date Saved: 2015-04-27 2:55:05 PM
Author: RTaylor



Legend

- ■ Proposed Geothermal Plant Location
- 🌢 Thermal Spring
- ╌ Proposed Transmission Line
- ⚡ Existing Substation
- ─ Existing Transmission Line

Bedrock Type

- 🟪 Intrusive Rocks
- 🟩 Metamorphic Rocks
- 🟩 Sedimentary Rocks
- ╌ Rock Type Boundary
- ─ Fault

Service Layer Credits: Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

1 0 1
Kilometers

Project No.	Date
2692-004	April 30, 2015

Geological Strata Map for Sloquet Hot Springs 10MW

Figure 33

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Author: RTaylor

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Appendix R

Sphaler Creek Geothermal Development Decision Matrix and Figures 34 & 35

SPHALER CREEK

Near Stikine, British Columbia, Canada
Topographical Map Sheet: Figure 34
Geological Map Sheet: Figure 35

Category		Comments
A.	**Reservoir Potential**	
	Size/Potential/Type	• **Reservoir size:** N/A (no area or depth defined in literature) - therefore, reservoir volume estimated* at: 2.2 km^3 (most-likely area: 2 km^2; most-likely thickness: 1.1 km) (*Reservoir assumptions made using Appendix III in GeothermEx, 2004) • **Potential:** Assume 10 MW, compatible with generic reservoir volume (above) in vicinity of single spring, for reservoir temperatures in range of 150˚C to 200˚C. • **Type:** unknown, likely binary
	Temperature/Water and Gas Chemistry/Mineral Indicators	**Surface features:** • Sphaler Creek spring: small hot spring discharges into Sphaler Creek, approximately 11 kilometers southwest of Round Lake (Logan and Koyanagi, 1989). **Geothermometry:** • No information **Exploration drilling:** • None **Water chemistry:** • No information **Mineral indicators:** • Sphaler Creek spring has deposited calcareous tufa up to I meter thick. The smell of hydrogen sulphide is easily detectable. Tufa was sampled for geochemical analysis (Logan and Koyanagi, 1989).
	Surface Flow Rates and Reservoir Recharge	unknown
	3D Permeability (heat exchange potential)	unknown
	Recent Magmatism	Most recent volcanic activity ~ 50 km south at Hoodoo Mountain
	Structural Setting	Complicated structures have resulted in part from polyform deformation (Paleozoic strata), but also from the contrasting competence of Triassic and Jurassic volcanic and sedimentary units. Four main sets of faults have produced a mosaic of fault-bounded blocks. The youngest faults in the map area strike north-northeast to northeast. The upper reaches of Sphaler Creek follow these steep to vertical structures and at one location one fault shows evidence of 1200 meters of left-lateral offset. The spring is located on a major north-trending structure which flanks the west side of the Hickman batholith. Folds in the area of the springs have NS-trending axes and have been mapped on the north and south side of Sphaler Creek. Further east, upstream towards Round Lake, Paleozoic rocks have been uplifted along steep west-dipping reverse faults (Logan and Koyanagi, 1989).
	Geophysics	Unknown
	Reservoir Host Rock	Unknown - volcanic or sedimentary (carbonate) likely
	Drilling Issues	Remote location - mining active in area, possible existing infrastructure.
	Brief Description of Geological Setting of Thermal Features (i.e., springs emanate from fluvial gravels; beside a river, etc.)	• The Cenozoic Stikine Volcanic Belt is considered to be the most recently active of the volcanic belts in British Columbia, and most of the recent volcanism in the Stikine Belt has been basaltic in nature. The volcanic activity is likely the result of extensional fracturing (Piteau and Associates, 1988). • Locally, the volcanic Stikine assemblage comprises lava flows and volcanoclastics, interbedded with carbonates and minor chert and shale. Plutonic rocks of Mesozoic and Tertiary age intrude this complex stratigraphy, with porphyry copper-silver-gold deposits in the area. Along Sphaler Creek valley, Triassic Stuhini Group andesites and basalts are found, and are in contact with Permian calcareous sedimentary layers and andesitic volcanic rocks of the Stikine Assemblage in the area of the springs. At a mining claim (possibly for gold) north of Sphaler Creek (Sphal-17 claim) near the spring (~7 km west along the river valley), the area is underlain by Upper Triassic pyroxene-porphyry flows, andesitic breccias and crystal tuffs. Prominent north-northeast-trending faults have localized intrusions of Tertiary (age unconfirmed) monzonite and felsite bodies as well as mineralization. At Sphal-17 disseminated copper mineralization occurs in altered and brecciated zones in volcanics and felsite intrusives. The main mineralized zone is hosted by an intrusive breccia measuring 50 by 18 meters at surface; pyrite, chalcopyrite and magnetite fill the matrix. Faulting has broken the breccia into discontinuous sections (Logan and Koyanagi, 1989).

SPHALER CREEK

Near Stikine, British Columbia, Canada
Topographical Map Sheet: Figure 34
Geological Map Sheet: Figure 35

Category		Comments
B.	**Exploration Uncertainty (Risk)**	
	Degree of Identification of Resources/Reserves	Low Some geologic mapping done, no known geophysical or geochemical studies conducted. No drilling in area known. Apparent mining exploration in area.
	Likelihood of Covering Reservoir with Concession	Moderate Potential competition with mineral tracts if resource lies to the east of the river.
	Expected Authorization Date	Unknown
	Specific Timing of Exploration (2 + 2 years, BC 8 years, etc.)	5-6 years (1 year deep gradient-well drilling + 2 year successful development drilling and testing + 1 year further development drilling and start plant construction + 1 year drilling wrap-up and finish plant construction). Possible delays due to issues of access and competing use (mining).
	Degree of Previous Exploration (can be good or bad)	Low Geologic mapping comprises the only known exploration in the area.
	Surface Operational Capacity (enough stable area for drilling and a plant?)	Likely Mining operations in area; possible need for additional infrastructure to springs site
	Exploration to Exploitation: A summary rating of Exploration Uncertainty (risk) on a scale of difficult (high risk) through medium (moderate risk) to easy (low risk)	Difficult Risk is considered high due to lack of information about resource characteristics. Mitigating factor is that mining activity in the area makes access somewhat easier. Sphaler Creek Spring is located ~100 m from an older mining road and power line (Galore Mine) - Active mining operation ~4 km down-river to the west.
C.	**Environmental Issues**	
	Protected Areas	• Nigunsaw River Ecological Reserve approx. 12.5 km from proposed transmission line connection. • Nigunsaw Provincial Park approx. 15 km from proposed transmission line connection. • Mount Edziza Provincial Park 65 km north of proposed plant location.
	Endangered Species	• Pygmy Longfin Smelt (red-listed fish) habitat polygon 7.3 km from proposed transmission line connection. • Northern Mountain Caribou (Endangered (SARA Schedule 1); red-listed) habitat polygon approx. 65 km north of proposed plant location.
	Geothermal Surface Features	• Sphaler Creek Hot Springs 1.4 km from proposed transmission line and 3.2 km from proposed plant location.
	Other	• Spotted Owl Wildlife Habitat Area is approx. 6.5 km east and 11 km southeast of proposed transmission line connection. • Proposed transmission line crosses through Cassiar proposed Wildlife Area allotment for Grizzly Bear. • Transmission line crosses approx. 20 streams, including More Creek and Devil Creek. • More Creek contains Dolly Varden. • Devil Creek contains Dolly Varden and Rainbow Trout.
D.	**Geothermal Area - Bidding and/or Type of Land Holding (private/government/lease/etc.)**	
	Bidding Area	No known existing active, cancelled or unsold geothermal title tracts
	Other Claim Rights (mining and/or oil)	Existing coal and mineral titles. Proposed location is not within known oil and gas management area; no known tenures at proposed location.

SPHALER CREEK

Near Stikine, British Columbia, Canada
Topographical Map Sheet: Figure 34
Geological Map Sheet: Figure 35

Category		Comments
E.	**Market**	
	Main Electricity Consumers (direct sales and/or government)	General Overview 1. BC Hydro acquires power from Independent Power Producers (which would include geothermal proponents) through two main processes: • Competitive calls: when BC Hydro issues a Call for Tenders for the supply of electricity to BC Hydro, geothermal proponents can bid into those competitive calls. • Standing Offer Program (SOP): This program is presently available for clean generation projects greater than 0.1 MW but not more than 15 MW. Proponents do not compete against each other but are paid a predetermined price by BC Hydro. Depending on the specifics of each project, proponents may wish to size their projects to be under the 15 MW threshold for the SOP (BC Hydro is developing a 'mini-SOP' component within the overall SOP. This mini-SOP will apply to projects in the 0.1 MW to 1 MW range, but would not realistically apply to potential geothermal generation projects). • In addition, BC Hydro's net metering program is designed for residential and commercial customers who wish to connect a small electricity generating unit to the BC Hydro distribution system. Generating units up to 0.1 MW in capacity that utilize a clean or renewable resource are eligible to participate in the program. Given the small size, this program has no applicability to potential geothermal generation projects. The acquisition of geothermal power would contribute to BC Hydro's current target for clean energy and to the diversification of BC Hydro's resource mix, making it less reliant on snow melt and stream flow. 2. Although FortisBC is a potential customer for electricity from geothermal sources, the opportunities may be limited given FortisBC's ability to receive electricity from BC Hydro under Rate Schedule 3808. However there is a wheeling agreement in place which would facilitate a geothermal project located in FortisBC's service territory to sell electricity to BC Hydro through BC Hydro's competitive calls and/or the SOP, or to other potential customers as noted below. 3. Wholesale wheeling (whereby electricity is transmitted from electricity generators to utilities) to customers in Alberta, the US, or other wholesale customer in BC is allowed. The generation supplier must request service on the appropriate BC Hydro transmission line under the Open Access Transmission Tariff (OATT) at a regulated cost for that service. Depending on the end customer, the generation supplier will have to make similar arrangements to cover transmission access in other jurisdictions (e.g. the Bonneville Power Authority for wheeling to a US customer). This 'pancaking' of rates, along with congestion issues, affects the economic viability of the potential wholesale opportunity. 4. Retail access, defined as a market in which electricity is sold directly to consumers by competing suppliers, is generally not permitted in BC. However there may be opportunities for bilateral arrangements for direct sales of electricity from geothermal generating plants to large customers (e.g. pulp mills, large sawmills, mines) as follows: • To replace the electricity supplied at a high voltage from BC Hydro under BC Hydro Transmission Rate 1823 of the Electric Tariff. Such replacement would be challenging given the rates charged under that tariff. • To supply electricity to a remote facility (e.g. a mine, LNG plant or other industrial facility) directly from a geothermal plant located in close proximity to the facility, thereby precluding the need for a lengthy transmission line to connect to the BC Hydro electrical grid. • Potential regional power shortage may occur in the NW BC. BC Hydro may need dependable capacity in the area. • The proposed Galore Creek mine is a potential customer (it is proposed that the access to this geothermal site use the Galore Creek access road). • A potential electricity customer, Bear River Gravel open pit aggregate mine, is in the permitting or environmental assessment phase. The potential operations are located approximately 140 km away. • Kerr-Sulphurets-Mitchell Mine is proceeding through regulatory processes for a mine project located approximately 150 km from the geothermal site. The gold/copper project would be 65 km northwest of Stewart.

