Tom A. Loski
Chief Regulatory Officer

16705 Fraser Highway
Surrey, B.C. V4N 0E8
Tel: (604) 592-7464
Cell: (604) 250-2722
Fax: (604) 576-7074
Email: tom.loski@terasengas.com
www.terasengas.com

Regulatory Affairs Correspondence
Email: regulatory.affairs@terasengas.com

July 15, 2010

British Columbia Utilities Commission
6th Floor, 900 Howe Street
Vancouver, B.C.   V6Z 2N3

Attention: Ms. Erica Hamilton, Commission Secretary

Dear Ms. Hamilton:

RE: Terasen Gas Inc. ("TGI" or the "Company")
Application ("Application") for a Certificate of Public Convenience and Necessity ("CPCN") for the Kootenay River Crossing (Shoreacres) Upgrade Project

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Pursuant to Section 45 of the *Utilities Commission Act*, TGI hereby requests approval from the British Columbia Utilities Commission (the "Commission") for a CPCN for the Kootenay River Crossing (Shoreacres) Upgrade (the "Application").

Currently, an aerial crossing of transmission pressure pipeline with an outside diameter of 168 mm (6 inch) crosses the Kootenay River near the community of Shoreacres. The crossing was built in 1957 and is nearing its end of life. The Kootenay River Crossing Upgrade Project is required at this time to address integrity concerns with respect to the instability of the river bank slope where a main support cable anchor block and two wind cable anchor blocks are buried and the deteriorating condition of the aerial crossing structure and pipe. TGI has concluded that the risk associated with this crossing is unacceptable and remedial action is required.

The Kootenay River Crossing Upgrade Project is estimated at $8.3 million (in as-spent dollars). The Company's current 2010-2011 Negotiated Settlement Agreement ("NSA") requires that the Company submit CPCN applications for capital investments in excess of $5 million.

The Company has met with stakeholder representatives and presented an overview of this Application. In order to appropriately accommodate all stakeholders, Terasen Gas, believes the proposed regulatory process and timetable noted below provides an efficient review process for all parties concerned. As a result of discussions with the British Columbia Public Interest Advocacy Centre on behalf of the British Columbia Old Age Pensioners Organization *et al* ("BCOAPO") on this Application and other matters, Terasen Gas recognizes that the BCOAPO will be unable to participate in Information Request ("IR") No. 1. Terasen Gas believes, however, that with the benefit of IR No. 1 responses on the record, BCOAPO's participation in IR No. 2 should adequately address any issues or concerns it may have.

The Comany believes that the following regulatory timetable provides for an efficient review process.

ACTION	DATES (2010)
Commission Information Request No. 1	Tuesday, August 17
Intervenor and Interested Party Registration	Tuesday, August 24
Intervenor Information Request No. 1	Tuesday, August 24
TGI Response to Information Requests No. 1	Thursday, September 9
Commission and Intervenor Information Requests No. 2	Thursday, September 23
TGI Response to Information Requests No. 2	Thursday, October 7
TGI Written Final Submission	Thursday, October 21
Intervenor Written Final Submission	Thursday, November 4
TGI Written Reply Submission	Thursday, November 18

Twelve hardcopies of this Application will be submitted to the Commission in accordance with the Commission's CPCN Guidelines. The Application and all subsequent exhibits will be made available on the Terasen Gas website under the Regulatory Submissions section for the Lower Main/Squamish/Interior at the following link:
http://www.terasengas.com/_AboutUs/RatesAndRegulatory/BCUCSubmissions/LowerMainlandSquamishInterior/default.htm

If there are any questions regarding this Application, please contact the undersigned.

Yours very truly,

TERASEN GAS INC.

Original signed:

Tom Loski

Attachments

cc (e-mail only): Parties to the TGI 2010-2011 Negotiated Settlement Agreement
Stakeholder Contacts (as noted in Appendices O and P for whom e-mail information is listed)

TERASEN GAS INC.

Application for a
Certificate of Public Convenience and Necessity
for the
Kootenay River Crossing (Shoreacres) Upgrade

Volume 1 - Application

July 15, 2010

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IN THE MATTER OF THE UTILITIES COMMISSION ACT
R.S.B.C. 1996, CHAPTER 473

AND IN THE MATTER OF AN APPLICATION BY

TERASEN GAS INC. FOR THE

KOOTENAY RIVER CROSSING (SHOREACRES) UPGRADE

To: The Commission Secretary

British Columbia Utilities Commission
Sixth Floor, 900 Howe Street
Vancouver, British Columbia V6Z 2N3

1 APPLICATION

Terasen Gas Inc. ("TGI" or the "Company") hereby applies to the British Columbia Utilities Commission (the "BCUC" or the "Commission"), pursuant to Sections 45 and 46 of the Utilities Commission Act, R.S.B.C. 1996, Chapter 473, (the "Act"), for approval of a Certificate of Public Convenience and Necessity ("CPCN") to upgrade the TGI Interior Transmission System ("ITS") crossing of the Kootenay River near Shoreacres, B.C., a small community approximately half way between Castlegar and Nelson (the "Project" or "Application").

The Project is intended to ensure the integrity of an existing pipeline crossing. The crossing is nearing its end of its useful structural life and is challenged by slope instability that endangers the main support cable anchor block and the two wind cable anchor blocks of the pipeline crossing.

The installation of a new pipeline crossing using the Horizontal Directional Drill ("HDD") construction method addresses the risks related to both the deteriorating condition of the crossing structure and pipe and the slope instability concerns at the east terminus of the crossing, thereby ensuring security of supply to customers in the region.

1.1 Executive Summary

The Company seeks a CPCN to upgrade an aerial crossing that is located on the TGI Interior Transmission System Savona-Nelson Main Line. The crossing, built in 1957, spans the Kootenay River near the community of Shoreacres (a small community approximately mid way between Castlegar and Nelson) and serves approximately 5200 customers downstream of the crossing. Terasen Gas has identified two issues with the crossing that must be addressed.

The first issue is the instability of the slope at the east end of the crossing. The east end of the aerial crossing terminates on a steep slope in which both the main support cable anchor block and the two wind cable anchor blocks are buried. A failure of this unstable slope could undermine some or all of these anchor blocks, which, in turn, could cause the aerial crossing to lose support on the east end. A 2009 report concluded that the east bank slope is only "marginally stable". If any aggravating factors were introduced, such as increased pore water pressure or seismic load, the east bank slope could fail. The study recommends that the slope be avoided when TGI considers replacement or refurbishment options.

Second, the crossing is reaching the end of its useful structural life expectancy and is experiencing corrosion in various components of the crossing, such as cables, piping, tower, and anchors.

Terasen Gas has concluded that the slope instability must be addressed at this time; it is not a viable option to maintain the status quo. To address both the slope instability concern and the continuing deteriorating condition of the crossing, TGI evaluated numerous options, ranging from refurbishment of the existing crossing including reinforcement of the unstable slope, replacement with a new aerial crossing, a new Transmission Pressure or Intermediate Pressure alignment, and a new Horizontal Directional Drill ("HDD") alignment.

An initial, high level screening process determined that stabilizing the slope with the existing crossing in place, and taking into account the environmental impact on the Kootenay River, was not a viable option. A new aerial crossing which would have to be substantially longer to avoid the unstable slope was also rejected on the basis of cost and visual and land impacts. Furthermore, the slope instability issue precluded any alternative using the existing alignment.

In terms of replacing the crossing, TGI's screening process identified three alternatives for more detailed evaluation:

a) HDD: constructing a new crossing approximately 880 m in length, by means of HDD, entering near the existing western terminus of the existing aerial crossing and exiting 625 m north of the existing east terminus.

b) Transmission Pressure ("TP") Re-route: installing approximately 9 km of NPS 6 pipeline, using standard trench and cover and transportation corridor crossing methods.

c) Intermediate Pressure ("IP") Re-route: similar to the TP re-route, but including a TP/IP station, 9 km of NPS 8 pipeline and with the transmission line downstream of the tie-in point reduced to IP.

All of these alternatives avoid the unstable slope on the east side of the existing crossing. Of the three, the HDD option (the Project) is superior to other options in terms of capital cost, ratepayer impact, and non-financial considerations. The estimated capital cost for the Project is 40% less than the costs for TP or IP Re-route. In addition, TGI completed a screening analysis of the three short-listed alternatives using the following non-financial factors: safety, environmental, land, First Nations, operational impacts, system capacity and aesthetics. The Project ranked equal or better than both the TP and IP Re-route options for almost all of these factors.

The Project has an estimated capital cost of approximately $8.3 million as-spent and involves:

- Installation of approximately 880 m of new NPS 6 transmission pressure pipe beneath the Kootenay River to be installed using the HDD construction method.
- decommissioning and removal of the existing NPS 8 Kootenay River aerial crossing near the community of Shoreacres, and
- abandonment of approximately 625 m of NPS 6 transmission pressure pipe between the east end of the existing crossing and the tie-in point of the new crossing

The Project is scheduled to be in service by the end of 2011.

The Company has identified a number of Project stakeholders, including residents, businesses and government entities, and has in place a communication plan for consultation with the public. Initial communications with the public about the Project have already taken place, and all issues identified have been resolved or a plan is in place to deal with them.

Three First Nations, the Ktunaxa Nation Council, the Okanagan Nation Alliance, and the Sinixt Nation Society, have been informed and engaged with regard to the Project. To date, no First Nations have expressed opposition to the Project. Plans are being developed to involve the First Nations in future archaeological investigations. TGI will continue to engage with the three First Nations with respect to any concerns that they may raise.

The Company believes that the Project is in the public interest and should be approved.

1.2 Provincial Government Energy Objectives and TGI Resource Plan

The Provincial government energy objectives are defined in Section 1 of the Utilities Commission Act. The Project, which is intended to address system integrity, does not have a direct link to the energy objectives defined therein, and does not hamper other projects or initiatives undertaken by TGI that advance these objectives.

The Project was identified as part of the major capital projects for the period of 2008 to 2012 in Terasen Gas Inc's 2008 Resource Plan, which was accepted by the Commission in Order G-194-08. The Resource Plan identified a HDD crossing as the prime alternative to replace the aerial crossing.

1.3 Requested Regulatory Review of CPCN Application

The Company's 2010 and 2011 Revenue Requirements Negotiated Settlement Agreement provides that TGI will apply for a CPCN for projects in excess of $5 million. Given that the current estimated capital cost of the Project exceeds the threshold, TGI is applying to the Commission for a CPCN for the Project.

The Information contained in this Application accords with the guidelines set out in the Commission's *2010 Certificates of Public Convenience and Necessity Application Guidelines* (the "*Guidelines*"). Draft Procedural and Final Orders are included as Appendix R.

TGI believes that a written review and approval process is appropriate for this Application, and that the following regulatory timetable provides for an efficient review process.

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Commission Information Request No. 1	Tuesday, August 17
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The Project involves upgrading an existing asset to maintain the integrity of a pipeline that is near end of its useful life, has been previously identified in TGI's 2008 Resource Plan as a major capital project for the period of 2008-2012, and has to date identified no significant stakeholder or First Nations concerns. The Application provides information on all areas required by the *Guidelines*. Any additional areas of concern in this Application can be adequately addressed through a written process.

As stated in section 5.5.1, the Project is conditional upon receiving approval from the Oil and Gas Commission ("OGC") of a Pipeline Application that was filed with the OGC on February 19, 2010. TGI respectfully requests that the Commission complete its process to review this Application and reach a decision by mid-November 2010 in order to meet the proposed construction schedule outlined herein.

2 APPLICANT

2.1 Name, Address, and Nature of Business

TGI is a company incorporated under the laws of the Province of British Columbia and is a wholly-owned subsidiary of Terasen Inc., which in turn is a wholly-owned subsidiary of Fortis Inc. TGI maintains an office and place of business at 16705 Fraser Highway, Surrey, British Columbia, V4N 0E8.

TGI is the largest natural gas distribution utility in British Columbia, providing sales and transportation services to residential, commercial, and industrial customers in more than 100 communities throughout British Columbia, with approximately 930,000 customers served on the mainland including the Inland, Columbia, and Lower Mainland service areas. TGI's distribution network delivers gas to more than eighty percent of the natural gas customers in British Columbia.

2.2 Financial Capability

TGI is regulated by the BCUC. TGI is capable of financing the Project either directly or through its parent, Terasen Inc. TGI has credit ratings for senior unsecured debentures from Dominion Bond Rating Service and Moody's Investors Service of A and A3 respectively. Terasen Inc. has credit ratings for senior unsecured debentures from Dominion Bond Rating Service and Moody's Investors Service of BBB (High) and Baa2 respectively.

2.3 Technical Capability

TGI has designed and constructed a system of integrated high, intermediate and low-pressure pipelines and operates more than 39,800 kilometres of natural gas transmission and natural gas distribution mains and service lines in British Columbia. This transmission and distribution infrastructure serves approximately 930,000 customers on the mainland.

2.4 Name, Title, and Address of Company Contact

Tom A. Loski.
Chief Regulatory Officer
Terasen Gas Inc.
16705 Fraser Highway
Surrey, B.C., V4N 0E8

Phone:	(604) 592-7464
Facsimile:	(604) 576-7074
E-mail:	tom.loski@terasengas.com
Regulatory Matters:	regulatory.affairs@terasengas.com

2.5 Name, Title, and Address of Legal Counsel

Song Jin Hill
Fasken Martineau DuMoulin LLP
2900-550 Burrard Street
Vancouver, B.C. V6C 0A3

Phone:	(604) 631-4824
Facsimile:	(604) 632-3232
E-mail:	shill@fasken.com

or

Matthew Ghikas
Fasken Martineau DuMoulin LLP
2900-550 Burrard Street
Vancouver, B.C. V6C 0A3

Phone:	(604) 631-3191
Facsimile:	(604) 632-3191
E-mail:	mghikas@fasken.com

3 PROJECT JUSTIFICATION

TGI has identified two threats to the integrity of the existing aerial crossing over the Kootenay River that has been in place since 1957:

- Slope Instability at the East Terminus – A major concern is the eastern end of the crossing structure which terminates on a very steep slope. An analysis of the slope concludes it is only marginally stable and is subject to short term and long term safety concerns, which could undermine the anchor blocks. The main support cable anchor block, the two wind cable anchor blocks and approximately 300m of pipeline are buried in this section of unstable slope.

- Deterioration of the Crossing – The Kootenay River crossing is over 50 years old with corrosion in various components and, unless a major refurbishment is undertaken, is nearing the end of its useful structural life.

TGI has concluded that these issues must be addressed to ensure the integrity of the crossing. This section provides a description of the existing aerial crossing structure, including the current condition of various components of the crossing structure and the terminus sites, and discusses the two major threats to the integrity of the crossing and consequences to TGI customers if the threats are not alleviated.

3.1 Overview of Existing Facilities

The Kootenay River aerial crossing is part of the Savona-Nelson Main Line (“SNML”), which was constructed in 1957. The NPS 6 SNML section between Castlegar and Nelson is a single direction flow from Castlegar to Nelson and includes eight stations and Transmission Pressure (“TP”) services with the largest being the Nelson Gate Station. When constructed, this section also included two NPS 8 aerial crossings, a crossing of the Columbia River near Castlegar and a crossing of the Kootenay River at the convergence of the Slocan and Kootenay Rivers near the community of Shoreacres, a small community approximately mid way between Castlegar and Nelson. The Columbia River crossing near Castlegar was successfully replaced with a new HDD crossing in 2009.

The Kootenay River aerial crossing consists of a single pipe supported by a main support cable suspended by a tower on the west side of the crossing and an anchor block buried in the hillside on the east side of the crossing. Two other cables, referred to as “wind” cables, provide lateral stability. The east wind cable anchor blocks are also buried in the hillside on the east terminus of the crossing.

The aerial crossing is 285 m long from kilometre post ("kmp") 17.368 to kmp 17.653.

The western support tower for the crossing is located on a large piece of property owned by TGI with a number of residential landowners adjacent. The east terminus and anchor blocks are located on a steep slope, which has experienced, and is continuing to experience, surface sloughing as described in Section 3.3. The support structures at each terminus are enclosed in fenced compounds.

The system serves approximately 5200 customers located in the City of Nelson and its surrounding area, downstream of the aerial crossing.

Figure 3-1 below is a map of the ITS and Figures 3-2, 3-3 and 3-4 show the existing Kootenay River aerial crossing.

Figure 3-1: Map of the ITS Showing Location of Kootenay River Aerial Crossing

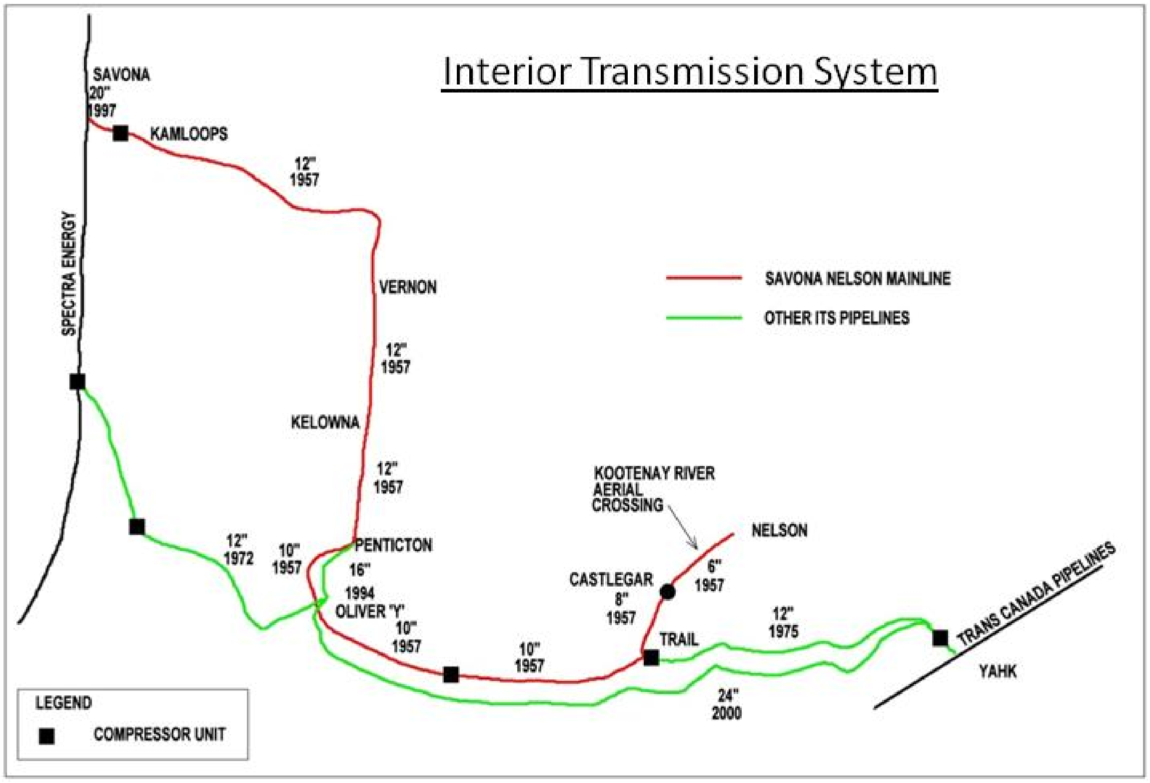

Figure 3-2 below is a photograph taken from the east bank looking across the Kootenay River toward the west bank of the Shoreacres Aerial Crossing. This east bank has experienced surface sloughing towards the river.

Figure 3-2: Photograph Showing the West Bank of the Shoreacres Aerial Crossing

Figure 3-3 below is a photograph looking downstream along east bank of the Shoreacres Aerial crossing. Note the steep slope on the east bank and the poor condition of the fencing caused by the surface sloughing.

Figure 3-3: Photograph Showing the East Bank of the Shoreacres Aerial Crossing

Figure 3-4 below is a photograph showing the view of the east bank of the Shoreacres Aerial Crossing. The steep-sided east bank is the location of the surface sloughing. The Project will bypass this slope.

Figure 3-4: Photograph showing the east bank of the Shoreacres Aerial Crossing

3.2 TGI Inspection Practice

The Canadian Standard CSA Z662, Oil and Gas Pipeline Systems, requires that facilities be regularly inspected to ensure that they continue to be fit for service. Detailed crossing inspection requirements are provided in the TGI standard OPM 08-02 Inspecting Bridge and Aerial Crossings. A copy of the TGI crossing inspection standard is attached as Appendix A. The Kootenay River crossing has been inspected in accordance with this standard, earlier versions of this standard and/or the company's general inspection practices since the crossing was originally constructed in 1957.

The buried portions of the Savona Nelson Main Line between Savona and Castlegar have been inspected using In-Line-Inspection tools since 1988. The buried section between Castlegar and Nelson has been evaluated using over-the-line cathodic protection survey techniques with digs performed at selected sites to assess TGI's corrosion mitigation activities and to confirm asset fitness-for-service. To date, all buried portions of the TP pipeline between Savona and Nelson are deemed, from an operating perspective, to be in acceptable condition subject to on-going inspection and maintenance.

The Kootenay River aerial crossing has been inspected in accordance with TGI's Bridge and Aerial Crossing Inspection standard. In addition to the twice yearly visual inspections, more detailed inspections of the crossing were carried out in 1994, 1998, 2003, and 2009. Assessments of the slope condition at the east terminus were conducted in 1990, 1995 and 2009. The stability of the east slope is also included in TGI's Natural Hazards Risk Management Program and is periodically re-assessed as required under this program.

TGI has continued to monitor the crossing as it approaches the end of its useful structural life. Based on the most recent studies and assessments, TGI has concluded that the crossing must be replaced, rather than refurbished, to address the operating risks associated with slope instability and to attain acceptable standards at the site. The specific concerns related to the slope instability and the crossing condition will be further described in Sections 3.3 and 3.4.

3.3 Slope Instability

Slope instability on the east bank of the river must be addressed in the near term, as the slope is only marginally stable and poses a risk of failure of the crossing.

3.3.1 LONG-STANDING CONCERNS

The aerial crossing terminates on the east bank of the Kootenay River on a relatively steep slope. The main support cable anchor block and two wind cable anchor blocks are buried in this slope.

Crossing inspections have regularly identified surface sloughing as a concern at this location. In the early '90's it was observed that soil was pushing against the above ground portion of the pipeline at this location and a retaining wall was constructed to mitigate this problem.

3.3.2 RECENT STUDY

TGI undertook a detailed review of the slope stability at this location in 2009. Considering the importance and complex nature of this issue, TGI structured this review as a collaborative effort between TGI's Geotechnical Engineer responsible for the TGI Natural Hazards Monitoring Program and an external subject matter expert from BGC Engineering ("BGC").[1] The results of this review are documented in a July 2009 report titled Assessment of East Bank Slope Stability

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[1] BGC Engineering Inc. – an international consulting company specializing in geotechnical and water resources engineering and applied earth sciences.

at the Terasen Gas Shoreacres Aerial Crossing. A copy of the report is attached as Appendix B. The conclusion of the authors was that the slope is only marginally stable.

The 2009 analysis used surveyed contours, current industry accepted modeling software, and as-built drawings to determine the effects of the slope instability on the structural components of the aerial crossing. The study also used additional soils information from the drilling investigation done for the HDD feasibility study.

To aid in understanding the results of the slope stability analysis it is helpful to define the term "angle of repose". The angle of repose is the steepest slope at which a pile of granular material will stand. If a slope exceeds the angle of repose of its composite material, the surface material will begin to slide down the slope until the angle of repose is re-established. The field evidence of this process is a shallow surface sloughing, as seen at the Kootenay River East Bank at Terasen's Shoreacres crossing.

A slope at its angle of repose is defined to have a factor of safety of 1. This is the case for the portion of the east slope of the Kootenay River Crossing in which the anchor blocks are buried. TGI's geotechnical consultant has recommended, however, that the short-term static and long-term static factors of safety should be 1.3 and 1.5, respectively. This provides a reasonable margin of stability beyond the angle of repose.

For the east terminus of the crossing, the engineers analysed the slope and determined where the slope angles corresponding to factors of safety of 1.3 and 1.5 would be located within the slope. The location of these slope positions relative to the anchor blocks will provide a measure of risk to the overall crossing structure.

The slope positions representing factors of safety of 1.3 and 1.5 are illustrated in Figures 3-5 and 3-6.

Figure 3-5 below is a slope profile of the east bank of the Kootenay River at the location of the terminus of the existing crossing showing the slope position for a factor of safety of 1.3. A failure at this location could impact the wind cable anchor blocks.

Figure 3-5: Slope Profile of the East Bank of the Kootenay River at the Existing Crossing – Factor of Safety of 1.3

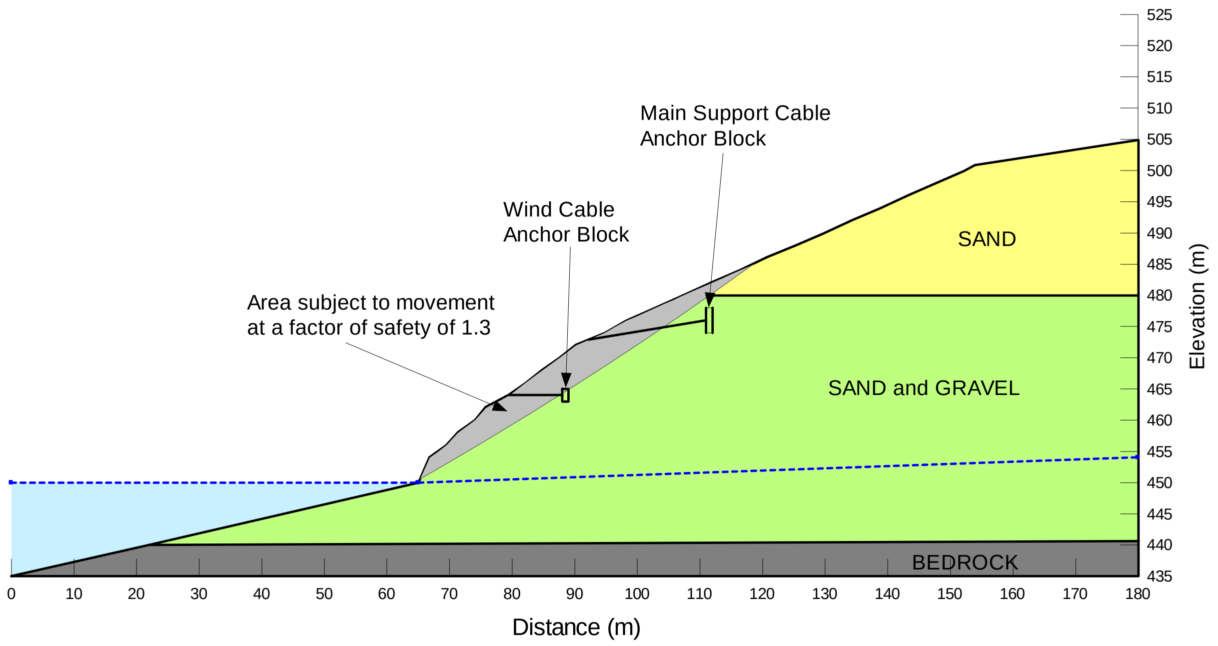
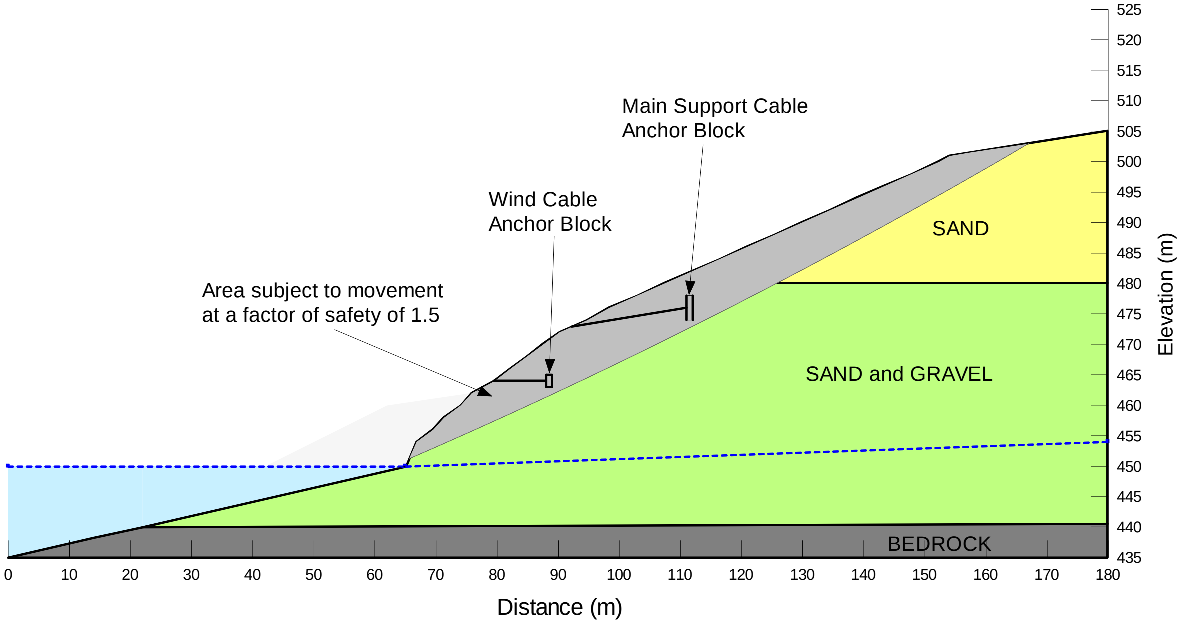


Figure 3-6 which follows is a slope profile of the east bank of the Kootenay River at the location of the terminus of the existing crossing showing the slope position for a factor of safety of 1.5. A failure at this location could impact both the wind cable anchor blocks and the main support cable anchor block.

Figure 3-6: Slope profile of the East Bank of the Kootenay River at the Existing Crossing – Factor of Safety of 1.5



The engineers responsible for performing the slope stability study concluded that:

- The slope angle representing a factor of safety of 1.3 intersects the wind cable anchor blocks. This means that, in the short term, there is an insufficient margin of safety where the wind cable anchor blocks are installed, and there is a reasonable risk that the slope could fail in these locations. A slope failure at this depth could impact the wind cable anchor blocks, possibly causing the anchor blocks to move and the cables to lose tension which would require taking the crossing out of service for major repairs. This is unacceptable as the crossing is part of a single feed to Nelson. For these reasons the slope does not meet the short term stability criteria.

- The slope angle with a factor of safety of 1.5 lies below both the wind cable and main support cable anchor blocks. This means that, in the long-term, there is an insufficient margin of safety where the wind cable and main support cable anchor blocks are installed, and there is a reasonable risk that the slope could fail in these locations. A slope failure at this depth could cause the aerial crossing to lose all support on the east bank which could result in the crossing collapsing into the river. At a minimum, the crossing would have to be taken out of service and replaced. This is unacceptable as the crossing is part of a single feed to Nelson. For these reasons the slope does not meet the long term stability criteria.

Overall, the 2009 report concluded that the east bank slope is only “marginally stable”. If any aggravating factors were introduced, such as increased pore water pressure caused by heavy seasonal run-off or by a very heavy rainfall or by seismic load, the east bank slope could fail.

Increasing the slope stability can be achieved by decreasing the slope angle. This can be accomplished in one of two ways:

- Decreasing the slope angle by removing material from the existing slope. This would require extensive earthworks and is not possible while the existing aerial crossing is in operation. As such, this is not a feasible alternative.

- Construction of a toe buttress which would allow the slope angle in the vicinity of the anchor blocks to be reduced by the addition of more material. A toe buttress would be very difficult to construct as the slope extends into the river and significant in-stream works would be required. In-stream buttress construction would require extensive environmental impact assessment work and additional environmental permit/approval acquisition as this work would result in a harmful alteration, disruption and destruction of fish habitat (“HADD”) and potentially impact on federally listed species at risk within the Kootenay River. Additional federal and provincial environmental permits/approvals would be required to meet requirements under the Fisheries Act, Navigable Waters Protection Act, Species at Risk Act, Canadian Environmental Assessment Act and provincial Water Act. Significant habitat compensation work would also be required to offset the impacts associated with the buttress. It is TGI’s opinion that the permit process would be lengthy, likely well in excess of a year, and, given the availability of a technically viable alternative, the chances of being granted the necessary permits are very low. For these reasons, TGI concludes that construction of a toe buttress is not a feasible alternative.

Overall, TGI concludes that it is not feasible to improve the slope stability to an acceptable level.

3.4 General Deterioration of the Crossing

The Kootenay River aerial crossing has been in service for over 50 years, and is reaching the end of its useful structural life. Significant refurbishment would be required to extend the life of the pipeline crossing, and this would not address the immediate concern of the instability of the east slope.

TGI commissioned CWMM Consulting Engineers Ltd. (“CWMM”)[2] to inspect and assess the general condition of the crossing. A copy of the CWMM report is attached as Appendix C. The CWMM report did not address the slope instability issue, which was addressed in a separate report discussed above. The CWMM report recommends that if the structure is to remain in service beyond five years, then certain remedial measures should be considered in the near future, including:

- Repainting of the pipe and steelwork components (TGI has tested the paint which is known to contain lead. Therefore containment will be needed to avoid deleterious material from entering the Kootenay River or the surrounding area. As a result the cost of repainting will be significant.)

- Replacement of seized roller supports (The CWMM report notes that this item poses challenges as the pair of rollers at each vertical suspension point are welded to the inside of the supporting pipe sleeve and will need to be torch cut loose to allow new rollers to be welded into the narrow space between the pipe and sleeve support.)

- Refurbishment of the east end anchorages (The CWMM report notes that this will present challenges as the anchorages are contained within metal culverts that are buried in the embankment and exposing them will require excavating the overburden, possibly with some additional slope retention to support the excavation. Access difficulties will add to the complexity and cost of this operation.)

The CWMM report further notes that the assessment was based on a visual assessment only. TGI concludes that, if the structure were to remain in service (and to do so, the slope instability would have to be addressed), structural testing of all components should be carried out, including the testing of the tension of all cables, with refurbishment undertaken as required.

3.5 Consequences of Pipeline Failure

The City of Nelson and its surrounding area are downstream customers of the Kootenay River crossing. A significant failure of the aerial crossing would leave approximately 5200 TGI customers without gas supply for a potentially prolonged period. The customer base is primarily core market residential and commercial customers with only one interruptible customer.

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[2] CWMM Consulting Engineers Ltd. – a professional service company specializing in the structural design of all types of buildings, marine structures, industrial facilities, and reservoirs.

Among the mix of customers are the following ten critical customers that depend on natural gas for heat:

- Kootenay Lake Hospital
- McKim House Care Home
- Mountain Lake Seniors Centre
- Central School
- Gordon Sargeant Primary School
- Brent Kennedy School
- Brent Kennedy Day Care
- Canadian International College
- Harrop Community Hall
- Harrop Greenhouse

The linepack in the NPS 6 transmission line is limited. It is estimated that, following a failure of the crossing, loss of gas supply to customers would start in as little as one hour on a design peak day, and in approximately three hours on a normal winter day. The outage would last in the order of several weeks to several months to restore service to downstream customers. The east bank of the crossing is relatively remote and access would be difficult. Removing a failed structure in the presence of the unstable slope would have a significant impact on the east shore of the Kootenay River.

In addition to prolonged outage concerns, if a significant slope failure occurred on the east bank, the crossing structure could collapse into the river with potentially serious environmental consequences.

TGI considers the risk identified above to be unacceptable, and the concerns discussed in Sections 3.3 and 3.4 must be addressed in the near-term.

3.6 Justification Summary

The east end of the Kootenay River crossing is on a relatively steep slope, which has shown signs of sloughing for many years. The most recent assessment of the slope condition concluded the slope is marginally stable and is below the minimum recommended factors of safety for both short and long term static conditions. Additional stressors could cause failure. The aerial crossing has also been in service for over 50 years with corrosion to various components. It would require a major refurbishment if it was to remain in service. Given the potential for a slope failure at the east terminus, the requirement for a major refurbishment of the crossing itself, and the social, environmental and cost consequences of a failure, TGI is of the belief that it is in the public interest to upgrade the Kootenay River crossing at this time.

4 UPGRADE ALTERNATIVES

TGI considered a number of upgrade alternatives and applied financial and non-financial criteria to identify the preferred alternative. This section includes:

- A discussion of all alternatives considered and the results of a preliminary screening leading to the identification of three technically viable alternatives
- An evaluation of the three technically viable alternatives using the following criteria:
  - Capital cost estimates including the use of a preliminary Monte Carlo analysis
  - Non-financial considerations
  - Net Present Value and ratepayer impact
- An evaluation summary and conclusion

This evaluation demonstrated that the best solution for customers is to replace the existing crossing with approximately 800 m of new NPS 6 transmission pressure pipe beneath the Kootenay River installed using the HDD construction method. This alternative was superior in terms of being the lowest cost alternative and also in relation to non-cost factors.

4.1 Alternatives Considered

TGI identified several alternatives. In the initial phase of the evaluation, TGI considered the ability of each alternative to address both the slope instability and the deteriorating condition of the crossing. This analysis is described below.

4.1.1 REFURBISHMENT AND SLOPE STABILIZATION OF EXISTING CROSSING

One alternative that TGI considered to address the instability of the eastern terminus of the aerial crossing and address the end of life issue was to refurbish the crossing structure and stabilize the east terminus slope. However, as noted in Section 3.3, increasing the stability of this slope would require decreasing the slope angle or constructing a toe buttress. Decreasing the slope would require extensive earthworks and is not feasible while the aerial crossing is in place. A toe buttress would be very difficult to construct as the slope extends into the Kootenay River and in-stream work would be required. Also, this option would have a significant environmental impact on the Kootenay River. TGI has made a preliminary evaluation of the permit process that would be required for this option and is of the opinion that this process would take in excess of one year to complete. Given the availability of a technically viable alternative (described later in this section), there would be a low likelihood that the necessary permits would be granted. Based on these technical obstacles, TGI rejected a refurbishment of the existing aerial crossing and any alternative using the same alignment.

4.1.2 NEW AERIAL CROSSING

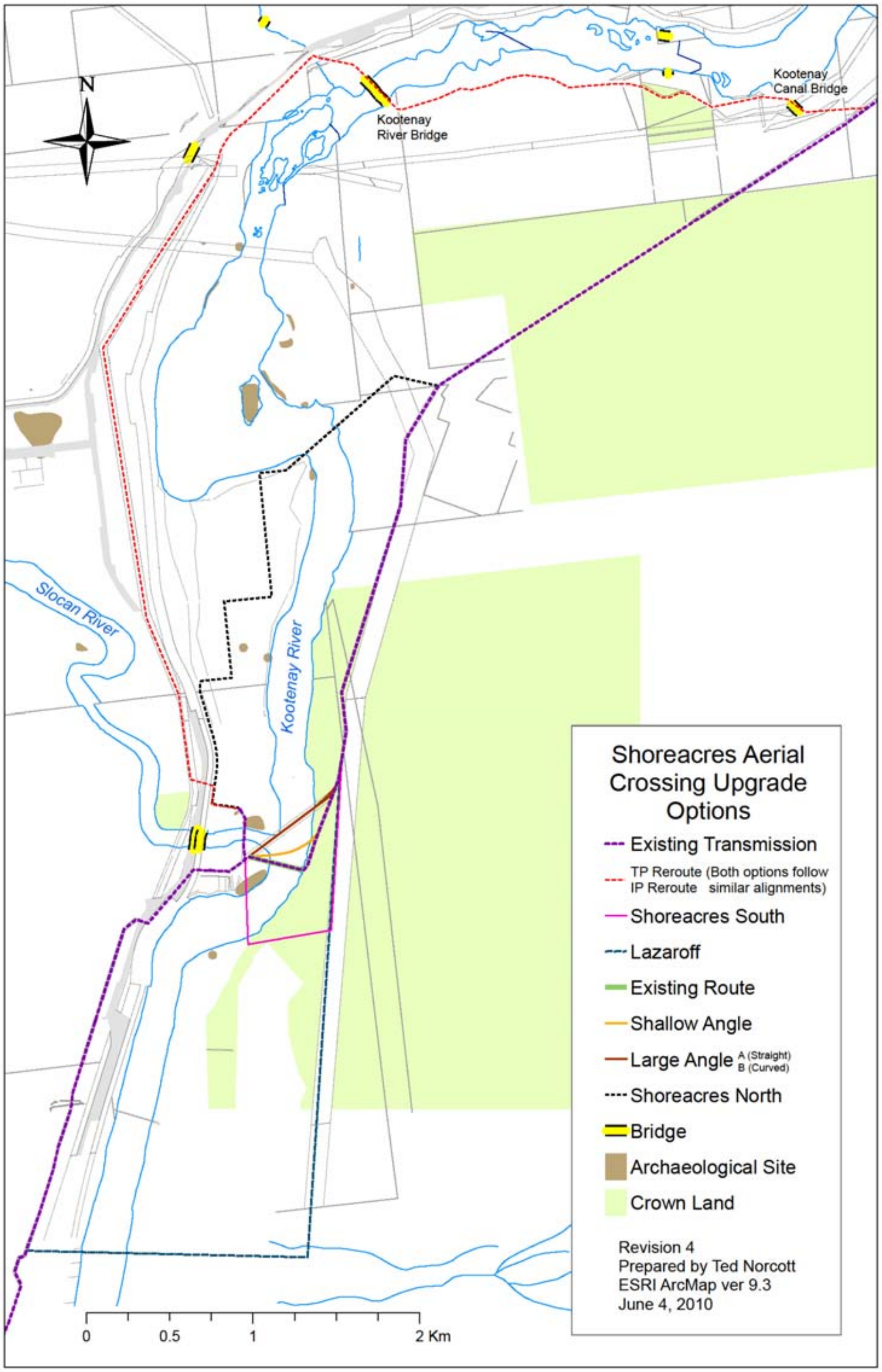
TGI considered a new aerial crossing in a different location; however, TGI concluded that this was not a viable alternative on the basis of cost and local visual and land impacts. A new crossing starting in the vicinity of the west end of the existing crossing would have to be oriented to the north-east in order to avoid the unstable area on the east side of the existing crossing, resulting in a very long and costly structure with a large visual impact. A location to the north of the existing crossing would require new transmission pressure Right of Way (“ROW”) through a built up area and would have a significant visual impact. A location to the south of the existing crossing would require considerable new ROW and avoiding the area of slope instability at the east end of the existing crossing would add to the Project complexity and cost. Moreover, aerial crossings have high capital and maintenance costs and are becoming much less common in situations where HDD provides a viable alternative. For these reasons, a new aerial crossing was concluded not to be a viable alternative.

4.1.3 ALTERNATIVES USING A NEW ALIGNMENT

TGI considered replacing the crossing with a new alignment that avoided the unstable slope area. Within this alternative, seven different alignments were considered including five different HDD alignments, and Transmission Pressure (“TP”) and Intermediate Pressure (“IP”) re-routes utilizing new ROW and two highway bridge crossings. Three of these options were identified as technically viable alternatives that would address the slope instability and structure and piping deterioration concerns and merited further analysis.

Figure 4-1 is a site plan showing the location of the various alternatives. (The TP and IP options follow essentially the same route and they are shown as a single line in this figure.)

Figure 4-1: Site Plan Showing Alternatives Considered



4.1.3.1 HDD Alternatives

TGI retained Complete Crossings Inc ("CCI")[3] to assist in identifying a range of HDD alignments and to evaluate the technical viability of these alternatives. In total, five potential HDD alignments were analyzed and the results of this analysis are documented in CCI's report titled Kootenay Shoreacres River Aerial Replacement Project Comparative Assessment which is attached as Appendix D. The alternative alignments were Lazaroff, Shoreacres South, Shallow Angle, Large Angle[4], and Shoreacres North. Only the Large Angle option, described below, was determined to be feasible. The other four options were found to be technically infeasible due to an unacceptably high risk of drilling fluid fracture to the surface with minimal options for mitigation using standard techniques. TGI thus eliminated all but the Large Angle option from further consideration at the initial screening stage. The four options eliminated from consideration were not economically evaluated.

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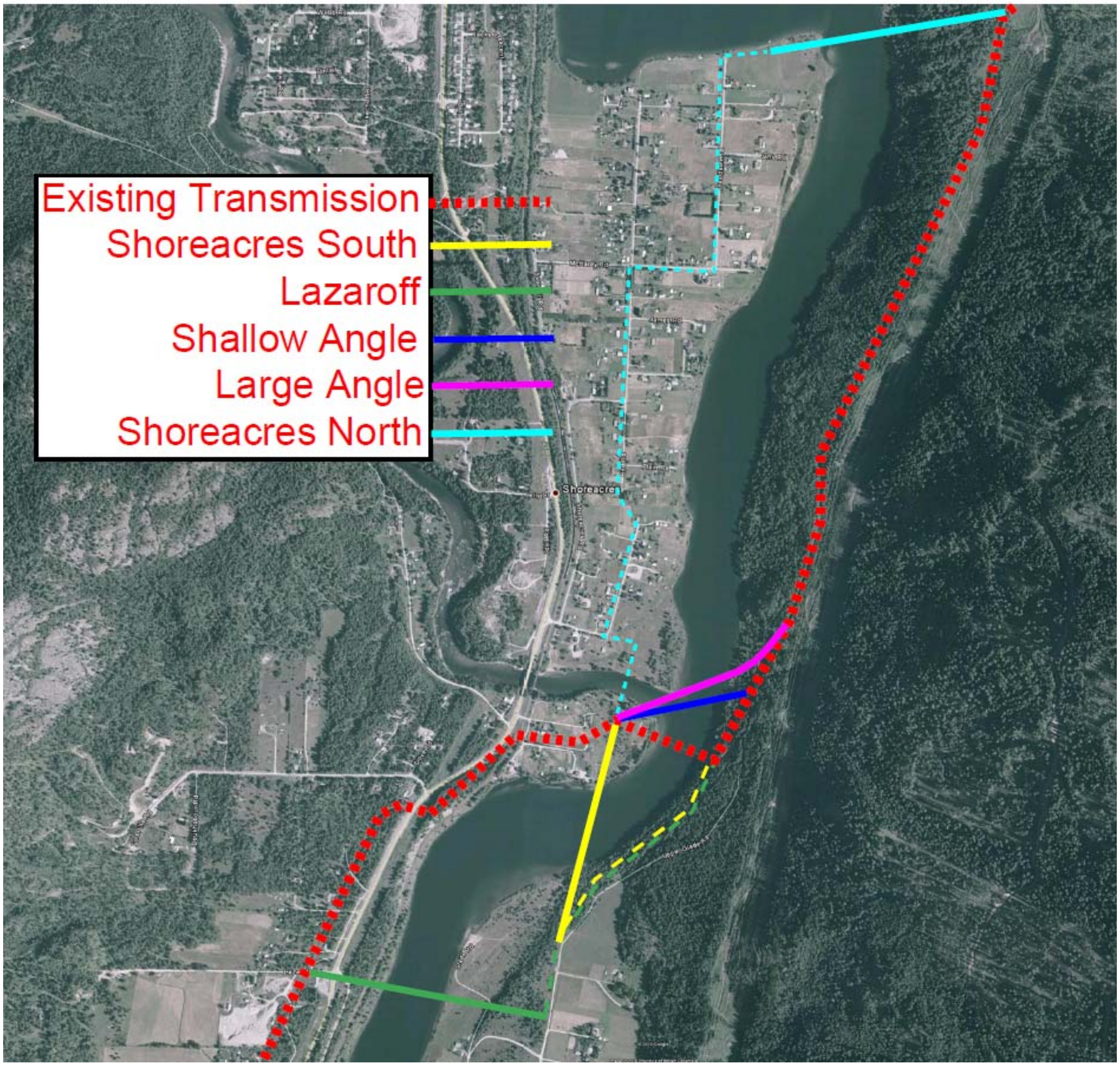
[3] Complete Crossings Inc. – an engineering consulting company specializing in the feasibility assessment, design, and construction supervision of Horizontal Directional Drills.

[4] The terms Large Angle and Shallow Angle are used to describe two of the HDD alternatives. The word "angle" refers to the angle between the proposed drill path and the orientation of the existing crossing.

Figure 4-2: Site Plan Showing Approximate Locations of HDD Alternatives Considered



The Large Angle HDD option (the “HDD Option” or the “HDD Alternative”), which emerged as the only viable HDD option, utilizes an HDD entering in the vicinity of the existing western terminus of the Kootenay River aerial crossing and exiting close to or within the existing ROW on the east side of the river approximately 650 m north of the existing eastern terminus of the aerial crossing. The downstream tie-in at the exit point is approximately kmp 18.2. The total bore length is approximately 880 m. The existing pipeline ROW north of the tie-in point would be used for stringing the pipe for the new crossing. A geotechnical investigation by BGC Engineering along the proposed HDD alignment supports the conclusion that the technical feasibility of the route is within acceptable parameters. A copy of BGC's report is attached as Appendix E.

4.1.3.2 Re-Route Alternatives

TP and IP re-routes utilizing existing bridges to cross the Kootenay River and Kootenay Canal were identified as technically viable alternatives. Preliminary routes for these alternatives were determined by TGI using internal engineering resources. A consultant was commissioned to review the feasibility of utilizing the bridges for river crossings. The review determined that these options were technically viable, hence the TP and IP Re-route alternatives were subjected to the second phase of the assessment.

The features of the TP re-route are:

- The TP re-route would require approximately 9 km of NPS 6 pipeline to be installed. The start point would be the end of the Shoreacres Lateral, making use of the existing NPS 4 (114 mm) crossing of the Slocan River. This option envisages utilizing two existing road bridges to cross the Kootenay River and the Kootenay Canal, both of which are shown on Figure 4-1. The downstream tie-in to the existing transmission line would be at approximately kmp 23.7 near the Kootenay Canal Bridge.

- The re-route would potentially utilize an existing utility corridor owned by Teck Cominco with a ROW registered to FortisBC Inc. for high voltage power line transmission. Between the FortisBC owned dam and the downstream tie-in the TP option would parallel Blewett road and utilize the Kootenay River and Kootenay Canal bridges. Blewett Road and both bridges are owned by the City of Nelson.

The suitability of the bridges for carrying natural gas transmission lines is the subject of a CWMM report titled Inspection and Assessment of Kootenay River Bridge and Kootenay Canal Bridge, Near Nelson, BC. The assessment concluded that the bridges were suitable for carrying the pipelines, however, some seismic upgrades to the bridges would be required. A copy of the report is attached as Appendix F.

The IP re-route option is similar to the Transmission Pressure Re-route, but includes a TP / IP station with some or all of the re-route reduced to IP in order to reduce ROW acquisition costs through the use of construction within road allowances. With this option, the operating pressure of the portion of the existing transmission system downstream of the IP Re-route tie-in point would be lowered to intermediate pressure.

4.1.4 PRELIMINARY SCREENING CONCLUSION

At the initial screening stage, refurbishment and all other alternatives utilizing the existing alignment were eliminated from contention due to the inability to effectively mitigate the slope instability concerns on the east terminus of the existing crossing. A number of HDD alternatives were assessed but only one, the Large Angle HDD, was concluded to be technically viable. The viable options (Large Angle HDD, TP and IP Re-Route alternatives) were subjected to a further assessment described in Section 4.2 below.

4.2 Further Evaluation of Technically Viable Alternatives

TGI undertook a second level of assessment in respect of the three viable alternatives that involved comparisons based on financial and non-financial criteria. The HDD emerged as the superior option both in terms of cost and non-financial criteria.

4.2.1 FINANCIAL CRITERIA

The financial evaluation of each option consisted of the following components:

- capital costs, determined based on AACE Class 5 estimates;
- a Monte Carlo analysis used to help assess the cost range of each alternative; and
- Net Present Value, Cash Flow and Rate Payer Impact calculations.

4.2.1.1 Capital Cost Estimates

The capital cost estimates used for evaluating the three technically viable alternatives were completed in accordance with the AACE International Recommended Practice No. 10S-90 Cost Engineering Terminology and the more detailed Recommended Practice No. 17R-97 Cost Estimate Classification System. The estimates were completed with a Class 5 level of project definition, which is the recommended practice suitable for project screening. The AACE Recommended Practices recognizes that estimating is a process whereby successive estimates are prepared to be followed by a 'go/no-go' decision upon continuation into the succeeding phase – in this case continued engineering efforts to support a Class 4 estimate.

The screening analysis was completed in 2009 utilizing Class 5 estimates which did not include escalation or Allowance for Funds Used During Construction ("AFUDC"). Escalation and AFUDC are proportional to the total capital cost and therefore do not impact the alternatives analysis. The capital cost estimates in 2009 dollars for these alternatives are:

HDD	$7.4 million
TP Re-Route	$10.3 million
IP Re-Route	$10.7 million

The CPCN Guidelines specify Class 4 estimates as a default standard for alternatives analysis, but do provide for some judgement to be applied by the Applicant in cases where the Applicant believes that a different class of estimate is more appropriate. TGI made the decision that the 40% gap between the Large Angle HDD and the TP Re-Route options based on the Class 5 estimates, coupled with the results of the non-financial analysis indicating that the best option was the HDD option, was sufficient to eliminate the TP and IP Re-Route options without performing a Class 4 estimate for all three alternatives. The expense of preparing Class 4 estimates for all alternatives was significant (TGI expects it would cost over $100,000 and take 4 months to complete) and added minimal additional value in the circumstances.

4.2.1.2 Preliminary Monte Carlo Analysis

As an additional review of the estimated capital costs, TGI carried out a preliminary Monte Carlo cost analysis on the three technically viable alternatives and the results are shown in Appendix G. This analysis further illustrates that HDD is the most cost effective of the three alternatives.

To assess the sensitivity of the HDD cost estimate, TGI re-ran the analysis for the HDD alternative assuming the scenario that the first drill attempt was unsuccessful whereby additional costs to TGI would be incurred:

- due to encountering unforeseen or changed sub-surface conditions from those disclosed by TGI to form the basis of the contract with the contractor;
- high demand for contractors in the market place; and
- through no fault of the contractor, it could not successfully drill a stable bore hole to allow the start of the pullback of the line pipe and therefore TGI would need to compensate the contractor for its costs on the unsuccessful attempt before considering the likelihood of success by proceeding with the second attempt at TGI's cost.

Based on this low probability of occurrence event, the results of this more conservative model indicate that the cost estimates only overlap if a comparison is made between the P90 (worst case outcome) for the HDD option versus the P10 (best case outcome) for the next lowest non-HDD cost option.

Furthermore, as has been done on previous projects, TGI will re-run the Monte Carlo analysis to verify the trend in project costs once the following updated information is available for the Project:

- Owner supplied material costs after tendering for the key components;
- HDD – pipeline construction costs after tendering for a prime contractor.

4.2.2 NET PRESENT VALUE, CASH FLOW AND RATE PAYER IMPACT

The Company prepared financial analyses based on as-spent costs for each viable alternative. The initial direct capital costs were prepared in 2009 dollars and escalated to as-spent costs when the project capital is spent in 2010 and 2011. Tables 4-1 and 4-2 present the project cost elements in the original 2009 dollars and as-spent dollars for each of the viable alternatives and show that the HDD alternative is significantly lower than either the TP Reroute or the IP Reroute alternatives.

Table 4-1: Capital Cost Comparison Summary for Viable Alternatives $2009

	Class 5 Estimate in $2009	Large Angle HDD ($000's)	TP-ReRoute Alternative ($000's)	IP-ReRoute Alternative ($000's)
1	**Pipe**			
2	Project Management, Engineering, Consultation, Inspection	995	685	761
3	Project Development Costs	571	571	571
4	Pipe & Coating Materials	241	959	1,527
5	River Crossing HDD Installation & Pipeline Construction	3,958	4,165	5,753
6	Permits	109	134	134
7	CPCN Development Costs [1]	200	200	200
8	**Sub-Total - Pipe**	**6,072**	**6,714**	**8,945**
9				
10	**Land/Land Rights**			
11	Land/Land Rights	102	2,293	487
12				
13	**Abandonment & Removal**			
14	Abandonment & Removal Costs	1,250	1,270	1,270
15				
16	**Total Direct Capital Costs** [2]	**7,424**	**10,277**	**10,703**

Notes
1 The CPCN Development Costs (line 7) include Legal, BCUC and Monte Carlo costs.
2 The Total Direct Capital Costs (line 16) include Project Development costs of $571K (line 3) and CPCN Development costs of $200K (line 7).

Table 4-2: Capital Cost Comparison Summary for Viable Alternatives $ As-Spent

	Class 5 Estimate in $ As-Spent	Large Angle HDD ($000's)	TP-ReRoute Alternative ($000's)	IP-ReRoute Alternative ($000's)
1	**Pipe**			
2	Project Management, Engineering, Consultation, Inspection	1,028	711	789
3	Project Development Costs	571	571	571
4	Pipe & Coating Materials	247	985	1,569
5	River Crossing HDD Installation & Pipeline Construction	4,155	4,373	6,041
6	Permits	112	139	139
7	CPCN Development Costs [1]	206	206	206
8	**Sub-Total - Pipe**	**6,319**	**6,985**	**9,314**
9				
10	**Land/Land Rights**			
11	Land/Land Rights	106	2,391	508
12				
13	**Abandonment & Removal**			
14	Abandonment & Removal Costs	1,311	1,332	1,332
15				
16	**Total Direct Capital Costs** [2]	**7,736**	**10,708**	**11,154**
17				
18	**AFUDC**	234	345	354
19				
20	**Total Project Costs**	**7,970**	**11,053**	**11,507**

Notes

1 The CPCN Development Costs (line 7) include Legal, BCUC and Monte Carlo costs.

2 The Total Direct Capital Costs (line 16) include Project Development costs of $571K (line 3) and CPCN Development costs of $206K (line 7).

TGI evaluated the incremental cost of service, cash flow and rate impacts associated with the three technically viable alternatives over 25 and 60 year periods. The 60 year time horizon was chosen to be consistent with the assumed useful life of the assets. The incremental cost of service estimates are based on TGI's currently approved capital structure, cost of capital and tax treatment.

The results of the financial analysis for each of the viable alternatives are summarised in Table 4-3 below and show that the HDD alternative is the lowest cost alternative on all the financial measures listed. The results also show that the TP and IP re-route alternatives result in a higher rate impact than the recommended HDD alternative.

Table 4-3: Incremental Cost of Service and Rate Impact Summary

	HDD	TP Re-route	IP Re-route
Total Direct Capital Costs ($M) - As Spent	7.7	10.7	11.2
AFUDC ($M)	0.3	0.3	0.4
2012 Rate Impact ($/GJ)	0.0093	0.0112	0.0120
Levelized Rate Impact 25 years ($/GJ)	0.0046	0.0062	0.0071
Levelized Rate Impact 60 years ($/GJ)	0.0042	0.0059	0.0066
Levelized Incremental Revenue Requirement ($M)	0.7	0.9	1.1
Incremental Revenue Requirement NPV 25 years ($M)	8.7	11.9	12.5
Incremental Revenue Requirement NPV 60 years ($M)	9.7	13.4	16.2
Net Cash Flow NPV 25 years ($M)	5.9	8.3	8.4
Net Cash Flow NPV 60 years ($M)	5.9	8.2	9.9
2012 Incremental Rate Base ($M)	8.0	11.1	11.6

Complete financial schedules showing the annual incremental revenue requirement, rate base and cash flow for each viable alternative are included in Appendix H.

4.2.3 NON-FINANCIAL CONSIDERATIONS

TGI considered non-financial factors in selecting the preferred option. The non-financial factors also favoured the Large Angle HDD option.

In this section TGI describes

- Additional assessments undertaken to complete the non-financial analysis;
- The qualitative advantages and disadvantages of each option; and
- The weighting methodology employed to assist in the non-financial analysis.

4.2.3.1 Additional Assessments

Environmental and archaeological considerations were important components of the non-financial analysis. TGI retained Westland Resource Group ("Westland")[5] to evaluate the environmental aspects of the HDD and TP and IP Re-route alternatives. The results of this study are summarized in their report Shoreacres Aerial Replacement Project – Route Selection – Environmental Screening Report, a copy of which is attached as Appendix I. This phase of

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[5] Westland Resource Group Inc. – a multidisciplinary consulting company whose services include environmental, land use and social-economic impact assessments.

the work also included a preliminary archaeological assessment conducted by Eagle Vision Geomatics and Archaeology ("Eagle Vision")[6]. A copy of their report is attached as Appendix J.

4.2.3.2 Advantages and Disadvantages

The non-financial advantages and disadvantages of each option are summarized below.

HDD

Advantages

- This option has relatively low environmental impact with no in-stream works required.
- New ROW through Crown land would be required, but as the ROW would be minimally disturbed by construction and operation, the approvals are expected to be relatively straight forward.
- There will be relatively low landowner impact as construction on the west side will be on TGI owned land and construction on the east site is in a remote location.
- This option has very little exposure to natural hazards.
- The option is operationally simple with low operation and maintenance costs.
- This option exceeds the twenty year forecast capacity requirements.

Disadvantages

- The access and workspace for pipe fabrication on the east side of the river will require some road construction and clearing.
- There is a construction risk of failure with any HDD. However, the CCI report concludes that the risk parameters are acceptable when compared with current industry practice, and can be addressed with standard mitigation techniques.

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[6] Eagle Vision Geomatics & Archaeology Ltd. – a company primarily owned and operated by members of the Ktunaxa Nation providing a variety of archaeological and GIS mapping services to clients in the Columbia and Kootenay regions of British Columbia.

TP Re-Route

Advantages

- The proposed route impacts relatively few property owners, most of whom are industrial, resulting in low land use impact. The risk of ROW acquisition difficulties is also low since much of the proposed route is in a utility corridor.
- The pipeline would be installed with standard trench and cover and transportation corridor crossing methods.
- This option exceeds the twenty year forecast capacity requirements.

Disadvantages

- The re-route is relatively long with a considerable expense for land owner consultation and statutory ROW acquisition.
- The option requires a number of highway, road, and railway crossings.
- It may not be possible to acquire statutory ROW for the entire length between the two bridges where there is little or no land available between the road allowance and the Kootenay River on one side and the Kootenay Canal on the other, requiring construction within a road ROW or other non standard route alternatives.
- In order to carry the proposed TP pipeline, the bridges would require seismic retrofits, which must be approved and coordinated by the owner.
- The proposed pipeline corridor must cross or come close to a number of sites that have been identified in the Environmental Screening Report as contaminated.
- Some of the route will require blasting, the extent of which is only estimated at this time.
- Some portion of the route will likely have to be constructed in close proximity to the Kootenay River, thus adding additional permit requirements and involving construction windows.
- The route may have to cross some Crown land which would impact the OGC approval schedule.
- The route is in proximity to a number of domestic water wells which will require monitoring before, during and after the Project.

- The pipeline will have to cross some BC Hydro property and will have to penetrate the concrete liner of the Kootenay Canal.

IP Re-Route

Advantages

- The IP Re-route option requires less statutory ROW acquisition than the TP option. Use of road allowance along Blewett Road is acceptable within TGI standards for IP pipelines.
- This option meets the twenty year forecast capacity requirements, although it would likely require reinforcement shortly after this period.

Disadvantages

The disadvantages for the IP Option are essentially the same as the TP Option with the following additional disadvantages:

- The TP / IP station would very likely be located on fee owned land which would require some property to be purchased.
- The TP / IP station adds complexity to the Project, as well as post-Project operations.
- The IP option requires the use of a larger pipe size to offset the reduced capacity of the lower operating pressure.
- All of the stations and farm taps between Shoreacres and Nelson would have to be upgraded for IP inlet pressures.
- Lowering the system operating pressure to IP would have a significant negative impact on future expansion in the service area.

4.2.3.3 Weighted Scoring

TGI evaluated and compared the non-financial attributes of the three options summarized in the preceding section. All of the criteria were given a weighted score in order to quantify the relative merits of each option. The non-financial criteria used in the evaluation were: natural hazard vulnerability, safety, environmental, land issues, First Nations, operational impacts, system capacity and aesthetics. Definitions for these criteria are attached as Appendix K. The screening analysis demonstrates that the HDD option has the best score for almost all of the screening factors considered.

The results of the screening analysis are summarized in Table 4-4.

Table 4-4: Screening Matrix (Non-Financial Factors)

Criterion	Weight	HDD		TP Re-Route		IP Re-Route	
		Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Natural Hazard Vulnerability	20	5	100	4	80	4	80
Safety	5	5	25	4	20	4	20
Environmental	10	5	50	2	20	2	20
Land issues	10	5	50	3	30	3	30
First Nations	15	4	60	5	75	5	75
Operational Impacts	5	5	25	4	20	3	15
System Capacity	5	5	25	5	25	2	10
Aesthetics	5	5	25	4	20	2	10
TOTALS	100		360		290		260

The rationale for the scores for each of the criteria is also included in Appendix K.

The non-financial screening matrix shows the HDD Alternative as having the highest overall score.

4.3 Conclusion – Preferred Option

TGI believes that it is in the public interest to upgrade the Kootenay River crossing using the HDD method. The HDD option will address both the slope instability and the continuing deterioration condition issues, has the lowest capital cost estimate, has the lowest customer rate impact, and has the best score for non-financial screening criteria. TGI believes that the evidence supporting the selection of the HDD alternative is sufficiently robust, that the AACE Class 5 cost estimates used in the analysis are adequate to support this conclusion and that preparation of Class 4 estimates for the alternatives is not necessary.

5 PROJECT DESCRIPTION

The Project involves replacing the existing NPS 8 aerial crossing of the Kootenay River near the community of Shoreacres with an NPS 6 crossing using the HDD method. The Project is comprised of the following major components:

a) Installation and construction of a new NPS 6 crossing using the HDD construction method.

b) Decommissioning of the existing NPS 8 aerial crossing and removal of the crossing pipe and structure.

c) Abandonment of approximately 650 m of NPS 6 transmission pressure pipe between the east terminus of the existing crossing and the new HDD tie-in point.

Each of these components is discussed below.

5.1 Project Components

5.1.1 INSTALLATION OF HDD CROSSING

The Project will use the HDD construction method to replace the existing Kootenay River aerial crossing.

The Kootenay River directional drill length will be approximately 880 m. The drill will start close to the west tower of the existing crossing structure and will be on property owned by TGI. The crossing will be angled to the north east which will allow the new line to avoid the area of unstable slope on the east bank. The drill path will cross both the Slocan and Kootenay rivers and will exit on a flat plateau on or close to the existing ROW on the east side of the Kootenay River approximately 650 m north of the east terminus of the existing crossing. The pipe will be prefabricated into one string along the existing TGI ROW north of the exit point.

The technical requirements and other design and construction components and requirements of installing a HDD crossing are described in section 5.2.

5.1.2 ABANDONMENT OF TP PIPE

Approximately 650 m of existing NPS 6 pipe between the new exit point tie in and the east terminus of the existing aerial crossing will be abandoned in place. The ROW between the new tie-in point and the small piece of property owned by TGI at the eastern terminus of the crossing will be returned to the Crown.

5.1.3 DECOMMISSIONING

After the new crossing is operational, all of the above ground components of the aerial crossing will be removed. At the east terminus of the existing crossing some site restoration including removal of the fencing and re-vegetation will be completed.

5.2 Design and Construction of the HDD Crossing

This section describes the design and construction of the HDD crossing. An aerial photograph of the proposed crossing site is attached as Appendix L. The photograph shows the existing line and crossing, the proposed HDD path and the temporary work space required at both ends of the drill path. The cross hatched portion of the ROW to the right of the temporary work space on the east side of the river will be used for stringing the pipe for the crossing.

5.2.1 HDD METHOD OF CONSTRUCTION

HDD is a common industry accepted method for replacing river crossings and for installations where other methods would be impossible or disruptive, for example, crossings of existing highways and railroads. TGI has utilized HDD’s on numerous occasions to avoid both technical and environmental concerns associated with other construction methods.

The methodology requires temporary “set-up” areas on both sides of the proposed crossing. On the entry side, a drilling machine is positioned. This machine, using a variety of guidance technologies, first drills a small diameter pilot hole between the entry and exit points. This is followed by a second drilling process which enlarges the pilot hole to a diameter larger than the pipeline to be installed.

On the opposite side of the proposed crossing (the exit point) a pipe “lay-up” area is required. The space requirements on this side are considerably larger since this area is used to weld together the pipe for the actual crossing. The drilling machine is then used to pull the pipe through the previously enlarged hole. There is sufficient lay-up area to let the contractor to fabricate the entire length of pipe reducing complexity and risk during the pull back stage.

The final step involves “tie-ins” to the existing pipeline upstream and downstream of the entry and exit points.

5.2.2 USE OF TGI RIGHT OF WAY

The drill entry point will be located close to the west tower of the existing aerial structure on land owned by TGI.

The exit point will be on or close to the existing ROW on the east side of the Kootenay River. However, temporary working space will be required at certain locations during HDD pipe string pull back and other installation staging. These working spaces will be included while securing ROW from Crown Land.

5.2.3 ACQUISITION OF CROWN LAND

A narrow strip of Crown Land will be needed for ROW for the new HDD alignment. The Project will thus require acquisition of approximately 475 m of new ROW across the river and on the east shore until the drill path rejoins the existing ROW.

During the OGC Pipeline Application for this Project, filing a License of Occupation will be required to secure the approximately 475 m of 18.0 m wide new ROW. After construction is completed a survey of the new alignment will be conducted and the License of Occupation will be converted into a new ROW. However, the pipeline from this location to the tie-in point of the new HDD crossing will be abandoned in place and the ROW for this section of pipeline will be returned to the Crown.

5.2.4 OTHER UTILITIES

There are no electrical, water or other third party utility services that will be impacted by the Project.

5.2.5 ROADS, HIGHWAYS AND RAILWAYS

The Project does not cross any roads or railways.

Consultation with local residents has been started as required to ensure the increased traffic and activity associated with construction at the drill entry site does not adversely impact the residents of Shoreacres. No significant impacts or disruptions to local businesses are expected.

Some road construction will be required to access the east side of the river but the area is relatively remote and this activity is not expected to adversely impact the public.

5.2.6 RESTORATION

The property owned by TGI and used as the drill entry site is visible to the local residents and will be restored. Restoration of the ROW and temporary work space on the east side of the river will meet both Provincial and TGI standards.

The fenced compound on the east side of the river that is currently the terminus of the aerial crossing and the ROW between that compound and the new tie-in point will be restored to remove any disturbance created by construction activities associated with this Project. This will include site cleanup and re-vegetation.

5.2.7 NOISE CONTROL

The drill entry site is located close to residents in the community of Shoreacres. Noise monitoring and control will comply with local guidelines. Noise concerns at the drill exit location are not anticipated as there are no immediate neighbours.

5.2.8 SAFETY AND SECURITY

HDD site safety and security will be maintained during the course of the installation including all working and non-working hours inclusive of weekends. A comprehensive safety plan will be developed by the HDD contractor in compliance with TGI standards, WorkSafeBC regulations, and the requirements of other impacted stakeholders.

5.3 Project Schedule

Detailed engineering and construction will be undertaken starting in 2010 to be completed by the end of 2011 with specific activities and durations as follows:

Table 5-1: Schedule Milestones

Activity	Duration
Concept Development	March – December 2009
OGC Pipeline Application	October 2009 – September 2010
CPCN Preparation	November 2009 – July 2010
CPCN Filing	July 2010
CPCN Review and Approval	July 2010 – November 2010
Detailed Engineering	November 2010 – March 2011
Tendering (Materials)	December 2010 – March 2011
Tendering (HDD)	March 2011– April 2011
Construction	April 2011 – July 2011
In Service	July 2011
Aerial Crossing Removal and Site Clean up	August 2011 – October 2011

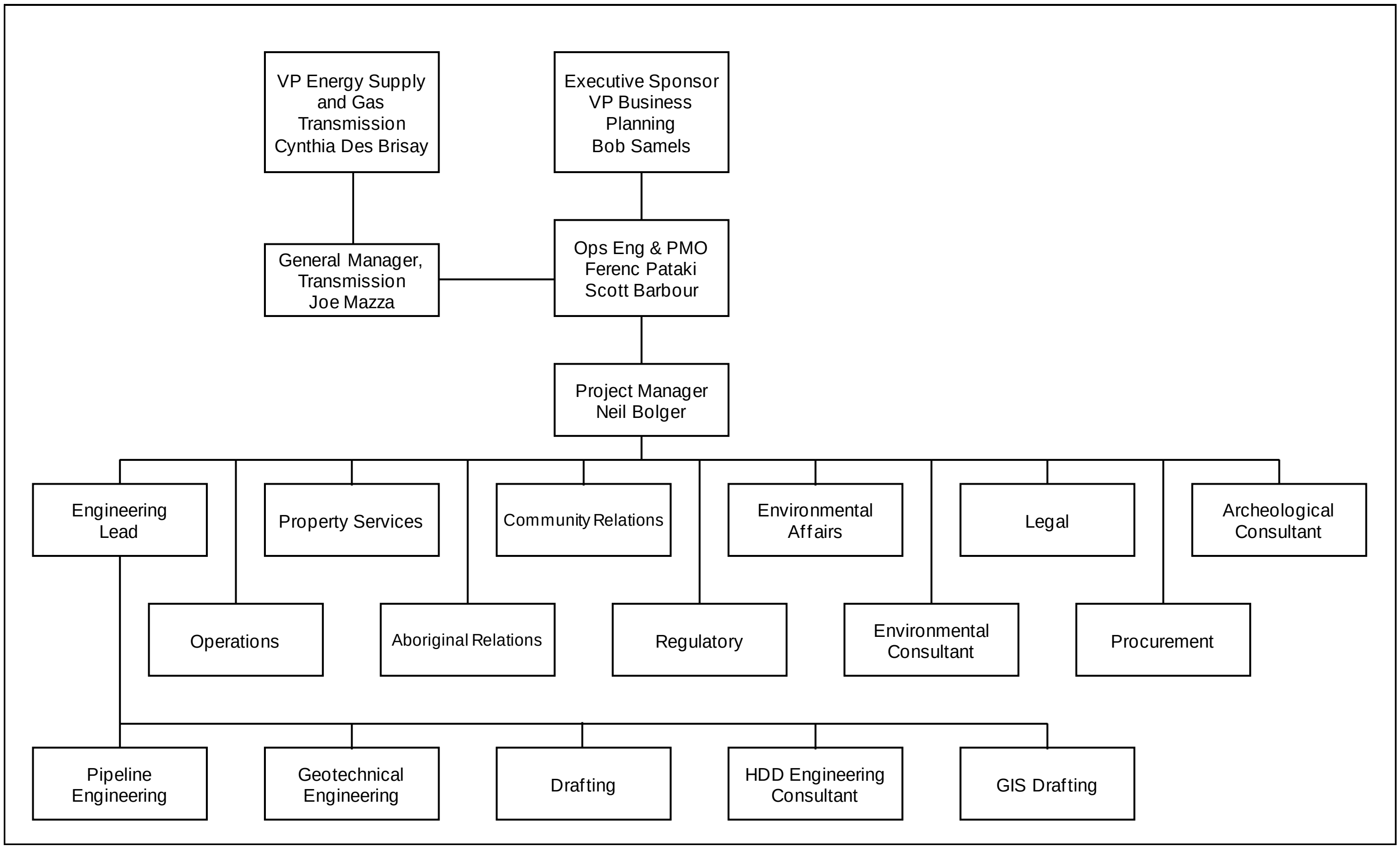
A more detailed schedule is attached as Appendix M. The schedule contemplates construction starting in the Spring when demand for contractors is lower and when site conditions are favorable.

5.4 Resource Requirements

5.4.1 PROJECT MANAGEMENT

A TGI project manager will manage the Project and implement the execution plan for each phase of the Project. Figure 5 -1 outlines the functional organization chart for management of this Project.

Figure 5-1: Project Functional Organization Chart



The Executive Sponsor for the execution of the Project is Bob Samels, Vice-President, Business Planning. The Project Manager is Neil Bolger, P.Eng.

5.4.2 DESIGN AND QUALITY CONTROL

TGI engineering resources will be utilized for the design of the land-based portions of the Project including the tie-ins. However, the specialized services required for environmental management, geotechnical investigation and analysis, HDD pipe and profile design, and construction inspection will be contracted to individuals and companies possessing the demonstrated skills and experience to complete the work. These individuals and companies will be expected to ensure that public and worker safety, quality workmanship and environmental compliance are maintained throughout the Project.

TGI operating personnel will ensure all facilities are efficiently placed into operation upon completion of construction and conform to TGI standards and industry practices.

5.4.3 CONSTRUCTION SERVICES

Potential prime construction contractors will be pre-qualified prior to the release of the tender documents. For the HDD crossing, the prime contractor will be responsible for the drilling and installation of the pipeline across the Kootenay River. The lowest cost qualified contractor will be selected by TGI at the close of the procurement process.

5.4.4 MATERIALS

All owner-supplied materials will be purchased by TGI through the Company's standard procurement process. Owner supplied materials will be purchase from the lowest-cost qualified bidder.

5.5 Other Applications and Approvals

5.5.1 OGC APPLICATION

The design, construction and operation of the Kootenay River Crossing transmission pipeline are subject to the *British Columbia Pipeline Act and Regulations,* which fall under the jurisdiction of the BC Oil and Gas Commission. Applications to the OGC for projects done within an existing ROW normally require a relatively simple "Notice of Intent" process. However, because the Project involves the acquisition of new ROW on Crown Land, a more complex Pipeline Application is required. TGI filed the Pipeline Application on February 19, 2010. A Pipeline Application is a significant process with considerable technical scrutiny on the Project by the Provincial regulator. Public and First Nations Consultation, Right of Way acquisition, archaeological requirements, land status and land use planning, design reviews, timber clearing permits, environmental permits / approvals for work in and around the Kootenay River are all components of the Pipeline Application. Each component must receive OGC approval prior to the start of construction and constitute a significant regulatory process in addition to the CPCN. A Pipeline Application can take up to one year for approval. The current schedule assumes nine months but an extension to twelve months will not affect the in-service date of the Project. TGI will update the Commission when the OGC approves the Pipeline Application.

5.5.2 OTHER PENDING OR ANTICIPATED APPLICATIONS / CONDITIONS

A qualified environmental professional working in conjunction with the TGI Environmental Affairs Department will assist the Project in identifying permits / approvals required and in the development of an Environmental Protection Plan including an Environmental Emergency Preparedness and Response Plan.

The Project is not likely to require an Environmental Assessment Certificate pursuant to the British Columbia Environmental Assessment Act. However, the Project may require a screening under the Canadian Environmental Assessment Act as a result of the Federal notifications/approvals that will be required to comply with provisions of the Fisheries Act and Navigable Waters Protection Act.

Agency notifications, permits and approvals are anticipated under, but not limited to, the Fisheries Act, Species at Risk Act, Navigable Waters Protection Act, Water Act, Forest and Range Practices Act, Heritage Conservation Act and Land Act. The terms and conditions outlined in these permits and approvals are legally binding and will be adhered to during the HDD crossing, aerial crossing removal, and pipeline abandonment portions of the Project.

As indicated above, the Project will involve the acquisition of new ROW but will not require any re-zoning.

The decommissioning and demolition of the existing aerial crossing may trigger regulatory agency interest. The approvals for the decommission plan will be coordinated by the OGC with additional Department of Fisheries and Oceans and Transport Canada notices required.

5.6 Risk Analysis and Management

The primary risks to cost and schedule, and the control / mitigation strategies for this Project are identified in Table 5-2.

Table 5-2: Project Execution - Risk Control Summary

	KEY RISK	**CONTROL / MITIGATION**
1	Project Management	Upon approval of the Project, a Project Execution Plan will be issued to detail risks and mitigation strategies, including a Control Budget based on material and HDD/Pipeline construction tenders.
2	Stakeholder Impacts	Regular collaborative communication with all internal and external stakeholders and First Nations throughout duration of the Project.
3	Construction Schedule	Ensure construction starts in the Spring when demand for contractors is lower and when site conditions are favorable.
4	Engineering / Construction Resources	Use Terasen internal resources combined with consultants who have proven skills, HDD experience and availability.
5	Material Cost / Delivery	Tender to known vendors and award to the lowest qualified bidder.
6	HDD / Pipeline Contract Cost	Optimize Total Contract Price via: 1) Lump Sum cost components for surface activities that can be best managed by the contractor; and 2) Unit Rates for unforeseen or variable subsurface risks to be shared between the contractor and TGI (e.g. mud fractures or extreme weather).
7	HDD / Pipeline Contractor Capability	Tender to known contractors with proven experience; award to the lowest qualified bidder.
8	Geotechnical Conditions	Complete geotechnical and geophysical studies for internal feasibility analysis and for bidders information to reduce risk premiums in HDD contract.

For an HDD contract, there will always remain some uncertainty with respect to subsurface conditions. TGI has conducted detailed geotechnical investigations along the drill path and it is expected that the geotechnical baseline report produced for the HDD contractors will reduce the uncertainty regarding subsurface conditions to an acceptable level. In designing procurement documents, it is possible to trade off risk for cost. While certainty is desirable, bidders can be expected to charge a significant risk premium to assume all risks that can have a material effect on the project cost. TGI will seek to structure the tender documents for the HDD contract in such a way as to arrive at an appropriate balance between price and risk. TGI expects that the additional geotechnical work will reduce, but not eliminate, the risk premium charged by bidders for assuming some geotechnical risk.

The project cost estimate outlined in section 6 already accounts for a risk premium charged by the HDD contractor commensurate with risk being shared efficiently between TGI and the HDD contractor. The preliminary Monte Carlo analysis described in section 4 suggests that the HDD option remains the most cost effective of the three viable alternatives even based on an adverse scenario where the first drill attempt is unsuccessful and TGI must bear part of the additional costs.

The risks listed in Table 5-2: Project Execution - Risk Control Summary are ranked in Table 5-3 below using a 5x5 risk matrix of likelihood and cost impact. TGI will continue to focus engineering and management resources on the issues that rank higher on the likelihood and cost impact scales in order to ensure that mitigation efforts continue to provide a reasonable balance between cost and risk. TGI proposes to complete a Monte Carlo analysis (see section 6) for the Project after the bids are received for the HDD contract. This will further refine the risk rankings and provide recommendations for any additional mitigation efforts.

The numbers in Table 5-3 below correspond to the key risks described in Table 5-1.

Table 5-3: Risk Ranking of Key Risks

Likelihood	High					
			3			
	Moderate		5	6	7, 8	
				4		
	Low			1, 2		
		Low		Moderate Cost Impact		High

6 PROJECT COST ESTIMATE

The Company prepared the Project cost estimate based on AACE Class 3 specifications, in accordance with the new CPCN Guidelines.

This section discusses:

- the Project cost estimate;
- the financial impacts; and
- the deferral account treatment of the costs prior to entering rates in 2012.

6.1 Cost Estimate Details

The total capital cost of the Project presented in Table 6-1 below is estimated to be approximately $8.3 million in as spent dollars. This cost estimate is based on preliminary Project definition and design and the individual cost elements consist of historical costs, non-binding quotations and projections. The expected accuracy of the cost estimate is +20 to -15%.

Table 6-1: Capital Cost

	Large Angle HDD Option	Estimate in $2009 ($000's)	Estimate in $As-Spent ($000's)
1	**Pipe**		
2	Project Management, Engineering, Consultation, Inspection [2]	1,697	1,745
3	Temporary Workspace	463	483
4	Pipe & Coating Materials	266	276
5	River Crossing HDD Installation & Pipeline Construction	3,345	3,512
6	Tie in Construction	220	231
7	Permits [2]	169	173
8	CPCN Development Costs [1]	200	206
9	**Sub-Total - Pipe**	**6,361**	**6,627**
10			
11	**Land/Land Rights**		
12	Land/Land Rights	190	200
13			
14	**Abandonment & Removal**		
15	Aerial Crossing Removals	1,000	1,050
16	Retirement Costs	165	173
17	**Sub-Total - Abandonment & Removal**	**1,165**	**1,223**
18			
19	**Total Direct Capital Costs**	**7,717**	**8,049**
20			
21	**AFUDC**		254
22			
23	**Total Project Costs**	**7,717**	**8,304**

Notes

1 The CPCN Development Costs (line 8) include Legal, BCUC and Monte Carlo costs.

2 Line 2 (Project Management, Engineering, Consultation, Inspection) and Line 7 (Permits) of the table include the Project Development costs of $528K and $43K respectively. This amounts to a total of $571K of the Project Development Costs.

- All capital cost estimates are based on an in-service date of July 2011 and aerial crossing removal completed by October 2011.
- Cost estimates include all engineering, procurement and construction costs, regulatory and environmental costs, and workspace acquisition costs.
- Steel pipe costs based on March 2008 vendor pricing and subject to market variation.
- Includes First Nations OGC Pipeline Application review funding and archaeological monitoring and review. Does not include accommodations.
- Escalation rates are based on forecasted general construction price index. Excludes significant changes to rates for market conditions for specialist HDD contractors.
- Meets AACE Class 3 level.

Cost estimates are based on the most recent studies and information currently available to TGI and an in-service date of July 2011. The estimate excludes GST and HST. Current market prices have been used for the expected contracted construction. In particular, the HDD contract estimate, which is part of the river crossing HDD installation and pipeline construction, is based on construction during the spring, summer or fall seasons. Construction during the winter is typically 5 to 15% more costly. Allowances have also been included for temporary workspace and procedures to minimize impacts to local residents.

The cost estimate for the Project has risen from $8.0 million at the Class 5 screening stage to $8.3 million at the Class 3 stage (in as-spent dollars). This is due mainly to an increase in the estimated cost to obtain a guaranteed completion contract for the HDD.

In order to provide more certainty regarding the cost of the Project, the Company, in light of the direction issued in Commission Order C-2-09[7], proposes to file with the Commission a compliance report (the “Report”) at the time of award providing a description of the HDD contract; identification of the components of the Project where cost risk is with the utility and its ratepayers; a description and analysis of risk allocation; a detailed control budget for the Project; an updated Project schedule; and cost estimates that have a 50 percent probability (“P50”) and a 90 percent probability (“P90”) that the actual cost of the Project will not exceed the cost estimates. The control budget will be consistent with the P50 cost estimate and will conform at a minimum to the level of detail as set out in Table 6-1.

6.2 Financial Analysis

The Company also prepared the financial analysis for the final project cost estimate which includes the incremental cost of service, cash flow and rate impacts over 25 and 60 year periods. Table 6-2 presents a summary of the financial schedules included in Appendix H. The results show that for the HDD alternative, the impact to customer rates in 2012 is approximately $0.009 per GJ and levelized over the analysis period is approximately $0.004 per GJ before taking into account the benefits of avoided costs associated with future upgrades. For a typical TGI Interior residential customer consuming an average 80 GJ per year in 2012 this would equate to approximately 75 cents per annum.

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[7] Commission Order No. C-2-09 granted TGI’s Application for a Certificate of Public Convenience ad Necessity to construct and operate the Fraser River Crossing Upgrade Project.

Table 6-2: Financial Analysis of HDD Final Project Cost

	HDD Class 3
Total Direct Capital Costs ($M) - As Spent	8.0
AFUDC ($M)	0.3
2012 Rate Impact ($/GJ)	0.0093
Levelized Rate Impact 25 years ($/GJ)	0.0048
Levelized Rate Impact 60 years ($/GJ)	0.0044
Levelized Incremental Revenue Requirement ($M)	0.7
Incremental Revenue Requirement NPV 25 years ($M)	9.0
Incremental Revenue Requirement NPV 60 years ($M)	10.0
Net Cash Flow NPV 25 years ($M)	6.2
Net Cash Flow NPV 60 years ($M)	6.1
2012 Incremental Rate Base ($M)	8.3

6.3 Deferral Account Treatment

The pipe and land capital costs of $6.8 million, as set out in lines 9 and 11 of Table 6-1 of this Application, will be held in work-in-progress until the asset is available for use, estimated at July 1, 2011, at which time depreciation will commence and the assets will be included in plant in service as transmission mains and land rights.

As agreed to in TGI's 2010 to 2011 Revenue Requirements Application Negotiated Settlement Agreement (the "NSA") the Company seeks deferral treatment for 2011 of the 2011 cost of service associated with this Project.[8] Since customer rates have been set for 2011 through the NSA, TGI proposes to capture the cost of service related to the Project that will be incurred prior to January 1, 2012 in three non-rate base deferral accounts and to enter these costs into rate base on January 1, 2012. The costs consist of the following:

- Retirement costs of $1.223 million plus AFUDC, consisting of the costs of abandoning or removing the existing plant (the aerial crossing and 650 meters of NPS 6 TP pipe) as set out in Table 6.1 of this Application, Line 16;
- The loss on removal of the remaining net book value of that plant, estimated at $0.166 million at July 2011; and

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[8] NSA Appendix A to Commission Order G-141-09, page 11 of 110, clause 18

- The 2011 cost of service related to the plant in service, consisting of depreciation expense, income taxes and earned return, estimated at $0.284 million.

At January 1, 2012, TGI proposes that the retirement costs and loss on disposal be transferred to the existing Removal Cost Deferral Account and Gains and Losses on Asset Disposition deferral account. Since neither of these two accounts currently has an approved recovery period, for purposes of determining the cost of service and cash flow impacts in this CPCN Application TGI has assumed a three year amortization period, although the actual amortization period will be determined as part of the Company's next Revenue Requirements application. The 2011 cost of service will be transferred to a rate base deferral account at the same time, also with a three year amortization period.

7 OVERVIEW OF ENVIRONMENTAL AND SOCIO-ECONOMIC ASSESSMENTS

The Company considered environmental and socio economic factors as non-financial factors in its assessment, and further detail is provided in this section.

7.1 Environmental Assessment

The HDD alignment runs beneath the Kootenay River and its riparian margins that are considered to be an extremely environmentally sensitive site with significant fisheries values and species at risk present. A preliminary environmental screening for the Project was undertaken by Westland Resource Group. Based on the preliminary environmental assessment work completed by Westland, the Project is the preferred option among three feasible Kootenay River crossing alternatives from an environmental and land use perspective because anticipated environmental risk is relatively low.

7.1.1 ENVIRONMENTAL SCREENING REPORT

The results of the work undertaken by Westland are outlined the Shoreacres Aerial Replacement Project Route Selection Environmental Screening Report, a copy of which is attached as Appendix I. The report summarizes that:

- land disturbances will be minimal;
- there are fewer potential environmental risks such as contaminated sites and domestic water resources;
- minimal new ROW will be required; and
- the proposed HDD crossing will not impact the fish or fish habitat resources of the Kootenay and Slocan Rivers.

Based on preliminary environmental assessment work completed by Westland, the Project will not require an Environmental Assessment Certificate pursuant to the British Columbia Environmental Assessment Act. However, the Project may require a screening under the Canadian Environmental Assessment Act as a result of the Federal notifications/approvals that will be required to comply with provisions of the Fisheries Act and Navigable Waters Protection Act.

7.1.2 FURTHER PLANS

Environmental sensitivities and proposed Project impacts will be documented during a baseline environmental site condition assessment which will include forestry/vegetation, species at risk, fish and wildlife and their habitat, surface water/ground water resources, soils and archaeology. Limited soil sampling will be undertaken to determine the potential for contamination.

Appropriate mitigation strategies will be developed to offset any potential negative environmental impacts associated with the proposed HDD, aerial crossing removal and pipeline abandonment portions of the Project. All required environmental permits and approvals for the Project will be identified and applied for during the detailed engineering phase of the Project.

Detailed environmental specifications will be prepared as part of the Project tendering process to ensure the contractor(s) are aware of the Project's environmental requirements in addition to TGI's internal environmental standards. A Project specific Environmental Management Plan will be developed by the successful contractor(s) prior to Project commencement. Environmental monitoring will be undertaken during all sensitive aspects of the work program that have the potential to impact on the Kootenay River and its riparian margins. An environmental monitor will be assigned to the project and will have "stop work authority" in the event that works underway have the potential to impact the natural environment.

7.2 Contaminated Soils

The potential for soil contamination exists within the Project area. As such, a soils management plan for contaminated soils will be required as part of the Project.

Before site disturbance associated with the HDD and removal of the aerial crossing and abandoning the section of pipe on the east side of the crossing, limited soil sampling will be completed to identify any potential areas of contamination within the Project area. Dependent on the results of the environmental site assessment, some baseline soil sampling may be required to identify areas of contamination before the HDD and removal of the aerial crossing. Any contaminated soil that is disturbed during the course of the HDD, removal of the aerial crossing, and abandonment of the pipeline will be disposed of in accordance with applicable environmental regulations.

7.3 Archaeology

A preliminary archaeological field reconnaissance was undertaken by Eagle Vision Geomatics & Archaeology Ltd. and is documented in their Preliminary Field Reconnaissance & Final Report, a copy of which is attached as Appendix J. No significant archaeological issues were identified.

The field work completed to date is a screening level report for purposes of evaluating the three technically viable alternatives. A final field reconnaissance will be required for the HDD alternative.

7.4 Socio-Economic Assessment

The economic impact of the Project to the regional area is expected to be limited. The HDD contract and the major materials will likely be procured from out-of-province sources since these resources are not readily available in B.C. Most of the professional services, such as geotechnical engineering and environmental assessments have been or will be provided by personnel based in B.C., with some provided by personnel in the local area. Expenditures by the small work force will be of some benefit to local businesses.

A positive impact for the Project will be the decreased visual impact of the crossing when the aerial structure is removed. This will be a benefit to both the nearby residents and the Ward's Ferry Trail.

As discussed in section 3.5, the Project's greatest impact, however, is the prevention of major social and economic consequences to the region that could result from a failure of the crossing.

The local Regional District and the City of Nelson have been informed of the Project and will be consulted on issues of concern including traffic patterns, removal and replacement of vegetation, and the supply and disposal of water for drilling and testing purposes.

8 PUBLIC CONSULTATION

Public consultation and communication are key elements of the TGI project development program. TGI identifies key community stakeholders in order to communicate project intent, respond to public interest and potential issues, and gather information that will assist in developing plans to construct, schedule and operate new facilities.

In this section, TGI provides:

- An overview of TGI's consultation plan;
- A list of Project stakeholders;
- A summary of consultation activities and input received; and
- Future consultation plans.

TGI has also engaged First Nations in the area, which is discussed in Section 9.

8.1 Overview of Consultation Plan

The Project Communication Plan is included in Appendix N. The plans, responsibilities and coordination are shared between TGI's Community Relations and Property Services team members.

The focus of the plan is to ensure that area residents and stakeholders are informed about the Project and have access to information in a timely and efficient manner. The plan identifies all of the stakeholders in the area, including residents, businesses, industry and municipal, regional, provincial and federal authorities.

Contact has been made with all stakeholders and will continue on an on-going basis, to maintain dialogue as required. The plan assists in identifying concerns and possible disputes. If there are concerns or issues raised, TGI will actively work with the affected stakeholder to clarify and resolve the issues.

As an example, one of the residents contacted through this process has expressed concern about TGI using their land to access the work site. TGI has obtained an entrance agreement with another land owner adjacent to the property, so access through the first landowner's property will not be required.

Other potential issues that could arise include traffic in the area and construction noise. TGI will maintain contact with landowners throughout the construction process and work to mitigate these and any other issues that may arise.

8.2 Project Stakeholders Other than First Nations

TGI has identified the following stakeholders, in addition to the First Nations identified in Chapter 9.

- Residents within one kilometre of the drill entry site
- Resident whose driveway is being used for site access
- Teck Cominco
- BC Hydro
- Recreational users of the Ward's Ferry Trail
- Central Kootenay Regional District
- City of Castlegar
- City of Nelson
- Agricultural Land Reserve and Ministry of Environment
- Oil and Gas Commission
- Department of Fisheries and Oceans and Transport Canada

8.3 Summary of Consultative Activities Occurred and Input Received

Appendix O includes a summary of stakeholder contacts made prior to CPCN filing.

TGI believes the public consultation and communication to the time of filing has been appropriate and has satisfied the expectations of landowners and other stakeholders. In particular, phone conversations with landowners have been both useful and instructive.

8.4 Future Consultation / Communication Plan

To date, TGI has provided information to the stakeholders of the Project and has responded to issues through different means, including letters, telephone calls, emails, and a newspaper advertisement. If the Project is approved, TGI will continue its communication and consultation program until the Project is completed. TGI's approach with stakeholders will remain inclusive and proactive.