SPHALER CREEK

Near Stikine, British Columbia, Canada
Topographical Map Sheet: Figure 34
Geological Map Sheet: Figure 35

Category		Comments
	Time Limits? (business agreements, operating/generating-by deadlines?)	• BC Hydro has issued competitive Calls for Tender for the supply of electricity in the past. • BC Hydro's SOP is presently directly available for clean energy projects which meet certain criteria, including a generation output of less than 15 MW. • Typical BC Hydro Energy Purchase Agreements from Independent Power Producers are 20-40 years in duration. • Business agreements with the owners of private transmission lines (e.g. independent power producers) for access to the market will be necessary. • The lead times to develop geothermal resources will include appropriate allowances for investigative drilling, technical and environmental studies, public consultation, transmission considerations, marketing, licencing, design, construction and commissioning. These lead times will vary from four to seven years depending on the specifics of each project. Projects with a history of exploration and analysis (e.g. Meager Creek/Pebble Creek, Lakelse, and Canoe Creek) will generally be on the shorter end of this time continuum, while other projects with less investigative work will take longer. Although the time required to drill a geothermal well and construct a power plant could conceivably be less than two years, the key uncertainties inherent in the environmental review, public consultation, transmission arrangements (either with BC Hydro or a private transmission owner), and the permitting and regulatory processes will realistically result in a further two years at a minimum for these activities.
F.	**Transmission Line Infrastructure**	
	State of the Infrastructure	Closest transmission line is 287 kV line to Bob Quinn substation.
	Transmission Route (distance, terrain and costs)	New 68 km 287 kV transmission line with interconnection at Bob Quinn substation. Difficult routing through steep, forested terrain. Routing along existing unpaved roads where available. Approx. 30 km of route following only natural valleys and creeks.
H.	**Community Issues**	
	Indigenous Law and Indigenous Development Areas	• First Nation consultative areas include Tahltan Indian Band, Iskut Band. • Proposed plant location is within Tahltan territory. (http://www.tahltan.org/welcome) • Tahltan Nation plan is in development (started 2011); broad issues that have been identified include better community infrastructure (particularly Bob Quinn and Dease Lake), managing social-culture growth. (http://www.tahltan.org/news/tahltan-nation-plan-community-vision-our-future) • Iskut Band Council (http://iskut.org/) does not provide any specific community/environmental planning agendas
	Community Action	• Tahltan Heritage Resources Environmental Assessment Team (THREAT) established in 2005 to support protection of the environmental, social, cultural, heritage and economic interests. (http://www.tahltan.org/administration/threat) • 2005 community action stopped Shell Canada test well activities. • Tahltan activists block Red Chris Mine site in 2014
	Surface Rights	• First Nation consultative areas include Tahltan Indian Band, Iskut Band. • Tahltan Nation Development Council is business council owned by the people of Tahltan Iskut bands and ensures First Nation consultation, involvement in economic ventures within Tahltan territory. (http://www.tahltan.org/nation/economy/economic-development)
	Tourism	• Bob Quinn Lake Airport is near proposed project location. Schoquette Hot Springs is near Stikine, BC. Proposed project location is remote; no significant infrastructure in within extent of project, although Bob Quinn Lake is a recreational outdoors park.

SPHALER CREEK

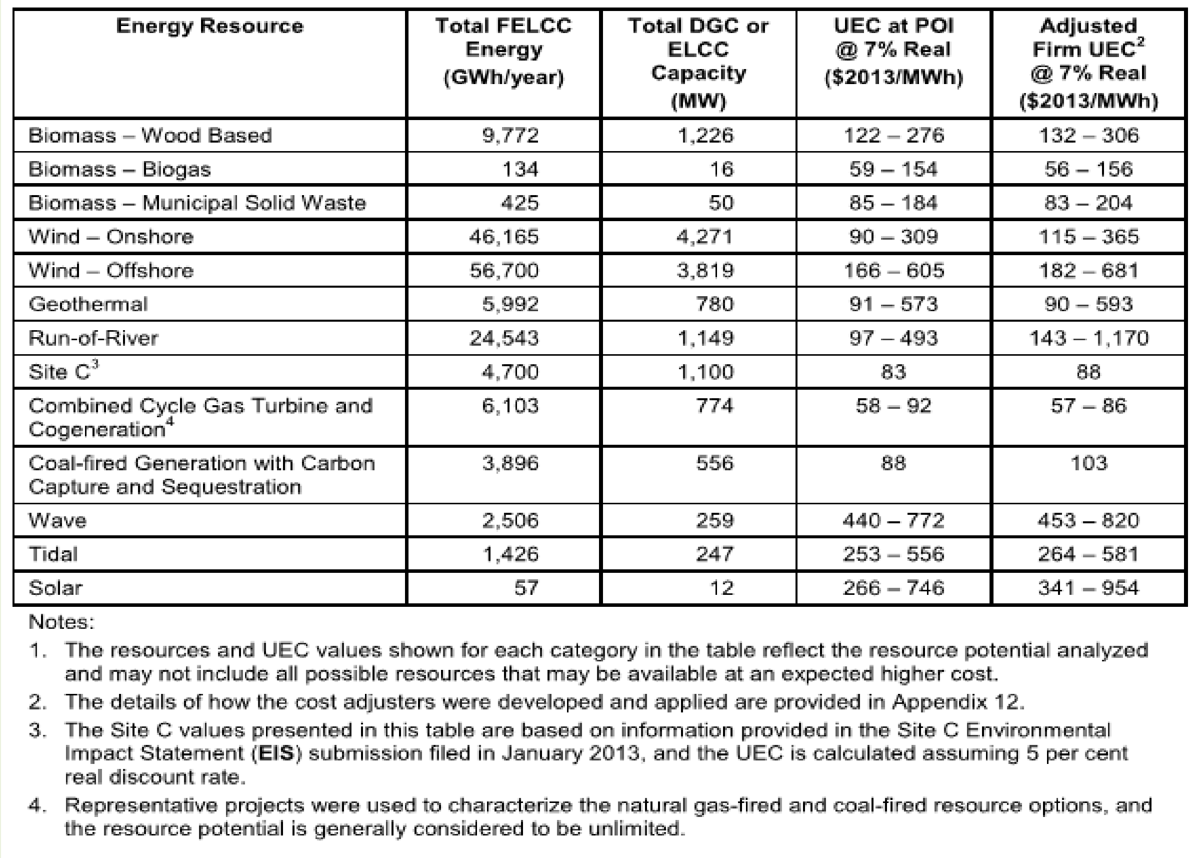
Near Stikine, British Columbia, Canada
Topographical Map Sheet: Figure 34
Geological Map Sheet: Figure 35

Category		Comments
I.	**Water Rights**	
	Availability (for example "air-cooled required")	Plant water requirement estimated approx. 13 L/s for binary plant. Approx. 10,000 L/s MAD in Sphaler Creek. Very few existing water licences in area. Closest water licence is approx. 16 km from point location for Power General on Sphaler Creek for 26,000 L/s.
	Availability for Drilling	Drilling requirement of 20 L/s. Approx. 10,000 L/s MAD in Sphaler Creek. Very few existing water licences in area. Closest water licence is approx. 16 km from point location for Power General on Sphaler Creek for 26,000 L/s.
J.	**Engineering**	
	Plant Location and Design	Remote plant location with little available access.
	Construction Issues	No existing road access. Possible permanent snow and/or muskeg conditions. Forested, steep terrain.
	Transportation Issues	No existing road access, approx. 30 km to nearest road.
	Architectural Issues (Blend/hide into environment? Local styles? etc.)	None found
	Special Construction Issues (zero emissions)	None found
K.	**Non-Electrical Infrastructure (Roads and Habitation)**	
	Nearest Large Community > 50,000	Prince George, BC
	Nearest Community	Stikine, BC
	Nearest Road and Condition	No existing roads in vicinity of point location. Closest road is unpaved approx. 30 km from plan location. Requirement to build new road approx. 31 km from plant to existing unpaved road.
	Current Access Conditions (restrictions)	No existing road access to point location. Mountainous terrain, possible permanent snow conditions.
	Terrain and Distance Factor for Road Building	New road is required; approx. 31 km of new road through steep, forested terrain.

SPHALER CREEK

Near Stikine, British Columbia, Canada
Topographical Map Sheet: Figure 34
Geological Map Sheet: Figure 35

Category		Comments
L.	**Finance**	
	General Power Prices	BC Hydro acquires power through (1) competitive processes (Calls for Tender), (2) the Standing Offer Program (not including the mini-SOP under development), and (3) upgrades to its existing facilities or the development of new generation facilities. (Note that the net metering program targets projects less than 100 kW and is therefore not relevant to geothermal generation projects). Comments on the general price of power under each one are: • The power price paid by BC Hydro to independent power producers through Energy Purchase Agreements (EPAs) under Calls for Tender are proprietary and confidential. • The power price paid by BC Hydro to independent power producers through EPAs under the SOP are made up of a predetermined base price in 2010 dollars as determined by the region of the point of interconnection to the BC Hydro system, escalated at the Consumer Price Index annually up to the year in which an EPA is signed, and further adjusted based upon the time of day and month when the energy is delivered. For reference, the base price for the Lower Mainland region in 2010 dollars is $103.69/MWh. • BC Hydro's current Integrated Resource Plan dated November 2013 includes details of both demand-side management options and supply-side resource options to consider in meeting the future demand for electricity. These resource options, together with their attributes of total energy and capacity and unit energy costs, are listed in Table 2-2 of the November 2013 Resource Options Report Update. That table is reproduced below for ready reference. • Table 5-7 of the above-noted November 2013 Resource Options Report Update provides a summary of the Geothermal Potential by Transmission Region.



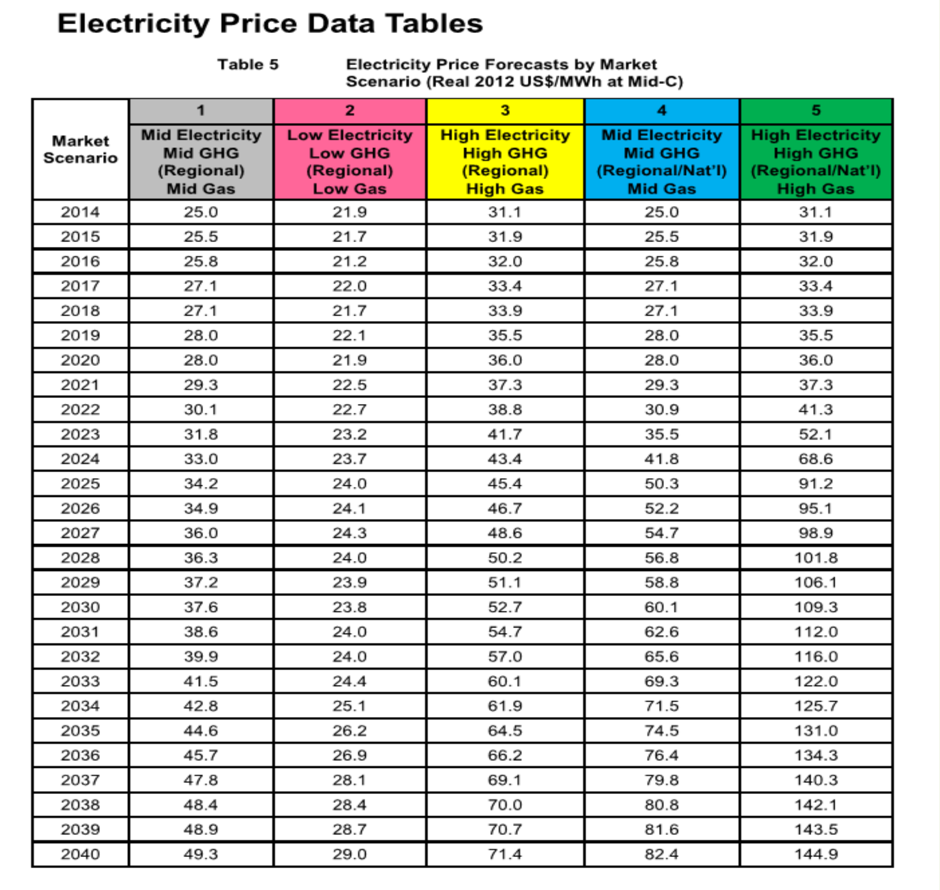
Energy Resource	Total FELCC Energy (GWh/year)	Total DGC or ELCC Capacity (MW)	UEC at POI @ 7% Real ($2013/MWh)	Adjusted Firm UEC^{2} @ 7% Real ($2013/MWh)
Biomass – Wood Based	9,772	1,226	122 – 276	132 – 306
Biomass – Biogas	134	16	59 – 154	56 – 156
Biomass – Municipal Solid Waste	425	50	85 – 184	83 – 204
Wind – Onshore	46,165	4,271	90 – 309	115 – 365
Wind – Offshore	56,700	3,819	166 – 605	182 – 681
Geothermal	5,992	780	91 – 573	90 – 593
Run-of-River	24,543	1,149	97 – 493	143 – 1,170
Site C^{3}	4,700	1,100	83	88
Combined Cycle Gas Turbine and Cogeneration^{4}	6,103	774	58 – 92	57 – 86
Coal-fired Generation with Carbon Capture and Sequestration	3,896	556	88	103
Wave	2,506	259	440 – 772	453 – 820
Tidal	1,426	247	253 – 556	264 – 581
Solar	57	12	266 – 746	341 – 954

Notes:

1. The resources and UEC values shown for each category in the table reflect the resource potential analyzed and may not include all possible resources that may be available at an expected higher cost.
2. The details of how the cost adjusters were developed and applied are provided in Appendix 12.
3. The Site C values presented in this table are based on information provided in the Site C Environmental Impact Statement (**EIS**) submission filed in January 2013, and the UEC is calculated assuming 5 per cent real discount rate.
4. Representative projects were used to characterize the natural gas-fired and coal-fired resource options, and the resource potential is generally considered to be unlimited.

SPHALER CREEK

Near Stikine, British Columbia, Canada
Topographical Map Sheet: Figure 34
Geological Map Sheet: Figure 35

Category	Comments
Market Price ($/MWhr)	• As noted in the above Table 2-2 from the November 2013 Resource Options Report Update, the Unit Energy Cost for geothermal resources at a 7% real discount rate in 2013 dollars ranges from $91/MWh to 573/MWh at the point of interconnection to the BC Hydro system. • Wholesale electricity prices for trading purposes can vary greatly. In the Pacific Northwest, these prices are affected by such factors as precipitation/snowfall in the region, unforeseen generation outages and ambient temperatures. A general flavour of the wholesale electricity prices for potential export of electricity from BC can be obtained from a variety of sources. One such source is the US Energy Information Administration (www.eia.gov/electricity/wholesale/#history). This source provides current and historical electricity market data. Of particular relevance is the mid-C trading hub in the Northwest Region (one example would be a Mid-C peak price on March 17, 2015 of $19.87US weighted average cost from 72 trades). Access to that market for geothermal projects in BC would require access on both the BC Hydro transmission system to the Canada/US border, and on the appropriate transmission system (e.g. Bonneville Power Authority) in the US. • BC Hydro forecasts of market prices under various scenarios was provided in the November 2013 IRP. Table 5 in Appendix 5A – Market Forecast Data is reproduced below for ready reference. 

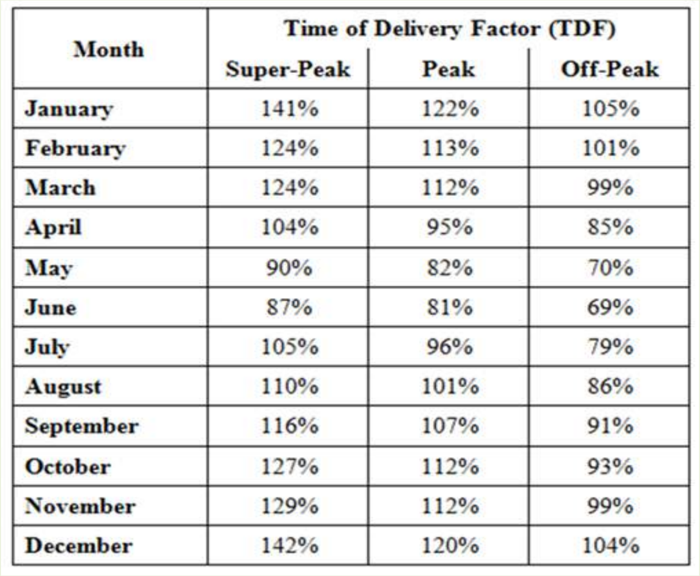
Electricity Price Data Tables

Table 5 Electricity Price Forecasts by Market Scenario (Real 2012 US$/MWh at Mid-C)

Market Scenario	1 Mid Electricity Mid GHG (Regional) Mid Gas	2 Low Electricity Low GHG (Regional) Low Gas	3 High Electricity High GHG (Regional) High Gas	4 Mid Electricity Mid GHG (Regional/Nat'l) Mid Gas	5 High Electricity High GHG (Regional/Nat'l) High Gas
2014	25.0	21.9	31.1	25.0	31.1
2015	25.5	21.7	31.9	25.5	31.9
2016	25.8	21.2	32.0	25.8	32.0
2017	27.1	22.0	33.4	27.1	33.4
2018	27.1	21.7	33.9	27.1	33.9
2019	28.0	22.1	35.5	28.0	35.5
2020	28.0	21.9	36.0	28.0	36.0
2021	29.3	22.5	37.3	29.3	37.3
2022	30.1	22.7	38.8	30.9	41.3
2023	31.8	23.2	41.7	35.5	52.1
2024	33.0	23.7	43.4	41.8	68.6
2025	34.2	24.0	45.4	50.3	91.2
2026	34.9	24.1	46.7	52.2	95.1
2027	36.0	24.3	48.6	54.7	98.9
2028	36.3	24.0	50.2	56.8	101.8
2029	37.2	23.9	51.1	58.8	106.1
2030	37.6	23.8	52.7	60.1	109.3
2031	38.6	24.0	54.7	62.6	112.0
2032	39.9	24.0	57.0	65.6	116.0
2033	41.5	24.4	60.1	69.3	122.0
2034	42.8	25.1	61.9	71.5	125.7
2035	44.6	26.2	64.5	74.5	131.0
2036	45.7	26.9	66.2	76.4	134.3
2037	47.8	28.1	69.1	79.8	140.3
2038	48.4	28.4	70.0	80.8	142.1
2039	48.9	28.7	70.7	81.6	143.5
2040	49.3	29.0	71.4	82.4	144.9

SPHALER CREEK

Near Stikine, British Columbia, Canada
Topographical Map Sheet: Figure 34
Geological Map Sheet: Figure 35

Category	Comments
Green Power Premium ($/MWhr)	• BC Hydro’s past procurement processes for the acquisition for power from independent power producers has offered a premium for green power. • Within British Columbia, there is little demand for the purchase of “green power certificates” (instruments that a customer can purchase to be assured that the electricity used is environmentally friendly) from BC Hydro. BC Hydro’s generation mix is already approximately 93% clean. • California has a goal of 33% of retail sales by 2020 to be sourced from eligible renewable energy sources. However, the opportunity for geothermal power from British Columbia, particularly “bundled” green energy with Renewable Energy Certificates (RECs), to compete in that market is low, for a number of reasons 1. The price of electricity is driven by the low cost of natural gas; 2. There are large amounts of renewables, such as wind and solar, in California; and 3. Firm transmission access to the California market through the BPA transmission system is generally not available.
Capacity Price ($/KW)	• There is no price in $/kW for capacity resource options in the market at present. • Table 3-27 entitled "UCCs of Capacity Resource Supply Options" in BC Hydro’s Integrated Resource Plan dated November 2013 provided a summary of capacity resource options (e.g. pumped storage, simple cycle gas turbines and resource smart projects such as Revelstoke Unit 6). The unit capacity costs (UCCs) at the point of interconnection to the BC Hydro system in $2013/kW-year are shown in the table.
Is there a higher price for base load power?	In general, baseload power (ie firm power) is more valuable to BC Hydro and furthermore the price paid for baseload power varies by month throughout the year. As an example, the following excerpt is taken from BC Hydro’s SOP: “1. Definitions: In this Appendix 4, the following words and expressions have the following meanings: (a) “Off-Peak Hours” means all hours other than Super-Peak Hours and Peak Hours. (b) “Peak Hours” means the hours commencing at 06:00 PPT and ending at 16:00 PPT, and commencing at 20:00 PPT and ending at 22:00 PPT, Monday through Saturday inclusive, but excluding British Columbia statutory holidays. (c) “Super-Peak Hours” means the hours commencing at 16:00 PPT and ending at 20:00 PPT Monday through Saturday inclusive, but excluding British Columbia statutory holidays.” 

Month	Time of Delivery Factor (TDF)		
	Super-Peak	Peak	Off-Peak
January	141%	122%	105%
February	124%	113%	101%
March	124%	112%	99%
April	104%	95%	85%
May	90%	82%	70%
June	87%	81%	69%
July	105%	96%	79%
August	110%	101%	86%
September	116%	107%	91%
October	127%	112%	93%
November	129%	112%	99%
December	142%	120%	104%

SPHALER CREEK

Near Stikine, British Columbia, Canada
Topographical Map Sheet: Figure 34
Geological Map Sheet: Figure 35

Category	Comments
Estimated Size of Resource	See Section A.
Is there any green power incentives?	• The BC government created the Innovative Clean Energy (ICE) fund with an initial mandate to accelerate the commercialization of emerging clean energy technologies (now expanded to include a broad range of energy efficiency and conservation projects). British Columbia also has a program entitled Scientific Research and Experimental Development Tax credit (SR&ED). Geothermal proponents could keep a watching brief on these programs for applicability and relevance. • The BC government's First Nations Clean Energy Business Fund. This fund promotes increased Aboriginal community participation in the clean energy sector. It provides: o Capacity funding of up to $50,000 per applicant to cover the early stages (e.g. feasibility studies) of project development ; and o Equity funding of up to $500,000 per applicant to support a financially viable and resourced clean energy project. • There are a number of government of Canada programs to encourage the development of renewable power. Some of these programs may be active but not currently issuing calls for proposals. Others may be focussed on research and innovation and may not be directly applicable to geothermal technologies/resources, while others may be fully subscribed and even inactive but are noted in terms of completeness. Some of these programs include: o Natural Resources Canada ecoEnergy for Renewable Power program; o Sustainable Development Technology Canada funds; o Clean Energy Fund; o Industrial Research Assistance Program; and o Green Infrastructure Fund Geothermal proponents could keep a watching brief on these and other federal government programs for their applicability and relevance.
Grants	See above under green power incentives
Tax Holidays	None listed on federal and provincial websites.
Tax Relief	• Under Classes 43.1 and 43.2 in Schedule II of the Income Tax Regulations, certain capital costs of systems that produce energy by using renewable energy sources or fuels from waste, or conserve energy by using fuel more efficiently are eligible for accelerated capital cost allowance. Under Class 43.1, eligible equipment may be written-off at 30 percent per year on a declining balance basis. In general, equipment that is eligible for Class 43.1 but is acquired after February 22, 2005 and before year 2020 may be written-off at 50 percent per year on a declining balance basis under Class 43.2. Without these accelerated write-offs, many of these assets would be depreciated for income tax purposes at annual rates between 4 and 30 percent. • In addition to Class 43.1 or 43.2 capital cost allowance, the Income Tax Regulations allow certain expenses incurred during the development and start-up of renewable energy and energy conservation projects [Canadian renewable and conservation expenses (CRCE)] to be fully deducted in the year they are incurred, carried forward indefinitely and deducted in future years, or transferred to investors through a flow-through share agreement.