A summary of TGI's communication plan is presented in Table 8-1 below.

Table 8-1: Project Communication Plan Summary

Phase	Activity	Completed By
1	Initial pre-construction communication with stakeholders	January 2010
2	Advertisement in local newspaper	February 2010
3	Continued stakeholder communication to provide Project updates and confirm awareness of details such as potential traffic and noise disruptions.	One month prior to Project start date
4	Advertisement in local newspaper. Project updates on TGI website.	Two weeks prior to Project start date
5	Project completion and thank you newspaper advertisement and communication.	Following completion of the Project.

Additional detail can be found in the Project Communication Plan in Appendix N. It is TGI's intent that good relationships with property owners and other stakeholders will be maintained through all phases of the project. TGI has every expectation that the public consultation and communication process will help mitigate potential impacts, ensure the Project remains on schedule, and eliminate increased and unexpected project costs.

8.5 Conclusion – Sufficiency of the Consultation Process

Given the relatively small size of the Project and the fact that the impacts will be very localized, TGI believes the consultation activities already carried out and the process as outlined in this Application is sufficient to meet the needs of all stakeholders.

9 FIRST NATIONS CONSULTATION

TGI, as the project proponent, has engaged potentially affected First Nations in respect of this Project from an early stage in the Project development process. The process before the Oil and Gas Commission that is occurring contemporaneously with this process ensures that the Crown is engaged in consultation, and if necessary accommodation, of First Nations. The Project "footprint" is limited, and does not affect the Kootenay and Slocan Rivers. TGI believes that the level of consultation that has occurred is appropriate in light of the modest potential of the Project to impact any asserted rights and title. Consultation will be ongoing as part of the OGC process, and TGI will remain engaged with identified First Nations.

This section describes:

- The First Nations with asserted claims in the area of the Project;
- OGC Process; and
- Engagement with each of the First Nations with asserted claims in the area of the Project.

9.1 Identification of First Nations with Asserted Claims in Area

TGI has identified three First Nations with asserted claims in the area of the Project:

a) Ktunaxa Nation Council ("KNC"),

b) Okanagan Nation Alliance ("ONA"), and

c) Sinixt Nation Society ("Sinixt Nation").

To identify the First Nations that may be potentially affected by the proposed HDD crossing, TGI has researched the BC Treaty Commission's Web site for Statement of Intent Maps and the maps of asserted traditional territory published by the KNC, the ONA, and the Sinixt Nations on their respective websites.

Background information for these three groups is included in Appendix P.

9.2 OGC Process and Consultation with, and if Necessary Accommodation of, First Nations

The OGC is a Crown agent. First Nations consultation is required as part of the OGC's Pipeline Application process. The OGC is responsible for conducting consultation with First Nations.

The OGC follows a prescribed process that includes identification of the affected groups, providing Project documentation, and allowing for a period of response. Any issues or concerns raised by First Nations during that consultation process are dealt with following the OGC's public engagement guidelines. The OGC makes a determination as to when the consultation is complete. A copy of the OGC's First Nations Consultation process as documented in their Pipelines and Facilities Manual is attached as Appendix Q.

Under the OGC process, TGI is responsible for conducting preliminary discussions with the identified First Nations groups, and for providing documentation, such as Project descriptions, maps and drawings, to facilitate the OGC process. TGI's consultation activities described below and in Appendix P will be provided to the OGC for its consideration. TGI also plans to meet with the OGC to ensure an effective continuation of consultation activities as they transition from TGI to the OGC.

9.3 TGI's Interaction with First Nations

TGI has engaged the three First Nations with asserted rights in the area of the Project to explain the Project and to identify the nature of their interests, and to address strategies for the involvement of First Nations in the Project.

The interaction with each of the ONA, KNC and Sinixt Nation is described below. A summary of TGI's communications is included in Appendix P.

9.3.1 KTUNAXA NATION COUNCIL

In connection with another HDD project to replace an aerial crossing of the Columbia River near Castlegar (the "Brilliant Project"), TGI has been working with the Ktunaxa Nation Council since early 2008. On March 17, 2008, by a telephone call and also an email message, TGI requested a meeting with the Ktunaxa Nation Council to review protocols regarding TGI's planned projects in their territory, including the proposed HDD crossing of the Kootenay River.

The Nupqu Development Corporation, previously operated as the Ktunaxa Kinbasket Development Corporation for 12 years, is a natural resource management consulting and contracting company owned by the communities of the Ktunaxa Nation Council. It was formed as a business arm of the Ktunaxa Nation Council to capture wealth, economic, employment, career development and other benefits from natural resource industrial activity within the Ktunaxa Traditional Territory. TGI has worked with the Nupqu Development Corporation previously on the Brilliant project and intends to continue the relationship.

From August 2009 to November 2009, TGI had both face-to-face meetings and email communications with the business manager of Nupqu Development Corporation about potential business opportunities relating to the projects and about the Nupqu Development Corporation's interest in contracting for the Brilliant project and this Project.

In January 2010, the KNC was advised, via an email, of an application for the Project that would be filed with the Commission, and of the expected construction commencement date. The email also reported that Nupqu Development Corporation was registered in the Company's procurement process.

On January 25, 2010, at the Ktunaxa Nation Council's request, a preliminary environmental screening report was provided to the KNC. On February 10, 2010, the KNC was advised that a more detailed field reconnaissance on the Project was being conducted. A report would be available later.

TGI sent a more detailed letter via registered mail to the Ktunaxa Nation Council regarding the Project on February 19, 2010. The letter describes the nature of the Project, the need for the Project, the proposed alignment, and additional land potentially needed. The letter also provides information on the permit process and anticipated construction starting date. TGI expressed its interest to continue relationships that have developed with the Ktunaxa Nation Council during the Brilliant project.

The Ktunaxa Nation Council has expressed an interest in business and contracting opportunities arising from the Project. Ktunaxa Nation's Nupqu Development Corporation ("Nupqu") is already registered in the TGI procurement process. The Company intends to continue the relationship it developed with Nupqu in the Brilliant project and intends to engage Nupqu where possible in this Project.

The KNC has requested a copy of the Project's field reconnaissance report. TGI will provide the KNC with a copy once the report is available.

9.3.2 OKANAGAN NATION ALLIANCE

TGI informed the Okanagan Nation Alliance of the Project first through a phone call and email message and then by a formal introductory letter via registered mail on February 19, 2010. The letter describes the nature of the Project, the need for the Project, the proposed alignment, and the additional land potentially required. The letter also provides information on the permit process and anticipated construction starting date.

In March and April of 2010, TGI had both telephone discussions and face-to-face meetings with the representative of the Okanagan Nation Alliance regarding the Project. For example, on April 12, 2010, the Aboriginal Relations Manager of TGI met with Mr. Jay Johnson, who was the Senior Technical Advisor of the ONA. At the meeting, TGI committed to re-sending information that was provided on February 19, 2010, and to providing a status report on studies to be done.

Mr. Johnson informed that the ONA has developed a new decision making process, and would not recognize external archaeological studies in its territory unless the ONA is involved in the field work. The ONA has advised that it had shared archaeologists in the past with the Ktunaxa Nation. The ONA would provide an initial funding proposal in order to proceed with consultation.

On April 19, 2010, TGI telephoned and emailed Mr. Johnson of the ONA, informing him about the upcoming project meeting and following up on the proposed initial funding agreement. On the same day, TGI provided the ONA via email a copy of the February 19, 2010 letter (Okanagan Nation Alliance letter 2010-02-19) and a preliminary archaeological field assessment (Shoreacres Archaeological Report July 2009).

On May 12, 2010, TGI and Mr. Johnson of the Okanagan Nation Alliance had a telephone conversation about the ONA's proposed budget for engagement on the Project. Mr. Johnson also stated that the proposed Project was not close to any ONA members' reserve. Following the telephone conversation, the ONA provided, via an email, a document outlining its position with regard to the archaeological work conducted within the Okanagan Nation Territory. The document states that the ONA would not recognize archaeological work conducted within its territory without the participation of the Okanagan Nation and may need to conduct its own preliminary field reconnaissance. The Okanagan Nation Alliance has a policy of not recognizing archaeological work within its territory absent the Okanagan Nation's participation in the work.

When the archaeological fieldwork is in progress within the Okanagan Nation territory, TGI will ensure that the personnel from the Okanagan Nation Alliance are involved. In addition, TGI has used an archaeological firm owned by Ktunaxa individuals and approved by the Ktunaxa Nation Council for both the Brilliant project and this Project. The Okanagan Nation Alliance is familiar with this archaeological firm, and has shared archaeologist in the past with the Ktunaxa Nation.

9.3.3 SINIXT NATION SOCIETY

Following a telephone conversion, TGI sent a formal introductory letter via registered mail to the Sinixt Nation Society on April 26, 2010, providing information about the proposed Kootenay River Crossing Upgrade Project. The letter describes the nature of the Project, the rationale for the Project, the proposed alignment, additional land potentially required, and other permits and approvals required. The letter also provides TGI's contact information during the planning and permitting stages of the Project. Subsequently, TGI followed up on the April 26, 2010 letter with another telephone call, confirming contact information.

On June 1, 2010, the Sinixt Nation, through an email, asked several questions about the Project. In particular, the Sinixt Nation asked about the proposed pipeline alignment, the temporary work sites, and opportunities for workers from the Sinixt Nation to participate in the construction of the pipeline. The Sinixt Nation also asked about TGI's plans for an archaeological overview assessment and expressed an interest to include its personnel in the assessment.

On June 8, 2010, through an email, TGI responded to the Sinixt Nation's inquiries. In particular, TGI advised that based on a study comparing different potential HDD pipeline alignments, the present alignment was chosen in order to provide the maximum protection against drilling fluid fracture to the surface from the HDD drilling process. TGI also informed the Sinixt Nation that the finalized study would be an appendix in the Certificate of Public Convenience and Necessity application before the Commission, and would be available when the application is filed. In addition, TGI welcomed potential workers from the Sinixt Nation to participate in the construction work when such opportunities arise, and provided the personnel from the Sinixt Nation with contact information. With regard to the Sinixt Nation's interest in participating in the archaeological overview assessment, TGI informed that Eagle Vision would be the archaeological contractor and that it would advise Eagle Vision and the other identified First Nations who have expressed an interest in participating in the archaeological overview assessment fieldwork of the Sinixt's interest.

TGI does not anticipate any problems with regard to the Sinixt Nation's interest in participating in the archaeological overview assessment fieldwork. If this becomes an issue, TGI will work with Eagle Vision and the other First Nations participating in the process to seek a resolution.

9.4 Further Consultation Plan

It is TGI's regular practice that communications with the First Nations continues as a project progresses. TGI answers any questions that may be raised by the First Nations on an on-going basis, and all concerns and issues identified will be dealt with in a timely manner. TGI will continue this practice in this Project. TGI plans to have on-going discussions with the three identified First Nations, to inform them of key project dates, and to address any concerns or questions they may raise during the duration of the construction of the Project. TGI has developed positive working relationships with the Ktunaxa Nation Council and the Okanagan Nation Alliance through past projects, and intends to continue these relationships.

TGI will be working with the ONA and the Sinixt Nation regarding the archaeological work being planned and their participation in the archaeological overview assessment fieldwork. In addition, on-going archaeological monitoring will be required as identified in Section 7.3.

A copy of this Application, together with information on how the First Nations can participate in the CPCN process for this Project, is being provided to the identified First Nations at the same time as the Application is being filed.

9.5 Conclusion on First Nations Consultation

The physical impacts of the Project are limited. The HDD crossing does not affect the Kootenay and Slocan rivers. The entry point of the HDD alignment will be on private land. A narrow strip of Crown land, about 475 m long and 18 m wide, for the new ROW will be acquired, but the pipeline will be below ground and the surface will be restored. TGI believes that there is very limited potential to affect aboriginal rights and title in the area of the Project. The level of consultation undertaken by the OGC with the assistance of TGI at this stage of the Project has been appropriate. It is TGI's intention and regular practice to continue liaising with First Nations as the Project progresses, and TGI expects the relationships with the First Nations to continue to be positive as the Project moves forward.

10 CONCLUSION

The Project is the best solution to the concerns identified by TGI regarding the fitness for service of the existing Shoreacres aerial crossing. Among the options considered, the Project is the lowest cost option, and best achieves the non-financial factors considered. The Project is in the public interest and necessity and should proceed at this time.

Appendix A

TGI STANDARD OPM 08-02 INSPECTION OF BRIDGE AND AERIAL CROSSINGS

OPM 08-02
23 October 2008

SPECIFICATION
OPERATIONS AND MAINTENANCE
Crossing Inspection

Inspecting Bridge and Aerial Crossings

Replaces: OPM 08-02 dated 10 August 2004

Overview

This standard specifies the requirements and responsibilities for the inspection of gas lines located on bridges and aerial crossing structures.

Audience

This document is intended for Distribution and Transmission Operations personnel involved with operations.

References

- DES 08-01 *Corrosion Control*
- OPM 04-01 *Inspecting and Maintaining BGSSs and System Valves*
- Form 1572 *Bridge/Underwater/Aerial Crossing Inspection Report*
- Form 2300 *Survey Leak and Hazardous Condition Report*
- **Transport Canada Manual** *Standard Obstruction Markings*
- **CSA Z662-07** including Sections 12.10.2.1, 10.6.4.3
- **ASME B31.8** *Gas Transmission and Distribution Piping Systems* (latest version)

General

Individuals who perform inspections shall be qualified by training and/or experience to implement the applicable requirements and recommendations of all bridge and aerial crossings according to this standard.

Pipeline and Distribution Operations and Project Managers must report all new or abandoned bridge/aerial crossings under their respective responsibility to the Operations Process Support (OPS) Closing and Admin at the Surrey Operations Centre. This information will be obtained by the integrity department for updating the master crossing list.

As required, aerial pipeline crossing identification, in the form of a distinctive painting scheme, must be maintained so that the crossing is clearly visible and the painting scheme complies with the **Transport Canada Manual** *Standard Obstruction Markings*.

Definitions

Category 1

All IP and TP bridge and aerial crossings are category 1.

Category 2

All DP bridge and aerial crossings with an outside diameter (OD) greater than or equal to 273 mm are category 2.

Category 3

All DP bridge and aerial crossings with an OD of 60 mm up to and including 219 mm are category 3.

Category 4

All DP bridge and aerial crossings with an OD less than 60 mm are category 4.

Category D

Category D crossings are selected crossings requiring periodic detailed inspections.

Responsibilities

The responsibilities pertaining to inspection of transmission and distribution bridge and aerial crossings include:

Transmission and Distribution Operations must ensure that the following processes are in place for the crossings that they are responsible for:

- categorizing crossings and maintaining and updating the master crossing list
- budgeting for routine inspections and for required corrective work
- ensuring the timely completion of routine inspections and required corrective work in accordance with this standard

- setting priorities and establishing schedules for the inspections and recommended remedial work
    - Scheduling of remedial actions should be based on the results of a risk assessment. Risk assessments should consider the probability of a harmful effect to: public safety, the environment, financial consequences to the company, and security of gas supply to customers. Previous reports should be reviewed for comparison prior to determination of the aerial crossing repair, upgrades, or abandonment.
- maintaining records of inspection, maintenance performed, and inspection frequency risk assessments

The General Manager, Transmission Operations is responsible for all:

- TP main line bridge and aerial crossings
- TP lateral bridge and aerial crossings off the mainline, the Vancouver Island transmission systems, and the Princeton lateral

The **Distribution Operations and Maintenance Manager** is responsible for all:

- TP lateral bridge and aerial crossings off the Spectra and Trans Canada Pipelines, except the Princeton lateral
- TP bridge and aerial crossings downstream of a high pressure transmission system regulating station, except on the mainline
- IP and DP bridge and aerial crossings

When requested, **Engineering Services** will provide or coordinate the following:

- assistance in conducting inspections or surveys
- terms of reference for any consultants retained to do inspections or surveys
- specifications and services for any remedial action
- copies of all inspection reports in which they participate

Engineering must maintain all inspection reports in which they participate.

Inspection Frequencies

Bridge and Aerial crossings will be inspected in accordance with the frequencies outlined in Tables 1 and 2. With the exception of Category 1 crossings, a different inspection frequency is acceptable if justified by a risk assessment.

Table 1: Visual Bridge and Aerial Inspections

Category	Crossing Criteria	Frequency of Inspection
1[a]	All TP and IP crossings	Once every 6 months for Class 1, 2, or 3 locations. Once every 3 months in Class 4 locations.
2	All DP crossings with an OD greater than or equal to 273 mm	once a year
3	All DP crossings with an OD of 60 mm up to and including 219 mm	once every 2 years
4	All DP crossing with an OD less than 60 mm	periodic [b]
1, 2, 3	All TP, IP, and DP crossings that have experienced unusual physical traumas such as floods, earthquakes, fires, or collisions	Special (non-scheduled) [c]

Definition
A visual inspection involves checking the crossing from the shoreline with binoculars and does not imply a detailed, close-up examination.
CSA Z662-07, Section 12.10.2.1:
Distribution lines that are installed in locations or on structures where abnormal physical movements or abnormal external loadings can cause failure or leakage must be patrolled periodically, with the patrol frequencies determined by the severity of the conditions and the associated safety risks.

NOTE: Abnormal physical movements and abnormal external loadings include long lengths of pipe installed above ground on bridges with expansion joints, land movements, river crossings, and shallow pipe in major collector roads.

[a] As per CSA Z662-07 Section 10.6.4.3 and ASME B31.8 Section 851.2.
[b] The asset manager will establish an inspection frequency that is appropriate for the risk associated with the specific crossing.
[c] Special inspections may range from a very brief visual examination to a detailed in-depth evaluation depending upon the nature of the trauma. Consult with respective Distribution and Transmission Operations departments.

Table 2: Detailed Visual Bridge and Aerial Inspections

Category	Crossing Criteria	Frequency of Inspection
D	All selected crossings	every 5 years

The crossings requiring detailed inspections will be determined by the Transmission/Distribution Asset Management in consultation with Engineering.

Inspection Requirements

Inspections

Prior to inspecting the crossing, previous reports should be reviewed to ensure familiarity with the design features and operating history of the crossing.

Carry out the inspection as per **Form 1572** *Bridge/Underwater/Aerial Crossing Inspection Report*.

NOTE: Corrosion Control is responsible for checking that bridge and aerial piping is electrically insulated from underground piping and from the bridge in accordance with **DES 08-01** *Corrosion Control*. Not all aerial pipes are electrically insulated. Some are only a few metres long.

NOTE: Transmission or Distribution Operations are responsible for valve inspection and maintenance in accordance with **OPM 04-01** *Inspecting and Maintaining BGSSs and System Valves*.

Scheduling Considerations

Inspections should be carried out preferably during weather extremes to view pipe and structure response during most stressful conditions (summer and winter) if weather and safety permit.

Inspection Reporting

Use **Form 1572** *Bridge/Underwater/Aerial Crossing Inspection Report* to record all routine visual bridge or aerial crossing inspections except category D inspections.

- For each unsatisfactory condition reported on **Form 1572**, complete **Form 2300** *Survey Leak and Hazardous Condition Report*.

For the crossings within the responsibility of the General Manger, Transmission Operations, the inspection reports are filed and closed in the Transmission Computerized Maintenance Management System (CMMS).

For the crossings within the responsibility of the Distribution Operations and Maintenance Manger, forward completed **Forms 1572** and **2300** with the original job package to OPS Closing and Admin at the Surrey Operations Center.

Requests for emergent or urgent repair work should be made verbally to:

- for DP and IP bridge or aerial crossings call Dispatch
- for TP bridge or aerial crossings notify the area manager of transmission or the Distribution Operations & Maintenance Manager depending on asset ownership
- document all emergent or urgent repair requests on **Form 2300**

When a problem is found on a crossing that is not of immediate concern but may compromise the long term integrity of the crossing, regardless of the category or location, complete **Form 2300** with details and digital pictures, if practical, of the problem. Examples of such problems are:

- pipe lifting off supports

- any support or roller missing or loose
- misaligned elbow
- extraordinary erosion exposing pipe riser through the bank
- pipe improperly supported
- cables stretched significantly beyond set marks
- excessive vibration in the pipe caused by bridge traffic or wind spring hanger setting outside of hanger limits or against stops
- excessive corrosion or pitting

Baseline Comparison

The asset manager or representative should compare new inspections to previous inspections to determine any significant changes by the asset manager or asset manager's representative.

Category D Inspections

For Category D inspections, in addition to the requirements outlined above, a written report, specific to a particular crossing, must be prepared and stamped by a qualified professional engineer. This report is recommended to contain the following information; however, the final content is to be determined by a qualified engineer:

Site Inspection and Survey

- Layout drawing indicating the pipe supports and other important features.
- Visual inspection of the coating condition on all components, noting deficiencies including rusting, blistering, chalking, corrosion, dents, gouges, or coating delamination. Dry film thickness measurements of the coating at specific locations, as required.
- Visual inspection of the pipe, including rollers, support brackets, U-bolts, expansion connections, and attachments to the concrete piers, checking alignment, and searching for evidence of distress caused by malfunctioning joints, missing or failed fasteners, ceased rollers, vibration, or vandalism.
- Visual inspection of all steelwork, with particular reference to corrosion and possible loss of wall. Measurements of thickness can be made with calipers when appropriate. Visual examination of weldments for evidence of cracking caused by vibration and fatigue.

- Examination of main cables, backstays, wind cables, horizontal, vertical, and diagonal suspenders, and safety cables, with particular attention to any slack cables, or areas of corrosion, birdcaging, kinks, or wire damage.
- Visual examination of saddles, clamps, sockets, pins, clevises, turnbuckles, clips, tension springs, and connections for possible missing fasteners, or signs of distressed or damaged members, buckled turnbuckles, or excessive wear. Spot checking of bolt torques in clamps, where appropriate.
- Examination for any evidence of gas leaks at pipe connections.
- Inspection of foundations and anchorages, paying particular attention to any evidence of movement of foundations caused by settlement, or slumping of the river banks. Also to be noted is the condition of the anchorage as it enters the concrete foundation, ensuring that there is not a corrosion pocket at the interface.
- Examination of the compound noting damage and/or hazards.

Structural Modeling and Analysis

- Structural modeling and analysis, as deemed necessary by a professional engineer.

Assessment and Report

- The condition of the pipe, structural members, cables, connections and foundations, noting deficiencies with any items mentioned under the inspection.
- Recommended maintenance to ensure contiued safe operation. Analysis and indication of adequacy of the various structural components.
- Recommended remedial action, as required.
- Photographs, analysis results, data, and drawings noting deficiency locations.
- Evaluation of the seismic design of the aerial or bridge structure.

Where Terasen gas lines are attached to structures owned by another party (e.g., MOTH), the owner of the structure must be advised prior to the inspection. The inspector is responsible for arranging all required permits before carrying out the work.

The inspector must complete the minor cleaning of the pipe to permit a detailed visual inspection (e.g., removing bird droppings). This activity must be completed in accordance with environmental and other regulatory requirements.

Dents, gouges, and corrosion must be evaluated and reported including the depth and size of the damage, if practical.

Coating damage including cracking and disbondment must be evaluated and the degree to which the pipe is exposed and damaged must be reported, if practical.

Transmission or Distribution Operations may need to commission a more detailed evaluation of crossing deficiencies identified in a Category D inspection in order to complete a risk analysis and establish a scope of work for repairs.

Records

Maintain records of:

- crossing inspection reports (**Form 1572** *Bridge/Underwater/Aerial Crossing Inspection Report*) for at least 6 years
- maintenance and repair work for as long as the facility remains in existence except for minor wrapping repair or touch up
- inspection frequency risk assessments for as long as the facility remains in existence

Engineering must maintain the following reports for as long as the facility remains in existence:

- all Category D inspection reports where they have participated
- follow up remedial action reports sent in from Transmission or Distribution Operations

Appendix B

ASSESSMENT OF EAST BANK SLOPE STABILITY AT THE TERASEN GAS SHOREACRES AERIAL CROSSING

Terasen Gas

Assessment of East Bank Slope Stability at the Terasen Gas Shoreacres Aerial Crossing

Prepared by: Janet Green, P.Eng.
Terasen Gas, System Integrity

Reviewed by: Dr. Alex Baumgard, P.Eng., P.Geo.
BGC Engineering Inc.

Revision Date: **July 2009**

Table of Contents

1. Introduction

Terasen Gas' aerial crossing at Shoreacres has been in place since 1957. It forms part of the Castlegar-Nelson 6" transmission line. The crossing is located at the convergence of the Slocan and Kootenay Rivers North of Castlegar. The aerial span crosses the Kootenay River between Shoreacres and Glade. On the Shoreacres (West bank) side the crossing has one tower that is built on a flat area near the river (Photo 1). On the Glade (East bank) side the pipeline comes ashore on a steeply graded slope (Photo 2). There is no tower on this side, but a support anchor is positioned in line with and upslope of the crossing, and two wind anchors are positioned at the same elevation and to either side of the crossing (Photo 3). As the pipeline comes ashore on the East bank it has a number of sharp bends before proceeding underground along Terasen's right of way. The City of Nelson and its surrounding area are downstream customers of this crossing. Terasen Gas is currently looking at options of replacement or refurbishment of the existing crossing.

The East slope of the aerial crossing and portions of the adjacent right of way have shown signs of instability over the life of the pipeline. Field observations indicate that this slope instability extends approximately 300 m north of the aerial crossing along the right of way. This risk is currently managed through Terasen's Natural Hazard Risk Management Program whereby inspections are conducted by qualified personnel at a frequency consistent with the risk. In addition, in 1990 a small retaining structure was installed inside the fenced compound to lessen the direct impacts of the shallow soil sloughing on the exposed pipe.

The purpose of this report is to evaluate the feasibility of replacing or refurbishing the aerial crossing at its current location as it pertains to the stability of the slope and the risk that it poses to the integrity and reliability of Terasen's system serving Nelson.

The sections of this report include a review of historic reports that address the slope stability of the East bank, and a more current slope stability assessment that uses industry standard methods to determine the factor of safety against failure of the slope.

2. Review of Past Slope Stability Assessments

Two previous slope stability assessments were conducted of the East bank slope of the Kootenay River at Terasen Gas' Shoreacres aerial crossing. The first study (Thurber) was initiated after Terasen field personnel noted signs of shallow slope instability affecting the above ground portion of the pipeline. The second study (Golder) was initiated by CWMM Consulting Engineers to address the effects of the slope instability on the overall structural integrity of the aerial crossing.

2.1 Thurber Consultants Ltd., January 1990

2.1.1 Scope of Work

Thurber conducted two site inspections. The first was a preliminary inspection on July 20, 1989. The second was a more detailed inspection on October 11, 1989 that included a rough survey using a hip chain and clinometer and the excavation of several test pits. Laboratory identification tests were completed on representative samples taken from the test pits. The information collected in the field was used in conjunction with historical records provided by Terasen and other published geological information and photographs to evaluate the shallow soil creeping and the general slope stability.

2.1.2 Findings

The Kootenay River valley is composed of glaciofluvial silts, sands and gravels overlying rock and basal till. Prior to hydroelectric developments, the Kootenay River eroded a valley through these deposits, leaving the slopes at their natural angle of repose. As a result, it is considered that the east slope of the crossing had only marginal stability at the time of pipeline construction. The upper slopes, extending to 30 m above the river level have a slope of approximately 18°. The lower slopes vary from 38° inside the fenced compound to a maximum of 60° on the silt bluff overlooking the river.

The contours shown on Dwg. 60091-ML51-RX4 dated February 13, 1957 show that there was a natural alcove at this location prior to pipeline construction. The alcove could have been the result of groundwater seepage or slope erosion. The alcove appears to have been filled in to bury the anchors for the pipeline crossing, giving the slope a more uniform profile.

The steep fill slope within the fenced compound had suffered surface soil creep with the result that three zones aligned across the fill face were visible. Each creep zone consisted of an upper scarp and lower bulge or toe roll. One such toe roll had moved up against the exposed length of pipe approximately 8 m long that is found within the fenced compound.

2.1.3 Recommendations

There is ongoing creep movement of the surficial soils within the fenced compound. There is no indication that the creep movements will stop, and they might accelerate. Provided the internal drainage of the slope is maintained, the movement should be confined to shallow depth.

Thurber recommended removing the soil that was pressing against the above ground pipe and installing a slope retention structure. This was carried out, and the retention structure is still in place at this time (Photo 4).

The general slope stability analysis for deep seated sliding showed that under fully drained conditions the long term slope stability had a marginally acceptable factor of safety (1.49). Under seismic loading or with an increase in groundwater the factor of safety dropped below acceptable levels (1.08-1.38). Thurber recommended a review of Terasen's slope stability requirements at this location.

2.2 Golder Associates Ltd., May 1995

2.2.1 Scope of Work

Golder Associates conducted preliminary geotechnical assessments of Terasen's Shoreacres crossing of the Kootenay River, and the Castlegar crossing of the Columbia River. This summary will only address the findings of the Kootenay River crossing.

Golder conducted a ground reconnaissance of the slope to observe site conditions and to collect slope profiles using a hip chain and clinometer. Previous drawings, reports, and aerial photographs were also reviewed. The information collected was used to complete a slope stability analysis.

2.2.2 Findings

The east bank slope varies between 30°and 40°. Observations indicated no apparent evidence of major slope instability and/or groundwater seepage. However, the steep sections of the slopes were noted to be experiencing minor surface creep movements.

The inferred slope soil conditions indicate that the lower portion of the slope is underlain by compact deposits of sand and gravel. The upper slope area is comprised of loose to compact sand. It is anticipated that these granular deposits overlie bedrock. The groundwater table is expected to be controlled by the water level in the Kootenay River. Any ground water flows within the slope would likely follow the bedrock surface.

Three failure surfaces were analyzed for stability. In general, for a slope to be considered stable under static and earthquake conditions, the factors of safety should be a minimum of 1.5 and 1.1 respectively. The calculated factor of safety for the deep seated failure surface under static and earthquake loads were close to or exceeded the minimum requirements (1.5 static, 1.1 seismic). However for shallow failures, the factors of safety were generally less than the desired values (1.1-1.2 static, 1.0-1.1 seismic).

2.2.3 Recommendations

Based on the preliminary assessment and barring adverse groundwater conditions and/or possible scouring at the toe of the slope during high river levels, it was Golder's opinion that the general slope area was marginally safe from shallow failures.

In order to increase the factors of safety to the suggested minimum values, it would be required that the slopes be flattened and/or construction of a toe berm. When considering the location and steep slopes, these works would be very difficult and expensive.

It was suggested that consideration be given to establishing a monitoring program for this site that consists of permanent survey monuments on the tower and wind cable anchors, as well as several located on the slope.

3. 2009 Slope Stability Assessment

3.1 Methodology

The information collected in the Thurber and Golder reports was supplemented with as-built drawings, site observations, and surveyed topography. This information was used to develop a slope stability model using Slope/W 2007 software to conduct a slope stability analysis.

The soil properties used by Golder Associates in their analysis were used again in this most recent analysis. The only change to the soil properties was that the friction angle of the upper sand layer was changed from 35° to 32° to reflect the findings of additional laboratory testing that was conducted on samples from a nearby borehole. The small changes in the soil properties did not have a significant impact on the results.

A topographical survey was carried out by HinterLand Surveying & Geomatics Inc. of Trail, BC in November 2008. This topography and profile is a more accurate representation of the East bank slope than what was used in the Thurber or Golder reports.

The as-built drawings for the crossing were used to locate the anchors on the model and to apply their tensile load to the forces acting on the slope. The location of the anchors was also used to determine what impact any slope movement would likely have on the structure and pipeline.

The slope stability model was created by Janet Green, P.Eng. of Terasen Gas and was reviewed by Dr. Alex Baumgard, P.Eng., P.Geo. and (Kumar) Somosanduram Sriskandakumar, P.Eng. of BGC Engineering Inc.

3.2 Results

The static short term and static long term stability models and results can be seen in Figures 1 and 2, respectively. Since the slope rests at the natural angle of repose of the soil, the surface of the slope is considered to have a factor of safety of 1.0, which is supported by the observations of shallow soil sloughing that have been noted within the fenced compound. In this scenario, the lowest factor of safety is always at the slope surface and increases as the sliding plane gets deeper.

The static short term stability applies to temporary slope conditions. For a slope to be considered stable under short term conditions, the factor of safety should be a minimum of 1.3.

Figure 1 shows that a slip surface with a factor of safety of 1.3 will impact the wind anchors, possibly causing the anchor blocks to move and the cable to lose tension. The main anchor would have reduced burial depth, but would likely not be undermined. More shallow sliding planes will have a lower factor of safety, and although they may not impact the anchor directly, they would reduce the soil cover over the anchors.

The static long term stability is relevant to the life of any asset placed in or on the slope in question. For a slope to be considered stable under long term conditions, the factor of safety should be a minimum of 1.5. Figure 2 shows that a slip surface with a factor of safety of 1.5 will undermine both the wind anchors and the main stay anchor which are found inside the sliding block. This could cause the aerial span to lose all support on the East bank.

4. Recommendations

In its current state the East bank slope at Terasen's Shoreacres crossing can only be considered marginally stable. It is expected that this slope will continue to experience surface sloughing. If any aggravating factors were introduced, such as increased pore water pressure or seismic load, these conditions would worsen.

Increasing the stability of this slope would require decreasing the slope angle, or constructing a toe buttress. Decreasing the slope would require extensive earthworks, and is not feasible while the aerial crossing is in place. A toe buttress would be both difficult and costly to construct as the slope extends into the Kootenay River. Both of these options would also have detrimental environmental impacts to the Kootenay River.

In consideration of these factors, it is recommended that Terasen make every attempt to avoid this area of slope instability when considering their replacement or refurbishment options at this location. For the short term, it is recommended that Terasen continue to monitor this site for signs of increased slope instability through repeat ground inspections. It is also recommended that Terasen assess the possible effects of reduced soil cover or undermining of the anchors to the overall integrity of the aerial span.

5. Closing

This report was intended for the use of Terasen Gas Inc. in the feasibility study for the replacement or refurbishment of the existing Shoreacres aerial crossing.

I hope that this meets with your needs at this time, please don't hesitate to contact the undersigned if you have any questions or concerns.

Written By:

J. L. GREEN
#32210
3/11/10

Janet Daly, P.Eng.
Integrity Engineer – Geotechnical
Terasen Gas Inc.

Reviewed By:

Dr. A. J. BAUMGARD
29438

Dr. A. J. BAUMGARD
#29438

Dr. Alex Baumgard, P.Eng, P.Geo.
Senior Geotechnical / Environmental Engineer
BGC Engineering Inc.

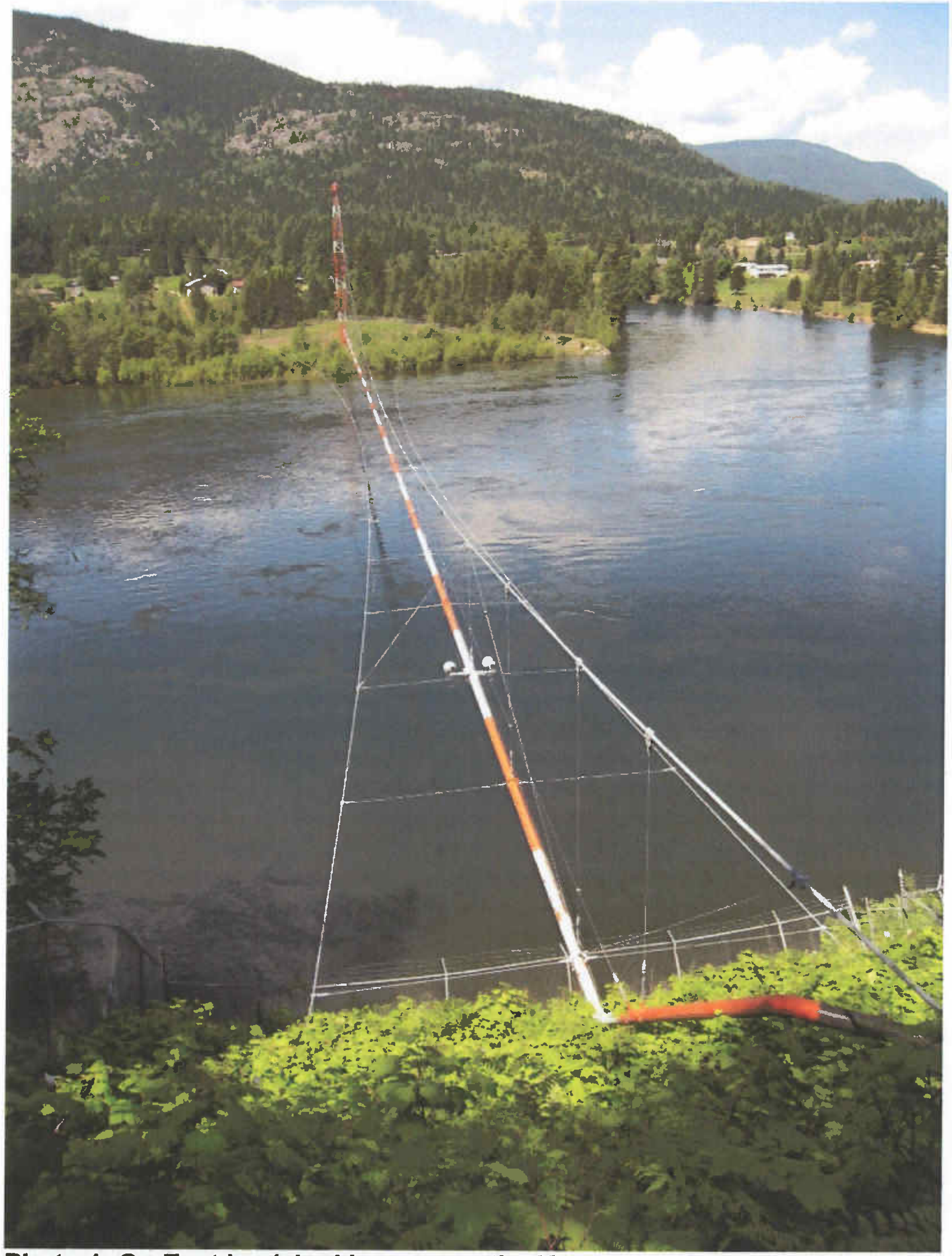
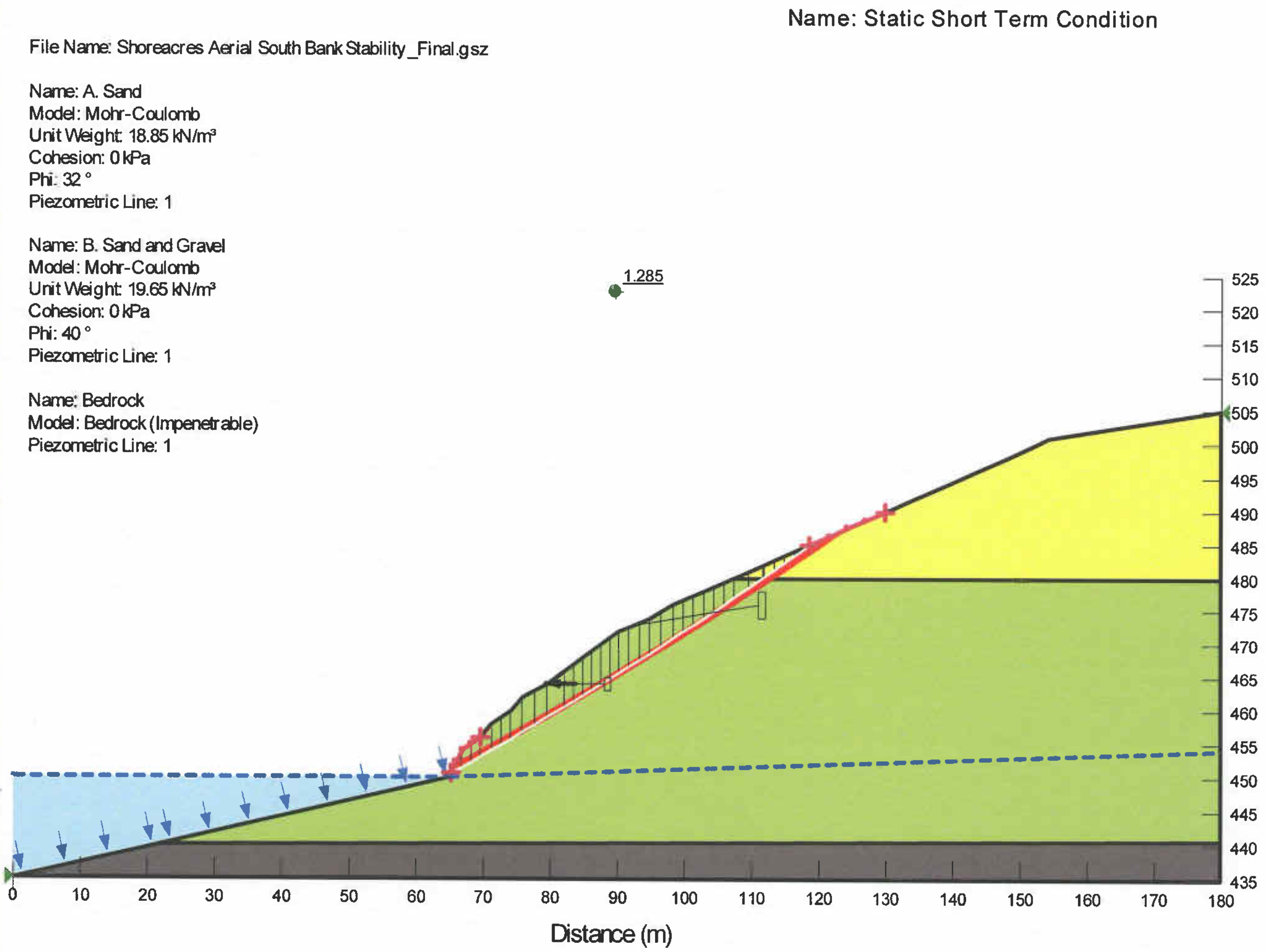


Photo 1: On East bank looking across the Kootenay River at the West bank of the Shoreacres Aerial Crossing

Photo 2: Looking downstream along East bank slope of Shoreacres Aerial crossing

Photo 3: On West bank looking at East bank of Shoreacreas Aerial Crossing

Photo 4: Slope retention structure recommended by Thurber Consultants Inc. in 1990.



Name: Static Short Term Condition

File Name: Shoreacres Aerial South Bank Stability_Final.gsz

Name: A. Sand
Model: Mohr-Coulomb
Unit Weight: 18.85 kN/m³
Cohesion: 0 kPa
Phi: 32 °
Piezometric Line: 1

Name: B. Sand and Gravel
Model: Mohr-Coulomb
Unit Weight: 19.65 kN/m³
Cohesion: 0 kPa
Phi: 40 °
Piezometric Line: 1

Name: Bedrock
Model: Bedrock (Impenetrable)
Piezometric Line: 1

Figure 1: Short term static stability

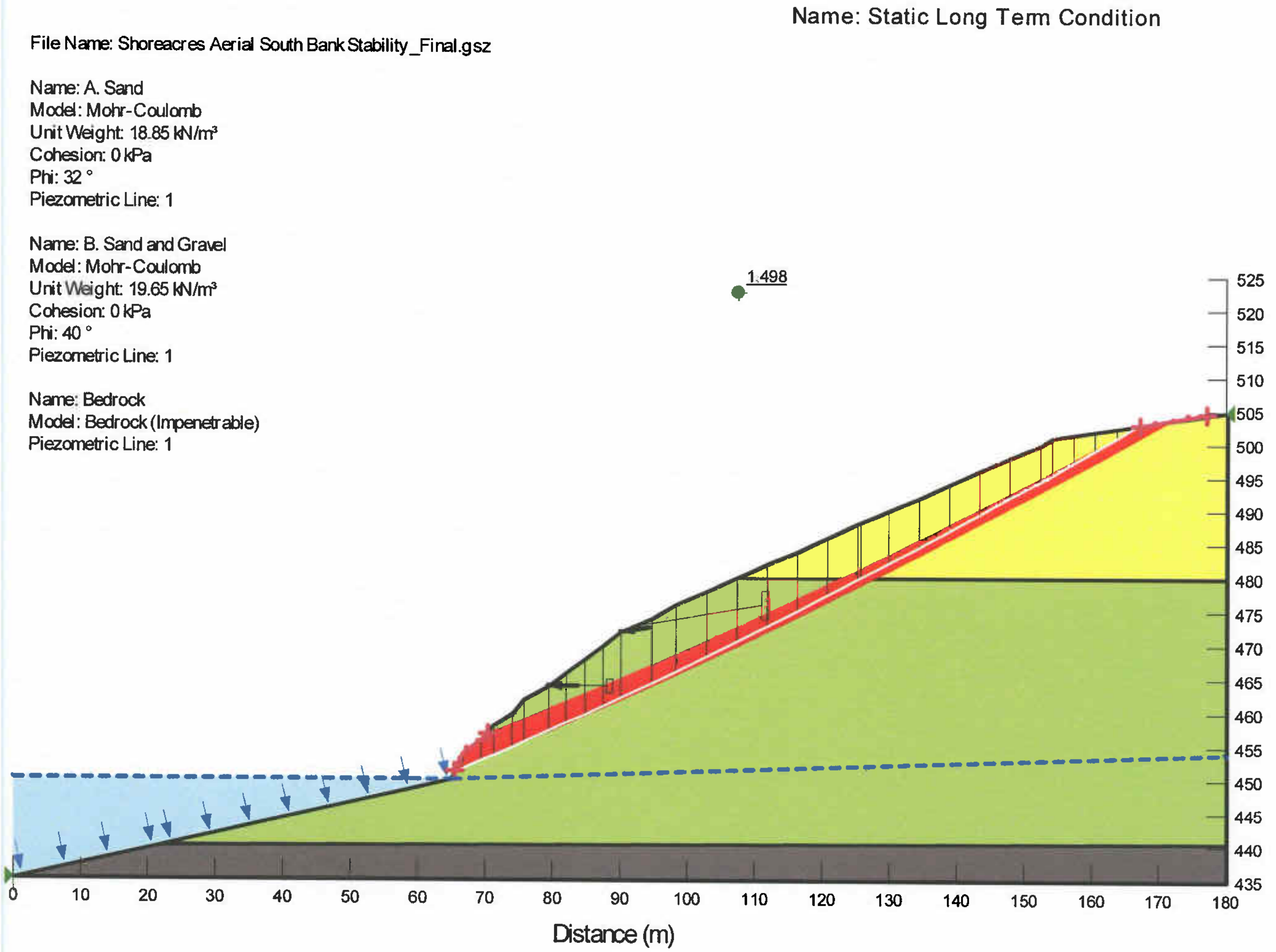


Figure 2: Static long term stability

6. References

Imada, G., & Carlsen, B. (1995). *Preliminary Slope Assessment B.C. Gas Crossings Castlegar and Shoreacres British Columbia.* Golder Associates Ltd.

Payne, M.I., & Buck, G.F. (1990). *Slope Assessment and Pipeline Protection Recommendations Kootenay River Crossing – East Slope Savona to Nelson Mainline.* Thurber Consultants Ltd.

Appendix C

INSPECTION AND ASSESSMENT OF KOOTENAY RIVER AERIAL CROSSING (SHOREACRES)

JUNE 24, 2010

TERASEN GAS INC.

INSPECTION AND ASSESSMENT OF KOOTENAY RIVER AERIAL CROSSING, SHOREACRES, BC

Prepared for:

Terasen Gas Inc.
Design Engineering - Pipelines
16705 Fraser Highway
Surrey, B.C.
V4N 0E8

Prepared by:

CWMM Consulting Engineers Ltd.
200-1854 Kirschner Road
Kelowna, B.C., V1Y 4N6
Tel: 250-868-2308
Fax: 250-868-2374
Contact: Donald D. Bergman, P.Eng.
Email: dbergman@cwmm.ca

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June 24, 2010

1.0 Introduction & Scope

CWMM Consulting Engineers Ltd. has been retained by Terasen Gas Inc. to carry out an inspection and condition assessment of the existing Kootenay River Aerial Crossing at Shoreacres. The crossing is located approximately 20km north east of Castlegar along Highway 3A. The purpose of the assessment is to determine the general condition of the structure and to provide an opinion as to the life expectancy of the crossing in its current state with no remedial work, and following a refurbishment which would remediate the most significant deterioration. This report follows two previous condition assessment reports prepared by CWMM in 1993 and 2003.