SPHALER CREEK

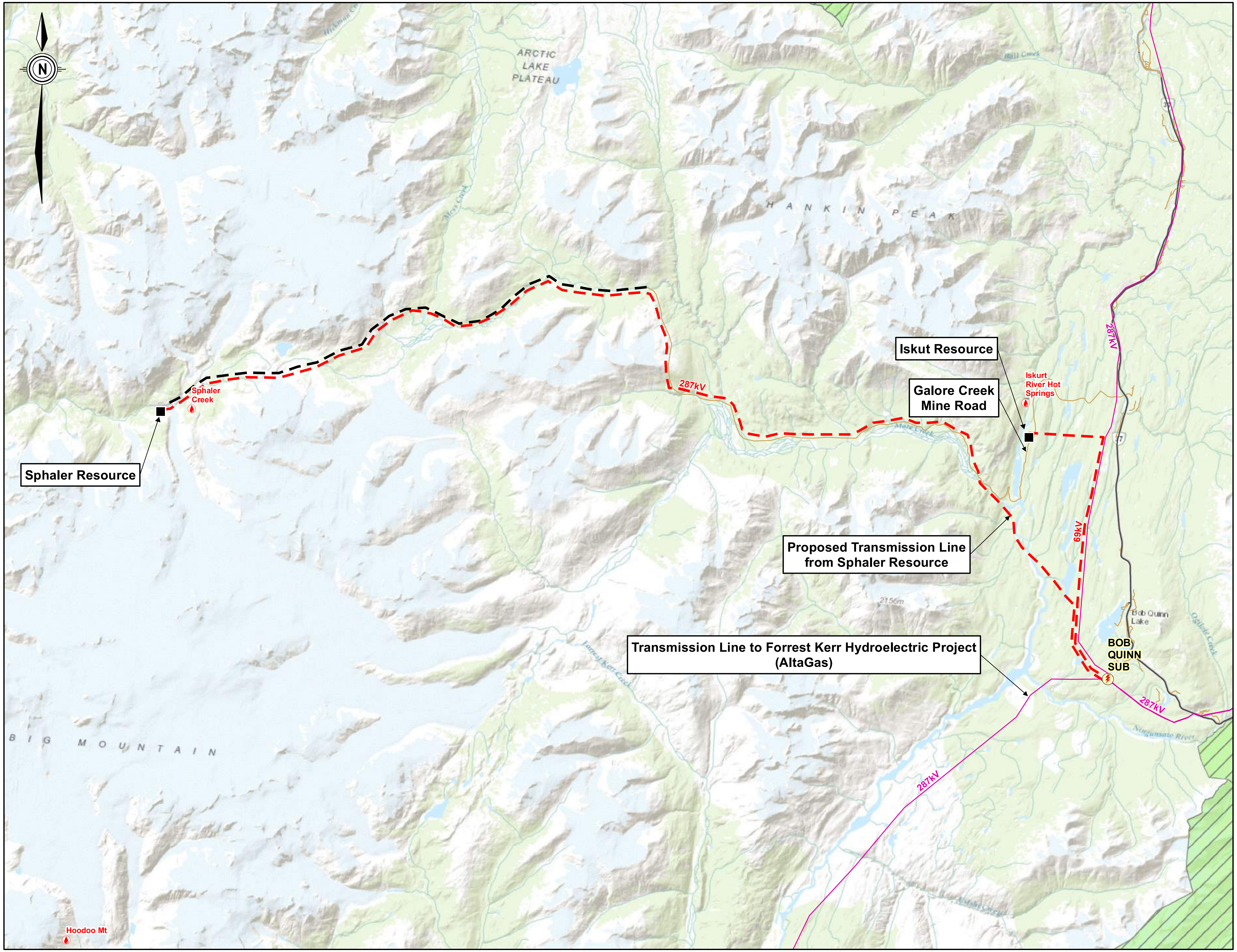
Near Stikine, British Columbia, Canada
Topographical Map Sheet: Figure 34
Geological Map Sheet: Figure 35

Category		Comments
	Loan Guarantees	The following is an excerpt from http://www.fnfa.ca/en/fnfa/ “The First Nations Finance Authority (FNFA) is a statutory not-for-profit organization without share capital, operating under the authority of the First Nations Fiscal Management Act, 2005. The FNFA’s purposes are to provide investment options and capital planning advice and—perhaps most importantly, access to long-term loans with preferable interest rates. The FNFA is not an agent of Her Majesty or a Crown corporation and is governed solely by the First Nations communities that join as Borrowing Members. The advantages of joining the FNFA as a Borrowing Member are: 1. Access to low rate, below bank prime, loans with repayment terms up to 30 years; 2. First Nations choose the repayment terms that work best for their budget; 3. FNFA loans do not require collateral; 4. FNFA loans can be used to refinance existing debt; and 5. FNFA’s interest rates and terms parallel those available to provincial and local governments. Most revenue streams are eligible to support FNFA loan requests. Eligible capital projects FNFA can finance include infrastructure, social and economic development, land purchases, independent power projects, community housing and rolling stock/heavy equipment. FNFA is a stand-alone organization separate from the Government of Canada, and its operating policies are set by its Borrowing Members, represented by the First Nation’s Chief and Council appointee. The FNFA is for First Nations, by First Nations.”
	Royalties/Fees	Geothermal Resources Act, [RSBC 1996] CHAPTER 171, as of March 11, 2015 Permits for well authorizations for wells to be drilled within the boundaries of the permittee's location must pay a prescribed rent for the permit (Section 5). Based on Section 17 of the Act, (1) A lessee who produces a geothermal resource for purposes other than testing must pay to the government (a) a royalty established by agreement under this section, (b) an amount agreed under this section to be paid instead of royalty, or (c) if no royalty or amount has been agreed under this section, the prescribed royalty.

SPHALER CREEK

Near Stikine, British Columbia, Canada
Topographical Map Sheet: Figure 34
Geological Map Sheet: Figure 35

Category		Comments
	General Idea of Royalties	With regard to use of the water resources within the geothermal tract, Section 4 of the Water Sustainability Act states “This Act does not apply to geothermal resources as defined in section 1 (1) [definitions] of the Geothermal Resources Act.”
	Private Land Owner or Government Land	Geothermal proponents will need to arrange financial agreements (eg leases or purchases) with private property owners for the geothermal land tract. Proponents for geothermal facilities on Crown Land must apply for the appropriate tenure under the BC Land Act (eg Statutory Right of Way, Licence of Occupation).
	Tax Rate in the Country	• Income eligible for small-business deduction (up to $500,000 income): 11% Federal tax, combined federal and provincial (British Columbia): 13.5%. • Income not eligible for small-business deduction: 15% Federal, combined federal and provincial (British Columbia): 26%
	Transmission Tariffs	• Under wholesale wheeling (whereby electricity is transmitted from electricity generators to utilities) to customers in Alberta, the US, or other wholesale customers in BC, the generation supplier must request service on the appropriate BC Hydro transmission line under the Open Access Transmission Tariff (OATT) at a regulated cost for that service. Depending on the end customer, the generation supplier will have to make similar arrangements to cover transmission access in other jurisdictions (e.g. the Bonneville Power Authority for wheeling to a US customer). This ‘pancaking’ of rates, along with transmission congestion issues, affects the economic viability of the potential wholesale opportunity. • Tariff Supplement 37, approved by the BC Utilities commission on April 10, 2013, sets out the contributions from future clean, renewable energy projects (such as geothermal) and mine developments that will connect to the Northwest Transmission Line (NTL). This contribution, in general terms, equates to about $10/MWh. These contributions are intended to offset the ratepayer contributions for the cost of building NTL.
M.	**Maps**	
	Regional topographic map showing population centres, roads and other infrastructure including electrical grid and nearest substation and/or generating station. (1:500,000?)	Topographical Map Sheet: Figure 34
	Regional map showing land tenure in area – geothermal concessions, mining concessions, private land holds, public or national lands (parks). (1:500,000?)	Topographical Map Sheet: Figure 34
	Regional geological map. (1:250 or 500,000?)	Geological Map Sheet: Figure 35
	Detailed geological map of the immediate area of the concessions. (1:50,000 or 100,000)	Geological Map Sheet: Figure 35
N.	**Other Issues and Considerations**	



Geoscience BC

Legend

■	Proposed Geothermal Plant Location
💧	Thermal Spring
- - -	Proposed Transmission Line
- - -	Proposed Access Road
⚡	Existing Substation
—	Existing Transmission Line
—	Paved Road
—	Other Road
▨	Park, Eco-Reserve, Protected Area

KERR WOOD LEIDAL
consulting engineers

Service Layer Credits: Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

6 0 6
Kilometers

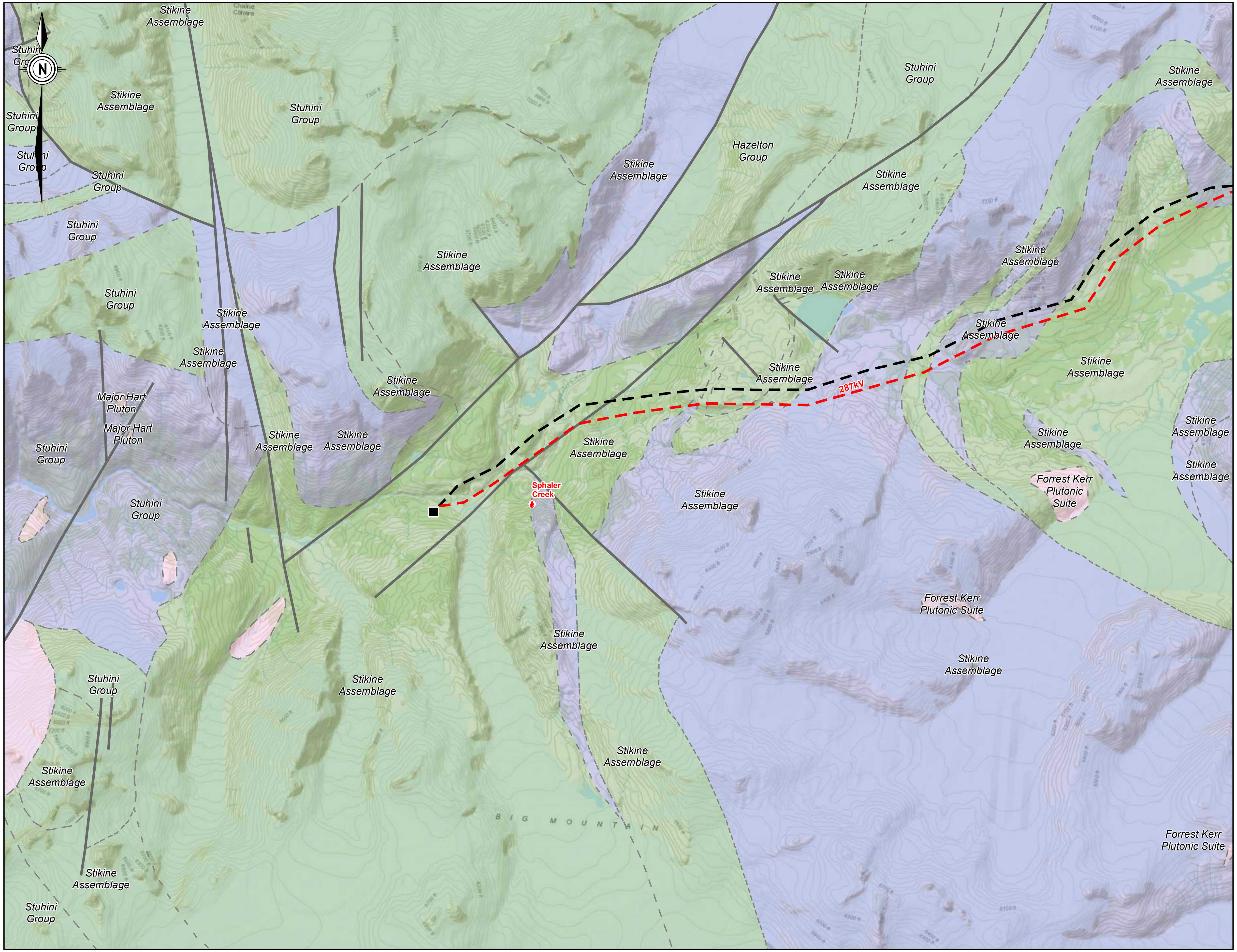
Project No.
2692-004

Date
April 30, 2015

Potential Geothermal Plant at Sphaler Creek 10MW

Figure 34

Path: Q:\2600-2699\2692-004\430-GIS\MXD-RP\2692004_GeothermalLocations_mapbook.mxd Date Saved: 2015-04-27 2:55:05 PM
Author: RTaylor



Geoscience BC

Legend

- ■ Proposed Geothermal Plant Location
- 🔴 Thermal Spring
- Proposed Transmission Line
- Proposed Access Road

Bedrock Type

- Intrusive Rocks
- Sedimentary Rocks
- Volcanic Rocks
- Rock Type Boundary
- Fault

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consulting engineers

Service Layer Credits: Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

2 0 2
Kilometers

Project No.	Date
2692-004	April 30, 2015

Geological Strata Map for Sphaler Creek 10MW

Figure 35

Path: Q:\2600-2699\2692-004\430-GIS\MXD-RP\2692004_GeothermalLocationsGeology_mapbook.mxd Date Saved: 2015-04-27 2:27:04 PM
Author: RTaylor

Appendix S

Upper Arrow Lake Geothermal Development Decision Matrix and Figures 36 & 37

UPPER ARROW LAKE

Near Revelstoke, British Columbia, Canada
Topographical Map Sheet: Figure 36
Geological Map Sheet: Figure 37

Category		Comments
A.	**Reservoir Potential**	
	Size/Potential/Type	• **Reservoir size:** No clearly defined area or thickness in literature, but description of multiple springs warrants an area estimate of about 5 km^2) - therefore, reservoir volume estimated at: 5.5 km^3 (most-likely area: 5 km^2; most-likely thickness*: 1.1 km) (*Reservoir thickness assumption based on most-likely value from Appendix III in GeothermEx, 2004) • **Potential:** 20 MW (Lovekin and Pletka, 2009) • **Type:** low-temperature resource, suitable for binary plant.
	Temperature/Water and Gas Chemistry/Mineral Indicators	**Surface features:** • Frosthall: No information • Halcyon spring: 48°C (Fairbank & Faulkner, 1992); 46.5°C, 50.5°C (Souther, 1975); 50.1°C (Grasby & Hutcheon, 2001) • Halfway river: 55°C (Fairbank & Faulkner, 1992); 58.9°C (Grasby & Hutcheon, 2001) • Nakusp spring: 54°C (Fairbank & Faulkner, 1992); 54.5°C, 53.0°C (Souther, 1975); 55.8°C (Grasby & Hutcheon, 2001) • St. Leon hot spring: 49°C (Fairbank & Faulkner, 1992); 50.0°C, 49.0°C (Souther, 1975); 46.5°C (Grasby & Hutcheon, 2001) • Whiskey Point: None reported. • Wilson Lake: 30°C (Fairbank & Faulkner, 1992) (Grasby & Hutcheon, 2001) **Geothermometry:** • "SiO_2 and Na-K-Ca geothermometry give regional source temperatures of 46.3°C to 73.9°C and 128.3°C to 67.4°C, respectively" (not clear which 4 springs gave these specific temps) (Fairbank & Faulkner, 1992). • Halcyon spring: 72-74°C (Souther, 1975); 69°C (Grasby & Hutcheon, 2001) • Halfway river: 27°C (Grasby & Hutcheon, 2001) • Nakusp spring: 49-52°C (Souther, 1975); 54°C (Grasby & Hutcheon, 2001) • St. Leon hot spring: 44-46°C (Souther, 1975); 44°C (Grasby & Hutcheon, 2001) **Exploration drilling:** • None reported **Water chemistry:** • Halcyon spring: water type is Na-SO_4 with SO_4 at ~400 mg/L and low Mg (0.6 mg/L) and Cl 6 mg/L: pH 7.1-7.7 (Souther, 1975) (Grasby & Hutcheon, 2001) • Halfway hot spring: water type is (Ca>Na)-SO_4 with SO_4 at ~500 mg/L and Mg <1 mg/L; pH 8.2; Cl 5 mg/L (Grasby & Hutcheon, 2001) • Nakusp spring: water type is (Na>Ca)-SO_4 with SO_4 at ~300 mg/L and Mg<1 mg/L; pH 7.0-7.9 (Souther, 1975) (Grasby & Hutcheon, 2001); Cl 1-2 mg/L (Souther, 1975) • St. Leon hot spring: water type is (Ca>Na)-SO_4 with SO_4 at 560 mg/L and Mg about 0.1 mg/L; pH 8.3-8.4 (Souther, 1975) (Grasby & Hutcheon, 2001); Cl 2 mg/L (Souther, 1975); Cl 5 mg/L (Grasby & Hutcheon, 2001) Mineral indicators: • No information

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Category	Comments
Surface Flow Rates and Reservoir Recharge	• Halcyon spring: 5 L/s (Fairbank & Faulkner, 1992) • Halfway river: 3 L/s (Fairbank & Faulkner, 1992) • Nakusp spring: 1 L/s (Fairbank & Faulkner, 1992) • St. Leon hot spring: 2 L/s (Fairbank & Faulkner, 1992) • Wilson Lake: 1 L/s (Fairbank & Faulkner, 1992)
3D Permeability (heat exchange potential)	No information
Recent Magmatism	None. Radiogenic heat source. (Fairbank & Faulkner, 1992)
Structural Setting	• Columbia River Fault along eastern margin of regional extension complex; characterized by mylonite zone up to 1 km wide, intense folding and fracturing. (Grasby & Hutcheon, 2001) • Stratified rocks are more complexly deformed and metamorphosed adjacent to the Kuskanax batholith on the eastern side of Upper Arrow Lake, and within the Monashee Complex on the western side of Upper Arrow Lake. The Columbia River fault is a complex fault system composed of numerous cataclastite, mylonite and fault zones which have truncated regional folds and metamorphic isograds during the Middle Jurassic to Cretaceous. (Mountjoy et al., 1997)
Geophysics	No information
Reservoir Host Rock	• Silicate hosted (Grasby et al., 2000); crystalline schist (Souther & Halstead, 1973) • Halfway, Nakusp, St. Leon and Wilson all lie within the Kuskanax Batholith; Mount Maldur and Halcyon lie within sedimentary rocks (Slocan Group and Milford Formation)
Drilling Issues	None reported.
Brief Description of Geological Setting of Thermal Features (i.e., springs emanate from fluvial gravels; beside a river, etc.)	• The area east of Upper Arrow Lake is dominated by strata of the Quesnel Terrane, which includes the Triassic Slocan Group and Lower Jurassic Rossland Group. The Valhalla gneiss dome complex is exposed west of Upper Arrow Lake. This structure includes metamorphic rocks of the Proterozoic to (?)lower Paleozoic Monashee Complex and Lower Proterozoic core (basement) gneiss. The northwest structural trend of these strata have been disrupted by two Middle Jurassic plutons - the Kuskanax batholith in the northwestern portion of the map area and the Nelson batholith along the southern margin. (Mountjoy et al., 1997) • Circulation depth of ~4 km calculated based on local geothermal gradients (32°C/km for Columbia River Fault (Grasby et al., 2000) • Many have small natural pools used recreationally (Halfway) (Google earth observations) • St Leon has natural pools with installed pipes (Google earth observations) • Nakusp has a commercial spa (Google earth observations)

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Category		Comments
B.	**Exploration Uncertainty (Risk)**	
	Degree of Identification of Resources/Reserves	Low
	Likelihood of Covering Reservoir with Concession	Unknown - looks possible (springs not within national park/restricted area); Halcyon and Whiskey Point springs are near mining titles
	Expected Authorization Date	Unknown
	Specific Timing of Exploration (2 + 2 years, BC 8 years, etc.)	5 years (1 year permitting and surface exploration, possibly drilling shallow temperature gradient holes + 1 year deep gradient-well drilling + 1 year successful development drilling and testing + 1 year further development drilling and start plant construction + 1 year drilling wrap-up and finish plant construction)
	Degree of Previous Exploration (can be good or bad)	Low
	Surface Operational Capacity (enough stable area for drilling and a plant?)	Likely Halfway, Nakusp, St. Leon and Wilson are all located up river valleys, away from Upper Arrow Lake.
	Exploration to Exploitation: A summary rating of Exploration Uncertainty (risk) on a scale of difficult (high risk) through medium (moderate risk) to easy (low risk)	Moderate A lot of unknowns, but no items have been identified as high risk.
C.	**Environmental Issues**	
	Protected Areas	• Proposed transmission line crosses through an Ungulate Winter Range No Harvest Zone. • Goat Range Provincial Park approx. 37 km from proposed plant location.
	Endangered Species	• Proposed transmission line runs through Southern Mountain Caribou (Endangered (SARA Schedule 1); red-listed) habitat polygon and Snow Ramble (blue-listed plant) occurrence polygon.
	Geothermal Surface Features	• Nearest hotsprings approx 11 km from proposed infrastructure. • Three hotsprings located approx. 16 km from proposed infrastructure.
	Other	• Proposed powerline crosses approximately 10 streams, including Turner Creek which contains Rainbow Trout, and Mccleod Creek and Kuskanax Creek which contain unnnamed observed fish. • The nearest Wildlife Habitat Area allotment for Grizzly Bears is approx. 45 km west of proposed infrastructure.
D.	**Geothermal Area - Bidding and/or Type of Land Holding (private/government/lease/etc.)**	
	Bidding Area	No existing geothermal title tracts.
	Other Claim Rights (mining and/or oil)	Plant location is within mineral / coal title. Several mineral/coal titles in area. Proposed location is not within known oil and gas management area; no known tenures at proposed location.

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Category		Comments
E.	**Market**	
	Main Electricity Consumers (direct sales and/or government)	General Overview 1. BC Hydro acquires power from Independent Power Producers (which would include geothermal proponents) through two main processes: • Competitive calls: when BC Hydro issues a Call for Tenders for the supply of electricity to BC Hydro, geothermal proponents can bid into those competitive calls. • Standing Offer Program (SOP): This program is presently available for clean generation projects greater than 0.1 MW but not more than 15 MW. Proponents do not compete against each other but are paid a predetermined price by BC Hydro. Depending on the specifics of each project, proponents may wish to size their projects to be under the 15 MW threshold for the SOP (BC Hydro is developing a 'mini-SOP' component within the overall SOP. This mini-SOP will apply to projects in the 0.1 MW to 1 MW range, but would not realistically apply to potential geothermal generation projects). • In addition, BC Hydro's net metering program is designed for residential and commercial customers who wish to connect a small electricity generating unit to the BC Hydro distribution system. Generating units up to 0.1 MW in capacity that utilize a clean or renewable resource are eligible to participate in the program. Given the small size, this program has no applicability to potential geothermal generation projects. The acquisition of geothermal power would contribute to BC Hydro's current target for clean energy and to the diversification of BC Hydro's resource mix, making it less reliant on snow melt and stream flow. 2. Although FortisBC is a potential customer for electricity from geothermal sources, the opportunities may be limited given FortisBC's ability to receive electricity from BC Hydro under Rate Schedule 3808. However there is a wheeling agreement in place which would facilitate a geothermal project located in FortisBC's service territory to sell electricity to BC Hydro through BC Hydro's competitive calls and/or the SOP, or to other potential customers as noted below. 3. Wholesale wheeling (whereby electricity is transmitted from electricity generators to utilities) to customers in Alberta, the US, or other wholesale customer in BC is allowed. The generation supplier must request service on the appropriate BC Hydro transmission line under the Open Access Transmission Tariff (OATT) at a regulated cost for that service. Depending on the end customer, the generation supplier will have to make similar arrangements to cover transmission access in other jurisdictions (e.g. the Bonneville Power Authority for wheeling to a US customer). This 'pancaking' of rates, along with congestion issues, affects the economic viability of the potential wholesale opportunity. 4. Retail access, defined as a market in which electricity is sold directly to consumers by competing suppliers, is generally not permitted in BC. However there may be opportunities for bilateral arrangements for direct sales of electricity from geothermal generating plants to large customers (e.g. pulp mills, large sawmills, mines) as follows: • To replace the electricity supplied at a high voltage from BC Hydro under BC Hydro Transmission Rate 1823 of the Electric Tariff. Such replacement would be challenging given the rates charged under that tariff. • To supply electricity to a remote facility (e.g. a mine, LNG plant or other industrial facility) directly from a geothermal plant located in close proximity to the facility, thereby precluding the need for a lengthy transmission line to connect to the BC Hydro electrical grid.