2.0 Site Description and Inspection

The Kootenay River Crossing at Shoreacres was originally built in 1957 and consists of a single pipe carried by a large cable suspended structure.

The main cable spans approximately 236 metres, supported by a tower on the west end, and an anchorage at the embankment on the east end. Vertical suspender cables hang from the main cable and carry the pipe on steel saddles with roller supports. There is also a pair of horizontal wind cables, connected to the pipe saddles by secondary wind guy cables.

An inspection of the crossing was carried out on June 11 and June 22, 2009 by Jonathon Smith, a Senior Technologist of our Creston branch office. The inspection involved climbing the fixed ladder on main tower and walking along the pipe itself from the main tower at the west bank to the anchorage at the east embankment.

A safety harness and lanyard were used as fall protection and an assistant remained on-site during the inspection as a safety precaution.

3.0 Condition Assessment

3.1 Pipe

At the west end, the pipe riser projects up out of the ground, and turns 90° before passing through the tower and crossing the river. At the east end, the pipe turns up the slope, then makes a transverse bend, extending further up the slope. The pipe enters the ground at a slight uphill angle.

The pipe is painted in alternating segments of orange and white. The white paint is generally in poor condition throughout the length of the pipe. Extensive flaking and peeling of the coating was observed with considerable surface rust throughout. The orange paint is generally in better condition with minor cracking and peeling in some areas. At the time of inspection, there is an osprey nest located on the pipe near the mid-span at H5 north.

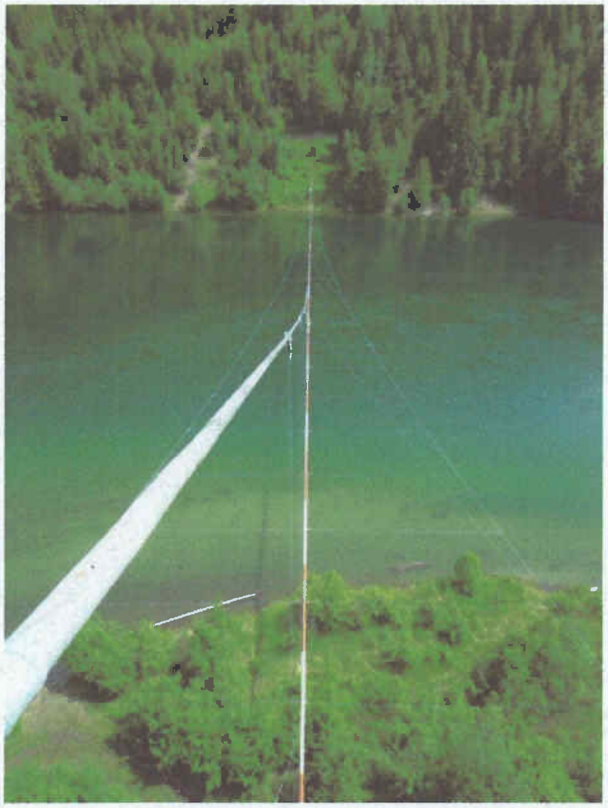

Fig. 1 - View looking east from tower.

Fig. 2 - Poor condition of white paint.

The ground entry points at both ends are in good condition. At both ends the pipe is wrapped with white tape at the ground entry point. Some cracking and blistering of the tape was noted, however there was no evidence of corrosion. At the east end the pipe is also wrapped with black tape to the transverse bend. Some bulges and peeling of the tape was noted in this area with subsequent corrosion noted.

As sighted from each end, the profile of the pipe is relatively smooth, and the alignment is essentially straight in plan, as viewed from the tower.

Fig. 3 - East ground entry point.

Fig. 4 - West ground entry point.

The following photos show the deterioration of the white paint on the pipe and the subsequent rust compared to the 2003 inspection photos.

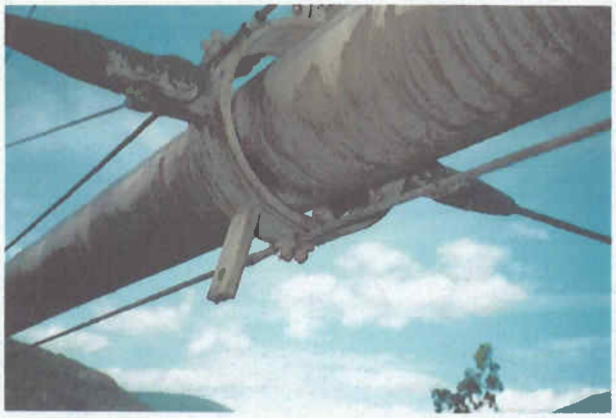

Fig. 5 - H8 east, 2003 inspection. Note dirty condition of pipe but no rust showing.

Fig. 6 - H8 east, 2009 inspection. Large rust spots showing.

Fig. 7 - H6-H7 west, 2003 inspection.

Fig. 8 - H6-H7 west, 2009 inspection.

3.2 Tower

The tower is made up of steel angles with welded and bolted connections. Similar to the pipe the tower is painted in alternating segments of orange and white. The paint on the steelwork is peeling and blistering in various locations throughout the tower, with subsequent rust showing. The white paint is generally in poor condition with fine cracks and peeling throughout the tower. In most areas the top coat is peeling away from the primer. In other areas the coating had been removed with large rust spots showing. At this time the rust is generally surface rust with no major pitting or loss of sectional area noted.

The steelwork is also covered with mildew and lichen. The osprey nest noted in earlier reports has been relocated from the top of the tower.

Fig. 9 - Peeling of paint and subsequent rust.

Fig. 10 - General cracking and peeling of white paint on tower.

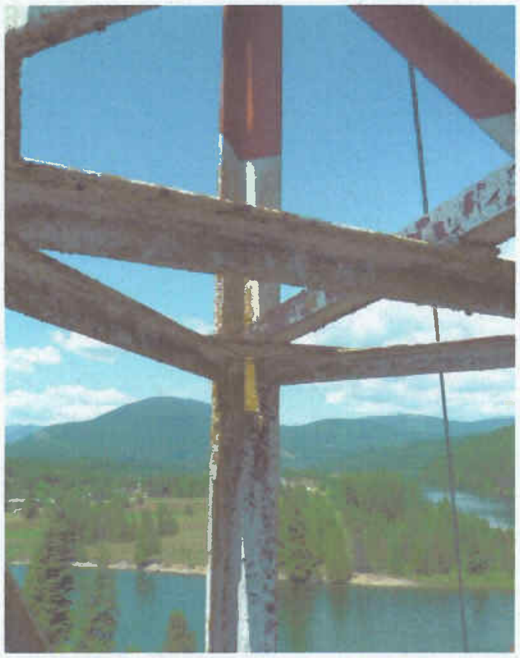

Fig. 11- Lichen and mildew on tower.

3.3 Wind Masts

The wind cables pass over steel saddles atop concrete masts at the west end, before continuing down to their anchorages. The masts and saddles are in good condition, with no apparent deficiencies.

Fig. 12 - South-west wind mast.

3.4 Cables

The primary cables including the main suspension cable, backstay, tower guys, and wind cables are bridge strand, whereas the remainder are wire rope. The cables, sockets, and their attachments are coated with a zinc rich paint (Zicote). The cables for the most part are in good condition with only minor amounts of surface rust showing in a few isolated locations. This is in contrast with the nearby Castlegar crossing were many of the cables had considerable amounts of surface rust.

Fig. 13 - Typical vertical suspender connection.

In the 1990's the various cables were tested for tension relative to their original design tension and were adjusted as required. Various vertical hangers supporting the pipe were adjusted as well as the tower guy cables. The main suspension cable and wind cables were deemed satisfactory and were not adjusted.

3.5 Foundations and Anchorages

At the west end, foundations for the tower, wind masts, backstays, and tower guys, are all located on clear, level ground, with no nearby embankments and no threat to stability. All anchorage steelwork at this end is in good condition.

At the east end, anchorages for the wind cables and main cable are located on a relatively steep embankment. The bank is well vegetated, and although there is some surface sloughing (see Fig. 18 and 19), there is no indication that it has undermined the anchorages to date.

The east end anchorages are all located within buried corrugated steel culverts. Originally, wood panels were used to backfill against on the uphill end. The wood has rotted away, and the ground has spilled inside onto the anchorage components. As a result of this condition the bolts at the south wind cable anchorage and the main cable anchorage are becoming quite corroded.

Fig. 14 - West backstay anchorage.

Fig. 15 - North-west tower guy anchorage.

Fig. 16 - Main cable anchorage at east bank.

Fig. 17 - South-east wind cable anchorage.

3.6 Compound

There is a fenced compound at each end of the pipe that contains the tower, wind mast and all anchorages. As indicated, the west compound is located on flat ground with mainly grass vegetation, while the east compound is located on a relatively steep embankment with brush and small trees. The west compound fence is in good condition. The east compound fence is badly damaged at the northeast corner, having been affected by surficial ground sloughing.

Fig. 18 - East compound.

Fig. 19 – Damaged fence at east compound.

Fig. 19 - West compound.

4.0 Summary and Recommendations

The aerial crossing at Shoreacres appears to be in relatively good condition, generally. The cables are in good condition with minimal signs of damage or rust. The profile and alignment of the pipe do not appear to have changed significantly since our last inspection, which is an indication that the structure, thus far, remains in a stable condition. As indicated, the coating on the tower and pipe is showing signs of deterioration. This is particularly true of the white coating which has been completely removed in some areas. However, there wasn't any major pitting or loss of sectional area noted at this time, either on the pipe, or structural steel tower components. Concrete elements appear sound.

Although surficial sloughing is evident at the east embankment, there doesn't appear to be any obvious signs of deep seated settlement or major sloughing to the extent that the structure geometry has been affected to date. Nonetheless, past geotechnical reports as well as the more recent 2009 report by Terasen Gas have indicated the potentially unstable nature of the east bank, which could potentially result in slope failure at some point, and loss of support for the anchorages.

The structure has been in service for over 50 years and it is our opinion that in its current state, with no additional remedial work, we would anticipate that the structure itself could have a life expectancy of 5 years or more, without considering the geotechnical issue of the embankment stability. Despite this, it is our recommendation that if the structure is to remain in service beyond 5 years, then certain remedial measures should be considered at this time, including the following:

1) A recoating of the pipe and steelwork components. There is a caution here that existing coatings may well contain lead based paint, and therefore containment will be needed to avoid having the deleterious materials from entering the waterway or surrounding areas.
2) Replacement of the seized roller supports. Note that this item poses challenges, as the pair of rollers at each vertical suspended are actually welded to the inside of the supporting pipe sleeve, and will need to be torch cut loose to allow new rollers to be welded back into the narrow space between the pipe and sleeve support.
3) The east end anchorages should be refurbished. Again, this operation presents some challenges as the anchorages are contained within metal culverts that are buried within the embankment, and to expose them would mean excavating the overburden, possibly with some additional slope retention above to support the excavation. The anchorages should then be cleaned and recoated, and the interior sloughing cleared to ensure that the anchors are completely uncovered, followed by reinstating the culvert protection.

Following the above measures for refurbishment, we would anticipate that the structure could remain operational for another 10 to 20 years without major rehabilitation. It should be noted, that our assessment is based on our visual observations only, and that we have not carried out any structural testing of components. We also caution that the issue of embankment stability is deemed outside of the scope of this report, and is considered a geotechnical matter. The embankment issue could be the most significant issue affecting the longevity of the structure.

Report Prepared by:

PROFESSIONAL
PROVINCE OF
D. D. BERGMAN
BRITISH COLUMBIA
ENGINEER

June 29/10

Don D. Bergman, M.Eng., P.Eng., Principal

Appendix D

KOOTENAY SHOREACRES RIVER AERIAL REPLACEMENT PROJECT COMPARATIVE ASSESSMENT, CCI

JUNE 30, 2009

Terasen Gas Inc.

Kootenay Shoreacres River Aerial Replacement Project

Comparative Assessment

Prepared by: Ed Douziech
Date: June 30th, 2009
Revision 5 (May 2010)

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Summary

The proposed Kootenay Shoreacres Aerial Replacement Project herein is located northeast of Castlegar within the province of British Columbia. Terasen Gas Inc. proposes a single 168.3mm O.D. pipeline to cross the Kootenay River in order to replace the existing 219.1mm O.D. Kootenay River aerial pipeline crossing near the hamlet of Shoreacres, BC.

Overview

Pursuant to a request from Mr. Neil Bolger, Project Manager (Terasen Gas Inc.); Ed Douziech for Complete Crossings Inc. (CCI) attended a site reconnaissance to view a number of additional proposed pipeline water crossing alignments and subsequently analyzed all of the proposed crossing routes. A comparative feasibility assessment with all proposed trenchless crossing alignments is provided in this report in order to provide the stakeholders with the benefits of each alignment an provide them an opportunity to select a single crossing position to pursue for construction.

Previous Engineering Analysis

In the fall of 2008, the existing pipeline Aerial Crossing route and three additional alignments (Shoreacres South, Shallow Angle, and Large Angle) were analyzed as possible horizontal directional drill (HDD) alignments and comparatively analyzed by information gathered by site reconnaissance and desk top study. Feasibility of these four options were detailed within the previously submitted CCI Reconnaissance and Preliminary Crossing Feasibility report[1] with the Existing Parallel Route and Shoreacres South eliminated by insurmountable technical issues and cost. Preliminary feasibility on the remaining route, Large Angle (Preferred), was detailed on the available data and considered feasible.

In the winter of 2008, the Large Angle was further evaluated and quantified within CCI's Risk Assessment and Comparison Report[2]. This general route was broken into numerous iterations and three dimensionally quantified into two primary selected options; Option A and Option B. Option A was selected as having less technical risks than Option B and recommended as the best HDD alignment of the two if the logistics of the east plateau layout and exit location could be determined. Subsequent available data ruled out Option A's feasibility on the east plateau, resulting in Option B as the prime HDD alignment.

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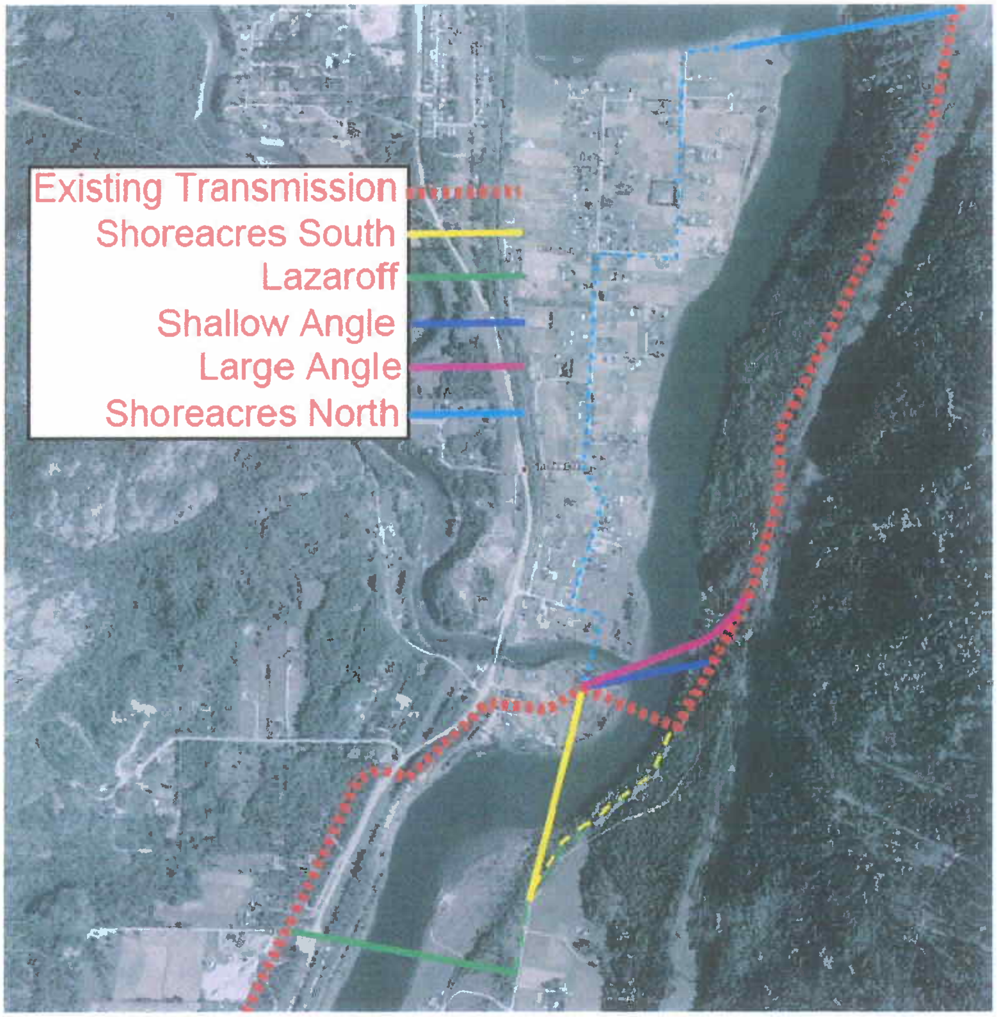
[1] Kootenay River Reconnaissance and Preliminary Crossing Feasibility, CCI, September 10, 2008.

[2] Kootenay River Risk Assessment and Comparison, CCI, December 4, 2008.

In the spring of 2009, two additional HDD alignments (Lazaroff and Shoreacres North) were added and feasibility was also scrutinized by site reconnaissance and data analysis. In summary review, there were six (6) alignments ultimately selected for the Kootenay River pipeline water crossing location. Of the six locations, one location (TP Option) was chosen for a possible non-trenchless construction (new bridge attachment or aerial) and was not part of this study. The remaining five (5) alignments are detailed to provide a final comparative assessment.

Comparative Assessment Scope

This report provides a final comparative feasibility of the Five alignments; Shoreacres South, Lazaroff, Shallow Angle, Large Angle, and Shoreacres North.



HDD Design and Feasibility Criteria

All evaluated HDD alignments were designed maintaining understood industry standards and engineered tolerances within the available data. All evaluations were completed within 3 dimensional drafted designs accurate in all perspectives. Three general standards specifically used to assess HDD feasibility are technical, contractual, and economic. The scope of this report covers only HDD technical feasibility, contractual and economic were excluded.

Technical feasibility is defined by the HDD's ability to be successfully installed using existing technical standards, engineering tolerances, regulatory guidelines and codes of practice, regardless of uncertainties surrounding the cost or contractual issues.

Technical Feasibility assessment includes (but not limited to):

Pipeline Preferred Routing	Site Assessment
Stability of Slope Crossing	Access
Landowners Concerns	Water Supply
HDD Methodology	Entry/Exit Points
Available Work Space	Changes in azimuth
Geotechnical Site Investigation	Navigation
Hydrological Evaluation	Pull Back
Drill Path Design	Disposal of drilling fluid and cuttings
Casing Requirements	Environmental
Fluid Containment	Regulatory Approval
Bank Setbacks	Design of Pipe and Pipe Coating
Cover under the water body	Required Drill Rig Equipment
Reaming size and number of passes	Drilling Fluid Requirements
Annular Pressure (AP)	Construction Execution
Pipe Stress Analysis	

Specifically Annular Pressure and Pipe Stress analysis are discussed below:

Annular Pressure is the fluid pressure between the drill string and open hole (annulus) is the focus of this tolerance study. The occurrence of hydraulic fracturing, resulting in the migration of drilling fluid to the surface, when fluidic pressure within the borehole exceeds the shear strength or cohesion of the strata. Predicting borehole fluid pressures over a wide range of project parameters that can be used as a guide to minimize the occurrence of hydraulic fracturing.

Pipe Stress Analysis is a model of the load and stress for an HDD application is different from similar analysis of conventionally buried or laid pipelines because of the relatively high tension loads, bending, and external fluid pressures. Pilot hole profiles and alignments must be designed such that construction loads, that may exceed design loads, are mitigated to eliminate damage. Installation loads and stresses are the primary focus of this tolerance including the interaction of tension, frictional drag, fluidic drag, unbalanced gravity, bending, and external hoop.

Geological Review

As described in CCI's, September 2008 report[3], two BGC Engineering Inc. studies were reviewed during the writing of this report. All relevant geophysical and geotechnical data was extrapolated from the investigated areas throughout the alignment options to provide a basis of a technical feasibility. The geotechnical and geophysical (seismic) investigation provided the majority of the relevant data necessary to conclude the technical feasibility of this all alignments on a geotechnical basis. Specifically, the three geotechnical boreholes (BGC06-01, 02, and 03) provided the necessary information to confirm HDD methodology with respect to the primary entry locations along the west bank (Shoreacres) and exit locations along the east bank (Glade Road area and north). Although actual conditions may vary significantly outside the geotechnical study area, it is assumed that the study would provide an adequate indication of subsurface conditions in order to conclude the technical feasibility of each option.

Two troublesome gravel areas defined for the west entry location (boreholes BGC06-03 and 02) with manageable silt and sand zones extending between them. The two zones as identified BGC06-02 were between 5 to 10 meters and the second extends to a depth of 18 to 23 meters. Casing installation was determined required to mitigate possible borehole collapse through both unconsolidated gravel zones. Most of the remaining drill alignments enter into bedrock (as inferred by geophysical) and remains in the bedrock until it nears the end of its transition to the final exit angle close to the eastern river bank.

A final troublesome zone is identified on the east bank location (north of Glade Road). This unconsolidated (gravel) zone identified by borehole BGC06-02 was found at a 25.5 meter to 27.5 meter depth. This zone is relatively thin and should be easily mitigated by typical or a-typical drilling fluid properties. At the projected HDD exit angles, the drilling assembly will pass through this zone within 5 meters

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[3] Kootenay River Reconnaissance and Preliminary Crossing Feasibility, CCI, September 10, 2008.

of the assembly length which it is highly unlikely that the available surface area of borehole would cause significant resistive force when combined with the properties of the drilling mud. Historical evidence strongly suggest that previous HDD activities[4] through very similar subsurface conditions posed little technical issues and progressed normally even with a-typical design characteristics.

Based on the inferred position of the bedrock, a mud motor assembly could be utilized for the entire drill path. However, given that the east bank subsurface conditions are mainly silt and sand, it is prudent to suggest that the contractor may elect to start with a jetting assembly and then change to a motor assembly when entering the bedrock.

Evaluation of the Various Alignments Proposed

Shoreacres South Alignment

The Shoreacres South HDD alignment has a 188° azimuth with an entry point on the east river bank where they the area has a lower slope (6% gradient, or 3.5°) and has good access on current roads. CCI Shoreacres South (Figure 1) shows the HDD drill plan for this proposal. Shoreacres South alignment was chosen after numerous iterations were tested.

The proposed Shoreacres South HDD specifications are summarized as follows:

Shoreacres South	
Arc Radii Entry Angle Exit Angle	300m 18° 18°
Relative Exit Angle (to surface topography)	17°
Invert Elevation	61m
Depth (thalweg) / Depth (maximum)	23m/41m
Entry Tangent Length	142.6m
Entry Arc Length	94.2m
Baseline Tangent Length	154.3m
1st Exit Arc	125.6m
1st Exit Tangent	35.2m
2nd Exit Arc Length	31.4m
2nd Exit Tangent Length	29.7m

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[4] Columbia River HDD, Castlegar, B.C., The Crossing Company Inc., September 2008.

Break-over Arc Radii	300m
Break-over Arc Maximum Height	10m
Total Horizontal Length	595.5m
Total Bore Length	613m
Pipeline Specifications (common to all alignments): Outside Diameter Wall Thickness Operating Pressure	 168.3mm Undefined 6619Kpa
Recommended Minimum Pipeline Wall Thickness	6.4mm
Recommended Pipeline Grade	359
Recommended Pipeline Coating	Fusion Bonded Epoxy (FBE)
Advantages	Disadvantages
• Alignment is straight providing for a simpler navigational setup. • The straight alignment allows for an increase in navigational positional accuracy given its simpler design. • Overall crossing length is the lowest possible increasing overall feasibility. • The south exit location has a less complicated logistical set-up.	• The exit location requires significant additional ROW and pipeline construction (approximately 700m) in extremely difficult and unstable terrain. • The Annular Pressure study shows a higher risk of drilling fluid fracture to the surface within the watercourse on the north and south banks. • The exit position located on the south provides little mitigation to loss of navigation or steering position due to its proximity to the watercourse. • The drill path transverses through a majority of silt/sand and is projected to cross through a thin gravel projected from BGC06-01 borehole. • There is no available ROW for drag-section.

Shoreacres South looking along alignment near south exit (past power lines) towards entry point (across river)

Shoreacres South Primary Risk Summary

A number of significant issues become apparent with the Shoreacres South alignment:

a) The annular pressure study shows increased risk to Induced Hydraulic Fracture directly to the water body at two critical locations. These points of fracture are extremely difficult to correct by any mitigation method.

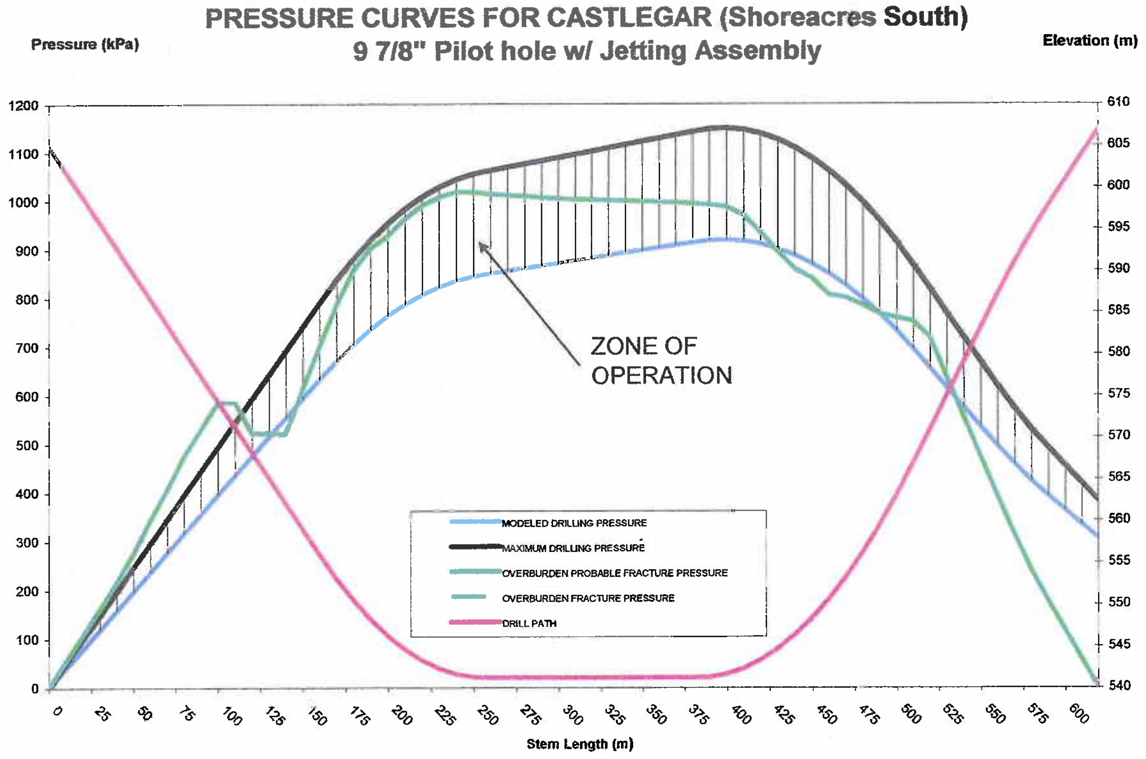
b) The south alignment would require additional open cut construction (approximately 700m) from the eastern aerial tie-in to the proposed HDD south alignment exit location. The additional open cut construction would require a new southern ROW running parallel to the south power line boundary and would greatly increase the cost of this replacement proposal given the extremely difficult terrain.

c) The additional ROW and open cut construction along the aggressive east side-slope from the existing pipeline ROW tie-in to the south exit location would be difficult to construct due to the undulating, 60% side-slope topography. Any conventional open-cut construction may not avoid further slope instability given its close proximity to the current bank movement.

d) The pipeline lay-down would require additional workspace required to facilitate the HDD installation which would need to be assembled on the east bank where there is no Terasen owned ROW. Furthermore, temporary workspace (TWS) would need to be constructed beyond the necessary ROW at an angle relative to the proposed HDD alignment.

e) This alignment may exit (or transverse through, depending on length) through a known archaeological site.

f) The available geological data on the south alignment does not provide quantitative proof of the absence of the gravel zones located on the northeast alignment. Due to the fact that the gravel zones on the northeast alignment should be mitigated by conventional means, the south alignment appears to provide no significant geological advantage.



Annular Pressure Graph (Figure 2)

Feasibility Conclusions

The Shoreacres South poses significant risk to the environment and technical failure. The Shoreacres South Alignment should be considered technically infeasible given known existing logistical, geotechnical, and physical constraints prohibit mitigation of elements, spaces, features, environment, or specifications which are necessary for new pipeline construction.

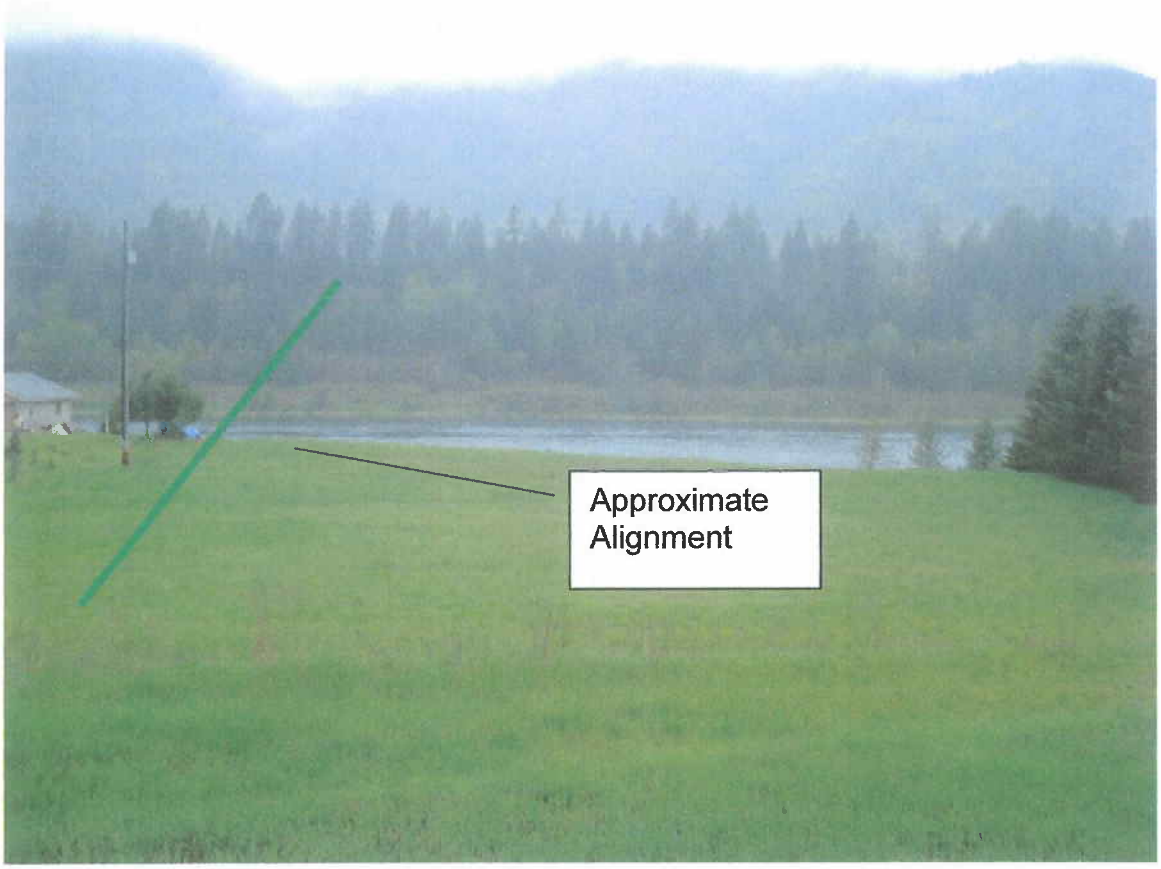
Lazaroff Alignment

The Lazaroff alignment (approximately 287° azimuth) originating near Glade road targets the existing Terasen ROW near the end of Lazaroff road. The topographical elevation gains 35m on the west side and therefore entry will be on the east and exit to the west.

The proposed Lazaroff HDD specifications are summarized as follows:

Lazaroff Alignment	
Arc Radii Entry Angle Exit Angle	300m 18° 18°
Relative Exit Angle (to surface topography)	13°
Invert Elevation	103.8m
Depth (thalweg) / Depth (maximum)	35m/49.5m
Entry Tangent Length	180.9m
Entry Arc Length	94.3m
Baseline Tangent Length	38.4m
1st Exit Arc	125.6m
1st Exit Tangent	129.6m
2nd Exit Arc Length	31.4
2nd Exit Tangent Length	15.3
Break-over Arc Radii	300m
Break-over Arc Maximum Height	6m
Total Horizontal Length	615.9m
Total Bore Length	645.5m
Advantages	**Disadvantages**
• Alignment is straight providing for a simpler navigational setup. • The straight alignment allows for an	• The exit location would be adjacent to the current Terasen ROW and has significant logistical obstacles

increase in navigational positional accuracy given its simpler design. • The east entry location has a simpler logistical set-up.	to overcome. • The exit HDD drag section would require assemble along existing ROW and would need numerous road restrictions or closures. • The Annular Pressure study shows a higher risk of drilling fluid fracture to the surface within the watercourse and east banks. • The entry position provides little mitigation to navigational proximity issues.

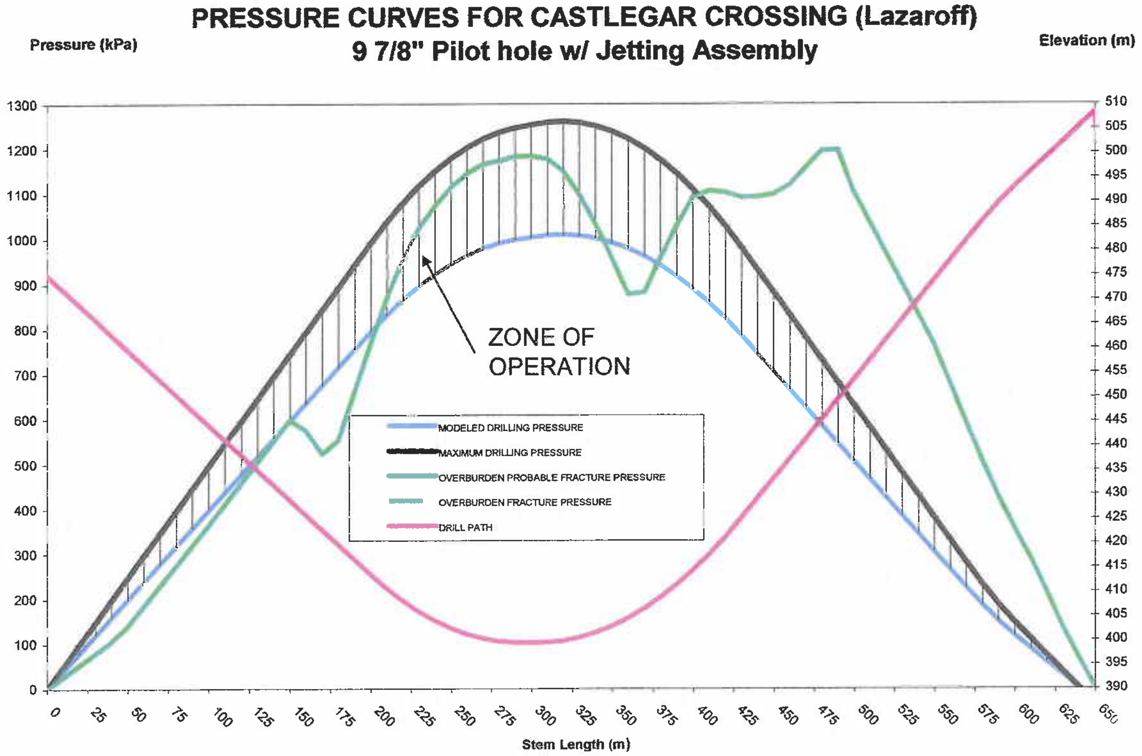


Looking along alignment near south entry (adjacent to Glade Road) towards entry (past tree line)

Lazaroff Significant Risk Summary

A number of significant issues become apparent with the Lazaroff alignment:

a) The annular pressure study shows increased risk to Induced Hydraulic Fracture within the extents of the water course. The restricted logistics of this alignment provides for little mitigation for surface drilling fluid fracture and/or loss of drilling fluid management. These locations would be extremely difficult to correct by any means and may not be possible to mitigate environmental effects.
b) The Lazaroff alignment would also require additional pipelining (approximately 1000m) from the eastern aerial tie-in to the proposed HDD south alignment exit location. The additional pipelining would require a new southern ROW running parallel to the south hydro power line boundary and would greatly increase technical difficulties given the extreme terrain.
c) The additional ROW and pipelining along the aggressive east side-slope from the existing tie-in to the south exit location would be difficult to construct due to the undulating, 60% side-slope topography. Any conventional open-cut construction may not avoid further slope instability given its close proximity to current bank movement near the east aerial bank structure.
d) The necessary pipeline lay-down workspace required to facilitate the HDD installation would need to be assembled along the Terasen ROW, south of Lazaroff Road. Pipe handling during pullback would require significant TWS in order to facilitate installation into the borehole within pipe stress specifications.
e) The available geological data on the south alignment does not provide quantitative proof of the absence of the gravel zones apparent on the northeast alignment. Due to the fact that the gravel zones on the northeast alignment should be mitigated by conventional means, the south alignment appears to provide no significant geological advantage.



Annular Pressure Graph (Figure 3)

Conclusions

The Lazaroff alignment poses significant risk to the environment and technical failure. The Lazaroff Alignment should be considered technically infeasible given known existing logistical, geotechnical, and physical constraints which prohibit mitigation of the technical risks previously identified which are necessary for new pipeline construction. This alignment poses significant risk to the environment and technical failure and should not be considered feasible given the available data.

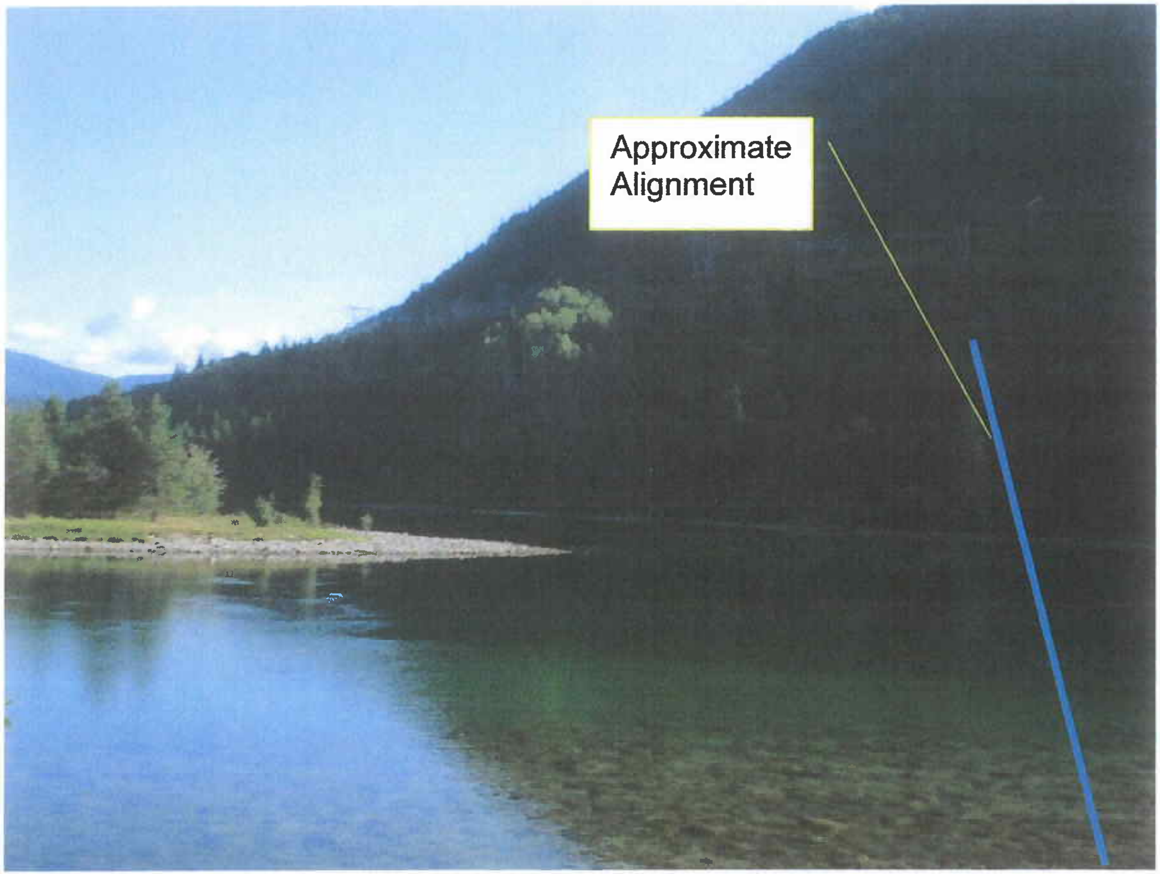
Shallow Angle Alignment

The Shallow Angle Alignment (approximately 71° azimuth) from the aerial tie-in targets the east river bank with large to extreme slopes (up to 83% gradient, or 40°) and only has a light trail access. Numerous iterations were tested within this general alignment with a final alignment chosen given its practical specifications.

The proposed Shallow Angle" HDD specifications are summarized as follows:

Shallow Angle	
Arc Radii Entry Angle Exit Angle	300m 18° 33°
Relative Exit Angle (to surface topography)	23°
Invert Elevation	123m
Depth (thalweg) / Depth (maximum)	43m/62m
Entry Tangent Length	127m
Entry Arc Length	94m
Baseline Tangent Length	190.2m
1st Exit Arc	174.3m
1st Exit Tangent	151.8m
2nd Exit Arc Length	23m
2nd Exit Tangent Length	26m
Break-over Arc Maximum Height	12m
Total Horizontal Length	695m
Total Bore Length	736m
Advantages	**Disadvantages**
• Low to moderate overall risk assessment. • Alignment is straight providing for a simpler navigational setup. • The straight alignment allows for an increase in navigational positional accuracy given its simpler design. • The drill path transverses through a majority of silt/sand and is projected to cross through a thin gravel projected from BGC06-01 borehole. • Overall crossing length is the least possible, increasing overall feasibility.	• The exit position located on the northeast plateau requires a larger amount of excavation for HDD construction and pipeline tie-in. • The Annular Pressure study shows a higher risk of drilling fluid fracture to the surface near the north-east river bank and hill. • The exit position located on the northeast plateau provides little mitigation to loss of navigation or steering position. • The exit position located on the northeast plateau requires the greatest amount of pipe-handling planning and equipment and therefore an increase risk of handling damage and costs. • The HDD exit angle is higher than typical design adding to pilot-hole

	positional difficulties. • The HDD alignment crosses partially across the Slocan River into the north section of Shoreacres. This may require additional ROW.



Looking near alignment on west bank (near entry) towards exit (just below hydro-line)

Shallow Angle Significant Risk Summary

A number of significant issues became apparent with the Shallow Angle alignment assessment:

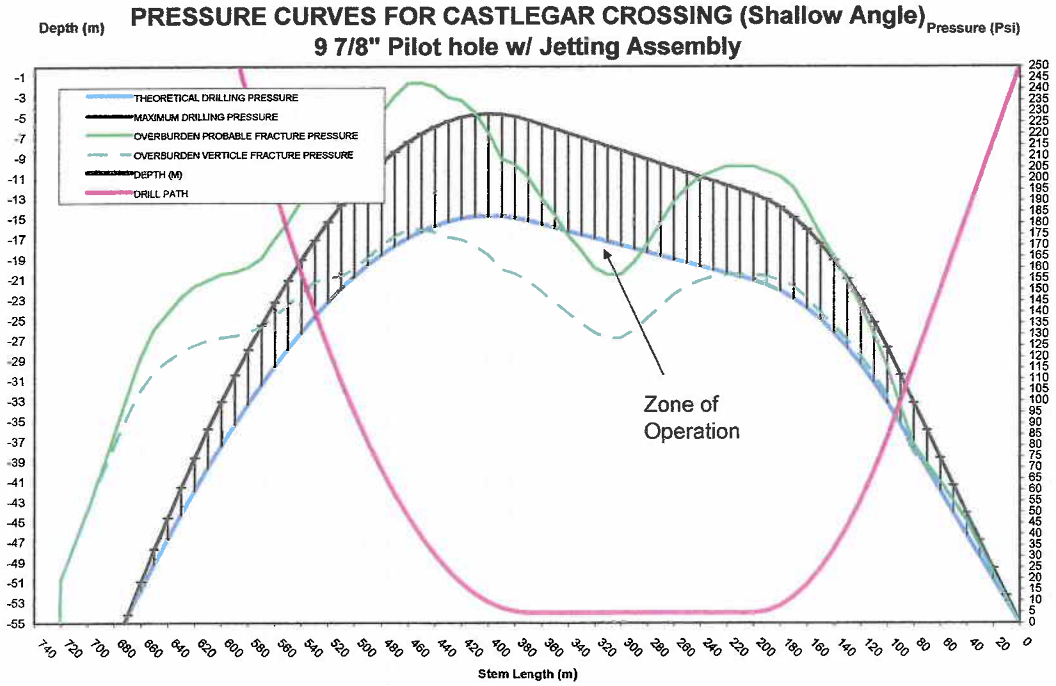
a) The Annular Pressure (AP) calculations have shown that the maximum achievable HDD profile has a risk to drilling fluid hydraulic fracture directly to the water body and surface within the toe and hill of the north-east slope. The technical and environmental effects would be extremely difficult (if not impossible) to mitigate if such an event was to occur.

b) Within the exit location on the east slope, a large complex break-over arc radius will have to be maintained up to 12 meters in the air during the pipe pullback within a difficult topography. This pipe handling will require a higher level of planning, support, and oversight to ensure that damage does not occur to the line and that it is handled safely in the difficult terrain adjacent to the high voltage power lines. An estimated break-over height of 12 meters will require a minimum of a large track-hoe with a boom capable of such heights or a crane that can be mobilized to the exit location.

c) An a-typical exit angle of 33 degrees poses some risk to the pilot hole navigation and positional control. If navigation and/or positional control is compromised, a risk of missing the exit location may occur. This is significant in that this position will require prior excavation and preparation and cannot allow for large changes in HDD exit location. Furthermore, a major change in exit position toward the hydro-power line R/W would mean a more difficult or infeasible pullback.

d) The necessary pipeline lay-down workspace required to facilitate the HDD installation would need to be assembled along the Terasen ROW within aggressive undulating slopes.

e) The available geological data on the south alignment does not provide quantitative proof of the absence of the gravel zones apparent on the northeast alignment. Due to the fact that the gravel zones on the northeast alignment should be mitigated by conventional means, the south alignment appears to provide no significant geological advantage.



Annular Pressure Graph (Figure 4)

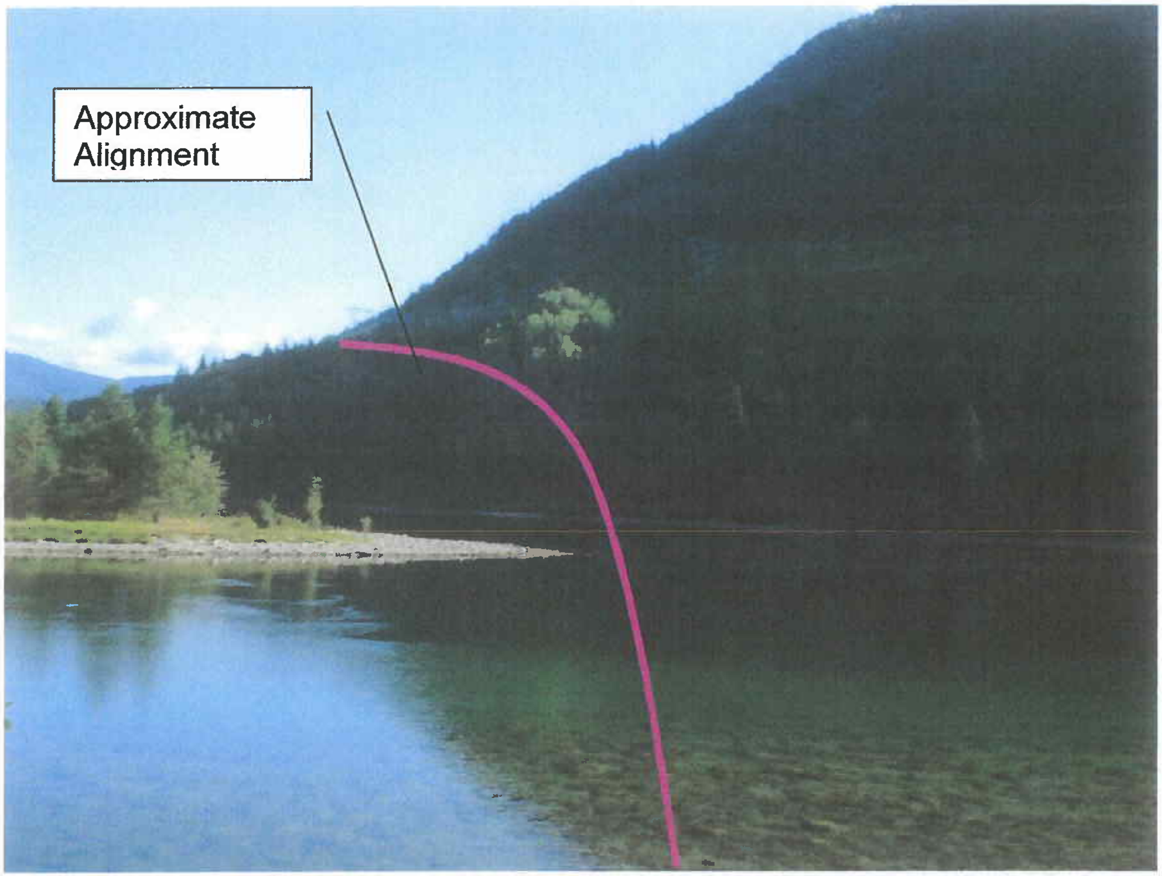
Conclusions

The Shallow Angle alignment poses significant risk to the environment and technical failure. The Lazaroff Alignment should be considered technically infeasible given known existing logistical, geotechnical, and physical constraints prohibit mitigation of elements, spaces, features, environment, or specifications which are necessary for new pipeline construction. The total length of the crossing

Large Angle

The Large Angle alignment (approximately 55° azimuth) from the aerial tie-in targets the east river bank with moderate to large slopes (up to 53% gradient, or 28°) and has good trail access. Numerous iterations were tested within this general alignment with a final alignment chosen given its practical specifications. The proposed Large Angle HDD specifications are summarized as follows:

Large Angle	
Arc Radii Entry Angle Exit Angle	300m 18° 17°
Relative Exit Angle (to surface topography)	17°
Invert Elevation	131m
Depth (thalweg)	41m
Entry Tangent Length	129m
Entry Arc Length	94m
Baseline Tangent Length	174m
Exit Complex Arc	287m
Exit Complex Arc Azimuth Turn	128°
Exit Complex Arc Vertical Turn	17°
Exit Tangent	194m
Break-over Arc Radii	90m
Break-over Arc Maximum Height	6m
Total Horizontal Length	Undefined in 2D
Total Bore Length	878m
Advantages	Disadvantages
• The exit position located on the northeast plateau provides for the maximum mitigation to loss of navigation and control. • The exit position located on the northeast plateau requires the least amount of excavation for HDD construction and pipeline tie-in. • The exit position requires the least amount of pipe-handling and equipment and therefore decreases the risk of handling damage. • The exit angle is typical and is considered low risk in navigational control. • The Annular Pressure study shows a lower risk of drilling fluid fracture to the surface anywhere along the drill path profile.	• The alignment is complex increasing the navigational setup and difficulty. • The complex alignment decreases positional accuracy. • This overall crossing length is the 2nd largest and therefore inherently poses an increased risk. • The drill path transverses through a majority of silt/sands and is projected to cross though a thin gravel projected from BGC06-01 borehole with a complex design. • Some loss of differential pressure at the bit face may occur reducing forward momentum as drill pipe key-seating increases friction.



Looking near curved alignment on west bank (near entry) towards exit (just below hydro-line)

Large Angle Significant Risk Summary

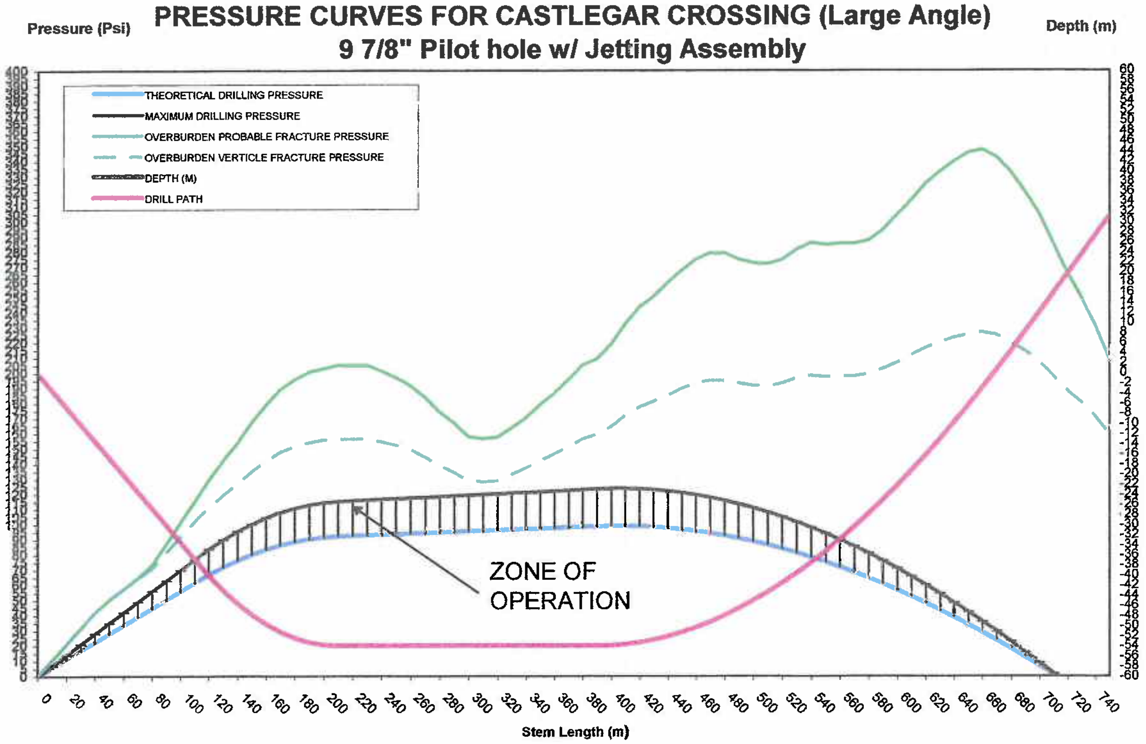
A number of significant issues become apparent with the Large Angle alignment:

a) Some risks are associated with the complex design. The HDD bore path will need to turn vertically and horizontally at the same time. This process of steering is not indifferent from any other type of directional drilling and therefore is no more difficult; however the navigational setup requires a higher level of complexity and skill to operate and may introduce positional errors if done incorrectly.

b) The overall drill distance is the 2nd longest of all alignments. This increase in length inherently poses an additional risk as longer HDD's typically are more problematic. The overall length however is still considered moderate in current standards.

c) An additional risk is the drill path will transverse through the identified gravel zone (BGC06-01) within its complex arc. This may pose some difficulty to the Bottom Hole Assembly (BHA) in that the distance to travel through this zone will be slightly longer than what is needed in any other option. As this distance is increased by only 2 meters (relative to straight alignment), this risk is expected to be small. Furthermore, the large complex arc may introduce bending forces vectored away from the pilot hole direction increasing the friction of the drill pipe on the annulus (key-seating) causing loss of bit pressure on the formation (differential pressure). This may reduce the footage rate production of the rig and some navigational control.

d) The necessary pipeline lay-down workspace required to facilitate the HDD installation would need to be assembled along the Terasen ROW within moderate undulating slopes.



Annular Pressure Graph (Figure 5)

Conclusions

The Large Angle alignment poses the least technical and environmental risk than all studied alignments. Given the available data, all known significant technical issues can be mitigated by currently understood HDD mitigation techniques and therefore should be considered technically feasible.

Shoreacres North Alignment

The Shoreacres North alignment (approximately 72° azimuth) targets the east upper plateau with a general flat slope (2% gradient, or 3.5°) and has easier access given the current roads. With a 153m elevation gain on the east side, the alignment must occur from entry on the west and exit on the east. The proposed Shoreacres North HDD specifications are summarized as follows:

Shoreacres North Alignment	
Arc Radii Entry Angle Exit Angle	300m 18° 18°
Relative Exit Angle (to surface topography)	5°
Invert Elevation	97m
Depth (thalweg) / Depth (maximum)	35m/35m
Entry Tangent Length	267.7m
Entry Arc Length	94.3m
Baseline Tangent Length	66.1m
1st Exit Arc	157.1m
1st Exit Tangent	355.8m
2nd Exit Arc Length	62.8m
2nd Exit Tangent Length	22.7m
Break-over Arc Radii	300m
Break-over Arc Maximum Height	4m
Total Horizontal Length	950.4m
Total Bore Length	1026.5m
Advantages	Disadvantages
• Moderate overall risk assessment. • Alignment is straight providing for a simpler navigational setup. • The straight alignment allows for an increase in navigational positional accuracy given its simpler design. • The drill path transverses through a majority of silt/sand and is projected to cross through a thin gravel projected from BGC06-01 borehole with a straight alignment design.	• The exit position located on the east upper plateau requires working around the Hydro power line ROW for HDD construction and pipeline tie-in. Break-over operations require mitigation. • The Annular Pressure study shows a higher risk of drilling fluid fracture to the water body surface near the east river bank and hill. • The exit position located on the east plateau requires the largest pipe-

	handling setup and therefore an increase risk of handling damage and costs. • The overall length is the greatest of all the alignments increasing the potential of technical failure.

Shoreacres North Significant Risk Summary

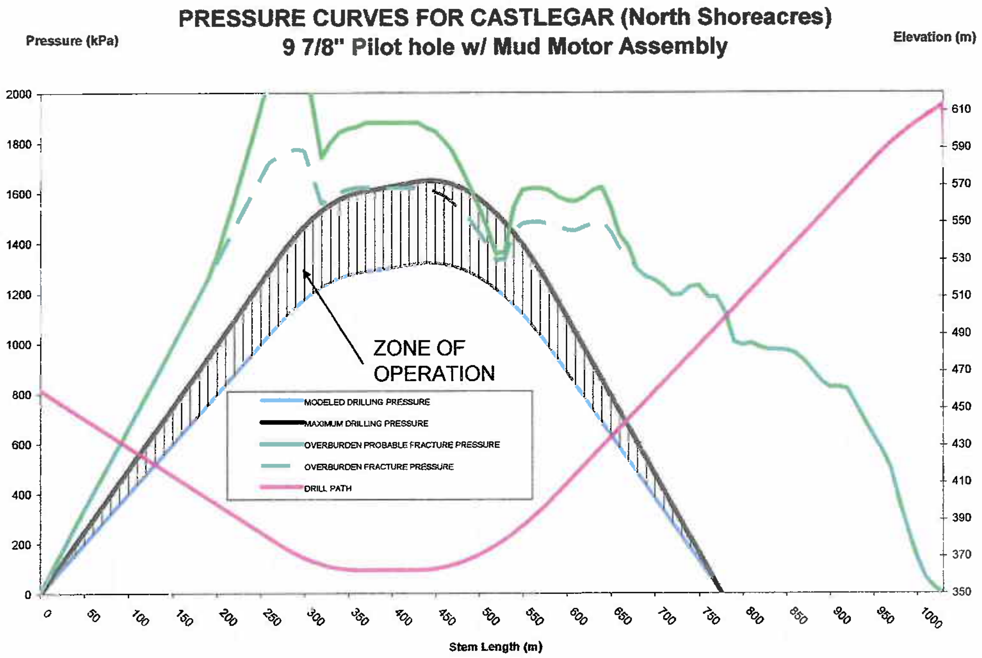
A number of significant issues become apparent with the Shoreacres North alignment:

a) The overall length of the crossing is the greatest of all alignments. This is due to the set-back requirements of AP model and the logistics of the exit location in close proximity to the multiple high voltage power lines and ROW's. The minimum length at 1026m, although moderate in typical bedrock designs, becomes increasingly technically difficult in silt/sand.

b) The Annular Pressure (AP) calculations have shown that the maximum achievable HDD profile has some risk of hydraulic fracture to the water body within the east bank area and toe of slope. Although this area of concern is small in comparison to other alignments, its potential is high and its specific location would be difficult to mitigate.

c) The necessary pipeline lay-down workspace required to facilitate the HDD installation would need to be assembled beyond the power line ROW's (east of intersection of power ROW and Terasen ROW) along the Terasen ROW within moderate undulating slopes.

d) The entry location would require an approximate 2kms of additional pipeline and ROW throughout the Shoreacres residential community to the north. This proposal would be extremely technically challenging given the land-owner proximity and current infrastructure.



Annular Pressure Graph (Figure 6)

Conclusions

The Shoreacres North alignment poses a significant risk to the environment and technical failure. The Shoreacres North alignment should be considered technically infeasible given known existing logistical, geotechnical, and physical constraints.

Technical Feasibility Summary

Shoreacres South	Technically Infeasible
Lazaroff	Technically Infeasible
Shallow Angle	Technically Infeasible
Large Angle	**Technically Feasible**
Shoreacres North	Technically Infeasible

Cost Estimate for Large Angle

The estimated cost for the HDD construction, based on the available data is [redacted] for the 878 meter for the Large Angle Alignment. The estimate includes [redacted] for off-site, facility disposal of all drilling fluid and cuttings (based on latest approvals/estimates). Remote facility disposal was selected based on the current understanding of available agricultural land and possible land-spray/mix-bury sites. Future assessments will attempt to garner approvals for alternative disposal methodologies that may provide significant cost savings.

Estimated pricing only defines the HDD contractor's scope of work and does not include:

a) Site preparations
b) Access / towing
c) Pipeline procurement, assembly, coating, testing, and handling
d) Additional pipeline equipment / support (side booms, rollers, lighting, etc)
e) Pipeline tie-in
f) Third party costs (Engineering, Inspection, Environmental Assessments/Approvals and monitoring, etc.)

Respectfully submitted,

Ed Douziech
Project Manager
Complete Crossings Inc. (CCI)

Reviewed by:

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
B. K. GOERZ
33825

Brent Goerz
V.P. of Engineering
Complete Crossings Inc. (CCI)

Definitions

Annular Pressure (AP)	The fluid pressure acting on the formation measured in the space between the drill stem and the wall of the borehole.
Arc	Curved section at a predetermined radius of curvature.
Atterberg Limits	The liquid and plastic limits of a fine-grained soil that provide details of its non-plastic, plastic and fluid states. This provides information on the volume change of a material as the moisture content is increased.
Azimuth	Direction change in the horizontal plane.
Bottom Hole Assembly (BHA)	Tools used in directional drilling that includes bit, bent sub, mud motor, steering tool, annular pressure tool, and all other connections to provide directional control, information gathering, and drilling power that lets the drill progress through the formation.
Borehole	The area of earth removed from the surface entry point to the end of the drilled portion.
Build rate	The increase/decrease of degrees per specific length.
Casing	Surface pipe that is installed through unstable geotechnical areas to provide a conduit for the down-hole tools and drilling fluid.
Drill stem	Steel drill pipe that is approximately 10 meters long / 4 to 6 inches in diameter used to control and transfer fluid in a directional drill.
Drill bit	A device that cuts into the formation and progresses the borehole.
Dogleg Severity	The difference of inclination/azimuth for any three joint section.
Down-hole tool	Any tools that are used at the end of the drill string to physically complete the bore and to provide directional and other information.
Hydraulic fracture	The process of annular pressure opening a fracture or inducing an existing fracture in the formation during the drilling process.
Inclination	Direction change in the vertical plane.
Measured	Length of the borehole measured along the bore path depth from the surface to the bottom of the borehole.
Monel	Non-magnetic drill stem used in the bore hole in order to isolate the steering/guidance tool from magnetic interference.
Mud motor	A mechanical device that transforms hydraulic power to mechanical power in order to turn the drill bit and progress the borehole.
"No Drill Zone"	An area below and to each side of the banks as outlined by the

	investigating engineer to allow for an adequate barrier under the water body and into the banks.
Pipe Break Over	A length of product pipe required to deflect in order for the pipe section to align with the borehole exit angle.
Pipe Pullback	The procedure of installation of the product pipe into a properly sized borehole.
Penetration rate-	The distance of advance of a drill bit / reamer in a specific period of time.
Pilot hole	The initial borehole drilled through the formation. Usually between 6 ¾" and 12" in diameter.
Product pipe	Pipe to be installed through the borehole at the completion of the HDD drill to carry product through the crossing location.
Pull-head	A device welded onto the product pipe section that is used to connect the drill pipe, swivel and rig to the product pipe section for pulling the drill pipe through the completed bore.
Radius of curvature	The arc length multiplied by the degrees of arc in radians.
Reaming pass	The subsequent pass(es) through the pilot hole to widen the diameter to the required size for pulling the product pipe.
Steering/guidance	Specific tools that provides steering direction information to the tool operator or directional driller.
Swivel	A device positioned in between the product pipe and the drill string that allows rotation of the drill stem but not the product pipe as tension is applied from the drill rig during the installation of the pipeline into the borehole.
Tangent	Straight section on each end of the arcs along the bore path trajectory.
Total Vertical Depth (TVD)-	Depth measured from the entry point vertically.

Codes, Practices, and Guidelines

B.C. Oil and Gas Commission
CSA Z662 Oil and Gas Pipeline Guidelines (2007)
American Gas Association Guidelines
Fisheries Act Water Course Crossings (Second edition Canadian Pipeline Water Crossing Committee, Nov. 1999)
Navigable Waters Protection Act

Appendix E

HDD GEOTECHNICAL INVESTIGATION FOR KOOTENAY RIVER CROSSING, BGC ENGINEERING

DEC 18, 2009

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

TERASEN GAS INC.

SHOREACRES

HORIZONTAL DIRECTIONAL DRILLING GEOTECHNICAL INVESTIGATION FOR KOOTENAY RIVER CROSSING

FINAL REPORT

PROJECT NO: 0093-076

DATE: December 18, 2009

DISTRIBUTION:

Terasen	3 copies
BGC	3 copies

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY
#500-1045 Howe Street
Vancouver, B.C.
Canada V6Z 2A9
Tel: 604.684.5900
Fax: 604.684.5909

December 18, 2009

Project No. 0093-076

Mr. Neil Bolger, P.Eng
Terasen Gas Inc.
16705 Fraser Hwy
Surrey BC, V3S 2X7

Dear Mr. Bolger,

Re: **Horizontal Directional Drilling Geotechnical Investigation for Kootenay River Crossing**

Please find attached three copies of our above referenced report dated December 18, 2009. We would like to take this opportunity to thank you for allowing our participation in this project. If you have any questions about this report, the project in general, or any other topic that we may be able to assist you with, please do not hesitate to contact us.

Yours sincerely,

BGC ENGINEERING INC.
per:

Dr. Alex Baumgard, P.Eng., P.Geo.

Senior Geotechnical / Environmental Engineer

AB/mb

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LIMITATIONS

BGC Engineering Inc. (BGC) prepared this document for the account of Terasen Gas Inc. The material in it reflects the judgment of BGC staff in light of the information available to BGC at the time of document preparation. Any use which a third party makes of this document or any reliance on decisions to be based on it is the responsibility of such third parties. BGC accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this document.

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1.0 INTRODUCTION

1.1. Background

BGC Engineering Inc. (BGC) understands that Terasen Gas Inc. (Terasen) intends to replace their Kootenay River (Shoreacres) aerial pipeline crossing, located approximately 20 km north of Castlegar BC. The eastern approach of the aerial crossing is subject to local instabilities which result in an increased risk of pipeline failure. To reduce this risk, Terasen is considering relocating the crossing by horizontal directional drilling (HDD) beneath the Kootenay River.

An initial geotechnical feasibility study was carried out at the Kootenay River crossing as part of a preliminary HDD route being decided upon by Terasen (BGC 2008). The 2009 revised route alignment proposed by Terasen places the HDD beginning near to the current tower location on the western approach of the aerial crossing that then passes under both the Slocan River and Kootenay River exiting approximately 700 m to the north of the current pipeline location on the eastern approach. In order to further assess the viability of this proposed HDD route and to advance into detailed engineering design, additional subsurface information was requested by Terasen.

1.2. Scope of Work

BGC's scope of work was to carry out deeper and more extensive investigations of the subsurface conditions along the eastern approach of the proposed Kootenay River HDD path at sites agreed upon with Terasen. The purpose of this investigation was to determine if the subsurface lithology is favorable for constructing the proposed HDD crossing along the east shore and beneath the Kootenay River. The results of the investigation will assist in providing geotechnical information to Terasen's pipeline designers as well as form part of a bidding information package for HDD contractors.

Authorization to proceed with the work was received from Terasen on August 31, 2009 under the purchase order 4500031612.

In order to carry out this project and as part of the agreed upon scope of work, the following methodology was adopted:

1. Obtain soil and rock geotechnical properties with depth from boreholes and geophysical information.
2. Create a refined interpreted stratigraphic section along the proposed HDD right-of-way (RoW) incorporating changes to the route from the 2009 route revision.

2.0 SITE INVESTIGATION

A detailed field investigation consisting of mud-rotary drilling, diamond drilling, and geophysics was conducted along the proposed HDD route and the existing Terasen pipeline Right-of-Way (RoW). Contractors from Geotech Drilling Services Ltd. based in Prince George, BC, and Frontier Geosciences Inc. based in North Vancouver, BC, were contracted to complete the drilling and geophysical surveys respectively. Acme Excavating Ltd. was contracted to build drill pads and assist moving the drill up the steep access road and Sorensen Excavating transported drilling water to the site.

During the field investigation, Michael Beaupre, E.I.T., provided full-time basis site supervision and Dr. Alex Baumgard, P.Eng, P.Geo, visited the site on September 23, 2009 along with Mr. Neil Bolger, P.Eng and Mr. David Kan, P.Eng of Terasen.

Prior to drilling, Hinterland Surveying & Geomatics Inc. and a Terasen inspector located the Terasen RoW and all utilities. BC One Call provided verbal conformation that no additional registered utilities were present at the borehole sites.

2.1. Geotechnical Drilling Investigation

Three boreholes were drilled on the existing Terasen RoW located to the north of the current Kootenay River crossing between September 17th, 2009 and October 2nd, 2009. Locations of the boreholes are shown in Drawing 1 and the detailed borehole logs are provided in Appendix II.

Soil and rock samples obtained from standard penetration testing (SPT) and diamond drilling were photographed and logged using the visual soil and rock classification in accordance with Canadian industry standards (CFEM 2006). All soil samples were retained, and select samples were sent to a laboratory for soil index testing. The rock core that was not sampled was transported to the Terasen fenced yard enclosure located on the west side of the Kootenay River for storage. Photographs of the collected soil samples and cored rock are provided on a CD included with a hard copy of this report. The location of each borehole was recorded with a handheld GPS with accuracy at or better than ± 10 m.

2.1.1. BGC09-01

BGC09-01 is located approximately 300 meters to the north of the current aerial crossing (Drawing 1). It was drilled from September 19th to 23th, 2009 and proceeded to a depth of 76.3 m without incident. BGC09-01 was drilled in a similar location to BGC06-01. The purpose of BGC09-01 was to determine the soil stratigraphy at the revised depth of the HDD crossing (as BGC06-01 had been previously terminated at 28.7 m). Shallow SPT samples were not taken in borehole BGC09-01 due to its similar location and soil stratigraphy to BGC06-01.

The first 3 m of BGC09-01 consisted of an interbedded sand and silt. Immediately below this was a poorly graded fluvial sand unit to 8.1 m, followed by uniform low plastic silt unit to 26.1 m. A well graded layer of dense gravels occurs from 26.1 m until 27.8 m. This gravel layer is underlain by well graded sand that sits overtop of bedrock that occurs at 29.6 m. The bedrock encountered in BGC09-01 consists of two units which includes a metamorphosed volcanic Rhyolite and volcanic Dacite. The foliated metamorphosed Rhyolite makes up the majority of the underlying bedrock; however, the volcanic Dacite occurs as what are interpreted to be several dikes, with a maximum thickness of 4 m, between depths of 32.6 m and 58.5 m. Below 58.5 m until the end of the hole at 76.3 m, the metamorphosed Rhyolite is again present. The rock quality designation (RQD) varies from 75 to 100 % for the section of the proposed HDD crossing and recovery was good throughout the hole. Some 0.1 to 0.2 m fault zones were noticed in the underlying bedrock with the highest concentration between depths of 61.5 m and 65.1 m. The faults appear to be related to local failures along joint planes as no major sections of highly fractured rock were encountered.

After the target depth of the borehole was achieved, the drill casing became locked within the underlying gravel unit. The approximate depth to groundwater on September 23rd, 2009 was 5.2 m; however, artesian conditions developed with the casing two days after the target depth of the borehole was achieved. After the casing was pulled, the borehole was filled with a bentonite cement.

2.1.2. BGC09-02

Drilling of BGC09-02 commenced on September 25th, proceeded through to September 30th 2009, and reached the target depth of 75.7 m without incident. Due to a broken SPT hammer, SPT's were not taken on the initial borehole. Once the target depth was achieved and the SPT hammer was fixed, a second parallel borehole was drilled with a 1 m offset to the first hole and SPT's were completed in the upper soil section. SPT samples were taken at 1.5 m intervals with the exception of samples taken at 3 m intervals in the thicker gravel layer that occurs between the approximate depths of 4.5 m and 8.95 m.

The first 3.9 m consists of a sandy silt which is underlain by a dense sand and gravel to a depth of 4.5 m. Immediately below this was a gravel layer that increases in cobble and boulder content with depth until 8.95 m, followed by a gravel and sand layer to 13.1 m. A very dense gravel layer occurs from 13.1 m until the bedrock contact at 14.49 m. Similar to BGC09-01, the underlying bedrock consists of a metamorphosed volcanic Rhyolite and a volcanic Dacite. Several Dacite dikes are interpreted to occur that are approximately 2 m thick, at depths of 15.75 m and 34.1 m whereas a 7.75 m thick dike occurs at 41.75 m. The remaining section from 49.5 m until the end of the hole at 75.7 m consists of the foliated metamorphosed volcanic Rhyolite. The RQD varies from 70 to 100 % for the section of the proposed HDD crossing. Recovery was good throughout the borehole and varied from 80 to 100 %. Several 0.1 to 0.2 m fault zones were noticed starting at a depth of 18 m and with a spacing of approximately 10 m. The faults had minor clay gouge and appear to be due to local failures along joint planes.

The borehole was terminated upon reaching the target depth of 75.7 m. The approximate depth to the water table on September 30th, 2009 was 4.6 m below the ground surface. After the completion of the hole, it was filled and sealed with a bentonite cement.

2.1.3. BGC09-03

BGC09-03 was drilled from October 2nd, to 3rd, 2009 to a final depth of 19.3 m. Based on the trend of the depth to bedrock along with consistency and type of rock encounter in the two previous drill holes, BGC09-01 and BGC09-02, a decision was made with Terasen to terminate BGC09-03 once 10 m of bedrock was drilled. SPT samples were taken at 1.5 m intervals until bedrock was encountered.

The first 0.5 m of BGC09-03 consisted of colluvial/fill material containing well graded sands and gravels. Below this layer, low plastic silt occurs to 6.4 m, which is then underlain by a 0.3 m thick layer of well graded sands and gravels. Bedrock, consisting of the previously mentioned volcanic Dacite, was encountered at a depth of 6.7 m below the ground. A large Quartz dike, up to 2.7 m in length, started at 14.2 m and the remaining section of the borehole consists of the overlying volcanic Dacite.

Upon completion of the hole at 19.3 m, it was filled and sealed with a bentonite cement. Groundwater was not encountered during the drilling of BGC09-03.

2.2. Laboratory Testing

Laboratory testing was performed on select SPT and rock core samples by Golder Associates of Burnaby, BC. Grain size analyses and Atterberg Limits tests were completed to determine representative engineering properties of the soil. Uniaxial Compression Tests were completed to determine the strength of the underlying rock. Sample depths are shown on the borehole logs found in Appendix II and the lab results are provided in Appendix III.

2.2.1. Grain Size Analysis

Grain size distributions for representative sediment units were determined in accordance with ASTM standard D422.

Table 1 presents a summary of the grain size analyses and Figure 1 shows the grain size distributions.

Table 1 Results of Grain Size Analysis

Borehole	Sample	Depth from (m)	Depth to (m)	USCS	Grain Size (%)			
					Gravel	Sand	Silt	Clay
BGC09-02	Grab 2	8.2	9.11	GW/SW	49.9	34.3	15.8 (fines)	
	SPT 2	3.05	3.5	CL - ML	7.4	22.6	61.5	8.5
	SPT 4	7.62	8.07	GW	65.8	21	13.2 (fines)	
	SPT 5	10.67	11.12	GW/SW	52	33.4	14.6 (fines)	
	SPT 6	13.14	13.59	GW	71.1	17.8	11.1 (fines)	
BGC09-03	SPT 2	3.05	3.5	ML	0	4	91	5
	SPT 3	4.57	5.02	ML	0	2	90	8

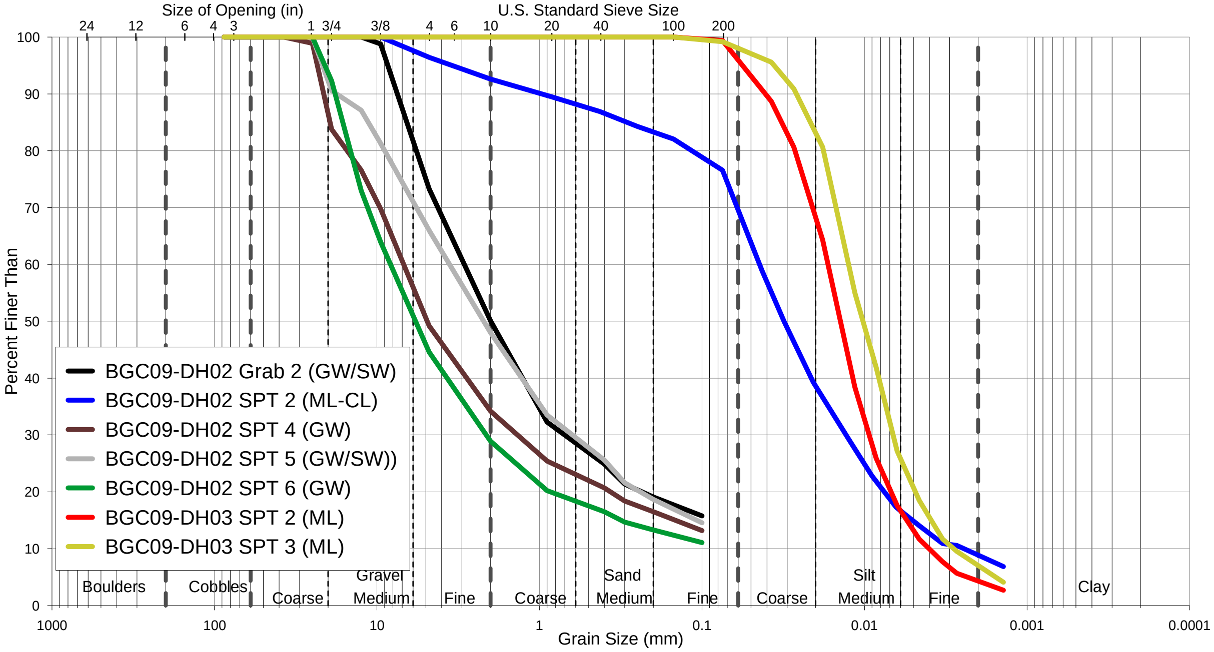


Figure 1 Grain Size Curves from the 7 Tested Samples

The grain size curves of the well graded gravel and sand (GW/SW) samples are relatively shallow lying, which indicates a wide range of sediment sizes often found in fluvial deposits. The steeper curve of the well graded gravels (GW) is due to the lack of sand found in the above samples.

The three finer grained silt (ML) and sandy silt (ML-CL) samples are found to the right in the graph. The sandy silt (CL-ML) sample contains a higher percentage of sand when compared to the cleaner silt (ML) samples which results in a shallower gradation curve and ultimately a wider range of sediment sizes.

2.2.2. Atterberg Limits Test

Atterberg limits test according to ASTM standard D4318 was completed for the fine grained samples. Table 2 below summarizes the Atterberg limits test.

Table 2 Results of the Atterberg Limits Test

Borehole	Sample	Depth from (m)	Depth to (m)	Water Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Plasticity
BGC09-02	SPT 2	3.05	3.5	21	24	20	4	CL - ML
BGC09-03	SPT 2	3.05	3.5	21	31	26	5	ML
	SPT 3	4.57	5.02	36	37	30	7	ML

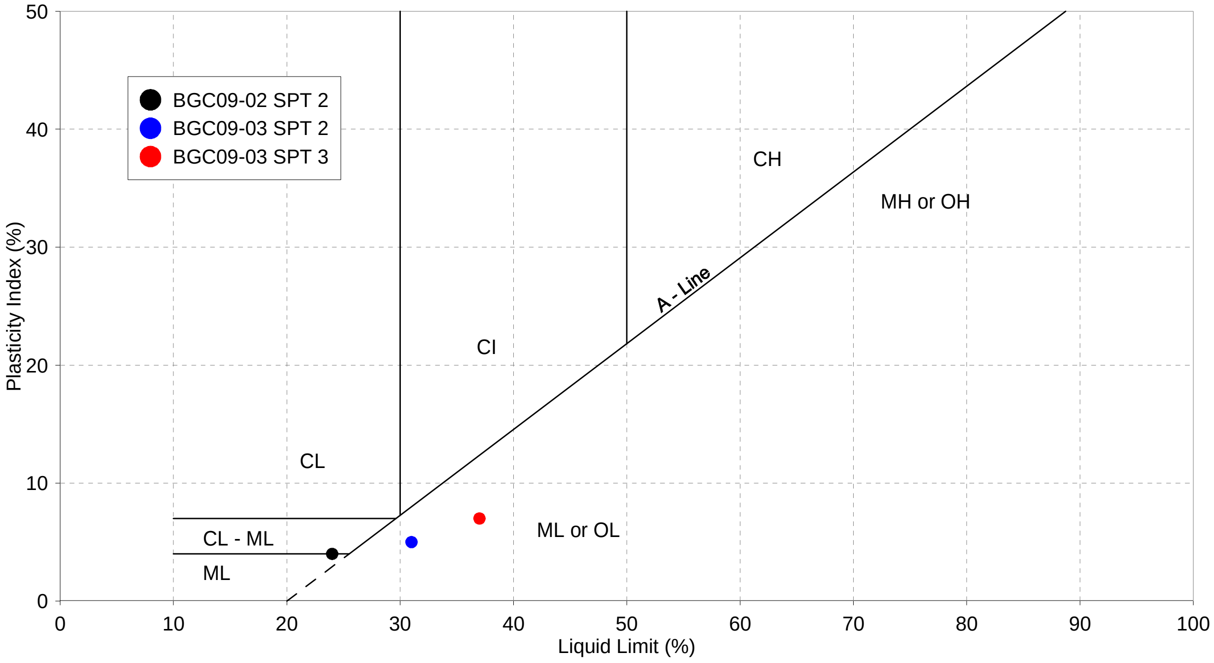


Figure 2 Plasticity of Selected Samples

The results of the Atterberg limits test for the three fine-grained samples are shown graphically above in Figure 2. The fine-grained soils are classified as silts with low plasticity as they plot on or below the A-Line on the above graph. From an engineering perspective, these low plastic silts will not pose significant problems such as volume expansion, excessive caving provided that adequate wall support is maintained, or be overtly hard during drilling.

2.2.3. Uniaxial Compression Test

A total of 12 Uniaxial Compression Test's (UCT) were completed according to ASTM standard D7012. Table 3 found below provides the results from the UCT on the selected rock samples from various borehole locations.

Results from the UCT's on the selected samples shows the average compressive strength of Rhyolite is 81 MPa, with a maximum of 101 MPa and a minimum of 36 MPa. The tested samples from the Dacite unit have an average compressive strength of 113 MPa, with a maximum of 202 MPa and a minimum value of 30 MPa. Based on a single sample, the strongest rock encountered with a compressive strength of 230 MPa was the Quartz dike found in the third borehole.

Table 3 Results of the Uniaxial Compression Test

Borehole	Sample #	Rock Type	Depth from (m)	Depth to (m)	Water Content (%)	Dry Density (Kg/M^3)	Compressive Strength (MPa)
BGC09-01	1	Rhyolite	31.86	32.16	0.11	2718	74.02
	2	Dacite	Sample broken during shipment to lab. Too short to test.				
	3	Rhyolite	50.25	55.55	0.09	2738	100.79
	4	Rhyolite	71.90	72.20	0.20	2772	80.02
BGC09-02	1	Rhyolite	24.01	24.30	0.19	2721	35.93
	2	Dacite	34.39	34.65	0.16	2992	29.66
	3	Rhyolite	58.67	58.97	0.07	2753	97.03
	4	Rhyolite	73.65	73.97	0.12	2748	82.64
	5	Rhyolite	38.60	38.90	0.05	2759	95.99
BGC09-03	1	Dacite	8.22	8.50	0.08	2956	201.63
	2	Dacite	18.25	18.50	0.06	3932	107.22
	3	Quartz	15.72	15.95	0.13	2646	229.56

2.3. Geophysical Survey

The objective of the geophysical survey was to map the underlying soil stratigraphy and depth to bedrock between boreholes and under the Kootenay River along the proposed HDD path.

Seismic refraction surveying was used to map the depth to the river bottom and the geological conditions below both rivers and between boreholes along the east shore as recommended by the Geophysical contractor, Frontier Geophysics. Seismic refraction delineates the underlying geology by creating a sound burst near the surface, then recording the echo of the burst after it has bounced off a geological boundary and returned to surface. The echoes occur at either rock or sediment boundaries if there is a significant difference between seismic impedance, which is the product of the density of the unit and the speed of sound in the material, across the boundary. The depth to geological contacts and thickness of the underlying units can then be determined by multiplying half the elapsed travel-time between the burst and return of the echo with the travel speed of the wave in the subsurface.

The seismic refraction survey along the east shore of the Kootenay River is fairly good at differentiating the underlying coarser grained sands, gravels, and cobbles from the overlying finer grained silts and sandy silts. Also, the depth to the bedrock contact is consistent with the depths acquired from the boreholes.

Under the Kootenay River, the seismic refraction survey did not differentiate materials with significantly different seismic impedance. Correlations can be made based on the seismic velocities encountered under the river and comparing them to the velocities of materials found in the boreholes on the east shore and west shore. Based on correlations between seismic velocities, the material under the river likely consists of saturated coarser grained sands, gravels, and cobbles. Addition borehole drilling in the river could confirm the underlying material and provide a more accurate depth to bedrock.

The seismic refraction survey along the west shore of the Kootenay River did not distinguish any significant changes in the underlying soil stratigraphy at depth. The seismic survey does show the stratigraphy consists of finer grained materials underlain by denser coarser grained materials. The coarser grained material probably consists of the interbedded sands and gravels found in boreholes BGC06-02 and BGC06-03.

The geophysics report is provided in Appendix IV. Seismic interpretations over both the land and water portion of the Kootenay River crossing are shown in Drawing 2 found in Appendix I.

2.4. Stratigraphy

The eastern side of the Kootenay River, based on data from the boreholes and the geophysics, consists generally of a surficial layer of silts and sandy silts. The silts range in density from soft to firm and appear to be greater in thickness towards the southern extent of the proposed HDD crossing along the east shore. These silts overlie denser, coarser grained fluvial sediments consisting of interbedded gravels and well graded sands and gravels ranging in thickness of up to 4 m. These gravels units are dense to very dense and there was evidence of cobbles and small boulders up to 300 mm in diameter. Compact to dense sand and gravels were often found below the gravel layer and on top of the underlying bedrock. The bedrock along the eastern side of the Kootenay River mainly consists of a metamorphosed Rhyolite with several volcanic Dacite dikes occurring in the upper portion of drill holes BGC09-01 and BGC09-02. No significant faults or fault zones were encountered during drilling, however, several small localized faults were observed. On the east slope, the phreatic surface (groundwater) was encountered in boreholes BGC09-01 and BGC09-02 and follows the topography, becoming increasingly shallow in the direction towards the river, ranging from a depth of 4.6 m at the second borehole to artesian conditions at the lowest.

Stratigraphy below the Kootenay River was determined through geophysical data. The subsurface most likely consists of two underlying units: a surficial layer of interbedded gravels, cobbles, and well graded sands similar to that found along the western shore, and a layer of denser well graded sand and gravel comparable to the material found at the bottom of boreholes BGC09-01. The contact between these two units was inferred and cannot be accurately delineated with the seismic data. The bedrock under the river dips to the west with the depth to bedrock on the east shore at approximately 45 m and along the west shore at 75 m. The maximum depth to bedrock below the river appears to be approximately 85 m.

The western side of the Kootenay River, based on the drilling from the 2006 program, consists of a surficial layer of sand and cobbles that is underlain by alternating layers of sandy gravel of varying cobble and boulder contents, and sands of varying gravel contents. Bedrock was not encountered in the 2006 drilling program, but the recent seismic refraction data indicates that bedrock is approximately 75 m below ground surface.

Drawing 2 represents the interpreted lithological cross section along section line A shown in Drawing 1 and is based on borehole logs, geophysical information and surface outcrops.

3.0 DISCUSSION & RECOMMENDATIONS

Based on the geotechnical information collected, the area of the proposed HDD crossing contains loose silts underlain by dense, well graded sands, gravels, and cobbles. These soils are likely channel and overbank deposits from the Kootenay River and extend down to the bedrock at approximately 45 m along the east shore and 75 m along the west shore of the Kootenay River with some overlying colluvium deposits on the east hillside. Should the decision be made to conduct an entry or exit of the HDD through the underlying dense gravels and sands, conditions could be encountered resulting in difficult drilling including inadequate wall support and excessive scour could occur. Difficult drilling conditions could be alleviated by placing a large diameter casing through these units to the underlying bedrock or dense strata.

The underlying bedrock found along the eastern shore of the proposed HDD route consists of predominately metamorphosed volcanic Rhyolite and volcanic Dacite dikes. The rock is strong with an average compressive strength ranging from approximately 80 to 230 MPa and competent with RQD values ranging from 65 to 100 % with good recovery. Several small 0.1 to 0.3 m fault zones were observed, however, no major fault zones were present at the drilled locations.

The results from the geophysics indicate that the underlying bedrock is relatively deep (60 - 75 m) along the west shore and under the Kootenay River. As such, the proposed HDD route, as provided by Terasen, would pass through the underlying soil and would likely encounter bedrock at approximately the eastern shore of the Kootenay River. Although shallow drilling has been conducted on the western side of the Kootenay River, no drilling has occurred along the center of the channel, and therefore the stratigraphy in this region is based on geophysical information where no confirmatory samples have been collected and from boreholes near to both shorelines. Further subsurface investigations could be considered beneficial to characterizing the materials at the depth of the proposed HDD crossing under the river, should Terasen so wish to delineate more accurately the materials along the borepath at this point.

The presence of a relatively shallow water table in the boreholes at the entry and exit together with some seams of sand has the potential for borehole instability, however, this can be overcome by advancing casing until competent ground conditions are encountered or with other borehole stabilizing measures.

4.0 CLOSURE

We trust the above satisfies your requirements at this time and provides adequate details in support of conducting an HDD at this site. Should you have any questions or comments regarding this report, please do not hesitate to contact us.

Yours sincerely,

BGC ENGINEERING INC.
per:

Michael Beaupre, E.I.T.	Dr. Alex Baumgard, P.Eng, P.Geo
Geological Engineer	Senior Geotechnical/Environmental Engineer

REFERENCES

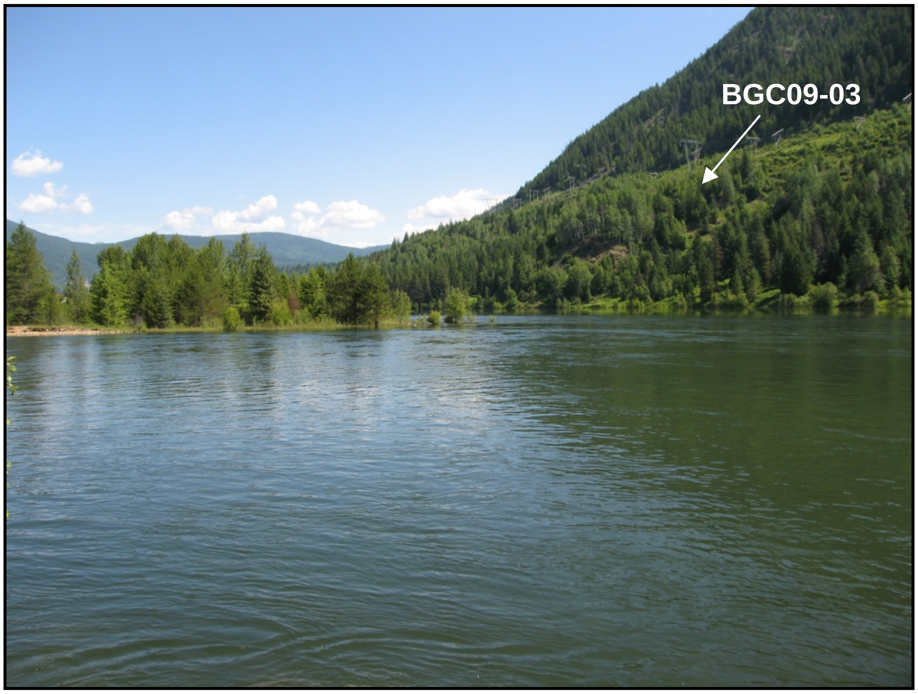
BGC 2008. Terasen Gas Inc. Geotechnical Feasibility Study For Horizontal Directional Drilling Kootenay River Crossing, April 18, 2008.

CFEM, 2006. Canadian Foundation Engineering Manual, Fourth Edition. Canadian Geotechnical Society, 488 p.

APPENDIX I

PHOTOGRAPHS & DRAWINGS

Photograph 1 Looking north at the existing Terasen RoW, proposed HDD alignment, and along drilling locations of holes BGC09-01, BGC09-02, and BGC09-03.



Photograph 2 Looking upstream and to the north east from the western shore of the Kootenay River at the proposed HDD alignment.