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Category		Comments
	Time Limits? (business agreements, operating/generating-by deadlines?)	• BC Hydro has issued competitive Calls for Tender for the supply of electricity in the past. • BC Hydro's SOP is presently directly available for clean energy projects which meet certain criteria, including a generation output of less than 15 MW. • Typical BC Hydro Energy Purchase Agreements from Independent Power Producers are 20-40 years in duration. • Business agreements with the owners of private transmission lines (e.g. independent power producers) for access to the market will be necessary. • The lead times to develop geothermal resources will include appropriate allowances for investigative drilling, technical and environmental studies, public consultation, transmission considerations, marketing, licencing, design, construction and commissioning. These lead times will vary from four to seven years depending on the specifics of each project. Projects with a history of exploration and analysis (e.g. Meager Creek/Pebble Creek, Lakelse, and Canoe Creek) will generally be on the shorter end of this time continuum, while other projects with less investigative work will take longer. Although the time required to drill a geothermal well and construct a power plant could conceivably be less than two years, the key uncertainties inherent in the environmental review, public consultation, transmission arrangements (either with BC Hydro or a private transmission owner), and the permitting and regulatory processes will realistically result in a further two years at a minimum for these activities.
F.	**Transmission Line Infrastructure**	
	State of the Infrastructure	69 kV transmission line to Nakusp substation.
	Transmission Route (distance, terrain and costs)	New 69 kV transmission line 28 km to Nakusp substation via existing paved road along Arrow Lake. Generally flat conditions close to lake; steep, treed mountainous terrain in St. Leon creek valley.

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Category		Comments
H.	**Community Issues**	
	Indigenous Law and Indigenous Development Areas	• First Nation consultative areas include Secwepemc Nation, Okanagan Indian Band, Splats'in First Nation, Neskonlith Indian Band, Lower Similkameen Indian Band, Upper Nicola Indian Band, Penticton Indian Band, Little Shuswap Indian Band, Adams Lake Indian Band. • Many of the consultative areas have community or land use plans however none are found to be near the proposed plant location. • Sinixt Nation (Arrow Lakes) is most relevant to plant location (http://sinixtnation.org/content/sinixt-territory). Requirement for "corporations, provincial and federal governments and their agents and employees consult with the Sinixt Nation is regards to development and business operations and land use and resource extraction with the territory." • Nakusp Community Plan: "The Hot Springs resource is enhanced, protected and economically sustainable (Nakusp Community Plan)
	Community Action	• Perry Ridge Wilderness Initiative - united campaign with Perry Ridge Water Users Association to protect Perry Ridge in the Slocan Valley (http://www.perryridge.org/about-perry-ridge/overview/) • 2010 - Injunction against Sinixt protest for Perry Ridge overturned by Vancouver court • 2013 Sinixt Nation receives notice of trespass at Perry Ridge • Challenge to Pass Creek logging
	Surface Rights	• First Nation consultative areas include Secwepemc Nation, Okanagan Indian Band, Splats'in First Nation, Neskonlith Indian Band, Lower Similkameen Indian Band, Upper Nicola Indian Band, Penticton Indian Band, Little Shuswap Indian Band, Adams Lake Indian Band. • Many of the consultative areas have community or land use plans however none are found to be near the proposed plant location. • Sinixt Nation (Arrow Lakes) is most relevant to plant location (http://sinixtnation.org/content/sinixt-territory). Requirement for "corporations, provincial and federal governments and their agents and employees consult with the Sinixt Nation is regards to development and business operations and land use and resource extraction with the territory."
	Tourism	• Halcyon hot springs in Nakusp is tourist destination. Large tourist industry due to proximity to Revelstoke and variety of outdoor recreational activities available. • Nakusp Tourism (http://nakusparrowlakes.com/) • Nakusp regional interests include ecosystem integrity and water and shoreline access for recreation.

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Category		Comments
I.	**Water Rights**	
	Availability (for example "air-cooled required")	Plant water requirement estimated approx. 25 L/s for binary plant. MAD of 3000 L/s on St. Leon Creek. No existing water licence 9 km of proposed location. Existing water licence concentrated on Arrow Lake and along Highway 1 corridor.
	Availability for Drilling	Drilling requirement of 20 L/s. MAD of 3000 L/s on St. Leon Creek. No existing water licence 9 km of proposed location. Existing water licence concentrated on Arrow Lake and along Highway 1 corridor.
J.	**Engineering**	
	Plant Location and Design	Remote plant location in valley of St. Leon Creek.
	Construction Issues	Remote plant location, mountainous terrain, limited existing access via logging roads.
	Transportation Issues	Limited access via existing unpaved roads in St. Leon Creek Valley and paved road to Nakusp substation.
	Architectural Issues (Blend/hide into environment? Local styles? etc.)	None found.
	Special Construction Issues (zero emissions)	None found.
K.	**Non-Electrical Infrastructure (Roads and Habitation)**	
	Nearest Large Community > 50,000	Kelowna, BC
	Nearest Community	Revelstoke, BC by distance, Nakusp by access (roads)
	Nearest Road and Condition	Unpaved access road within 1 km of plant location; steep mountainous terrain.
	Current Access Conditions (restrictions)	Provincial park at south west of location. Access via Nakusp along Arrow Lake.
	Terrain and Distance Factor for Road Building	No new road requirement expected. Paved road access from Nakusp to St. Leon Creek. Unpaved access road through steep, treed terrain from lake to plant location.

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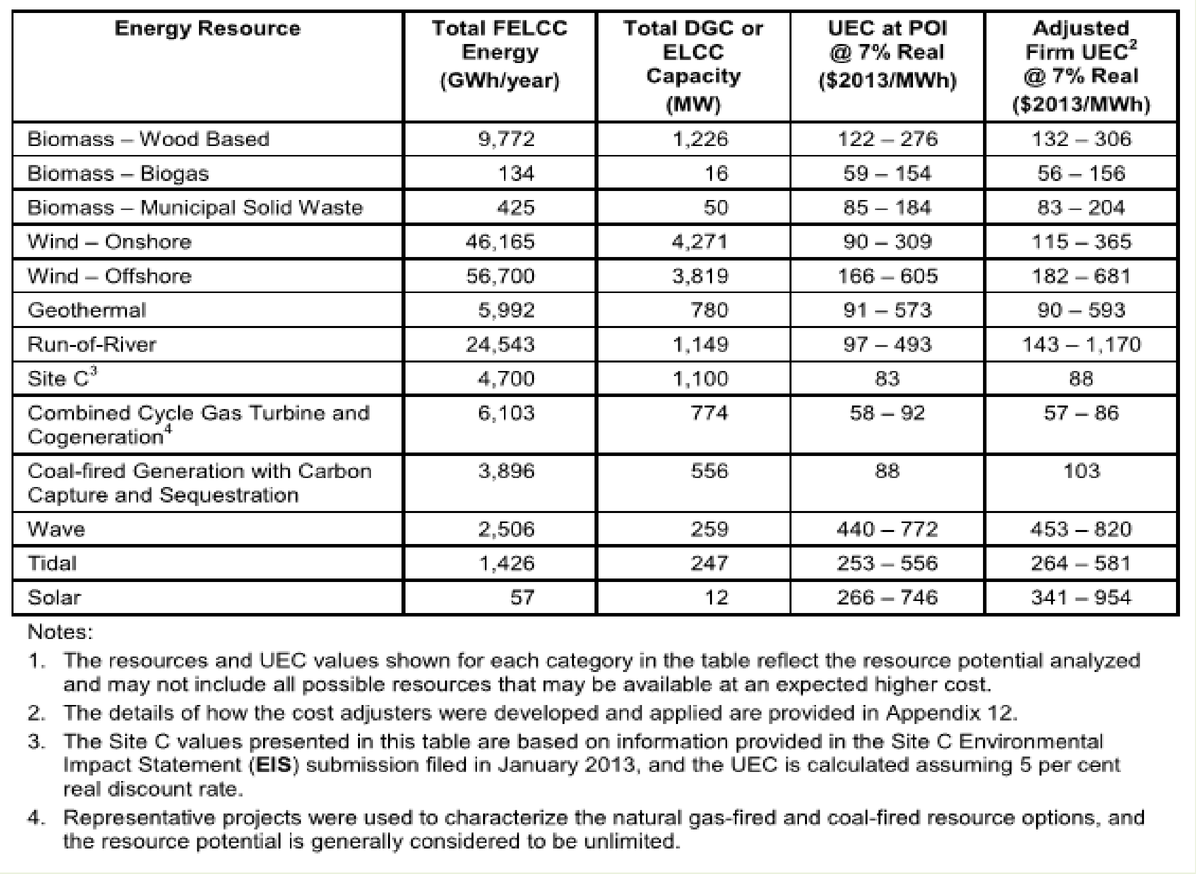
	Category	Comments
L.	**Finance**	
	General Power Prices	BC Hydro acquires power through (1) competitive processes (Calls for Tender), (2) the Standing Offer Program (not including the mini-SOP under development), and (3) upgrades to its existing facilities or the development of new generation facilities. (Note that the net metering program targets projects less than 100 kW and is therefore not relevant to geothermal generation projects). Comments on the general price of power under each one are: • The power price paid by BC Hydro to independent power producers through Energy Purchase Agreements (EPAs) under Calls for Tender are proprietary and confidential. • The power price paid by BC Hydro to independent power producers through EPAs under the SOP are made up of a predetermined base price in 2010 dollars as determined by the region of the point of interconnection to the BC Hydro system, escalated at the Consumer Price Index annually up to the year in which an EPA is signed, and further adjusted based upon the time of day and month when the energy is delivered. For reference, the base price for the Lower Mainland region in 2010 dollars is $103.69/MWh. • BC Hydro's current Integrated Resource Plan dated November 2013 includes details of both demand-side management options and supply-side resource options to consider in meeting the future demand for electricity. These resource options, together with their attributes of total energy and capacity and unit energy costs, are listed in Table 2-2 of the November 2013 Resource Options Report Update. That table is reproduced below for ready reference. • Table 5-7 of the above-noted November 2013 Resource Options Report Update provides a summary of the Geothermal Potential by Transmission Region.



Energy Resource	Total FELCC Energy (GWh/year)	Total DGC or ELCC Capacity (MW)	UEC at POI @ 7% Real ($2013/MWh)	Adjusted Firm UEC[2] @ 7% Real ($2013/MWh)
Biomass – Wood Based	9,772	1,226	122 – 276	132 – 306
Biomass – Biogas	134	16	59 – 154	56 – 156
Biomass – Municipal Solid Waste	425	50	85 – 184	83 – 204
Wind – Onshore	46,165	4,271	90 – 309	115 – 365
Wind – Offshore	56,700	3,819	166 – 605	182 – 681
Geothermal	5,992	780	91 – 573	90 – 593
Run-of-River	24,543	1,149	97 – 493	143 – 1,170
Site C[3]	4,700	1,100	83	88
Combined Cycle Gas Turbine and Cogeneration[4]	6,103	774	58 – 92	57 – 86
Coal-fired Generation with Carbon Capture and Sequestration	3,896	556	88	103
Wave	2,506	259	440 – 772	453 – 820
Tidal	1,426	247	253 – 556	264 – 581
Solar	57	12	266 – 746	341 – 954

Notes:

1. The resources and UEC values shown for each category in the table reflect the resource potential analyzed and may not include all possible resources that may be available at an expected higher cost.
2. The details of how the cost adjusters were developed and applied are provided in Appendix 12.
3. The Site C values presented in this table are based on information provided in the Site C Environmental Impact Statement (**EIS**) submission filed in January 2013, and the UEC is calculated assuming 5 per cent real discount rate.
4. Representative projects were used to characterize the natural gas-fired and coal-fired resource options, and the resource potential is generally considered to be unlimited.