FINAL

NAD 1983 UTM Zone 11N

SCALE:	1:5,000	DESIGNED:	TNR
DATE:	DEC 2009	CHECKED:	MMB
DRAWN:	TNR	APPROVED:	AJB

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

PROJECT:
SHOREACRES HDD
GEOTECHNICAL INVESTIGATION

TITLE:
KOOTENAY HDD ALIGNMENT PLAN
CROSS SECTION A

CLIENT:
Terasen Gas

PROJECT No.:	FIG No.:	REV.:
0093-076	1	A

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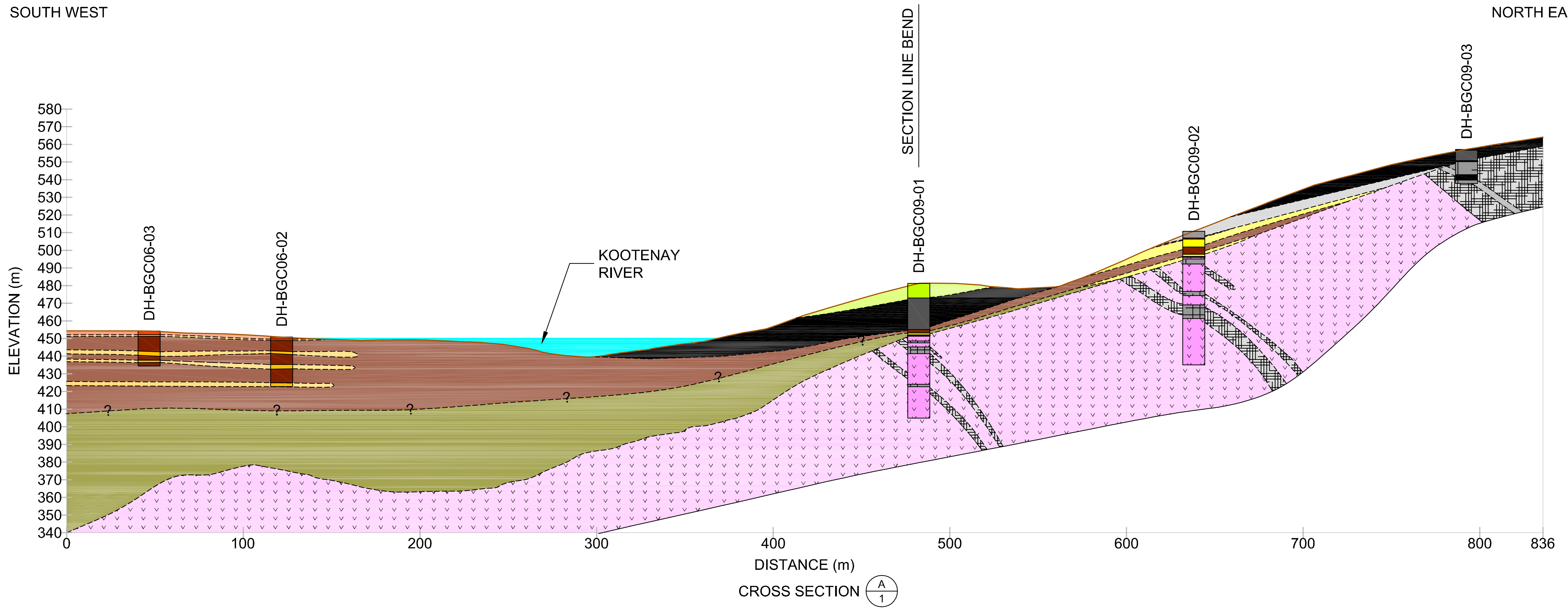
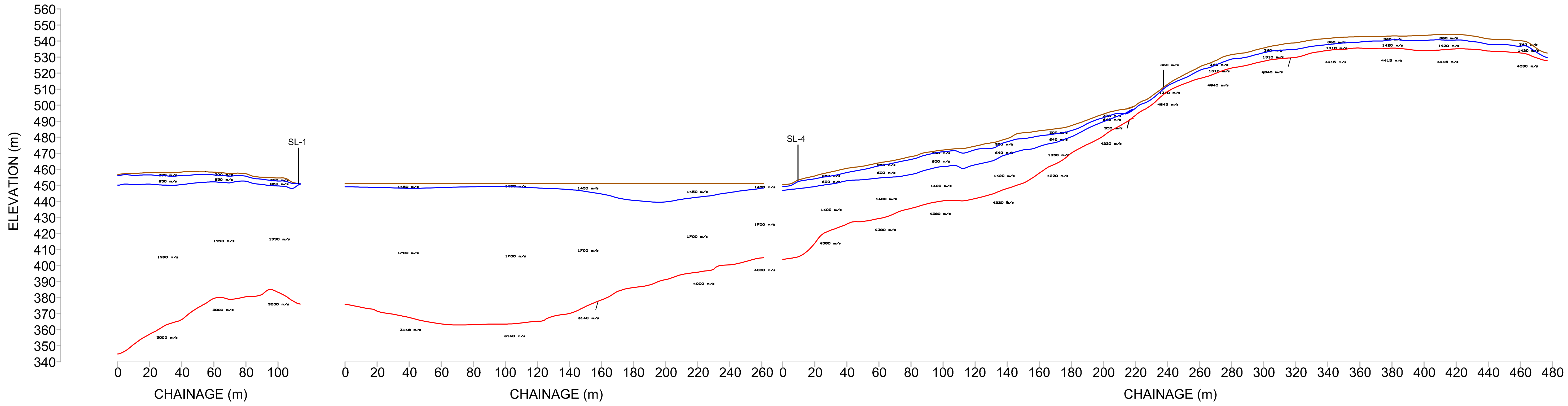
LITHOLOGICAL INTERPRETATION



CROSS SECTION A/1

GEOPHYSICAL RESULTS



LEGEND

BOREHOLE	INTERPRETED	
■	■	Sand (SM) and cobbles, some gravel, some boulders, some silt
■	■	Sand (SW) trace to some gravel, trace cobbles
■	■	Interbedded Gravel (GW) cobbley, some sand, trace boulders and Sand (SW) trace gravel
■	□	Silt (ML) and sand, trace clay, trace fine gravel
■	■	Silt (ML) trace sand, trace clay
■	■	Interbedded silty Sand (SM) and Sand (SP) and Silt (ML) trace gravel
■	■	Gravel (GW) some cobbles, some boulder, dense
■	■	Sand (SW) some gravel, very dense
▩	▩	Metamorphosed Volcanics - Rhyolite
▦	▤	Volcanics - Dacite
■	■	Quartz Dike

— EXISTING GROUND SURFACE

— SEISMIC INTERPRETED VELOCITY BOUNDARY

— SEISMIC INTERPRETED BEDROCK

- - - - INFERRED LITHOLOGICAL CONTACT

NOTES

1. THIS DRAWING MUST BE INTERPRETED IN ACCORDANCE WITH BGC ENGINEERING INC. REPORT "HORIZONTAL DIRECTIONAL DRILLING GEOTECHNICAL INVESTIGATION FOR KOOTENAY RIVER CROSSING" DATED DECEMBER 18, 2009.
2. SUBSURFACE STRATIGRAPHY IS ONLY KNOWN AT EACH INDIVIDUAL BOREHOLE LOCATION. EXTRAPOLATION OF STRATIGRAPHIC HORIZONS HAS BEEN CONDUCTED BETWEEN BOREHOLES AND ACTUAL THICKNESSES AND LOCATIONS MAY VARY.
3. GEOTECHNICAL DATA HAS BEEN PROJECTED TO THE ALIGNMENT FROM THE BOREHOLE LOCATIONS AND THE GEOPHYSICAL RESULTS.
4. GROUND SURFACE FOR THE GEOPHYSICAL RESULTS WAS ACQUIRED THROUGH TAPE AND CLINOMETER. LITHOLOGICAL INTERPRETATION TOPOGRAPHY WAS BASED OFF A DIGITAL ELEVATION MAP FROM THE NATIONAL TOPOGRAPHIC DATA BASE PUBLISHED BY THE GOVERNMENT OF CANADA.

Scale 1:2500

50 0 50 100 150

meters

REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE: 1:2500
DATE: DEC 2009
DRAWN: AP
DESIGNED: MMB
CHECKED: AJB
APPROVED: AJB

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Terasen Gas

PROJECT: SHOREACRES HDD GEOTECHNICAL INVESTIGATION

TITLE: CROSS SECTION A

PROJECT No.: 0093-076
DWG No.: 2
REV.: A

DWG TO BE READ WITH BGC REPORT TITLED "SHOREACRES HDD GEOTECHNICAL INVESTIGATION" DATED DEC 2009

APPENDIX II

BOREHOLE LOGS

Project: Shoreacres HDD
Geotechnical Investigation

DRILL HOLE # DH-BGC09-01

Location : Shoreacres East Approach

Page 1 **of** 9

Project No. : 0093-076

Survey Method : Handheld GPS
Co-ordinates (m) : 462,233.E, 5,474,261.N
Ground Elevation (m) : 468.0
Datum : UTM NAD 83, Zone 11
Dip (degrees from horizontal) : 90
Direction : 0

Drill Designation : Fraste MD-XL
Drilling Contractor : Geotech Drilling
Drill Method : Mud rotary
Core : HQ
Fluid : Polymer/Mud
Casing : PQ **Cased To (m)** : 29.87

Start Date : 19 Sep 09
Finish Date: 23 Sep 09
Final Depth of Hole (m): : 76.3
Depth to Top of Rock (m) : 29.60
Logged by : MMB
Reviewed by : AJB

Su - kPa
40 80 120 160

VANE	FIELD	LAB
PEAK	◆	■
REMOLD	◇	□

★ % Fines
Hydraulic Conductivity (m/sec) 10^{-8} 10^{-6} 10^{-4} 10^{-2}
Core Recovery 20 40 60 80

▲ UC/2
△ Pocket Pen /2
DCT (blows/300mm)
● SPT (blows/300mm)
Moisture Content & SPT N
W_P% W% W_L%
20 40 60 80

Depth (m)	Sample Type	Sample No.	Weathering Grade	Symbol	Lithologic Description	Instrument Details	SPT Blows per 150mm	SPT-T Friction (kPa)	DCT Blows per 300mm
0					SAND (SP) and SILT (ML) - fine to medium, trace fine to medium sub-angular gravels, poorly graded, loose to compact, 10 mm maximum particle size, sub-rounded, brown, odourless, moist, no structure, no cementation				
1					SILT (ML) and SAND (SP) - fine sand, some fine to medium gravels, low plasticity, firm, light brown, odourless, moist, no structure, no cementation, slow dilatency				
3					SAND (SM) - fine, silty, poorly graded, loose to compact, brown, odourless, moist, no structure, no cementation 8.1 m - Orange mottling in cuttings.	▽			
8					SILT (ML) - trace fine sand, trace clay, low plasticity, firm to stiff, grey, odourless, moist, no structure, no cementation, trace orange mottling in cuttings 8.8 m - Silt becomes stiff and fine sand disappears.				
10									

(Continued on next page)

Project: Shoreacres HDD
Geotechnical Investigation

DRILL HOLE # DH-BGC09-01

Location : Shoreacres East Approach

Project No. : 0093-076

Survey Method : Handheld GPS
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Logged by : MMB
Reviewed by : AJB

Su - kPa: 40 80 120 160

VANE	FIELD	LAB
PEAK	◆	■
REMOLD	◇	☐

★ % Fines
Hydraulic Conductivity (m/sec) 10^{-8} 10^{-6} 10^{-4} 10^{-2}
Core Recovery 20 40 60 80

▲ UC/2
△ Pocket Pen /2
DCT (blows/300mm)
● SPT (blows/300mm)
Moisture Content & SPT N
W_P% W% W_L%
20 40 60 80

Depth (m)	Sample Type	Sample No.	Weathering Grade	Symbol	Lithologic Description	Instrument Details	SPT Blows per 150mm	SPT-T Friction (kPa)	DCT Blows per 300mm
10					SILT (ML) - trace fine sand, trace clay, low plasticity, firm to stiff, grey, odourless, moist, no structure, no cementation, trace orange mottling in cuttings				
11									
12									
13					13.5 m - Becomes trace to some clay.				
14									
15					15.8 m - 10 cm wide lens of medium to coarse sand.				
16									
17									
18									
19									
20									

(Continued on next page)

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

Client: Terasen Gas

DRILL HOLE # DH-BGC09-01

Location : Shoreacres East Approach

Project No. : 0093-076

Survey Method : Handheld GPS
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Reviewed by : AJB

Su - kPa
40 80 120 160

VANE	FIELD	LAB
PEAK	◆	■
REMOLD	◇	□

★ % Fines
Hydraulic Conductivity (m/sec)
10^{-8} 10^{-6} 10^{-4} 10^{-2}
Core Recovery
20 40 60 80

▲ UC/2
△ Pocket Pen /2
DCT (blows/300mm)
● SPT (blows/300mm)
Moisture Content & SPT N
W_P% W% W_L%
20 40 60 80

Depth (m)	Sample Type	Sample No.	Weathering Grade	Symbol	Lithologic Description	Instrument Details	SPT Blows per 150mm	SPT-T Friction (kPa)	DCT Blows per 300mm
20				▥	SILT (ML) - trace fine sand, trace clay, low plasticity, firm to stiff, grey, odourless, moist, no structure, no cementation, trace orange mottling in cuttings				
21									
22									
23									
24									
25									
26				●	GRAVEL (GW) - fine to coarse, some medium to large cobbles, trace boulders, dense, greater than 150 mm maximum particle size, angular, wet, dark grey, odourless, no structure, no cementation (particle size interpreted through drilling)				
27				∴	SAND (SW) - fine to coarse, trace silt, trace fine gravels, well graded, very dense, 12 mm maximum particle size, sub-angular to angular, light brown, odourless, moist, no structure, no cementation				
28									
29					Rock encountered at 29.60 m depth. See DH-BGC09-01 rock log.				
30									

Survey Method :Handheld GPS
Co-ordinates (m) : 462,233.E, 5,474,261.N
Ground Elevation (m) : 468.0
Datum : UTM NAD 83, Zone 11
Dip (degrees from horizontal) : 90
Direction : 0

Drill Designation : Fraste MD-XL
Drilling Contractor : Geotech Drilling
Drill Method : Mud rotary
Core : HQ
Fluid : Polymer/Mud
Casing : PQ ***Cased To (m)*** : 29.87

Start Date : 19 Sep 09
Finish Date: 23 Sep 09
Final Depth of Hole : 76.3
Depth to Top of Rock (m) : 29.60
Logged by : MMB
Reviewed by : AJB

Depth (m)	Sample Type	Sample No.	Weathering Grade	Symbol	Lithologic Description	Instrument Details	Hydraulic Conductivity m/sec (10^{-8} 10^{-6} 10^{-4} 10^{-2}) / Core Recovery % / RQD % (20 40 60 80)	UCS - MPa (50 100 150 200) ■ Point Load ◇ Triaxial / RMR (20 40 60 80)
20								
21								
22								
23								
24								
25					0 to 29.60 m - See DH-BGC09-01 soil log.			
26								
27								
28								
29								
				v v v	METAMORPHOSED VOLCANICS (Rhyolite) - Dark pinkish grey, fine grained, equigranular, strong (R4), slightly weathered, potassic alteration			
30								

(Continued on next page)

Survey Method :Handheld GPS
Co-ordinates (m) : 462,233.E, 5,474,261.N
Ground Elevation (m) : 468.0
Datum : UTM NAD 83, Zone 11
Dip (degrees from horizontal) : 90
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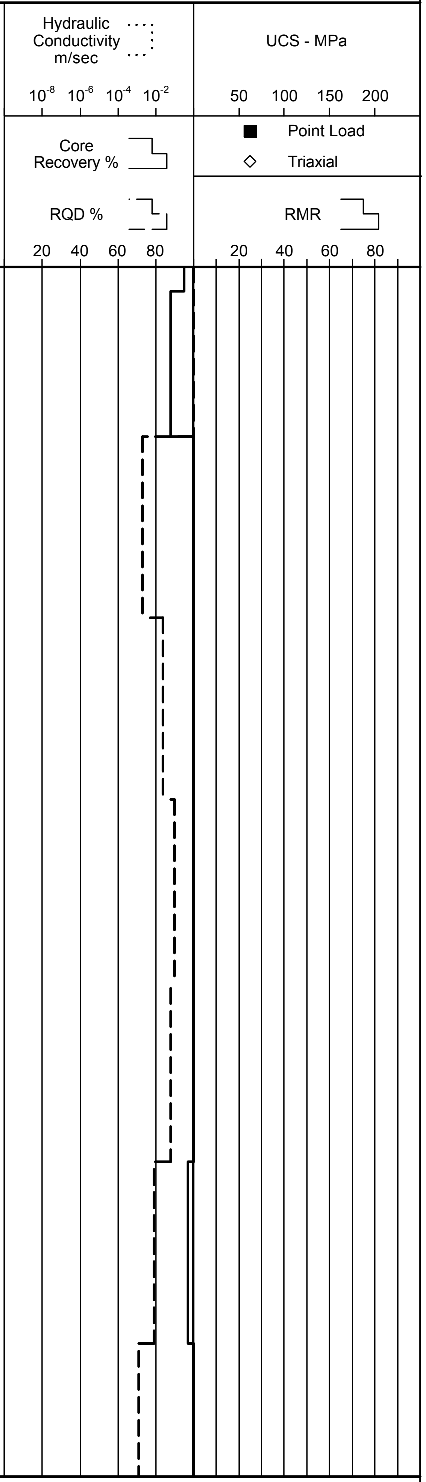
Start Date : 19 Sep 09
Finish Date: 23 Sep 09
Final Depth of Hole : 76.3
Depth to Top of Rock (m) : 29.60
Logged by : MMB
Reviewed by : AJB

Depth (m)	Sample Type	Sample No.	Weathering Grade	Symbol	Lithologic Description	Instrument Details
30					with quartz and calcite veins to a maximum thickness of 5 mm, RQD = 70 - 80% 30.75 m - 5 mm wide fault with clay and calcite fault gouge.	
31						
32		1				
					VOLCANICS (Dacite) - Greenish grey, fine to medium grained, bimodal; medium grained mafics minerals in a fine grained matrix, strong (R4), fresh, with slight chlorite alteration, RQD = 70 - 90% 33.05 m - 0.15 m thick metamorphosed volcanic dike.	
33						
					METAMORPHOSED VOLCANICS (Rhyolite) - Dark pinkish grey, fine grained, slightly foliated, equigranular, strong (R4), fresh, potassic alteration with quartz and calcite stockworks veining	
34						
35						
36					VOLCANICS (Dacite) - Greenish grey, fine to medium grained, bimodal; medium grained mafics minerals in a fine grained matrix, strong (R4), fresh, slight chlorite alteration with trace quartz veins, RQD = 70 - 85% Two major joint sets with beta angles of 30 and 65 degrees	
37		2				
38					38.45 m - 0.55 m thick metamorphosed volcanic dike	
39						
					METAMORPHOSED VOLCANICS (Rhyolite) - Dark pinkish grey/black,	
40						



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Project: Shoreacres HDD
Geotechnical Investigation

DRILL HOLE # DH-BGC09-01

Location : Shoreacres East Approach

Project No. : 0093-076

Survey Method :Handheld GPS
Co-ordinates (m) : 462,233.E, 5,474,261.N
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Direction : 0

Drill Designation : Fraste MD-XL
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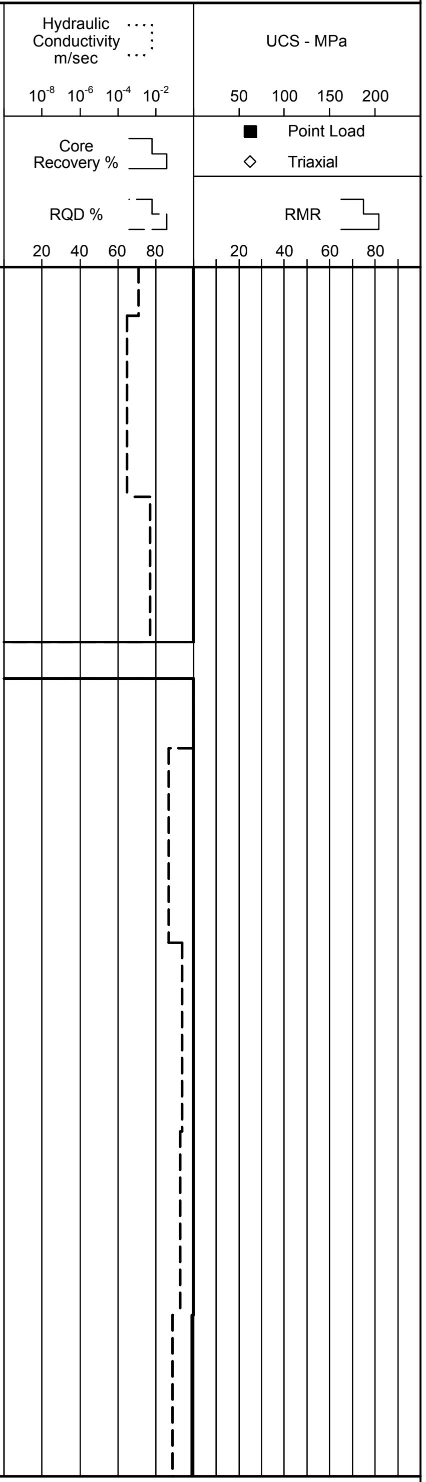
Drill Method : Mud rotary
Core : HQ
Fluid : Polymer/Mud
Casing : PQ **Cased To (m)** : 29.87

Start Date : 19 Sep 09
Finish Date: 23 Sep 09
Final Depth of Hole : 76.3
Depth to Top of Rock (m) : 29.60
Logged by : MMB
Reviewed by : AJB

Depth (m)	Sample Type	Sample No.	Weathering Grade	Symbol	Lithologic Description	Instrument Details
40				v v v	fine grained, banded, equigranular, strong to very strong (R4 - R5), fresh, potassic alteration with visible flow banding in quartz stockworks veins, RQD = 60 - 80%	
41				v v v	41.42 m - Fault with clay fault gouge. Fault has an alpha angle of 55 degrees.	
42				v v v		
43				v v v	43.1 m - Moved casing down 0.3 m causing approximately 0.3 m of lost recovery.	
44				v v v	43.98 m - Primary joint set with an alpha angle of 55 degrees and spacing of approximately 0.65 m. Secondary joint set with an alpha angle of 25 degrees and spacing of 0.45 m	
45				v v v		
46				v v v		
47				v v v	47.55 m - Decrease in the quartz stockworks veinlets.	
48				v v v		
49				v v v		
50						



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Project: Shoreacres HDD
Geotechnical Investigation

DRILL HOLE # DH-BGC09-01

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Project No. : 0093-076

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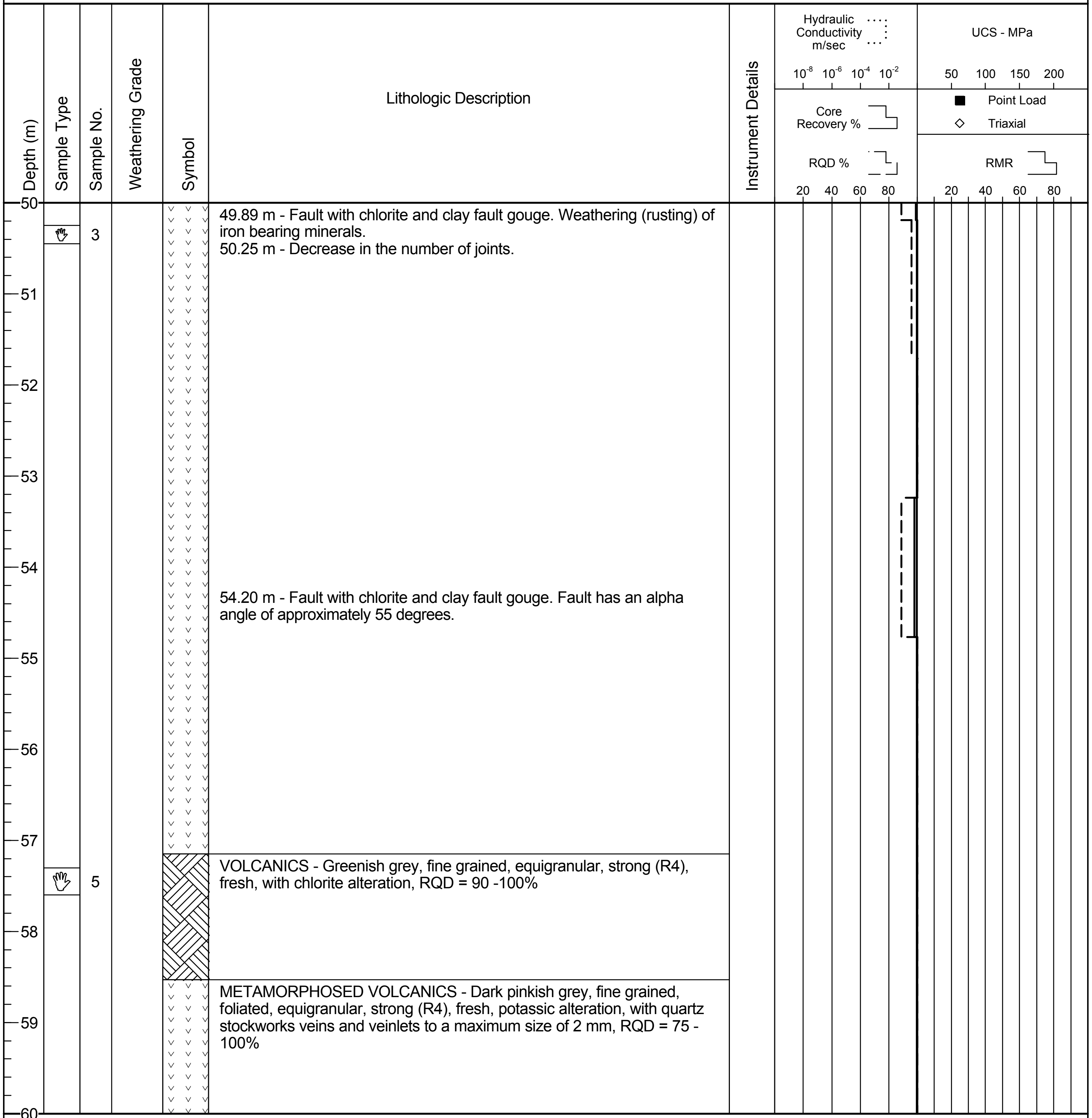


49.89 m - Fault with chlorite and clay fault gouge. Weathering (rusting) of iron bearing minerals.
50.25 m - Decrease in the number of joints.

54.20 m - Fault with chlorite and clay fault gouge. Fault has an alpha angle of approximately 55 degrees.

VOLCANICS - Greenish grey, fine grained, equigranular, strong (R4), fresh, with chlorite alteration, RQD = 90 -100%

METAMORPHOSED VOLCANICS - Dark pinkish grey, fine grained, foliated, equigranular, strong (R4), fresh, potassic alteration, with quartz stockworks veins and veinlets to a maximum size of 2 mm, RQD = 75 - 100%

(Continued on next page)

Location : Shoreacres East Approach

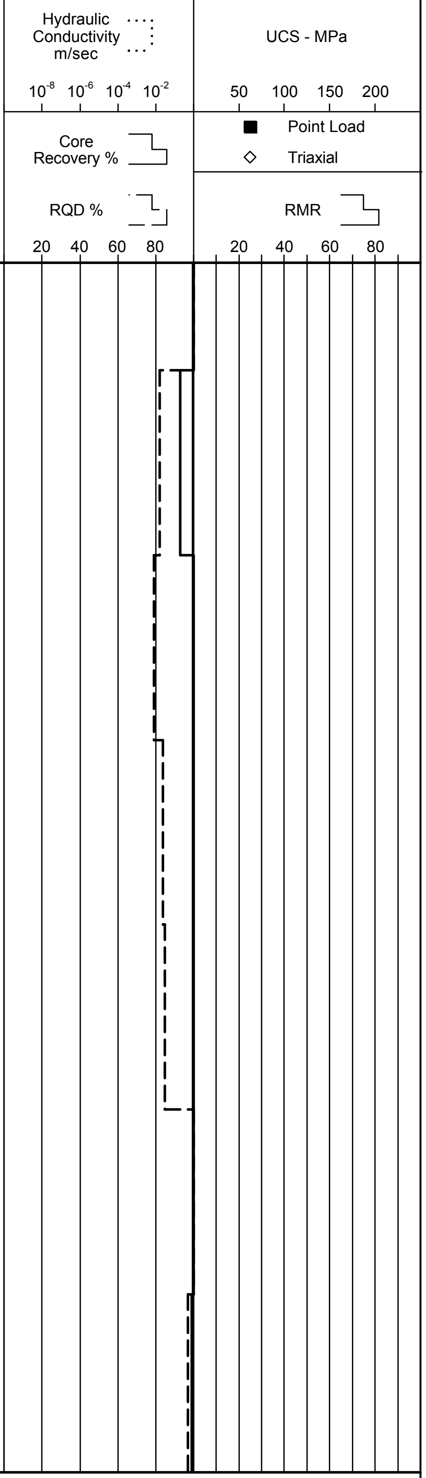
Project No. : 0093-076

Survey Method :Handheld GPS
Co-ordinates (m) : 462,233.E, 5,474,261.N
Ground Elevation (m) : 468.0
Datum : UTM NAD 83, Zone 11
Dip (degrees from horizontal) : 90
Direction : 0

Drill Designation : Fraste MD-XL
Drilling Contractor : Geotech Drilling
Drill Method : Mud rotary
Core : HQ
Fluid : Polymer/Mud
Casing : PQ ***Cased To (m)*** : 29.87

Start Date : 19 Sep 09
Finish Date: 23 Sep 09
Final Depth of Hole : 76.3
Depth to Top of Rock (m) : 29.60
Logged by : MMB
Reviewed by : AJB

Depth (m)	Sample Type	Sample No.	Weathering Grade	Symbol	Lithologic Description	Instrument Details
60					METAMORPHOSED VOLCANICS - Dark pinkish grey, fine grained, foliated, equigranular, strong (R4), fresh, potassic alteration, with quartz stockworks veins and veinlets to a maximum size of 2 mm, RQD = 75 - 100%	
61					61.70 m - 15 cm wide highly fracture zone.	
62						
63					63.35 m - 10 cm wide highly fracture zone.	
64						
65					65.1 m - 10 cm wide highly fracture zone.	
66						
67						
68					68.67 m - Trace quartz veins up to 10 mm.	
69						
70						



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Project: Shoreacres HDD
Geotechnical Investigation

DRILL HOLE # DH-BGC09-01

Location : Shoreacres East Approach

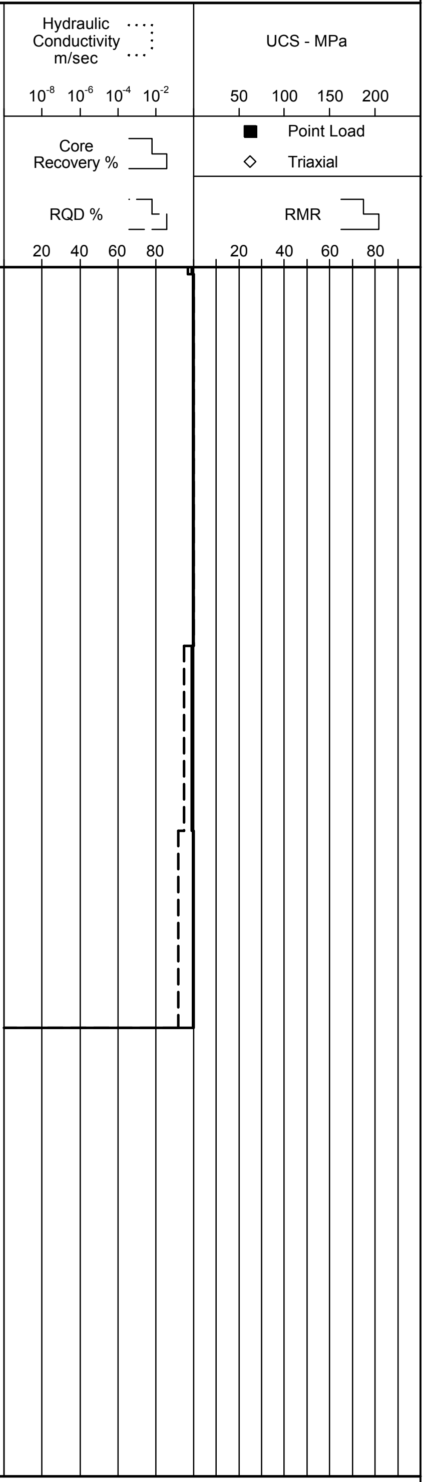
Project No. : 0093-076

Survey Method :Handheld GPS
Co-ordinates (m) : 462,233.E, 5,474,261.N
Ground Elevation (m) : 468.0
Datum : UTM NAD 83, Zone 11
Dip (degrees from horizontal) : 90
Direction : 0

Drill Designation : Fraste MD-XL
Drilling Contractor : Geotech Drilling
Drill Method : Mud rotary
Core : HQ
Fluid : Polymer/Mud
Casing : PQ **Cased To (m)** : 29.87

Start Date : 19 Sep 09
Finish Date: 23 Sep 09
Final Depth of Hole : 76.3
Depth to Top of Rock (m) : 29.60
Logged by : MMB
Reviewed by : AJB

Depth (m)	Sample Type	Sample No.	Weathering Grade	Symbol	Lithologic Description	Instrument Details
70					METAMORPHOSED VOLCANICS - Dark pinkish grey, fine grained, foliated, equigranular, strong (R4), fresh, potassic alteration, with quartz stockworks veins and veinlets to a maximum size of 2 mm, RQD = 75 - 100%	
71					71.00 m - Some quartz stockworks veins up to 8 mm.	
72	✋	4				
73						
74						
75						
76						
					End of Borehole @ 76.29 m Notes: 1. Discontinued drilling as reached target depth. 2. Hole grouted and filled with bentonite following completion. 3. Approximate depth of water as interpreted through drilling: Sept. 24, 2009 - 5.2 m. On Sept. 25, 2009 well became artesianed. 4. Drill bit hardness: 9 - 11.	
77						
78						
79						
80						



BGC ENGINEERING INC.
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Client: Terasen Gas

Project: Shoreacres HDD
Geotechnical Investigation

DRILL HOLE # DH-BGC09-02

Location : Shoreacres East Approach

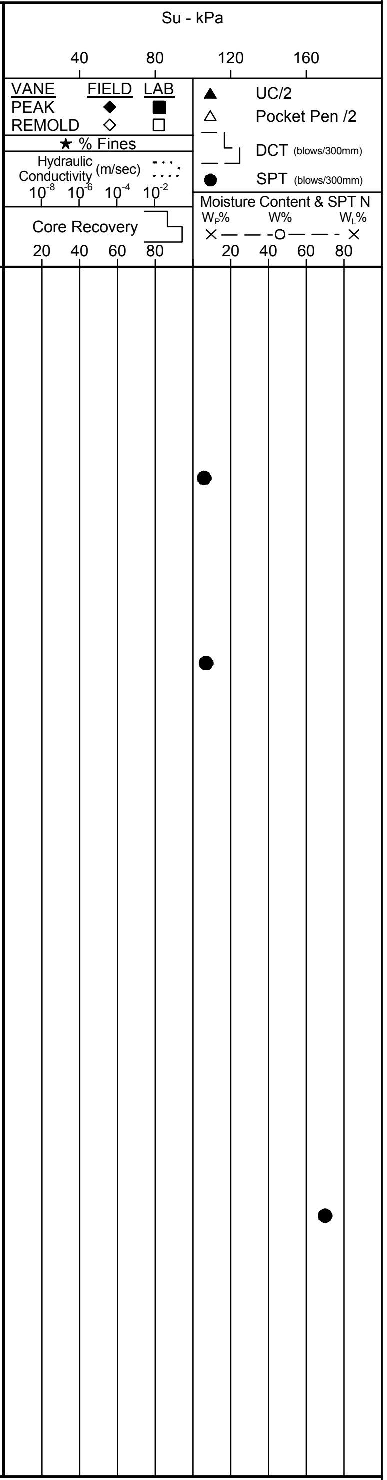
Project No. : 0093-076

Survey Method : Handheld GPS
Co-ordinates (m) : 462,296.E, 5,474,411.N
Ground Elevation (m) : 481.0
Datum : UTM NAD 83, Zone 11
Dip (degrees from horizontal) : 90
Direction : 0

Drill Designation : Fraste MD-XL
Drilling Contractor : Geotech Drilling
Drill Method : Mud rotary
Core : HQ
Fluid : Polymer/Mud
Casing : PQ **Cased To (m)** : 15.20

Start Date : 25 Sep 09
Finish Date: 30 Sep 09
Final Depth of Hole (m): : 75.7
Depth to Top of Rock (m) : 14.49
Logged by : MMB
Reviewed by : AJB

Depth (m)	Sample Type	Sample No.	Weathering Grade	Symbol	Lithologic Description	Instrument Details	SPT Blows per 150mm	SPT-T Friction (kPa)	DCT Blows per 300mm
0					SILT (CL-ML) - sandy fine to coarse, trace gravels, trace clay, low plasticity, firm, medium sensitivity, grey, odourless, moist, no structure, no cementation, low dry strength, slow dilatency				
1.5–2	⧗	1					2 3 3		
3–3.5	⧗	2					4 3 4		
3.9					SAND (SW) and GRAVEL (GW) - fine to coarse, trace silt, well graded, dense, 20 mm maximum particle size, sub-rounded to sub-angular, light brown, odourless, moist, no structure, no cementation	∇			
4.7					GRAVEL (GW) - fine to coarse, fine to coarse sandy, trace cobbles and boulders, trace silt, well graded, very dense to hard, greater than 200 mm maximum particle size, sub-angular, dark grey/brown, odourless, moist, no structure, no cementation (maximum particle size interpreted through drilling)				
4.6–5	⧗	3					5 cm / 50		
6.1					6.1 m - Poor water recovery during drilling.				
7.6–8	⧗	4					13 40 30		
8.22					8.22 m - Becomes some cobbles and boulders up to 300 mm maximum particle size and very dense. (maximum particle size interpreted through tricone drilling)				
8.9					GRAVEL (GW) and SAND (SW) - fine to coarse, some silt, trace cobbles and boulders, well graded, dense to very dense, sub-angular, grey, odourless, moist, no structure, no cementation				
10									



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Project: Shoreacres HDD
Geotechnical Investigation

DRILL HOLE # DH-BGC09-02

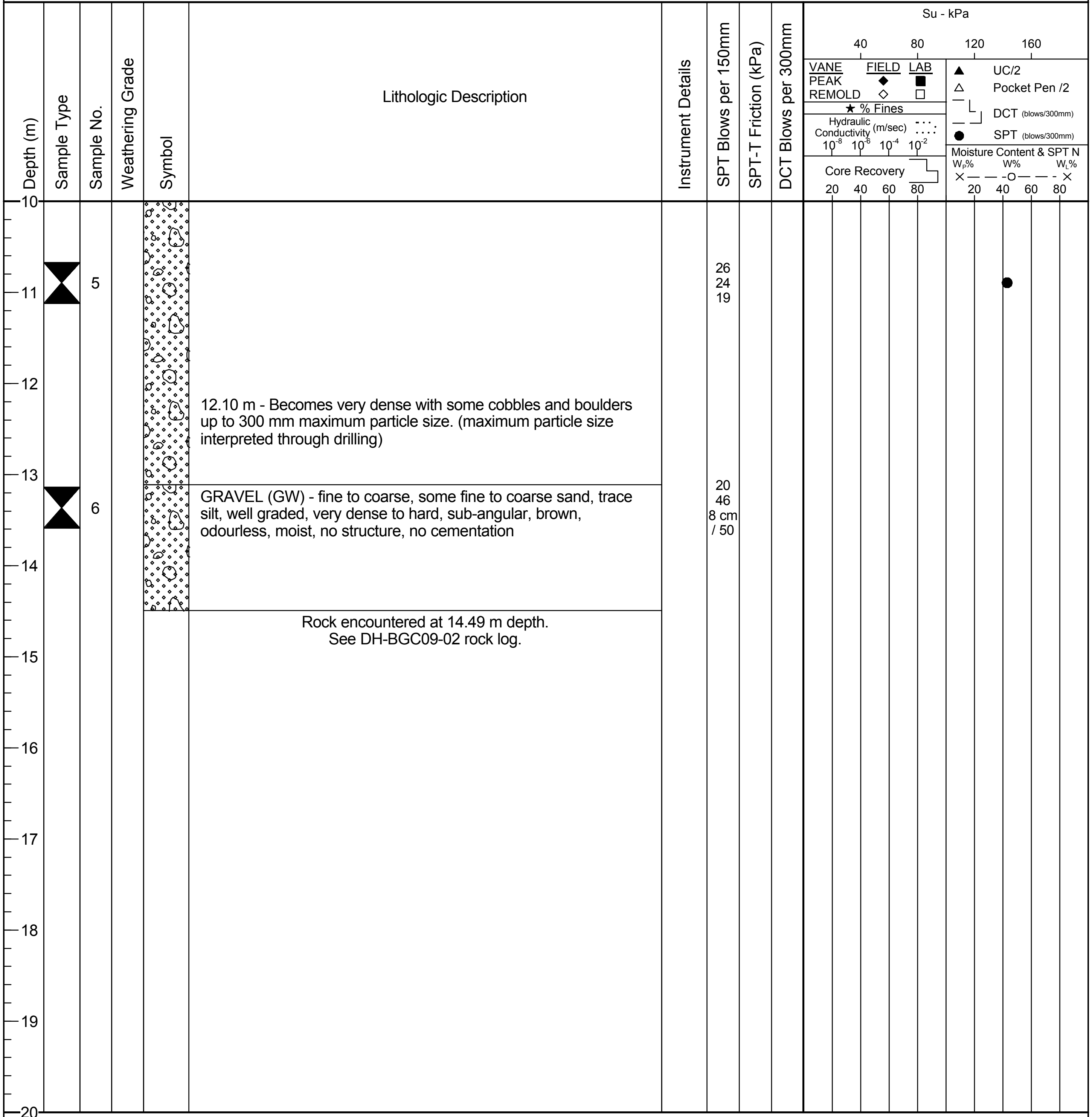
Location : Shoreacres East Approach

Project No. : 0093-076

Survey Method : Handheld GPS
Co-ordinates (m) : 462,296.E, 5,474,411.N
Ground Elevation (m) : 481.0
Datum : UTM NAD 83, Zone 11
Dip (degrees from horizontal) : 90
Direction : 0

Drill Designation : Fraste MD-XL
Drilling Contractor : Geotech Drilling
Drill Method : Mud rotary
Core : HQ
Fluid : Polymer/Mud
Casing : PQ **Cased To (m)** : 15.20

Start Date : 25 Sep 09
Finish Date: 30 Sep 09
Final Depth of Hole (m): : 75.7
Depth to Top of Rock (m) : 14.49
Logged by : MMB
Reviewed by : AJB



Depth (m)	Sample No.	Lithologic Description	SPT Blows per 150mm
11	5		26 24 19
12.10		12.10 m - Becomes very dense with some cobbles and boulders up to 300 mm maximum particle size. (maximum particle size interpreted through drilling)	
13.1	6	GRAVEL (GW) - fine to coarse, some fine to coarse sand, trace silt, well graded, very dense to hard, sub-angular, brown, odourless, moist, no structure, no cementation	20 46 8 cm / 50
14.49		Rock encountered at 14.49 m depth. See DH-BGC09-02 rock log.	

BGC ENGINEERING INC.
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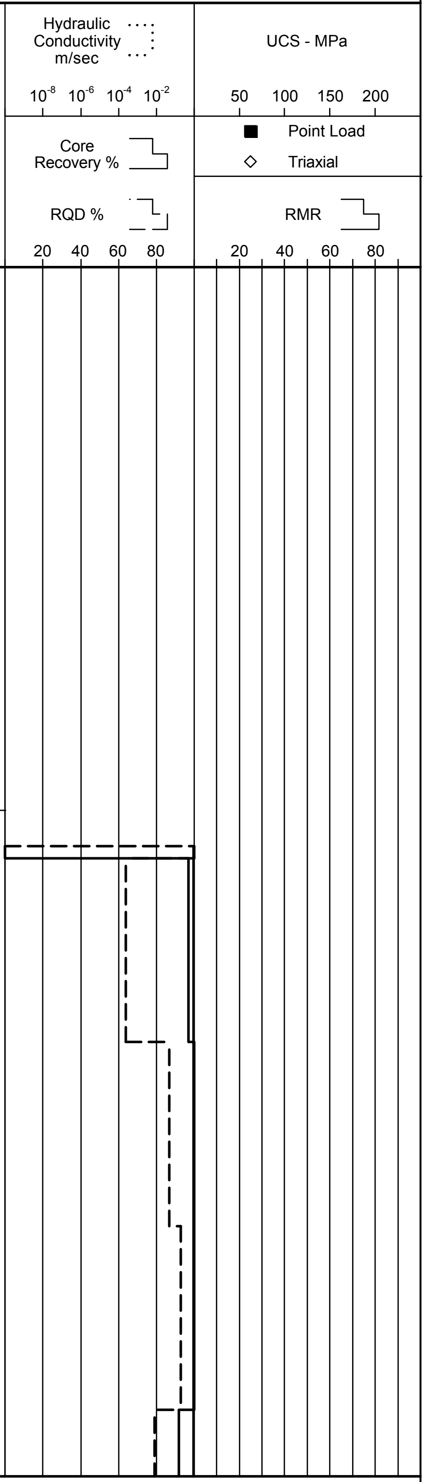
Client: Terasen Gas

Survey Method :Handheld GPS
Co-ordinates (m) : 462,296.E, 5,474,411.N
Ground Elevation (m) : 481.0
Datum : UTM NAD 83, Zone 11
Dip (degrees from horizontal) : 90
Direction : 0

Drill Designation : Fraste MD-XL
Drilling Contractor : Geotech Drilling
Drill Method : Mud rotary
Core : HQ
Fluid : Polymer/Mud
Casing : PQ **Cased To (m)** : 15.20

Start Date : 25 Sep 09
Finish Date: 30 Sep 09
Final Depth of Hole : 75.7
Depth to Top of Rock (m) : 14.49
Logged by : MMB
Reviewed by : AJB

Depth (m)	Sample Type	Sample No.	Weathering Grade	Symbol	Lithologic Description	Instrument Details
10 11 12 13 14					0 to 14.49 m - See DH-BGC09-02 soil log.	
15					METAMORPHOSED VOLCANICS (Rhyolite) - Dark pinkish grey, fine to medium grained, slightly foliated, equigranular, strong (R4), slightly weathered, with potassic alteration and some quartz veins, RQD = 60 - 70% Two joint sets with alpha angles of 65 and 30 degrees	
16 17 18					VOLCANICS (Dacite) - Light greenish grey, fine to medium grained, bimodal; medium grained chloritized mafics in a fine grained matrix, strong (R4), fresh, slight chlorite alteration, RQD = 60 - 85% 17.34 m - 0.25 m wide altered volcanic dike.	
19 20					METAMORPHOSED VOLCANICS (Rhyolite) - Dark pink grey, fine grained, foliated, equigranular, strong (R4), fresh, with predominantly potassic and minor chlorite alteration, RQD = 50 - 80% One joint set of approximately 45 degrees 18.63 m - Fault with clay and calcite fault gouge. Fault has an alpha angle of 65 degrees.	



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BGC ENGINEERING INC.
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Client: Terasen Gas

Project: Shoreacres HDD
Geotechnical Investigation

DRILL HOLE # DH-BGC09-02

Location : Shoreacres East Approach

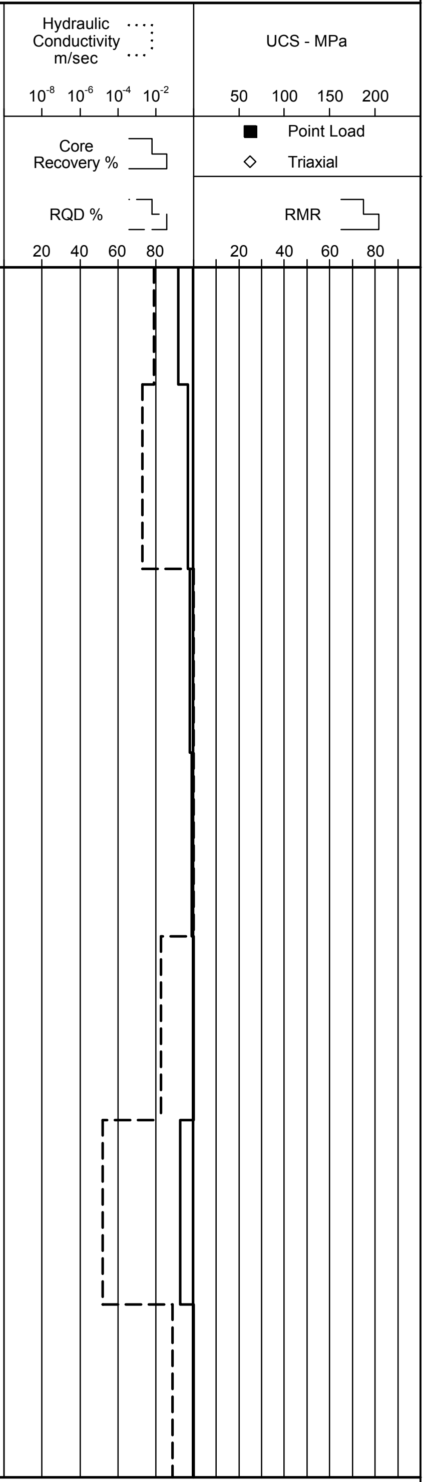
Project No. : 0093-076

Survey Method :Handheld GPS
Co-ordinates (m) : 462,296.E, 5,474,411.N
Ground Elevation (m) : 481.0
Datum : UTM NAD 83, Zone 11
Dip (degrees from horizontal) : 90
Direction : 0

Drill Designation : Fraste MD-XL
Drilling Contractor : Geotech Drilling
Drill Method : Mud rotary
Core : HQ
Fluid : Polymer/Mud
Casing : PQ **Cased To (m)** : 15.20

Start Date : 25 Sep 09
Finish Date: 30 Sep 09
Final Depth of Hole : 75.7
Depth to Top of Rock (m) : 14.49
Logged by : MMB
Reviewed by : AJB

Depth (m)	Sample Type	Sample No.	Weathering Grade	Symbol	Lithologic Description	Instrument Details
20					METAMORPHOSED VOLCANICS (Rhyolite) - Dark pink grey, fine grained, foliated, equigranular, strong to very strong (R4-R5), fresh with predominantly potassic and minor chlorite alteration, RQD = 50 - 80%	
21						
22					22.6 m - Increase in potassic alteration and quartz stockworks veins and veinlets to a maximum thickness of 5 mm.	
23					23.19 m - 2 mm wide calcite infilled joint with an alpha angle of 65 degrees.	
24	✋	1				
25						
26					26.55 m - Decrease in quartz veinlets.	
27					27.10 m - Jammed core tube during drilling causing crushed rock and poor recovery. Poor water water recovery during drilling. 27.72 m - Fault with clay fault gouge and an alpha angle of 55 degrees.	
28						
29					29.06 m - Fault with clay and calcite fault gouge. Fault has an alpha angle of 55 degrees.	
30						



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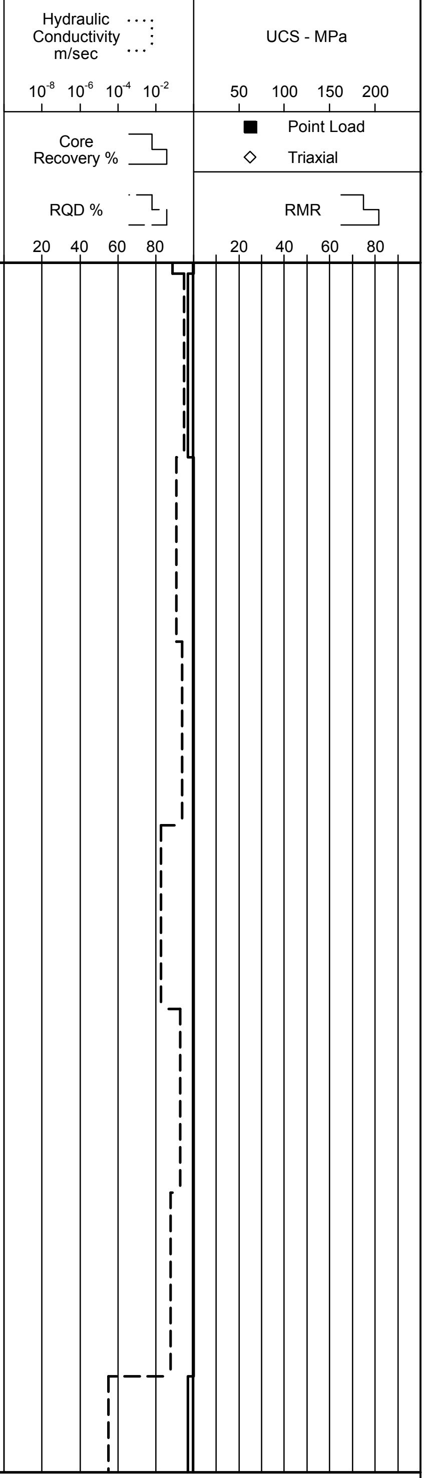
Survey Method :Handheld GPS
Co-ordinates (m) : 462,296.E, 5,474,411.N
Ground Elevation (m) : 481.0
Datum : UTM NAD 83, Zone 11
Dip (degrees from horizontal) : 90
Direction : 0

Drill Designation : Fraste MD-XL
Drilling Contractor : Geotech Drilling
Drill Method : Mud rotary
Core : HQ
Fluid : Polymer/Mud
Casing : PQ ***Cased To (m)*** : 15.20

Start Date : 25 Sep 09
Finish Date: 30 Sep 09
Final Depth of Hole : 75.7
Depth to Top of Rock (m) : 14.49
Logged by : MMB
Reviewed by : AJB

Depth (m)	Sample Type	Sample No.	Weathering Grade	Symbol	Lithologic Description	Instrument Details
30					METAMORPHOSED VOLCANICS (Rhyolite) - Dark pink grey, fine grained, foliated, equigranular, strong to very strong (R4-R5), fresh with predominantly potassic and minor chlorite alteration, RQD = 50 - 80%	
31						
					31.61 m - Two predominant joint sets; one with an alpha angle of 40 degrees and spacing of approximately 0.80 m, and a second with an alpha angle of 55 degrees and spacing of approximately 2 m.	
32						
33						
34					VOLCANICS (Dacite) - Greenish grey, fine to coarse grained, bimodal; medium to coarse grained chloritized mafics in a fine grained matrix, very strong, fresh, with chlorite alteration, RQD = 80 - 90%	
		2				
35					35.60 m - 0.42 m wide altered volcanic dike with sharp contacts. Both contacts have alpha angles of approximately 50 degrees.	
36					METAMORPHOSED VOLCANICS (Rhyolite) - Dark pinkish grey, fine grained, foliated, equigranular, very strong (R5), fresh, with potassic alteration and trace quartz veinlets to a maximum size of 2 mm, RQD = 55 - 80% 36.8 m - Fault with minor clay gouge and weathering of mafic minerals. Fault has an alpha angle of 65 degrees. 37.50 m - Predominantly one joint set with an alpha angle of 55 degrees and spacing of 0.5 to 0.6 m.	
37						
38						
		5				
39					39.58 m - Fault with clay and calcite fault gouge and an alpha angle of 55 degrees.	
40						



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Project: Shoreacres HDD
Geotechnical Investigation

DRILL HOLE # DH-BGC09-02

Location : Shoreacres East Approach

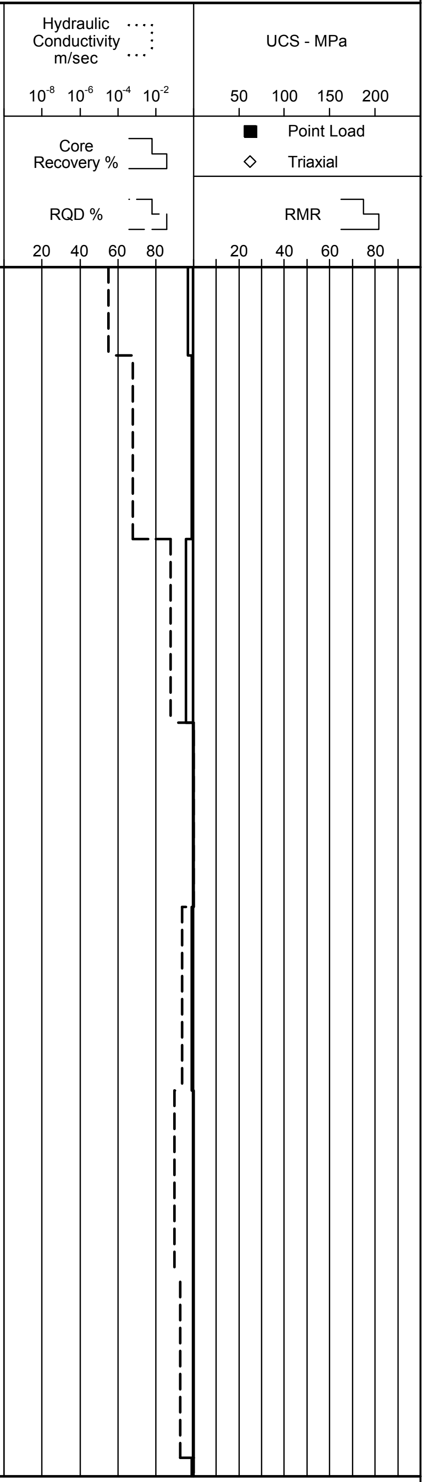
Project No. : 0093-076

Survey Method :Handheld GPS
Co-ordinates (m) : 462,296.E, 5,474,411.N
Ground Elevation (m) : 481.0
Datum : UTM NAD 83, Zone 11
Dip (degrees from horizontal) : 90
Direction : 0

Drill Designation : Fraste MD-XL
Drilling Contractor : Geotech Drilling
Drill Method : Mud rotary
Core : HQ
Fluid : Polymer/Mud
Casing : PQ **Cased To (m)** : 15.20

Start Date : 25 Sep 09
Finish Date: 30 Sep 09
Final Depth of Hole : 75.7
Depth to Top of Rock (m) : 14.49
Logged by : MMB
Reviewed by : AJB

Depth (m)	Sample Type	Sample No.	Weathering Grade	Symbol	Lithologic Description	Instrument Details
40				∨ ∨ ∨	40.48 m - 0.5 m wide fault zone with clay and calcite fault gouge and fractured rock. Fault has an alpha angle of approximately 55 degrees.	
41						
42				▨	VOLCANICS (Dacite)- Greenish grey, fine to coarse grained, bimodal, very strong (R5), fresh, with chlorite alteration and some quartz veins up to 3 mm thick, 65 - 100% 42.0 m - One joint set with an alpha angle of 35 degrees and spacing of 0.3 - 0.6 m.	
43						
44						
45						
46						
47					47.45 m - 0.18 m wide altered volcanic dike with gradational contacts.	
48						
49				∨ ∨ ∨	METAMORPHOSED VOLCANICS (Rhyolite) - Dark pinkish grey, fine grained, equigranular, foliated, very strong (R5), fresh, with potassic	
50						



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Project: Shoreacres HDD
Geotechnical Investigation

DRILL HOLE # DH-BGC09-02

Location : Shoreacres East Approach

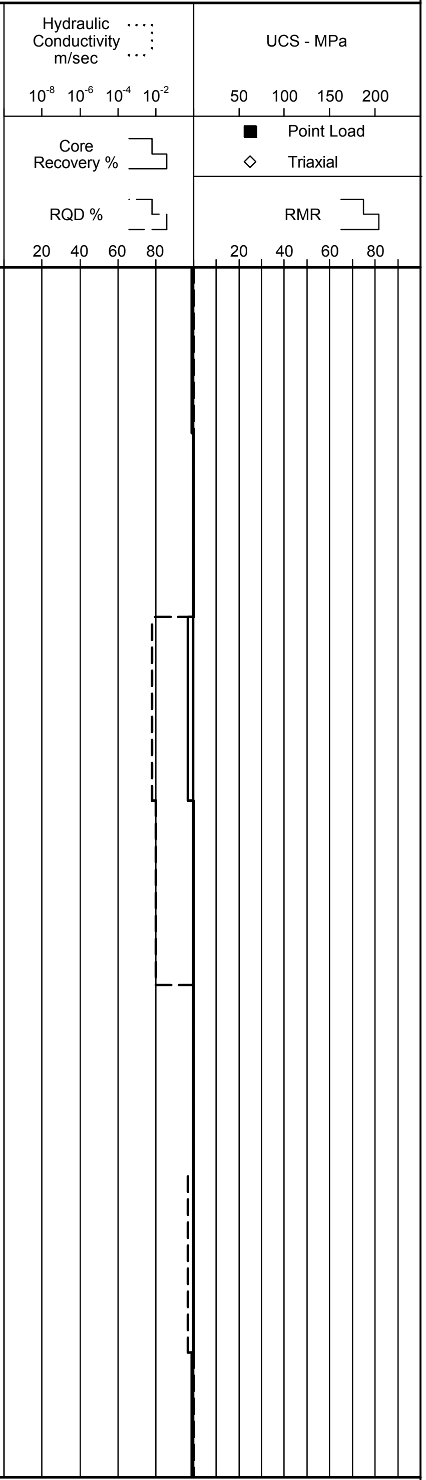
Project No. : 0093-076

Survey Method :Handheld GPS
Co-ordinates (m) : 462,296.E, 5,474,411.N
Ground Elevation (m) : 481.0
Datum : UTM NAD 83, Zone 11
Dip (degrees from horizontal) : 90
Direction : 0

Drill Designation : Fraste MD-XL
Drilling Contractor : Geotech Drilling
Drill Method : Mud rotary
Core : HQ
Fluid : Polymer/Mud
Casing : PQ **Cased To (m)** : 15.20

Start Date : 25 Sep 09
Finish Date: 30 Sep 09
Final Depth of Hole : 75.7
Depth to Top of Rock (m) : 14.49
Logged by : MMB
Reviewed by : AJB

Depth (m)	Sample Type	Sample No.	Weathering Grade	Symbol	Lithologic Description	Instrument Details
50					alteration and some quartz veins up to 5 mm thick, RQD = 70 - 100%	
51						
52						
53					52.89 m - Increase in joint frequency.	
54						
55						
56						
57						
58						
59	✋	3			59.27 m - High angle joint with a beta angle of 75 degrees.	
60						



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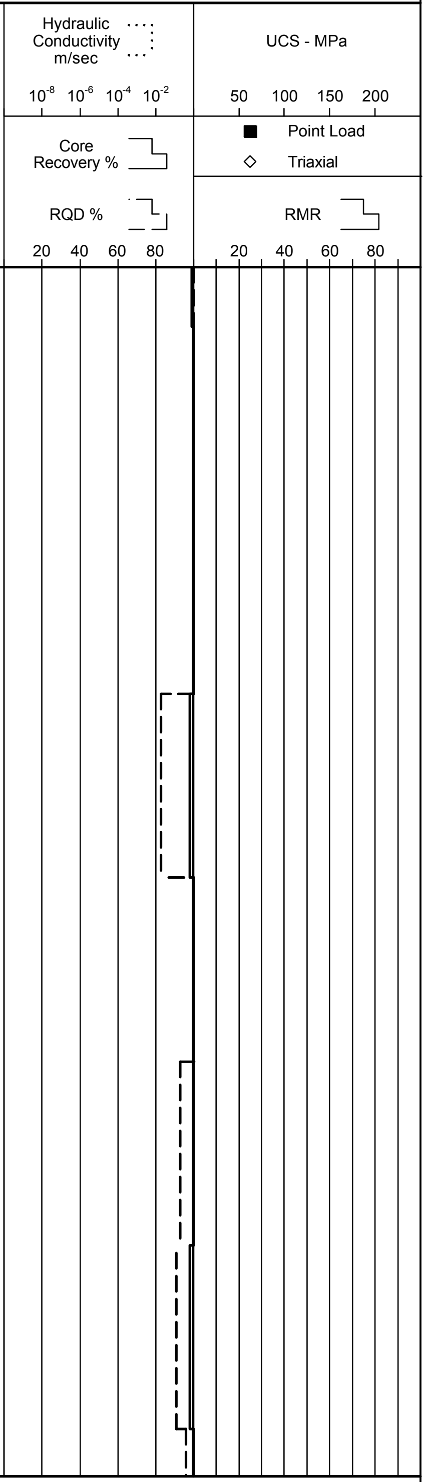
Survey Method :Handheld GPS
Co-ordinates (m) : 462,296.E, 5,474,411.N
Ground Elevation (m) : 481.0
Datum : UTM NAD 83, Zone 11
Dip (degrees from horizontal) : 90
Direction : 0

Drill Designation : Fraste MD-XL
Drilling Contractor : Geotech Drilling
Drill Method : Mud rotary
Core : HQ
Fluid : Polymer/Mud
Casing : PQ ***Cased To (m)*** : 15.20

Start Date : 25 Sep 09
Finish Date: 30 Sep 09
Final Depth of Hole : 75.7
Depth to Top of Rock (m) : 14.49
Logged by : MMB
Reviewed by : AJB

Depth (m)	Sample Type	Sample No.	Weathering Grade	Symbol	Lithologic Description	Instrument Details
60				v v v	METAMORPHOSED VOLCANICS (Rhyolite) - Dark pink grey, fine grained, foliated, equigranular, very strong (R5), fresh with potassic alteration and some quartz veins up to 5 mm thick, RQD = 70 - 100%	
61				v v v	61.36 m - Fault with clay gouge and an alpha angle of 65 degrees.	
62				v v v		
63				v v v		
64	✋	6		v v v		
65				v v v		
66				v v v	65.90 m - Increase in quartz stockworks veins and veinlets.	
67				v v v		
68				v v v	68.20 m - Potassic alteration becomes less predominant.	
69				v v v		
70						



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Project: Shoreacres HDD
Geotechnical Investigation

DRILL HOLE # DH-BGC09-02

Location : Shoreacres East Approach

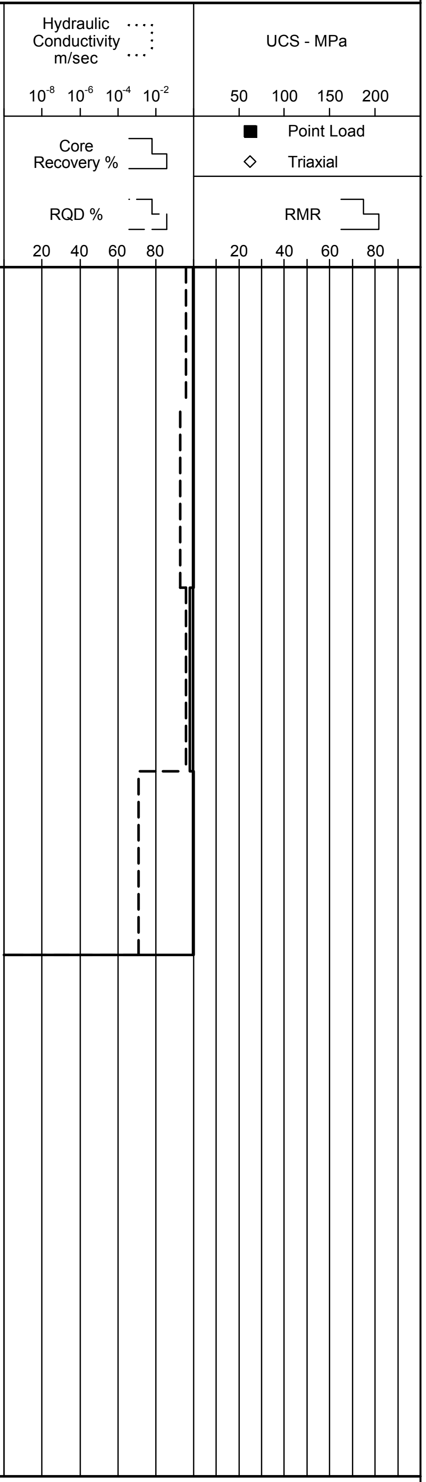
Project No. : 0093-076

Survey Method :Handheld GPS
Co-ordinates (m) : 462,296.E, 5,474,411.N
Ground Elevation (m) : 481.0
Datum : UTM NAD 83, Zone 11
Dip (degrees from horizontal) : 90
Direction : 0

Drill Designation : Fraste MD-XL
Drilling Contractor : Geotech Drilling
Drill Method : Mud rotary
Core : HQ
Fluid : Polymer/Mud
Casing : PQ ***Cased To (m)*** : 15.20

Start Date : 25 Sep 09
Finish Date: 30 Sep 09
Final Depth of Hole : 75.7
Depth to Top of Rock (m) : 14.49
Logged by : MMB
Reviewed by : AJB

Depth (m)	Sample Type	Sample No.	Weathering Grade	Symbol	Lithologic Description	Instrument Details
70				∨ ∨ ∨	METAMORPHOSED VOLCANICS (Rhyolite) - Dark pink grey, fine grained, foliated, equigranular, very strong (R5), fresh with potassic alteration and some quartz veins up to 5 mm thick, RQD = 70 - 100%	
71						
72						
73						
74	✋	4			74.17 m - 0.35 m wide fault zone which contains fault breccia.	
75						
76					End of Borehole @ 75.69 m Notes: 1. Discontinued drilling as reached target depth. 2. Hole grouted and filled with bentonite following completion. 3. Approximate depth of water as interpreted through drilling: Sept. 30, 2009 - 4.6 m. 4. Drill bit hardness: 9 - 11	
77						
78						
79						
80						



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Client: Terasen Gas

Project: Shoreacres HDD
Geotechnical Investigation

DRILL HOLE # DH-BGC09-03

Page 1 ***of*** 4

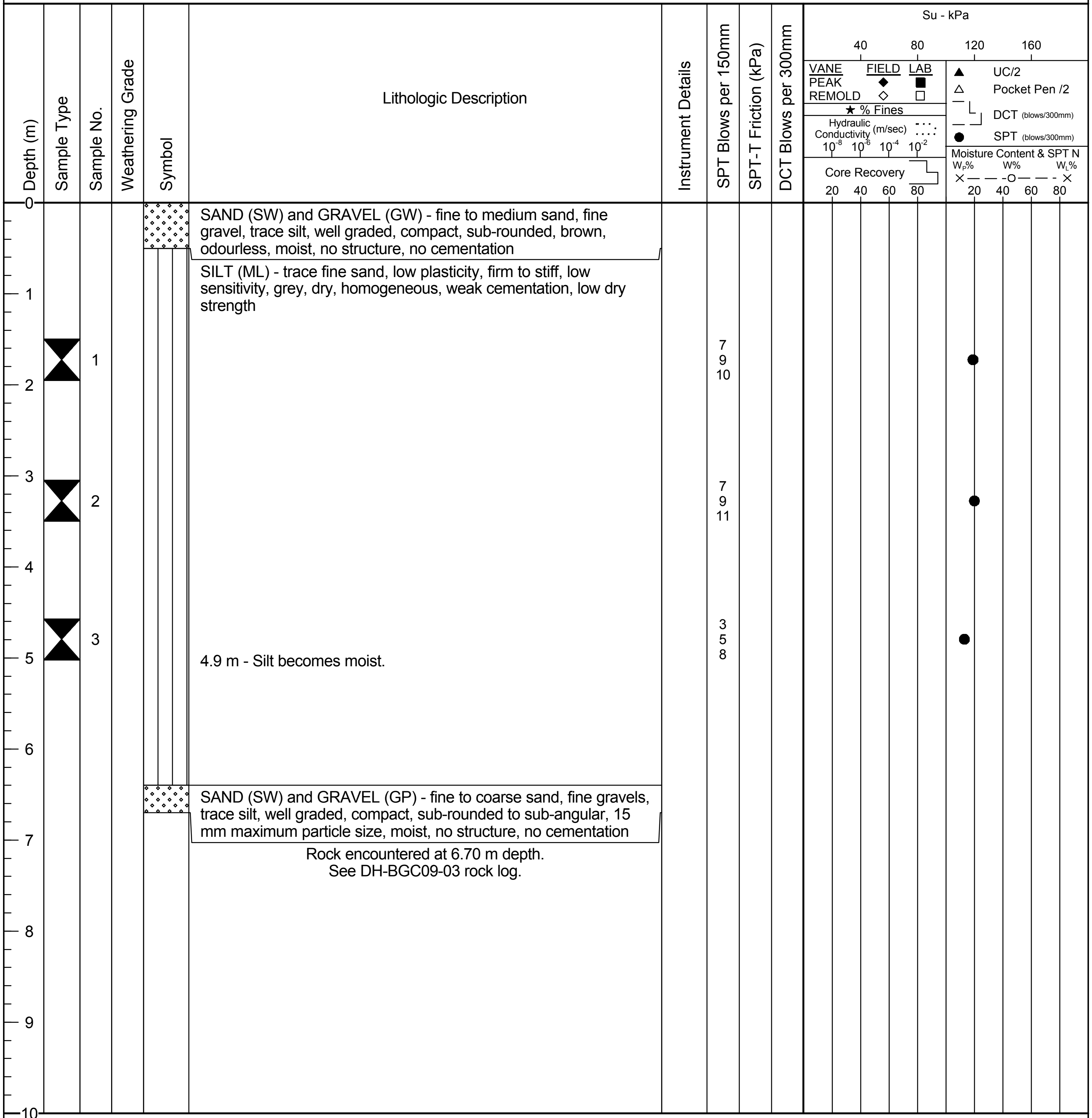
Location : Shoreacres East Approach

Project No. : 0093-076

Survey Method : Handheld GPS
Co-ordinates (m) : 462,365.E, 5,474,550.N
Ground Elevation (m) : 537.0
Datum : UTM NAD 83, Zone 11
Dip (degrees from horizontal) : 90
Direction : 0

Drill Designation : Fraste MD-XL
Drilling Contractor : Geotech Drilling
Drill Method : Mud rotary
Core : HQ
Fluid : Polymer/Mud
Casing : PQ ***Cased To (m)*** : 6.86

Start Date : 02 Oct 09
Finish Date: 03 Oct 09
Final Depth of Hole (m): : 19.3
Depth to Top of Rock (m) : 6.70
Logged by : MMB
Reviewed by : AJB



Sample No.	Lithologic Description	SPT Blows per 150mm
	SAND (SW) and GRAVEL (GW) - fine to medium sand, fine gravel, trace silt, well graded, compact, sub-rounded, brown, odourless, moist, no structure, no cementation	
	SILT (ML) - trace fine sand, low plasticity, firm to stiff, low sensitivity, grey, dry, homogeneous, weak cementation, low dry strength	
1		7 9 10
2		7 9 11
3		3 5 8
	4.9 m - Silt becomes moist.	
	SAND (SW) and GRAVEL (GP) - fine to coarse sand, fine gravels, trace silt, well graded, compact, sub-rounded to sub-angular, 15 mm maximum particle size, moist, no structure, no cementation	

Rock encountered at 6.70 m depth.
See DH-BGC09-03 rock log.

DRILL HOLE # DH-BGC09-03

Project: Shoreacres HDD
Geotechnical Investigation

Location : Shoreacres East Approach

Page 2 **of** 4

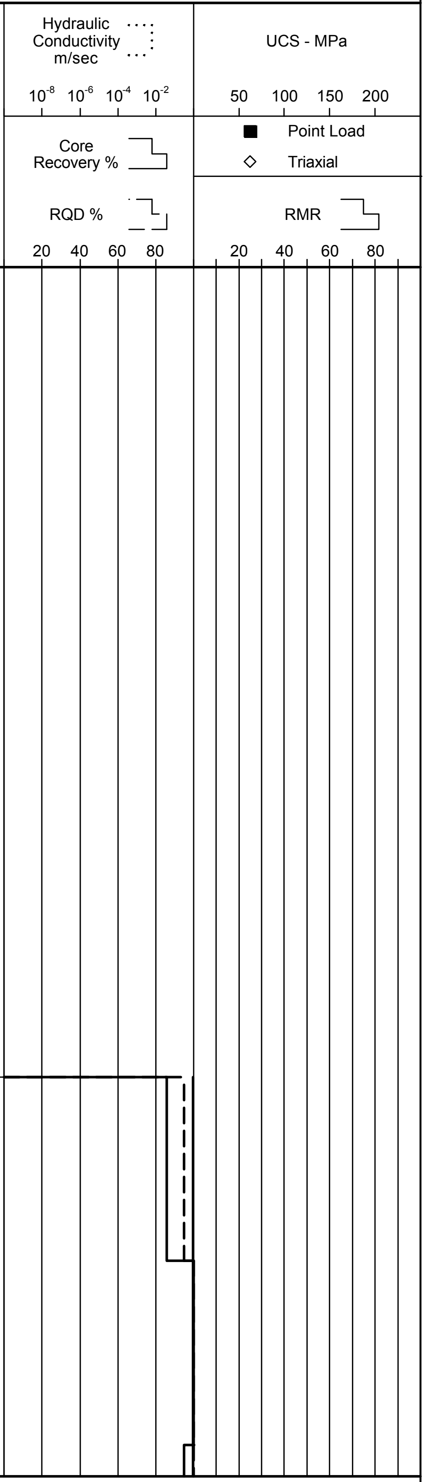
Project No. : 0093-076

Survey Method :Handheld GPS
Co-ordinates (m) : 462,365.E, 5,474,550.N
Ground Elevation (m) : 537.0
Datum : UTM NAD 83, Zone 11
Dip (degrees from horizontal) : 90
Direction : 0

Drill Designation : Fraste MD-XL
Drilling Contractor : Geotech Drilling
Drill Method : Mud rotary
Core : HQ
Fluid : Polymer/Mud
Casing : PQ **Cased To (m)** : 6.86

Start Date : 02 Oct 09
Finish Date: 03 Oct 09
Final Depth of Hole : 19.3
Depth to Top of Rock (m) : 6.70
Logged by : MMB
Reviewed by : AJB

Depth (m)	Sample Type	Sample No.	Weathering Grade	Symbol	Lithologic Description	Instrument Details
0–6					0 to 6.70 m - See DH-BGC09-03 soil log.	
7				▨	VOLCANICS (Dacite) - Dark blueish grey, fine grained, slightly foliated, equigranular, strong to very strong (R4 - R5), fresh, no alteration 7.10 m - One fracture with an alpha angle of 15 degrees.	
8	✋	1		▨		
9				▨	8.55 m - Trace quartz veins to a maximum width of 1 mm.	
10						



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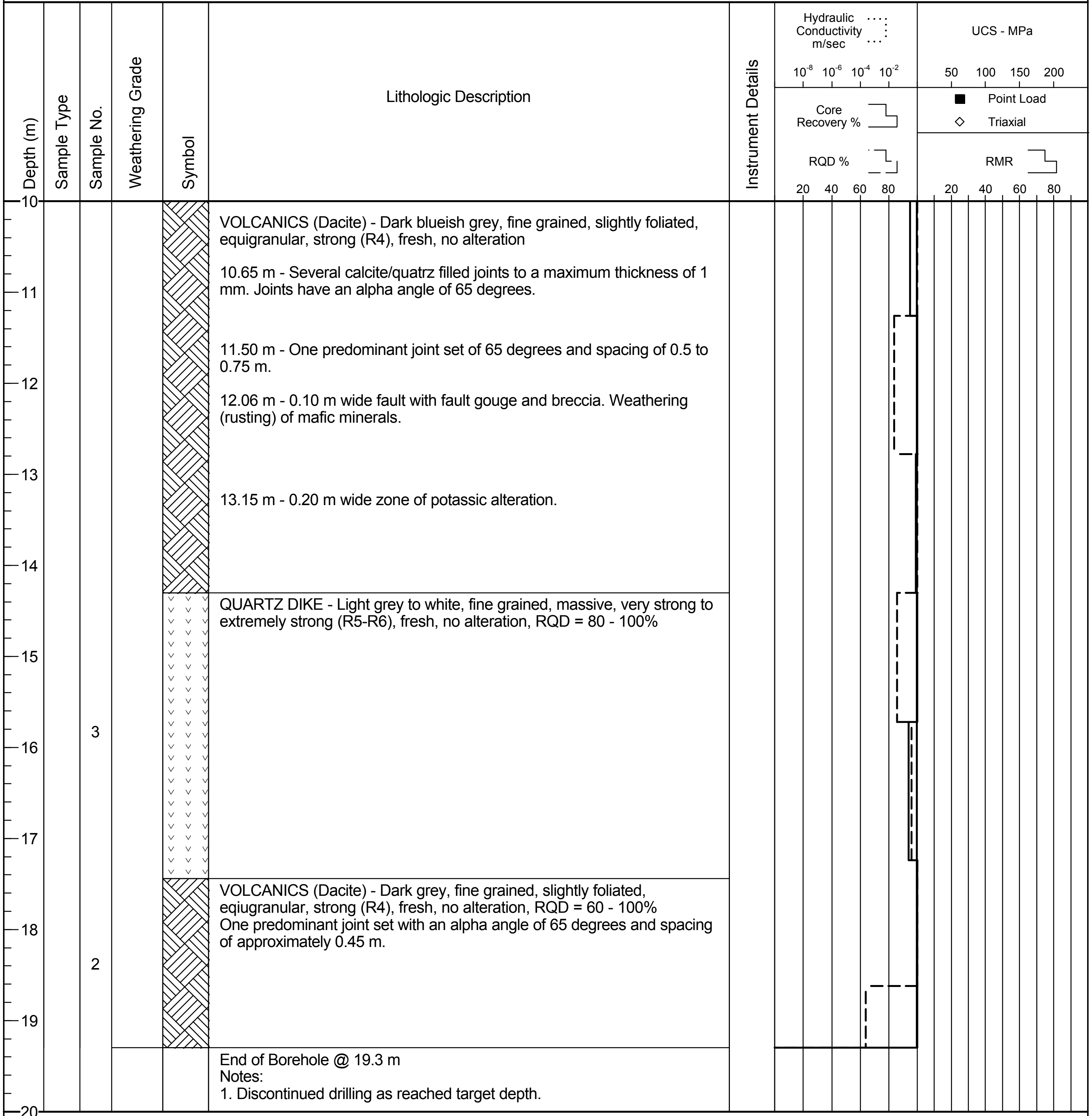
AN APPLIED EARTH SCIENCES COMPANY

Client: Terasen Gas

Survey Method :Handheld GPS
Co-ordinates (m) : 462,365.E, 5,474,550.N
Ground Elevation (m) : 537.0
Datum : UTM NAD 83, Zone 11
Dip (degrees from horizontal) : 90
Direction : 0

Drill Designation : Fraste MD-XL
Drilling Contractor : Geotech Drilling
Drill Method : Mud rotary
Core : HQ
Fluid : Polymer/Mud
Casing : PQ ***Cased To (m)*** : 6.86

Start Date : 02 Oct 09
Finish Date: 03 Oct 09
Final Depth of Hole : 19.3
Depth to Top of Rock (m) : 6.70
Logged by : MMB
Reviewed by : AJB



Sample No.	Lithologic Description
	VOLCANICS (Dacite) - Dark blueish grey, fine grained, slightly foliated, equigranular, strong (R4), fresh, no alteration 10.65 m - Several calcite/quatrz filled joints to a maximum thickness of 1 mm. Joints have an alpha angle of 65 degrees. 11.50 m - One predominant joint set of 65 degrees and spacing of 0.5 to 0.75 m. 12.06 m - 0.10 m wide fault with fault gouge and breccia. Weathering (rusting) of mafic minerals. 13.15 m - 0.20 m wide zone of potassic alteration.
3	QUARTZ DIKE - Light grey to white, fine grained, massive, very strong to extremely strong (R5-R6), fresh, no alteration, RQD = 80 - 100%
2	VOLCANICS (Dacite) - Dark grey, fine grained, slightly foliated, eqiugranular, strong (R4), fresh, no alteration, RQD = 60 - 100% One predominant joint set with an alpha angle of 65 degrees and spacing of approximately 0.45 m.
	End of Borehole @ 19.3 m Notes: 1. Discontinued drilling as reached target depth.

(Continued on next page)

Project: Shoreacres HDD
Geotechnical Investigation

DRILL HOLE # DH-BGC09-03

Location : Shoreacres East Approach

Project No. : 0093-076

Survey Method :Handheld GPS
Co-ordinates (m) : 462,365.E, 5,474,550.N
Ground Elevation (m) : 537.0
Datum : UTM NAD 83, Zone 11
Dip (degrees from horizontal) : 90
Direction : 0

Drill Designation : Fraste MD-XL
Drilling Contractor : Geotech Drilling
Drill Method : Mud rotary
Core : HQ
Fluid : Polymer/Mud
Casing : PQ **Cased To (m)** : 6.86

Start Date : 02 Oct 09
Finish Date: 03 Oct 09
Final Depth of Hole : 19.3
Depth to Top of Rock (m) : 6.70
Logged by : MMB
Reviewed by : AJB

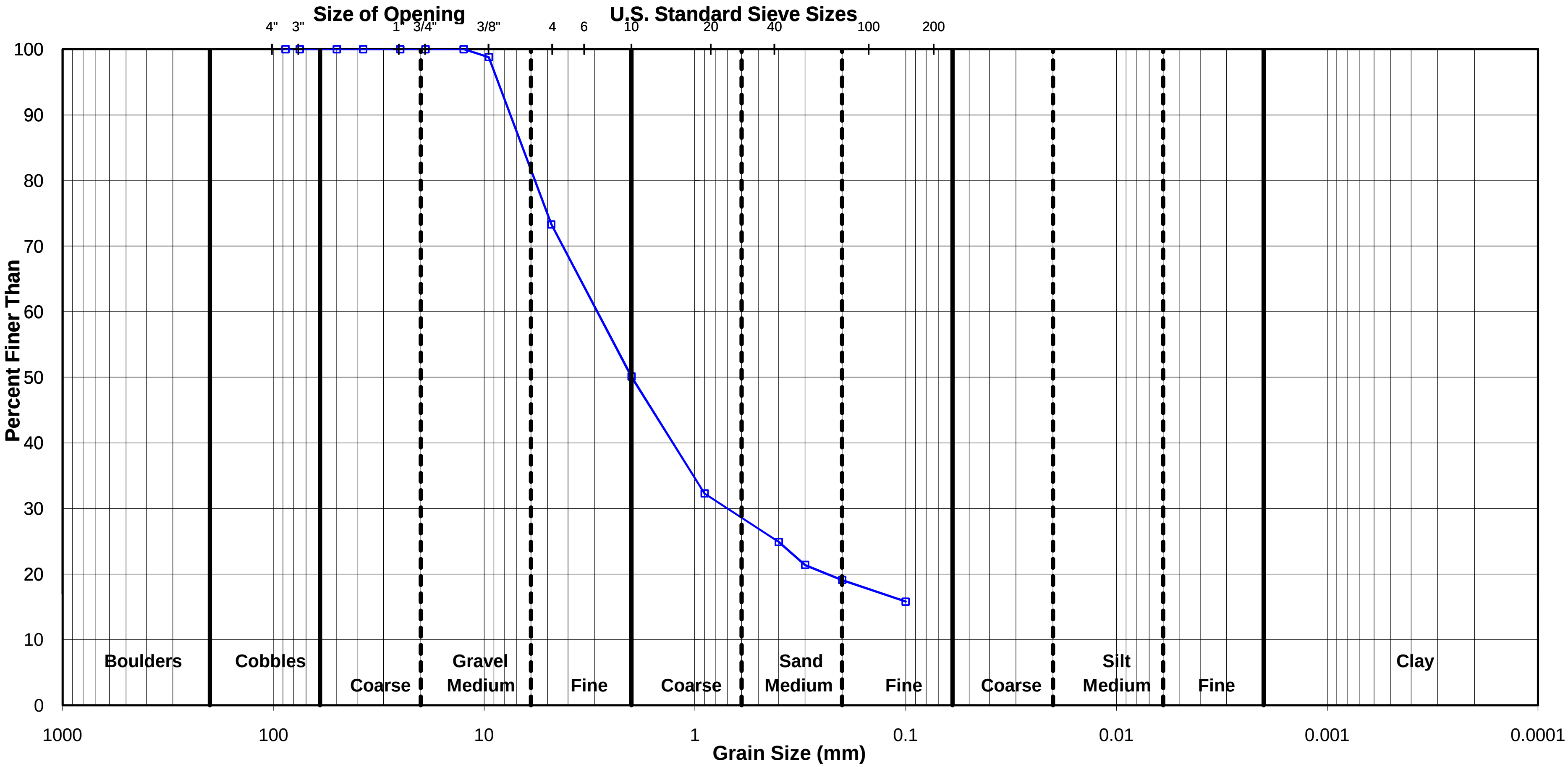
Depth (m)	Sample Type	Sample No.	Weathering Grade	Symbol	Lithologic Description	Instrument Details	Hydraulic Conductivity m/sec 10^{-8} 10^{-6} 10^{-4} 10^{-2} Core Recovery % RQD % 20 40 60 80	UCS - MPa 50 100 150 200 ■ Point Load ◇ Triaxial RMR 20 40 60 80
20					2. Hole grouted and filled with bentonite following completion. 3. No water table encountered. 4. Drill bit hardness: 9 - 11, but changed to 12 - 14 when drilling encountered quartz dike.			
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

Client: Terasen Gas

APPENDIX III

LABORATORY TESTING RESULTS



BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

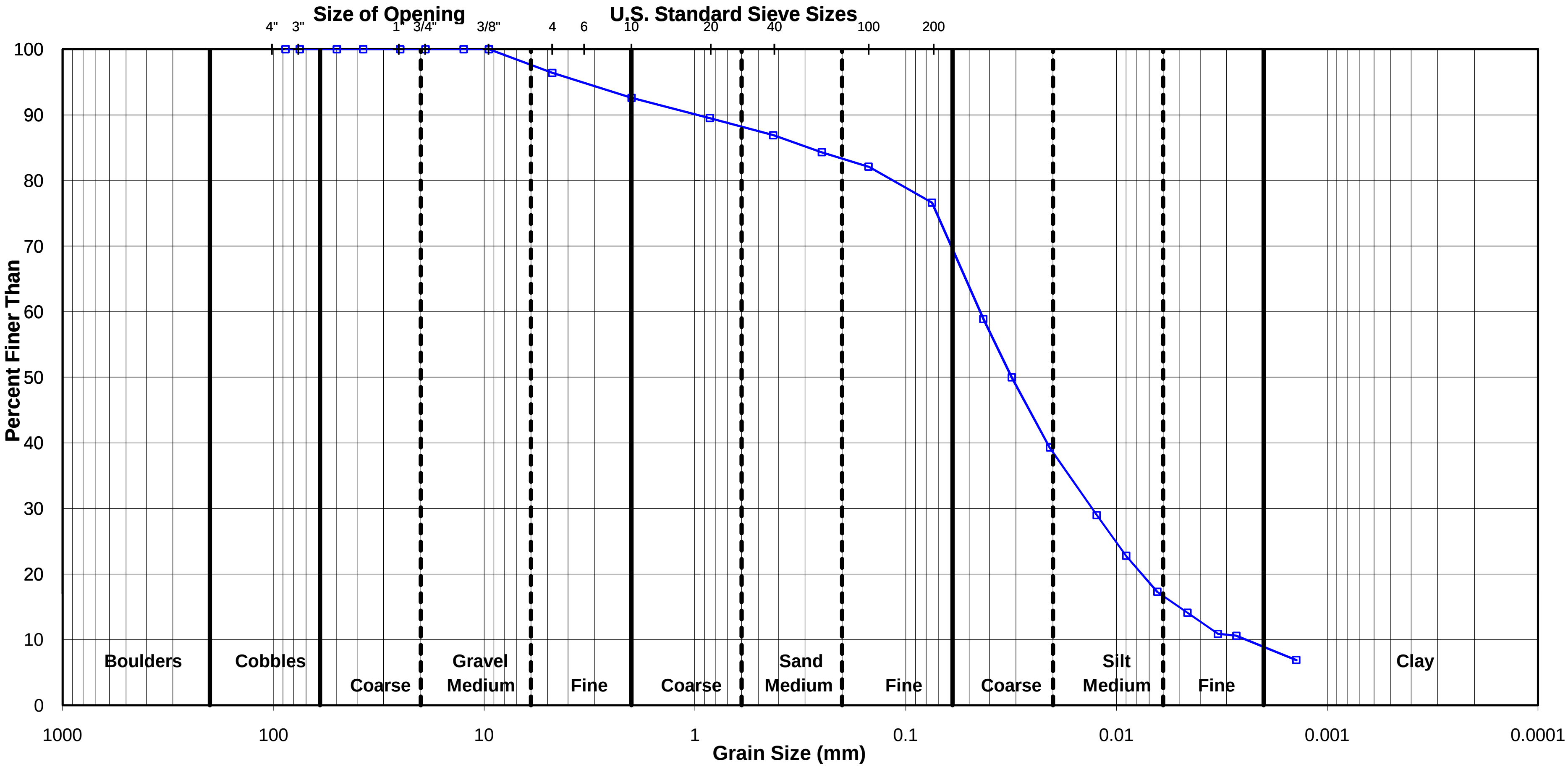
PROJECT:
Shoreacres HDD

TITLE:
Grain Size Distribution Analysis BGC09-DH02
Grab 2: 8.2 - 9.11 m

CLIENT:
Terasen Gas Inc.

PROJECT NO. **0093-076-04**

DWG. NO. **Appendix III - Figure 01**



BGC

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT:

Terasen Gas Inc.