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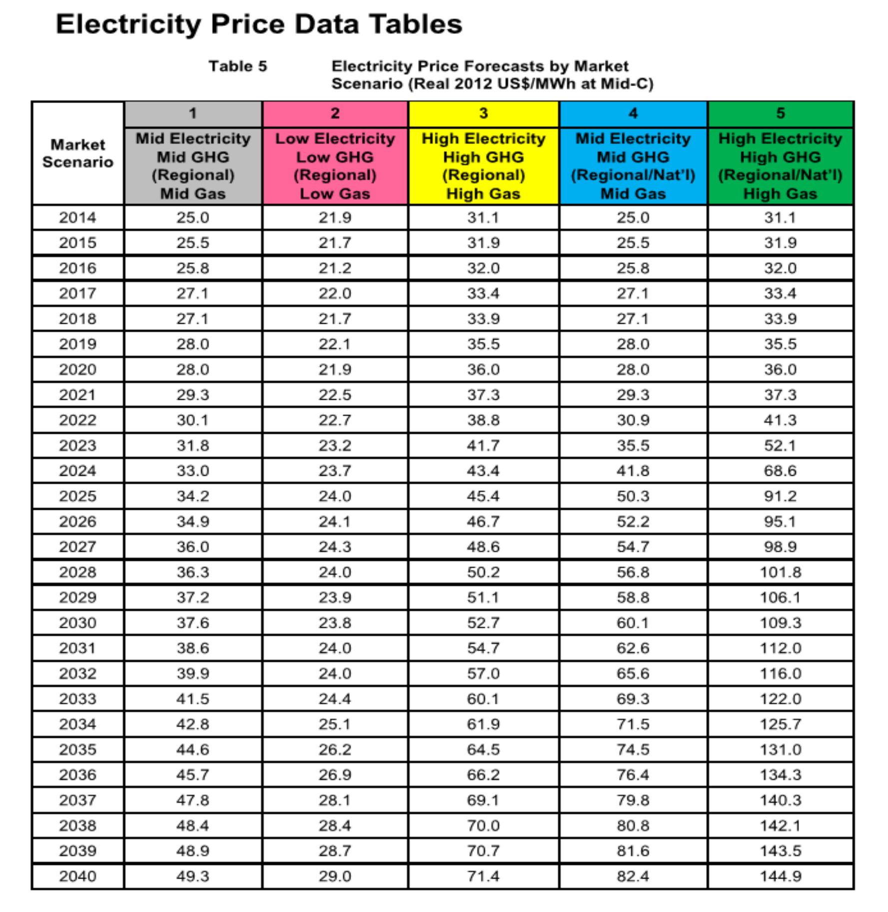
Category	Comments
Market Price ($/MWhr)	• As noted in the above Table 2-2 from the November 2013 Resource Options Report Update, the Unit Energy Cost for geothermal resources at a 7% real discount rate in 2013 dollars ranges from $91/MWh to 573/MWh at the point of interconnection to the BC Hydro system. • Wholesale electricity prices for trading purposes can vary greatly. In the Pacific Northwest, these prices are affected by such factors as precipitation/snowfall in the region, unforeseen generation outages and ambient temperatures. A general flavour of the wholesale electricity prices for potential export of electricity from BC can be obtained from a variety of sources. One such source is the US Energy Information Administration (www.eia.gov/electricity/wholesale/#history). This source provides current and historical electricity market data. Of particular relevance is the mid-C trading hub in the Northwest Region (one example would be a Mid-C peak price on March 17, 2015 of $19.87US weighted average cost from 72 trades). Access to that market for geothermal projects in BC would require access on both the BC Hydro transmission system to the Canada/US border, and on the appropriate transmission system (e.g. Bonneville Power Authority) in the US. • BC Hydro forecasts of market prices under various scenarios was provided in the November 2013 IRP. Table 5 in Appendix 5A – Market Forecast Data is reproduced below for ready reference.



Electricity Price Data Tables

Table 5 Electricity Price Forecasts by Market Scenario (Real 2012 US$/MWh at Mid-C)

Market Scenario	1 Mid Electricity Mid GHG (Regional) Mid Gas	2 Low Electricity Low GHG (Regional) Low Gas	3 High Electricity High GHG (Regional) High Gas	4 Mid Electricity Mid GHG (Regional/Nat'l) Mid Gas	5 High Electricity High GHG (Regional/Nat'l) High Gas
2014	25.0	21.9	31.1	25.0	31.1
2015	25.5	21.7	31.9	25.5	31.9
2016	25.8	21.2	32.0	25.8	32.0
2017	27.1	22.0	33.4	27.1	33.4
2018	27.1	21.7	33.9	27.1	33.9
2019	28.0	22.1	35.5	28.0	35.5
2020	28.0	21.9	36.0	28.0	36.0
2021	29.3	22.5	37.3	29.3	37.3
2022	30.1	22.7	38.8	30.9	41.3
2023	31.8	23.2	41.7	35.5	52.1
2024	33.0	23.7	43.4	41.8	68.6
2025	34.2	24.0	45.4	50.3	91.2
2026	34.9	24.1	46.7	52.2	95.1
2027	36.0	24.3	48.6	54.7	98.9
2028	36.3	24.0	50.2	56.8	101.8
2029	37.2	23.9	51.1	58.8	106.1
2030	37.6	23.8	52.7	60.1	109.3
2031	38.6	24.0	54.7	62.6	112.0
2032	39.9	24.0	57.0	65.6	116.0
2033	41.5	24.4	60.1	69.3	122.0
2034	42.8	25.1	61.9	71.5	125.7
2035	44.6	26.2	64.5	74.5	131.0
2036	45.7	26.9	66.2	76.4	134.3
2037	47.8	28.1	69.1	79.8	140.3
2038	48.4	28.4	70.0	80.8	142.1
2039	48.9	28.7	70.7	81.6	143.5
2040	49.3	29.0	71.4	82.4	144.9

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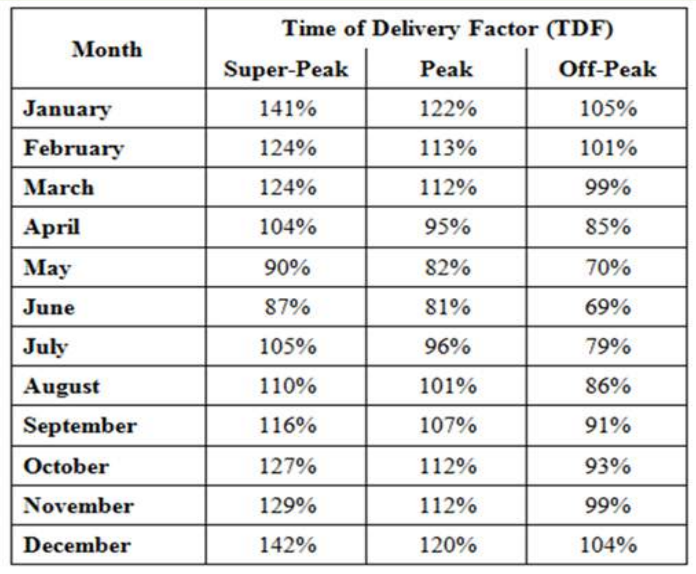
	Category	Comments
	Green Power Premium ($/MWhr)	• BC Hydro’s past procurement processes for the acquisition for power from independent power producers has offered a premium for green power. • Within British Columbia, there is little demand for the purchase of “green power certificates” (instruments that a customer can purchase to be assured that the electricity used is environmentally friendly) from BC Hydro. BC Hydro’s generation mix is already approximately 93% clean. • California has a goal of 33% of retail sales by 2020 to be sourced from eligible renewable energy sources. However, the opportunity for geothermal power from British Columbia, particularly “bundled” green energy with Renewable Energy Certificates (RECs), to compete in that market is low, for a number of reasons 1. The price of electricity is driven by the low cost of natural gas; 2. There are large amounts of renewables, such as wind and solar, in California; and 3. Firm transmission access to the California market through the BPA transmission system is generally not available.
	Capacity Price ($/KW)	• There is no price in $/kW for capacity resource options in the market at present. • Table 3-27 entitled "UCCs of Capacity Resource Supply Options" in BC Hydro’s Integrated Resource Plan dated November 2013 provided a summary of capacity resource options (e.g. pumped storage, simple cycle gas turbines and resource smart projects such as Revelstoke Unit 6). The unit capacity costs (UCCs) at the point of interconnection to the BC Hydro system in $2013/kW-year are shown in the table.
	Is there a higher price for base load power?	In general, baseload power (ie firm power) is more valuable to BC Hydro and furthermore the price paid for baseload power varies by month throughout the year. As an example, the following excerpt is taken from BC Hydro’s SOP: “1. Definitions: In this Appendix 4, the following words and expressions have the following meanings: (a) “Off-Peak Hours” means all hours other than Super-Peak Hours and Peak Hours. (b) “Peak Hours” means the hours commencing at 06:00 PPT and ending at 16:00 PPT, and commencing at 20:00 PPT and ending at 22:00 PPT, Monday through Saturday inclusive, but excluding British Columbia statutory holidays. (c) “Super-Peak Hours” means the hours commencing at 16:00 PPT and ending at 20:00 PPT Monday through Saturday inclusive, but excluding British Columbia statutory holidays.” 

Month	Time of Delivery Factor (TDF)		
	Super-Peak	Peak	Off-Peak
January	141%	122%	105%
February	124%	113%	101%
March	124%	112%	99%
April	104%	95%	85%
May	90%	82%	70%
June	87%	81%	69%
July	105%	96%	79%
August	110%	101%	86%
September	116%	107%	91%
October	127%	112%	93%
November	129%	112%	99%
December	142%	120%	104%

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Category	Comments
Estimated Size of Resource	See Section A.
Is there any green power incentives?	• The BC government created the Innovative Clean Energy (ICE) fund with an initial mandate to accelerate the commercialization of emerging clean energy technologies (now expanded to include a broad range of energy efficiency and conservation projects). British Columbia also has a program entitled Scientific Research and Experimental Development Tax credit (SR&ED). Geothermal proponents could keep a watching brief on these programs for applicability and relevance. • The BC government's First Nations Clean Energy Business Fund. This fund promotes increased Aboriginal community participation in the clean energy sector. It provides: o Capacity funding of up to $50,000 per applicant to cover the early stages (e.g. feasibility studies) of project development ; and o Equity funding of up to $500,000 per applicant to support a financially viable and resourced clean energy project. • There are a number of government of Canada programs to encourage the development of renewable power. Some of these programs may be active but not currently issuing calls for proposals. Others may be focussed on research and innovation and may not be directly applicable to geothermal technologies/resources, while others may be fully subscribed and even inactive but are noted in terms of completeness. Some of these programs include: o Natural Resources Canada ecoEnergy for Renewable Power program; o Sustainable Development Technology Canada funds; o Clean Energy Fund; o Industrial Research Assistance Program; and o Green Infrastructure Fund Geothermal proponents could keep a watching brief on these and other federal government programs for their applicability and relevance.
Grants	See above under green power incentives
Tax Holidays	None listed on federal and provincial websites.
Tax Relief	• Under Classes 43.1 and 43.2 in Schedule II of the Income Tax Regulations, certain capital costs of systems that produce energy by using renewable energy sources or fuels from waste, or conserve energy by using fuel more efficiently are eligible for accelerated capital cost allowance. Under Class 43.1, eligible equipment may be written-off at 30 percent per year on a declining balance basis. In general, equipment that is eligible for Class 43.1 but is acquired after February 22, 2005 and before year 2020 may be written-off at 50 percent per year on a declining balance basis under Class 43.2. Without these accelerated write-offs, many of these assets would be depreciated for income tax purposes at annual rates between 4 and 30 percent. • In addition to Class 43.1 or 43.2 capital cost allowance, the Income Tax Regulations allow certain expenses incurred during the development and start-up of renewable energy and energy conservation projects [Canadian renewable and conservation expenses (CRCE)] to be fully deducted in the year they are incurred, carried forward indefinitely and deducted in future years, or transferred to investors through a flow-through share agreement.

UPPER ARROW LAKE

Near Revelstoke, British Columbia, Canada
Topographical Map Sheet: Figure 36
Geological Map Sheet: Figure 37

Category	Comments
Loan Guarantees	The following is an excerpt from http://www.fnfa.ca/en/fnfa/ "The First Nations Finance Authority (FNFA) is a statutory not-for-profit organization without share capital, operating under the authority of the First Nations Fiscal Management Act, 2005. The FNFA's purposes are to provide investment options and capital planning advice and—perhaps most importantly, access to long-term loans with preferable interest rates. The FNFA is not an agent of Her Majesty or a Crown corporation and is governed solely by the First Nations communities that join as Borrowing Members. The advantages of joining the FNFA as a Borrowing Member are: 1. Access to low rate, below bank prime, loans with repayment terms up to 30 years; 2. First Nations choose the repayment terms that work best for their budget; 3. FNFA loans do not require collateral; 4. FNFA loans can be used to refinance existing debt; and 5. FNFA's interest rates and terms parallel those available to provincial and local governments. Most revenue streams are eligible to support FNFA loan requests. Eligible capital projects FNFA can finance include infrastructure, social and economic development, land purchases, independent power projects, community housing and rolling stock/heavy equipment. FNFA is a stand-alone organization separate from the Government of Canada, and its operating policies are set by its Borrowing Members, represented by the First Nation's Chief and Council appointee. The FNFA is for First Nations, by First Nations."
Royalties/Fees	Geothermal Resources Act, [RSBC 1996] CHAPTER 171, as of March 11, 2015 Permits for well authorizations for wells to be drilled within the boundaries of the permittee's location must pay a prescribed rent for the permit (Section 5). Based on Section 17 of the Act, (1) A lessee who produces a geothermal resource for purposes other than testing must pay to the government (a) a royalty established by agreement under this section, (b) an amount agreed under this section to be paid instead of royalty, or (c) if no royalty or amount has been agreed under this section, the prescribed royalty.
General Idea of Royalties	With regard to use of the water resources within the geothermal tract, Section 4 of the Water Sustainability Act states "This Act does not apply to geothermal resources as defined in section 1 (1) [definitions] of the Geothermal Resources Act."
Private Land Owner or Government Land	Geothermal proponents will need to arrange financial agreements (eg leases or purchases) with private property owners for the geothermal land tract. Proponents for geothermal facilities on Crown Land must apply for the appropriate tenure under the BC Land Act (eg Statutory Right of Way, Licence of Occupation).
Tax Rate in the Country	• Income eligible for small-business deduction (up to $500,000 income): 11% Federal tax, combined federal and provincial (British Columbia): 13.5%. • Income not eligible for small-business deduction: 15% Federal, combined federal and provincial (British Columbia): 26%
Transmission Tariffs	Under wholesale wheeling (whereby electricity is transmitted from electricity generators to utilities) to customers in Alberta, the US, or other wholesale customers in BC, the generation supplier must request service on the appropriate BC Hydro transmission line under the Open Access Transmission Tariff (OATT) at a regulated cost for that service. Depending on the end customer, the generation supplier will have to make similar arrangements to cover transmission access in other jurisdictions (e.g. the Bonneville Power Authority for wheeling to a US customer). This 'pancaking' of rates, along with transmission congestion issues, affects the economic viability of the potential wholesale opportunity.

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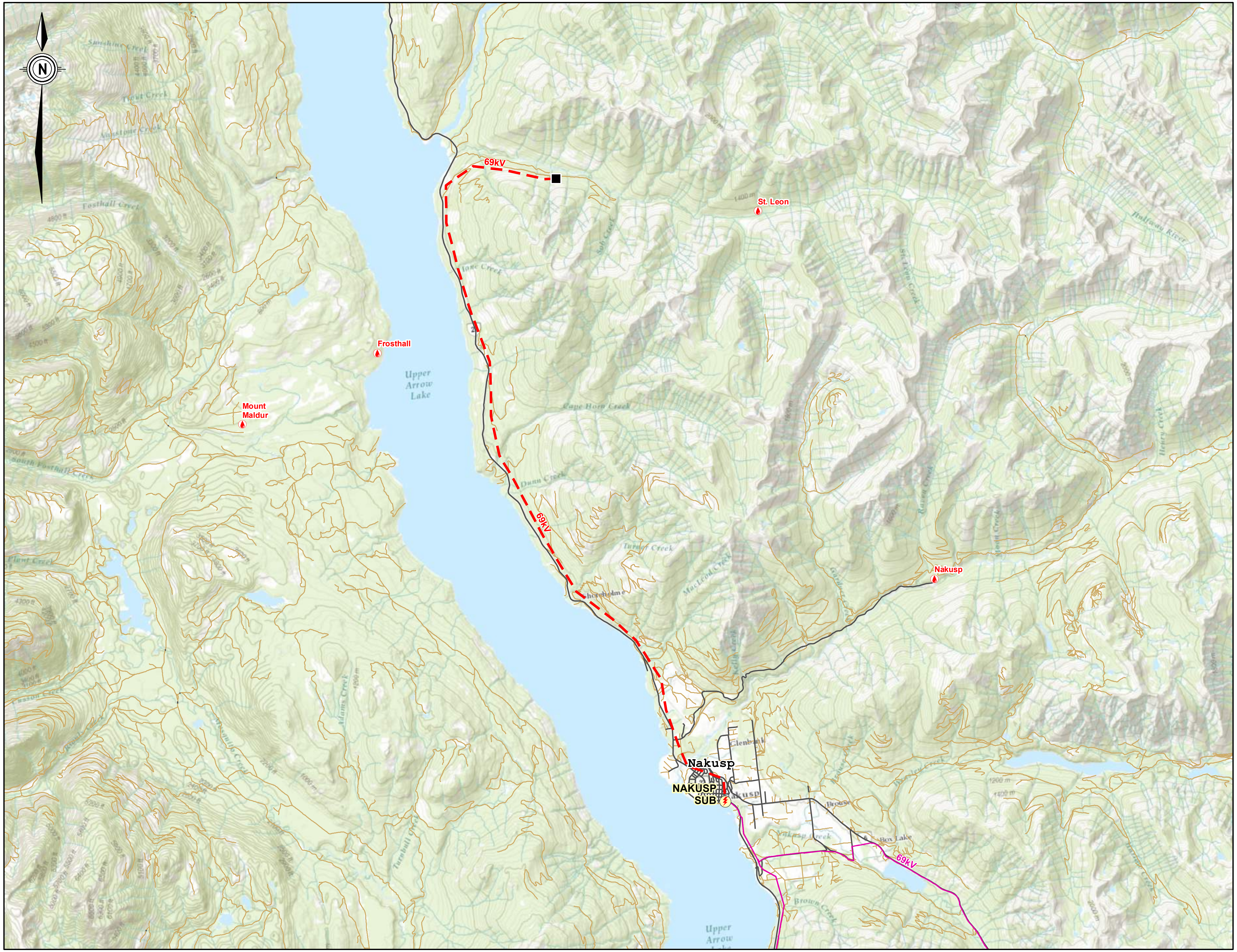
Category		Comments
M.	**Maps**	
	Regional topographic map showing population centres, roads and other infrastructure including electrical grid and nearest substation and/or generating station. (1:500,000?)	Topographical Map Sheet: Figure 36
	Regional map showing land tenure in area – geothermal concessions, mining concessions, private land holds, public or national lands (parks). (1:500,000?)	Topographical Map Sheet: Figure 36
	Regional geological map. (1:250 or 500,000?)	Geological Map Sheet: Figure 37
	Detailed geological map of the immediate area of the concessions. (1:50,000 or 100,000)	Geological Map Sheet: Figure 37
N.	**Other Issues and Considerations**	



Geoscience BC

Legend

■ Proposed Geothermal Plant Location

● Thermal Spring

- - Proposed Transmission Line

⚡ Existing Substation

Existing Transmission Line

Paved Road

Other Road

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consulting engineers

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3 0 3
Kilometers

Project No.	Date
2692-004	April 30, 2015

Potential Geothermal Plant at Upper Arrow 20MW

Figure 36

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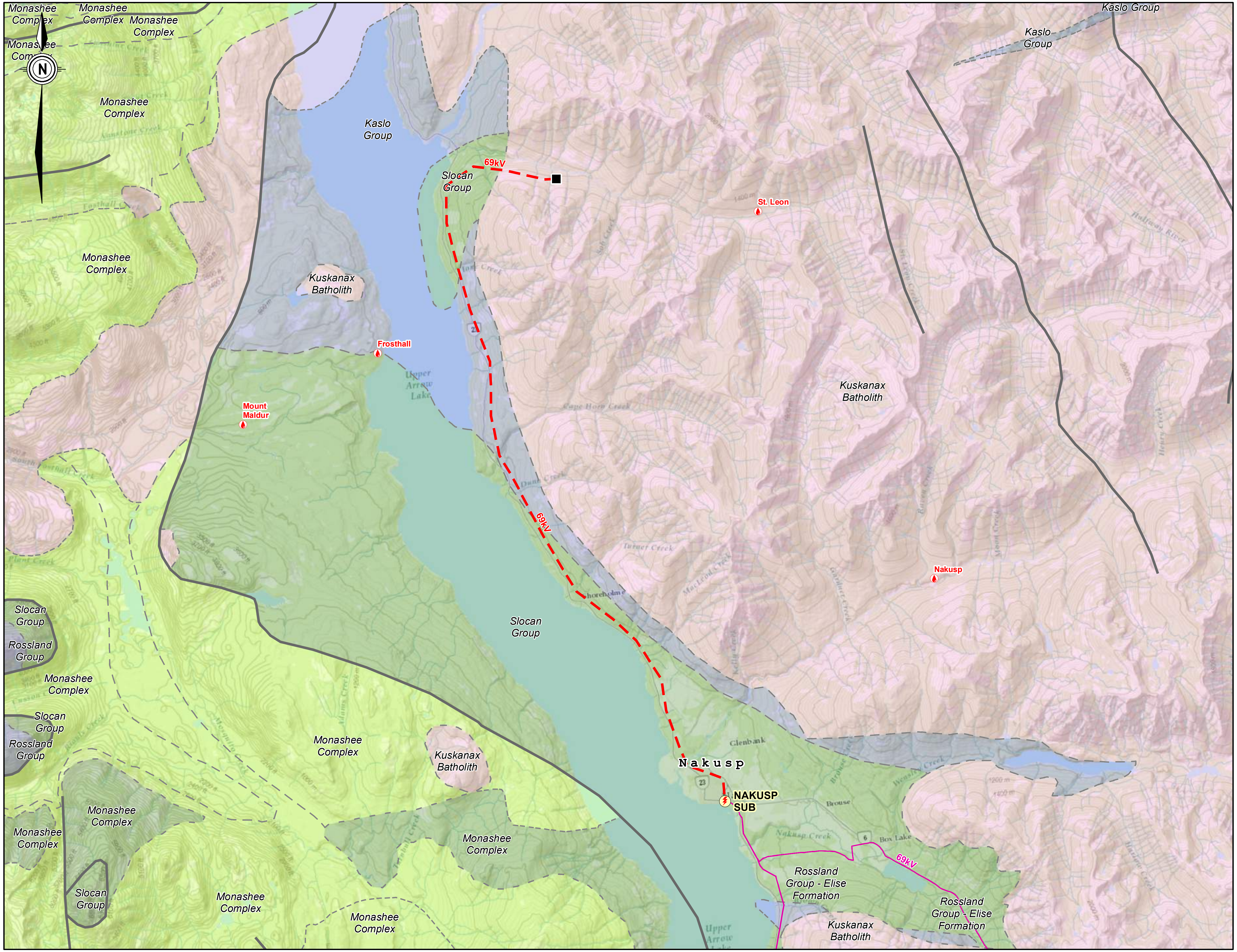
Author: RTaylor



Geoscience BC

Legend

■ Proposed Geothermal Plant Location

Thermal Spring

Proposed Transmission Line

Existing Substation

Existing Transmission Line

Bedrock Type

Intrusive Rocks

Metamorphic Rocks

Sedimentary Rocks

Volcanic Rocks

Rock Type Boundary

Fault

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Service Layer Credits: Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

4 0 4
Kilometers

Project No.	Date
2692-004	April 30, 2015

Geological Strata Map for Upper Arrow 20MW

Figure 37

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