PROJECT:

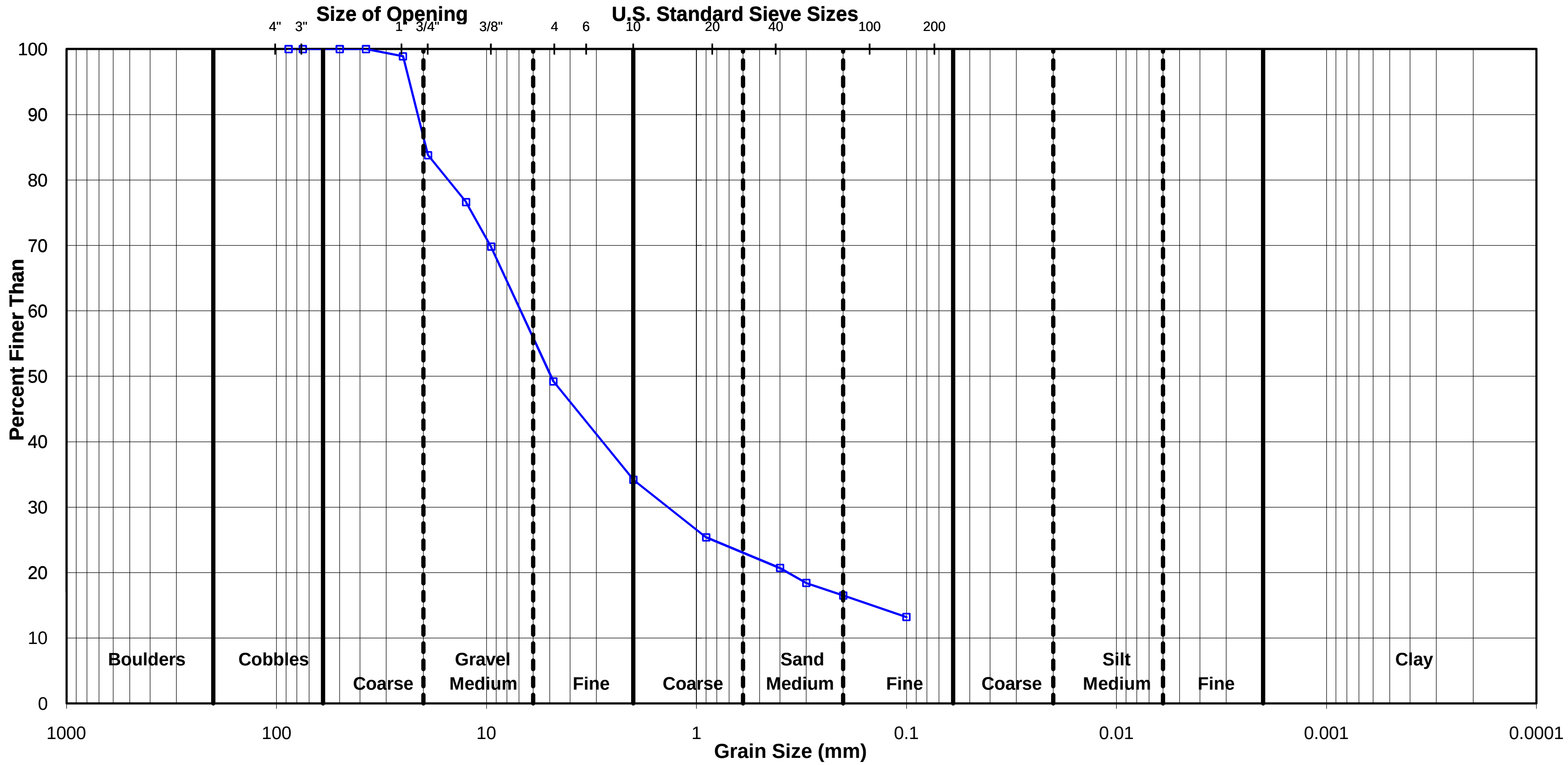
Shoreacres HDD

TITLE:

Grain Size Distribution Analysis BGC09-DH02
SPT 2: 3.05 - 3.50 m

PROJECT NO. **0093-076-04**

DWG. NO. **Appendix III - Figure 02**



BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

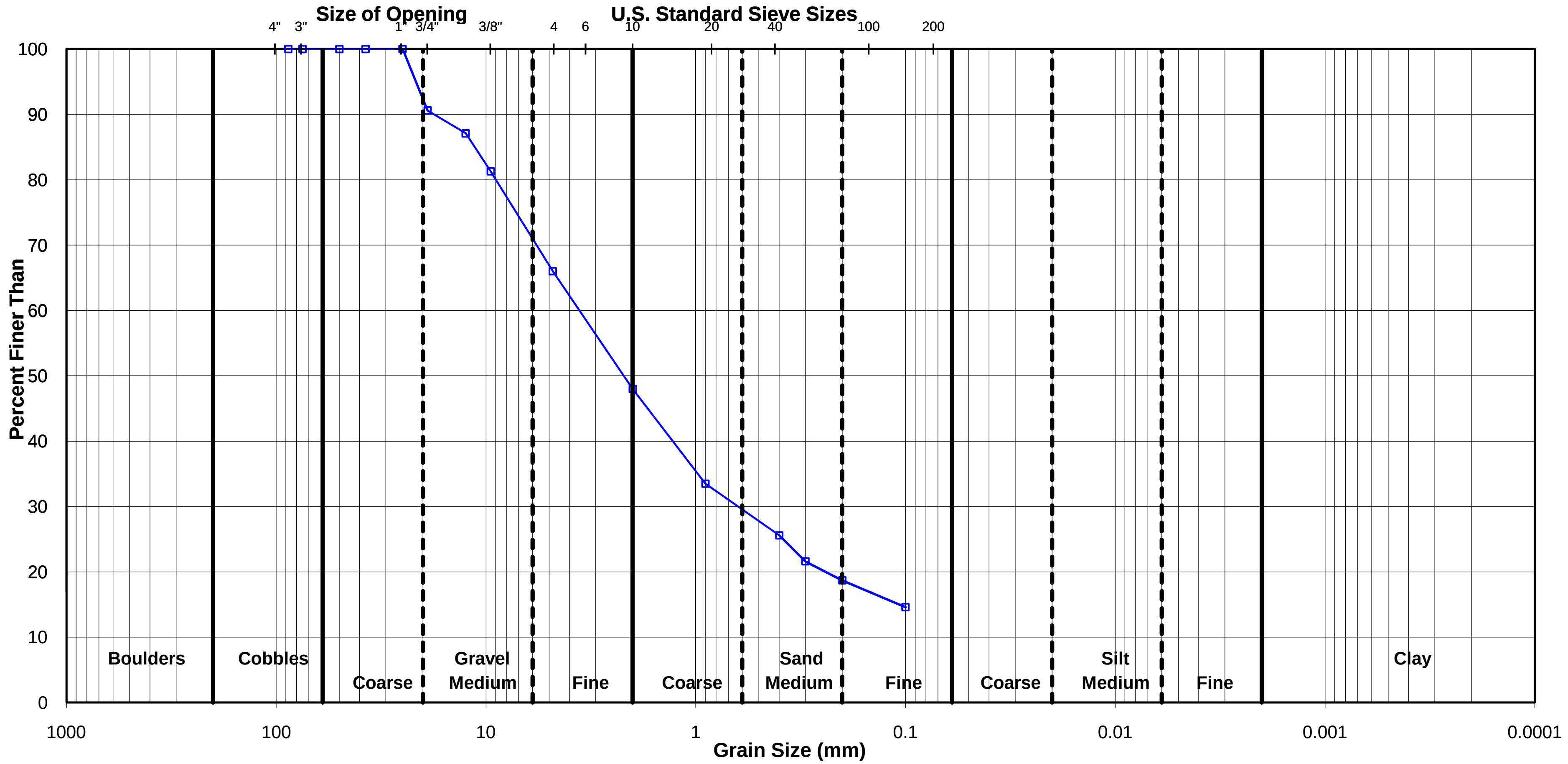
PROJECT:
Shoreacres HDD

TITLE:
Grain Size Distribution Analysis BGC09-DH02
SPT 4: 7.62 - 8.07 m

CLIENT:
Terasen Gas Inc.

PROJECT NO. **0093-076-04**

DWG. NO. **Appendix III - Figure 03**



BGC

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT:

Terasen Gas Inc.

PROJECT:

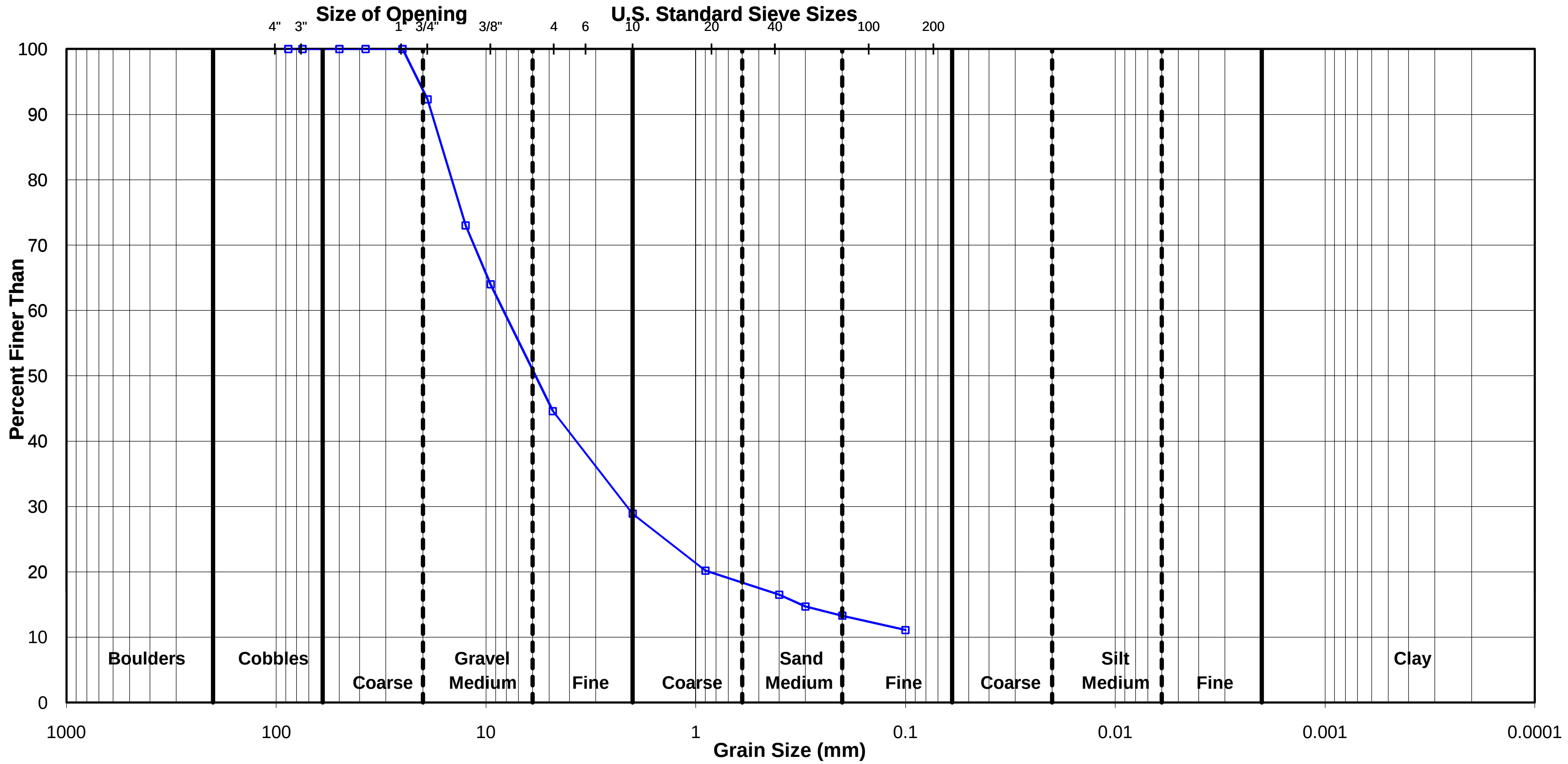
Shoreacres HDD

TITLE:

Grain Size Distribution Analysis BGC09-DH02
SPT 5: 10.67 - 11.12 m

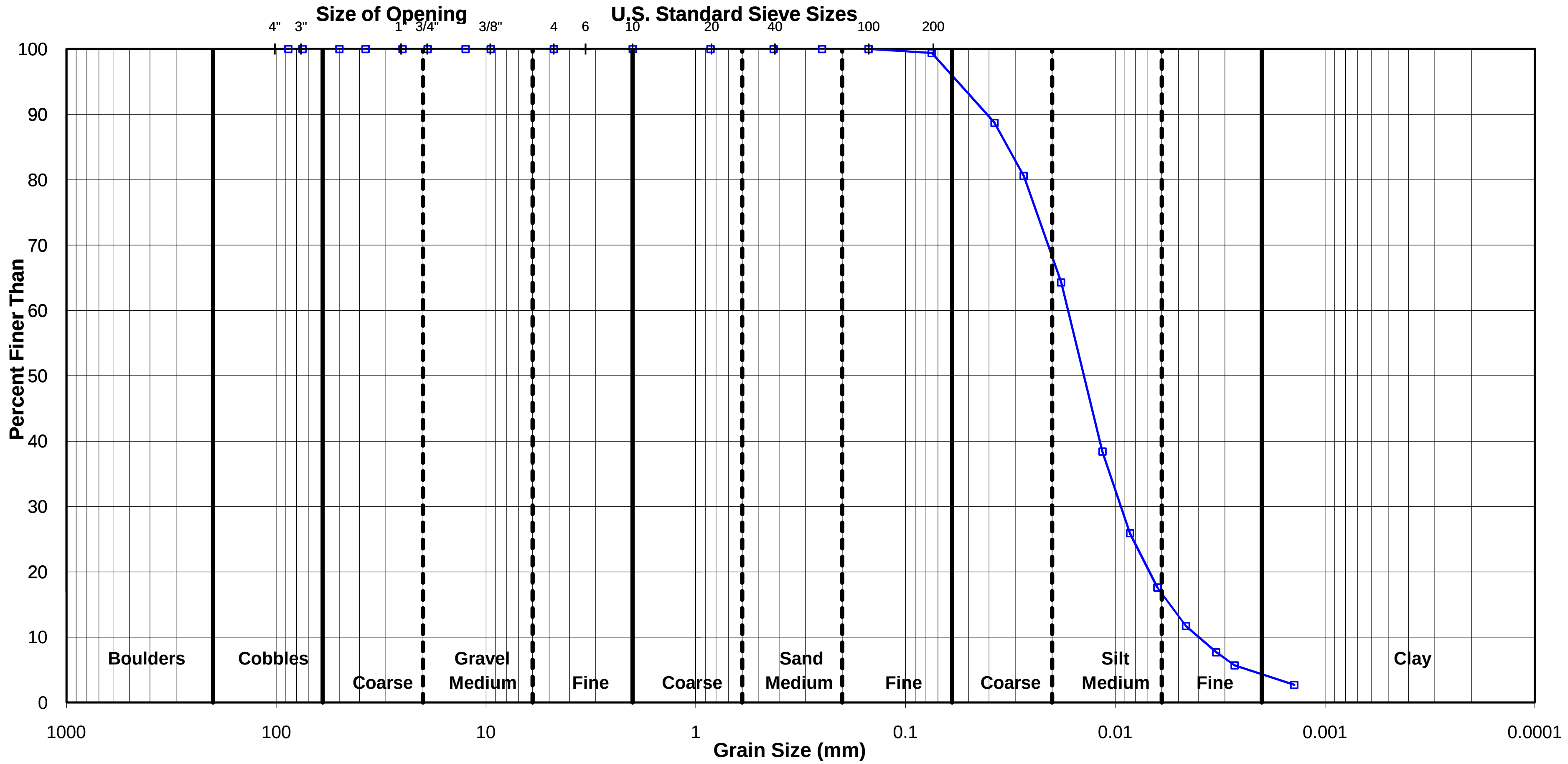
PROJECT NO. **0093-076-04**

DWG. NO. **Appendix III - Figure 04**



BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

PROJECT:	**Shoreacres HDD**
TITLE:	**Grain Size Distribution Analysis BGC09-DH02** **SPT 6: 13.14 - 13.59 m**
CLIENT:	**Terasen Gas Inc.**
PROJECT NO.	**0093-076-04**
DWG. NO.	**Appendix III - Figure 05**



BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

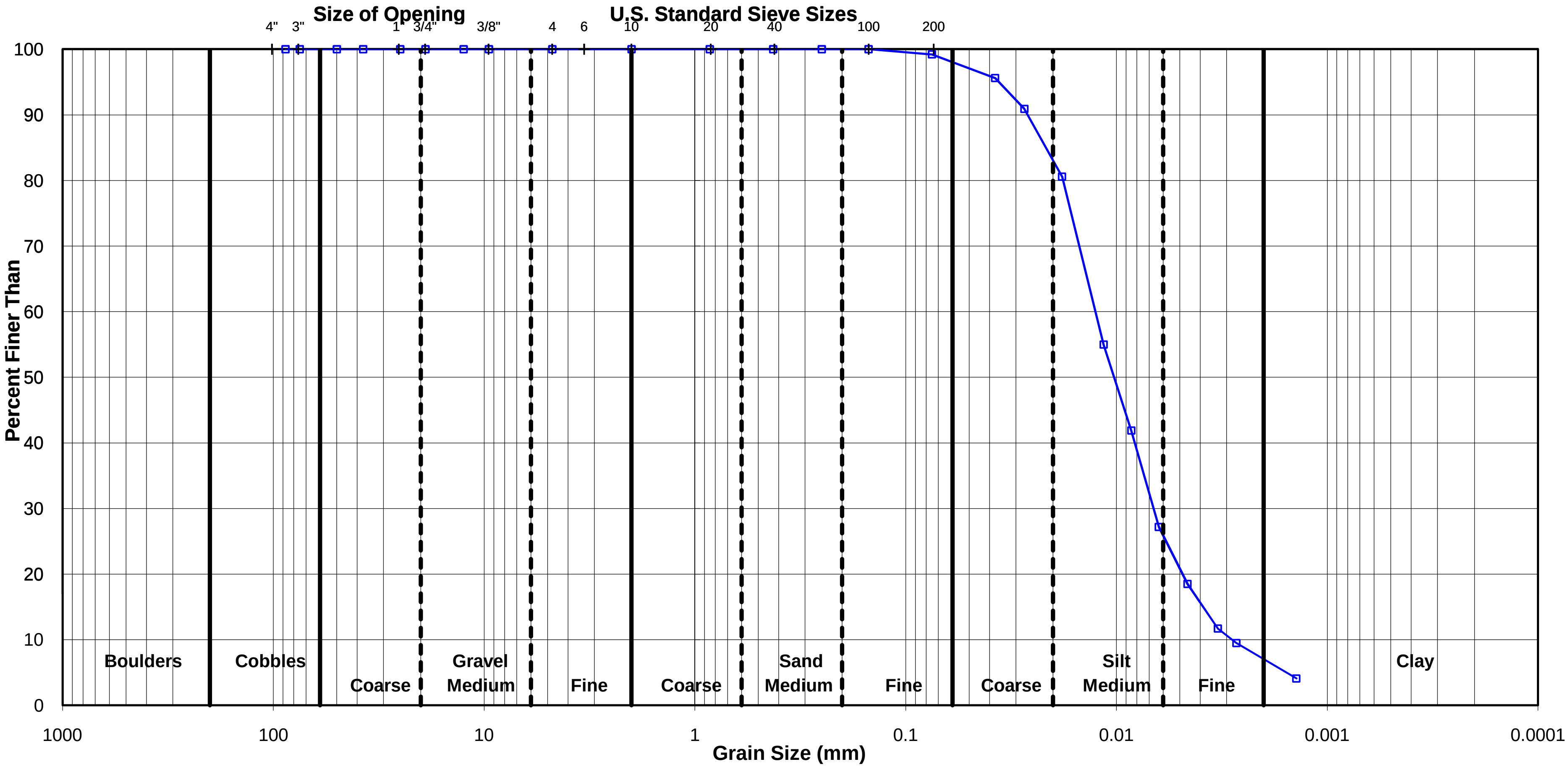
CLIENT:
Terasen Gas Inc.

PROJECT:
Shoreacres HDD

TITLE:
Grain Size Distribution Analysis BGC09-DH03
SPT 2: 3.05 - 3.50 m

PROJECT NO. **0093-076-04**

DWG. NO. **Appendix III - Figure 06**



BGC

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

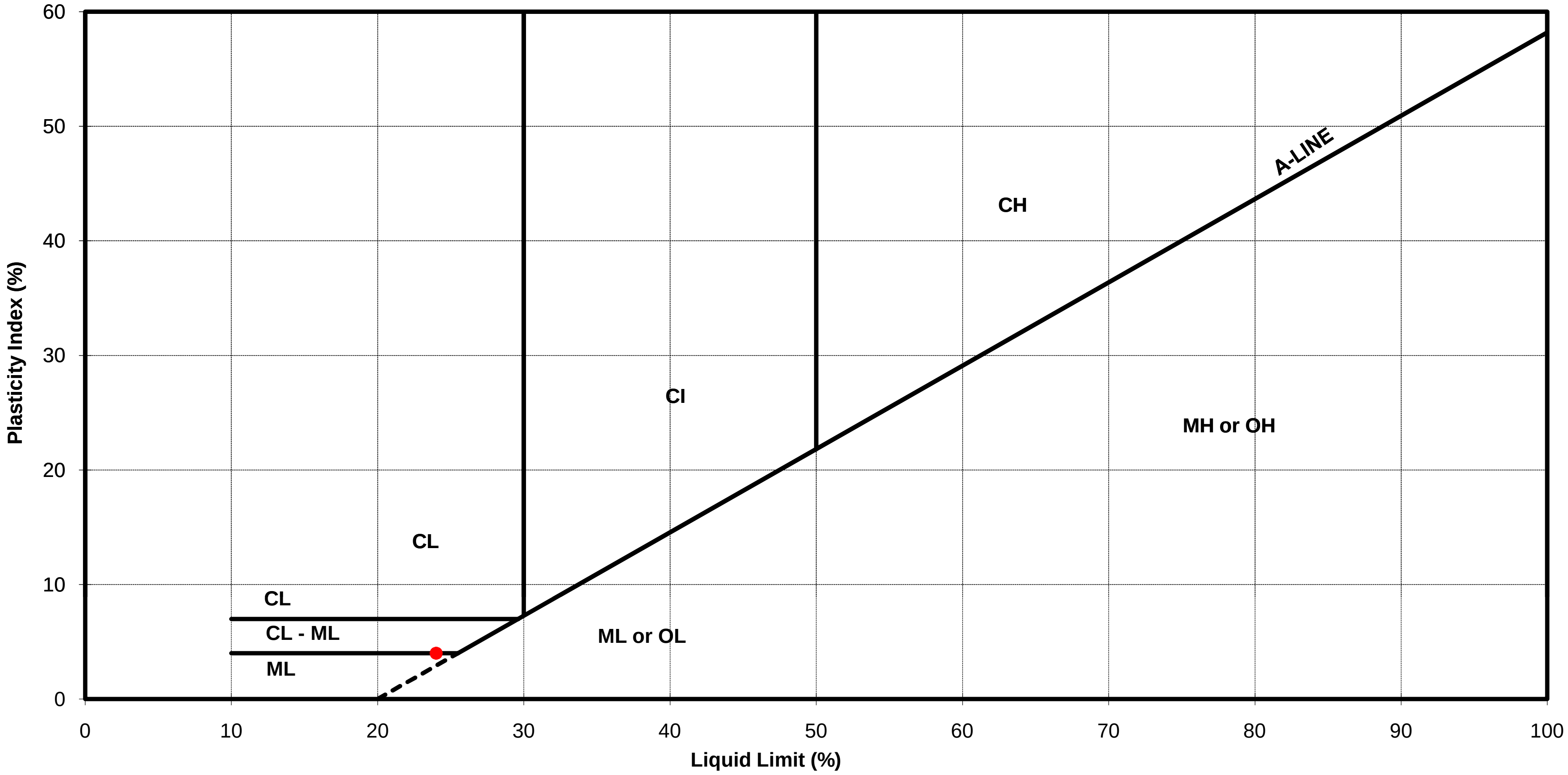
CLIENT:
Terasen Gas Inc.

PROJECT:
Shoreacres HDD

TITLE:
Grain Size Distribution Analysis BGC09-DH03
SPT 3: 4.57 - 5.02 m

PROJECT NO. **0093-076-04**

DWG. NO. **Appendix III - Figure 07**



Test Pit / Borehole: BGC09-DH02
Location: 5474411 N, 462296 E
Sample: SPT 2 **Depth:** 3.05-3.50 m

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

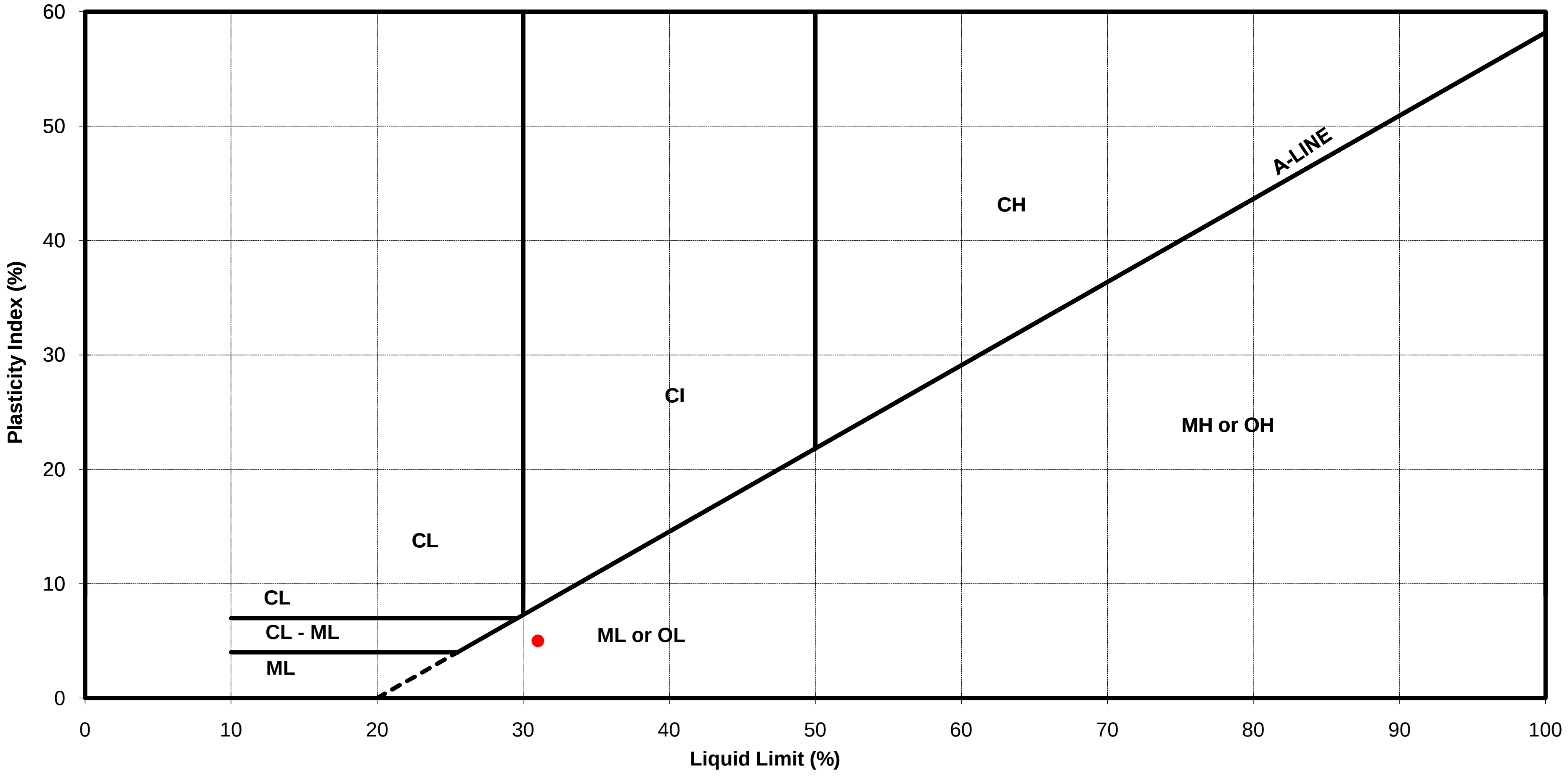
CLIENT:
Terasen Gas Inc.

PROJECT:
Shoreacres HDD

TITLE:
Atterberg Limits Analysis

PROJECT NO. **0093-076-04**

DWG. NO. **Appendix III - Figure 08**



Test Pit / Borehole: BGC09-DH03
Location: 5474550 N, 462365 E
Sample: SPT 2 **Depth:** 3.05-3.50 m

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

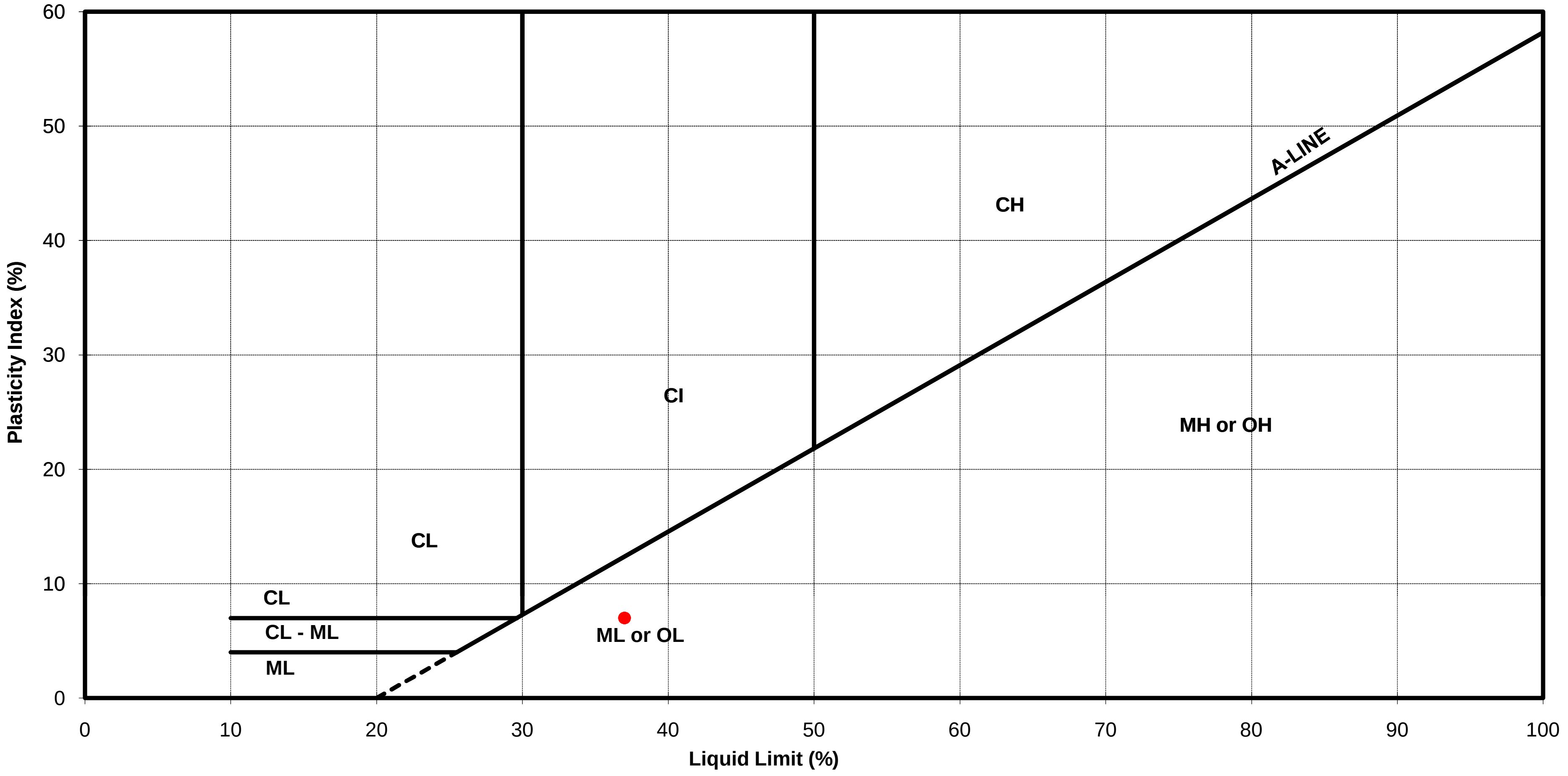
CLIENT:
Terasen Gas Inc.

PROJECT:
Shoreacres HDD

TITLE:
Atterberg Limits Analysis

PROJECT NO. **0093-076-04**

DWG. NO. **Appendix III - Figure 09**



Test Pit / Borehole: BGC09-DH03
Location: 5474550 N, 462365 E
Sample: SPT 3 **Depth:** 4.57-5.02m

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT:
Terasen Gas Inc.

PROJECT:
Shoreacres HDD

TITLE:
Atterberg Limits Analysis

PROJECT NO. **0093-076-04**

DWG. NO. **Appendix III - Figure 10**

Golder Associates Ltd. - Burnaby Laboratory
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C8

Unconfined Compressive Strength of Intact Rock Core Specimens

Reference
ASTM D7012-07 Method C

Project No.: 09-1416-0029/7000
Project: Shoreacres Project # 0093-076
Client: BGC Engineering Ltd.
Location: Not Provided
Lab ID 186

Failure Mode

(1) Single diagonal shear plane
(2) Multi-vertical fracture
(3) Vertical splitting
(4) Shear along foliation / discontinuity
(5) Conical
(6) Spalling
(7) Other
Note: (deg) measured from core axis

No.	Borehole #	Sample #	Depth (m)	Dia (mm)	Ht (mm)	A (cm^2)	V (cm^3)	Mass (g)	Wet Density (Kg/M^3)	W (%)	Dry Density (Kg/M^3)	Maximum Load (kN)	Stress σ (MPa)	Rock Type	Failure Mode Type	 (deg)
1	BGC09-01	1	31.86-32.16	60.70	123.05	28.94	356.08	968.80	2721	0.11	2718	214.20	74.02	Not Provided	4	N/A
2	BGC09-01	2	Sample Received Broken - Too Short To Test													
3	BGC09-01	3	50.25-50.55	60.85	122.06	29.08	354.96	972.70	2740	0.09	2738	293.10	100.79	Not Provided	2	N/A
4	BGC09-01	4	71.90-72.20	60.94	123.06	29.17	358.93	997.00	2778	0.20	2772	233.40	80.02	Not Provided	1/2	~16
5	BGC09-02	1	24.01-24.30	60.88	122.91	29.11	357.79	975.40	2726	0.19	2721	104.60	35.93	Not Provided	4	N/A
6	BGC09-02	2	34.39-34.65	60.80	122.72	29.03	356.30	1067.80	2997	0.16	2992	86.10	29.66	Not Provided	4	24
7	BGC09-02	3	58.67-58.97	60.83	123.47	29.06	358.83	988.50	2755	0.07	2753	282.00	97.03	Not Provided	4	30
8	BGC09-02	4	73.65-73.97	60.86	123.83	29.09	360.23	991.10	2751	0.12	2748	240.40	82.64	Not Provided	4	33
9	BGC09-02	5	38.60-38.90	60.80	124.17	29.03	360.51	995.10	2760	0.05	2759	278.70	95.99	Not Provided	4	20
10	BGC09-03	1	8.72	60.78	123.15	29.01	357.31	1057.10	2958	0.08	2956	585.00	201.63	Not Provided	2/4	~27
11	BGC09-03	2	18.25-18.50	60.87	121.61	29.10	353.89	1073.70	3034	0.06	3032	312.00	107.22	Not Provided	4	~30
12	BGC09-03	3	15.72	60.91	124.23	29.14	361.99	959.20	2650	0.13	2646	668.90	229.56	Not Provided	7	Shattered

G. Patton	October 21, 2009	J. Ramesch	October 22, 2009
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Lab
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C6

Unconfined Compressive Strength of Intact Rock Core Specimens

Reference
ASTM D7012-07 Method C

Project No.:	09-1416-0029/7000	**Borehole:**	**BGC09-01**
Project:	Shoreacres Project # 0093-076	**Sample Number:**	1
Location:	Not Provided	**Depth (m):**	31.86-32.16
Client:	BGC Engineering Ltd.	**Lab ID No:**	186

Testing Results		Sample Measurements	
Max Load (kN)	**214.20**	Diameter (mm)	60.70
		Height (mm)	123.05
Stress σ (MPa)	**74.02**	Area (cm^2)	28.94
		Volume (cm^3)	356.08
Pace Rate (kN/s)	0.50	Mass (g)	968.80
		Moisture Content (%)	0.11
Lithology	Not Provided	Wet Density (Kg/m^3)	2721
		Dry Density (Kg/m^3)	2718

Failure Mode

Type: **4**

Degrees:* **N/A**

* Degrees measured with respect to core axis.

Notes

- Water content as received

Mode:

(1) Single diagonal shear plane
(2) Vertical fracture(s)
(3) Vertical splitting
(4) Shear along foliation /discontinuity
(5) Conical
(6) Spalling
(7) Other

Comments

Veining in multiple orientations.

** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.*

BEFORE TEST

AFTER TEST

G. Patton	October 21, 2009	J. Ramesch	October 22, 2009
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Lab
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C6

Unconfined Compressive Strength of Intact Rock Core Specimens

Reference
ASTM D7012-07 Method C

Project No.:	09-1416-0029/7000	**Borehole:**	**BGC09-01**
Project:	Shoreacres Project # 0093-076	**Sample Number:**	3
Location:	Not Provided	**Depth (m):**	50.25-50.55
Client:	BGC Engineering Ltd.	**Lab ID No:**	186

Testing Results

Max Load (kN)	**293.10**
Stress σ (MPa)	**100.79**
Pace Rate (kN/s)	0.50
Lithology	Not Provided

Sample Measurements

Diameter (mm)	60.85
Height (mm)	122.06
Area (cm^2)	29.08
Volume (cm^3)	354.96
Mass (g)	972.70
Moisture Content (%)	0.09
Wet Density (Kg/m^3)	2740
Dry Density (Kg/m^3)	2738

BEFORE TEST

Failure Mode

Type: **2**

Degrees:* **N/A**

* Degrees measured with respect to core axis.

Notes

- Water content as received

Mode:
(1) Single diagonal shear plane
(2) Vertical fracture(s)
(3) Vertical splitting
(4) Shear along foliation /discontinuity
(5) Conical
(6) Spalling
(7) Other

AFTER TEST

Comments

Multiple small veining.

** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.*

G. Patton	October 21, 2009	J. Ramesch	October 22, 2009
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates

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4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C6

Unconfined Compressive Strength of Intact Rock Core Specimens

Reference
ASTM D7012-07 Method C

Project No.:	09-1416-0029/7000	**Borehole:**	**BGC09-01**
Project:	Shoreacres Project # 0093-076	**Sample Number:**	4
Location:	Not Provided	**Depth (m):**	71.90-72.20
Client:	BGC Engineering Ltd.	**Lab ID No:**	186

Testing Results

Max Load (kN)	**233.40**
Stress σ (MPa)	**80.02**
Pace Rate (kN/s)	0.50
Lithology	Not Provided

Sample Measurements

Diameter (mm)	60.94
Height (mm)	123.06
Area (cm^2)	29.17
Volume (cm^3)	358.93
Mass (g)	997.00
Moisture Content (%)	0.20
Wet Density (Kg/m^3)	2778
Dry Density (Kg/m^3)	2772

Failure Mode

Type:	**1/2**
Degrees:*	**~16**

* Degrees measured with respect to core axis.

Notes

- Water content as received

Mode:
(1) Single diagonal shear plane
(2) Vertical fracture(s)
(3) Vertical splitting
(4) Shear along foliation /discontinuity
(5) Conical
(6) Spalling
(7) Other

Comments

Sample received in two pieces.

Multiple veining.

** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.*

BEFORE TEST

AFTER TEST

G. Patton	October 21, 2009	J. Ramesch	October 22, 2009
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates

Golder Associates Ltd. - Burnaby Lab
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C6

Unconfined Compressive Strength of Intact Rock Core Specimens

Reference
ASTM D7012-07 Method C

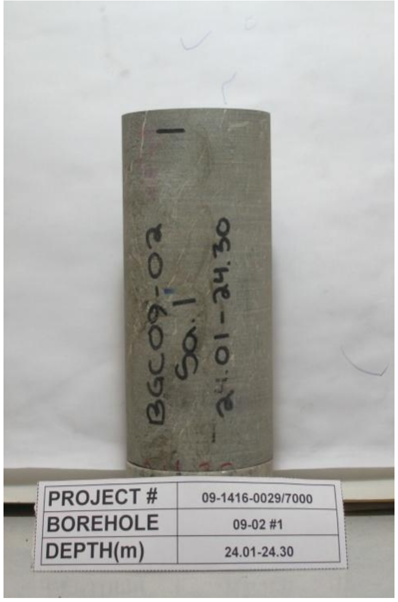
Project No.:	09-1416-0029/7000	**Borehole:**	**BGC09-02**
Project:	Shoreacres Project # 0093-076	**Sample Number:**	1
Location:	Not Provided	**Depth (m):**	24.01-24.30
Client:	BGC Engineering Ltd.	**Lab ID No:**	186

Testing Results

Max Load (kN)	**104.60**
Stress σ (MPa)	**35.93**
Pace Rate (kN/s)	0.50
Lithology	Not Provided

Sample Measurements

Diameter (mm)	60.88
Height (mm)	122.91
Area (cm^2)	29.11
Volume (cm^3)	357.79
Mass (g)	975.40
Moisture Content (%)	0.19
Wet Density (Kg/m^3)	2726
Dry Density (Kg/m^3)	2721



BEFORE TEST

Failure Mode

Type: **4**

Degrees:* **N/A**

* Degrees measured with respect to core axis.

Notes

- Water content as received

Mode:
(1) Single diagonal shear plane
(2) Vertical fracture(s)
(3) Vertical splitting
(4) Shear along foliation /discontinuity
(5) Conical
(6) Spalling
(7) Other

AFTER TEST

Comments

Contains small veins.

Sample split along small veins.

** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.*

G. Patton	October 21, 2009	J. Ramesch	October 22, 2009
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Lab
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C6

Unconfined Compressive Strength of Intact Rock Core Specimens

Reference
ASTM D7012-07 Method C

Project No.:	09-1416-0029/7000	**Borehole:**	**BGC09-02**
Project:	Shoreacres Project # 0093-076	**Sample Number:**	2
Location:	Not Provided	**Depth (m):**	34.39-34.65
Client:	BGC Engineering Ltd.	**Lab ID No:**	186

Testing Results

Max Load (kN)	**86.10**
Stress σ (MPa)	**29.66**
Pace Rate (kN/s)	0.50
Lithology	Not Provided

Sample Measurements

Diameter (mm)	60.80
Height (mm)	122.72
Area (cm^2)	29.03
Volume (cm^3)	356.30
Mass (g)	1067.80
Moisture Content (%)	0.16
Wet Density (Kg/m^3)	2997
Dry Density (Kg/m^3)	2992

BEFORE TEST

Failure Mode

Type: **4**

Degrees:* **24**

* Degrees measured with respect to core axis.

Notes

- Water content as received

Mode:

(1) Single diagonal shear plane
(2) Vertical fracture(s)
(3) Vertical splitting
(4) Shear along foliation /discontinuity
(5) Conical
(6) Spalling
(7) Other

AFTER TEST

Comments

Large discontinuity ~24° with respect to core axis.

** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.*

G. Patton	October 21, 2009	J. Ramesch	October 22, 2009
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Lab
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Burnaby, B.C. Canada V5C 6C6

Unconfined Compressive Strength of Intact Rock Core Specimens

Reference
ASTM D7012-07 Method C

Project No.:	09-1416-0029/7000	**Borehole:**	**BGC09-02**
Project:	Shoreacres Project # 0093-076	**Sample Number:**	3
Location:	Not Provided	**Depth (m):**	58.67-58.97
Client:	BGC Engineering Ltd.	**Lab ID No:**	186

Testing Results

Max Load (kN)	**282.00**
Stress σ (MPa)	**97.03**
Pace Rate (kN/s)	0.50
Lithology	Not Provided

Sample Measurements

Diameter (mm)	60.83
Height (mm)	123.47
Area (cm^2)	29.06
Volume (cm^3)	358.83
Mass (g)	988.50
Moisture Content (%)	0.07
Wet Density (Kg/m^3)	2755
Dry Density (Kg/m^3)	2753

Failure Mode

Type: **4**

Degrees:* **30**

* Degrees measured with respect to core axis.

Notes

- Water content as received

Mode:
(1) Single diagonal shear plane
(2) Vertical fracture(s)
(3) Vertical splitting
(4) Shear along foliation /discontinuity
(5) Conical
(6) Spalling
(7) Other

Comments

Variably foliated with veins.

** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.*

BEFORE TEST

AFTER TEST

G. Patton	October 21, 2009	J. Ramesch	October 22, 2009
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Lab
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C6

Unconfined Compressive Strength of Intact Rock Core Specimens

Reference
ASTM D7012-07 Method C

Project No.:	09-1416-0029/7000	**Borehole:**	**BGC09-02**
Project:	Shoreacres Project # 0093-076	**Sample Number:**	4
Location:	Not Provided	**Depth (m):**	73.65-73.97
Client:	BGC Engineering Ltd.	**Lab ID No:**	186

Testing Results

Max Load (kN): **240.40**

Stress σ (MPa): **82.64**

Pace Rate (kN/s): 0.50

Lithology: Not Provided

Sample Measurements

Diameter (mm)	60.86
Height (mm)	123.83
Area (cm^2)	29.09
Volume (cm^3)	360.23
Mass (g)	991.10
Moisture Content (%)	0.12
Wet Density (Kg/m^3)	2751
Dry Density (Kg/m^3)	2748

Failure Mode

Type: **4**

Degrees:* **33**

* Degrees measured with respect to core axis.

Notes

- Water content as received

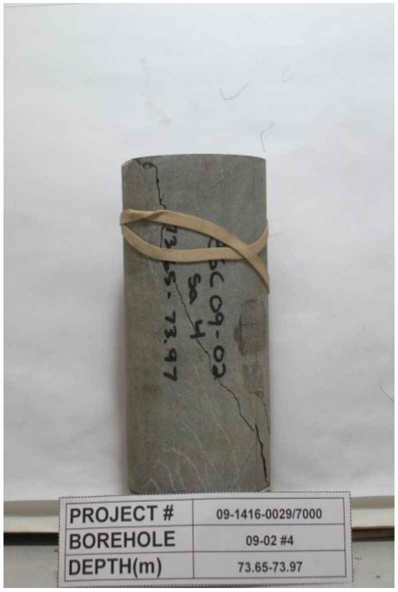
Mode:
(1) Single diagonal shear plane
(2) Vertical fracture(s)
(3) Vertical splitting
(4) Shear along foliation /discontinuity
(5) Conical
(6) Spalling
(7) Other

Comments

Sample received in two pieces.

** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.*

BEFORE TEST



AFTER TEST

G. Patton	October 21, 2009	J. Ramesch	October 22, 2009
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Lab
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C6

Unconfined Compressive Strength of Intact Rock Core Specimens

Reference
ASTM D7012-07 Method C

Project No.:	09-1416-0029/7000	**Borehole:**	**BGC09-02**
Project:	Shoreacres Project # 0093-076	**Sample Number:**	5
Location:	Not Provided	**Depth (m):**	38.60-38.90
Client:	BGC Engineering Ltd.	**Lab ID No:**	186

Testing Results

Max Load (kN)	**278.70**
Stress σ (MPa)	**95.99**
Pace Rate (kN/s)	0.50
Lithology	Not Provided

Sample Measurements

Diameter (mm)	60.80
Height (mm)	124.17
Area (cm^2)	29.03
Volume (cm^3)	360.51
Mass (g)	995.10
Moisture Content (%)	0.05
Wet Density (Kg/m^3)	2760
Dry Density (Kg/m^3)	2759

BEFORE TEST

Failure Mode

Type: **4**

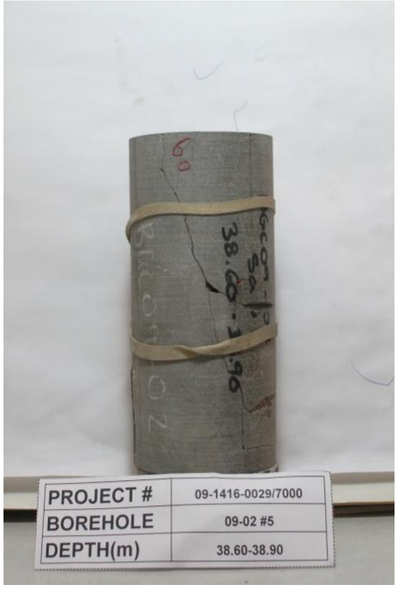
Degrees:* **20**

* Degrees measured with respect to core axis.

Notes

- Water content as received

Mode:
(1) Single diagonal shear plane
(2) Vertical fracture(s)
(3) Vertical splitting
(4) Shear along foliation /discontinuity
(5) Conical
(6) Spalling
(7) Other



AFTER TEST

Comments

Foliated ~20° with respect to core axis.

** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.*

G. Patton	October 21, 2009	J. Ramesch	October 22, 2009
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates

Golder Associates Ltd. - Burnaby Lab
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C6

Unconfined Compressive Strength of Intact Rock Core Specimens

Reference
ASTM D7012-07 Method C

Project No.:	09-1416-0029/7000	**Borehole:**	**BGC09-03**
Project:	Shoreacres Project # 0093-076	**Sample Number:**	1
Location:	Not Provided	**Depth (m):**	8.72 (Second depth number illegible)
Client:	BGC Engineering Ltd.	**Lab ID No:**	186

Testing Results		Sample Measurements	
Max Load (kN)	**585.00**	Diameter (mm)	60.78
		Height (mm)	123.15
Stress σ (MPa)	**201.63**	Area (cm^2)	29.01
		Volume (cm^3)	357.31
Pace Rate (kN/s)	0.50	Mass (g)	1057.10
		Moisture Content (%)	0.08
Lithology	Not Provided	Wet Density (Kg/m^3)	2958
		Dry Density (Kg/m^3)	2956

Failure Mode	
Type:	**2/4**
Degrees:*	**~27**

* Degrees measured with respect to core axis.

Notes

- Water content as received

Mode:
(1) Single diagonal shear plane
(2) Vertical fracture(s)
(3) Vertical splitting
(4) Shear along foliation /discontinuity
(5) Conical
(6) Spalling
(7) Other

Comments

Faint foliation ~27° with respect to core axis.

** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.*

BEFORE TEST

AFTER TEST

G. Patton	October 21, 2009	J. Ramesch	October 22, 2009
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Lab
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C6

Unconfined Compressive Strength of Intact Rock Core Specimens

Reference
ASTM D7012-07 Method C

Project No.:	09-1416-0029/7000	**Borehole:**	**BGC09-03**
Project:	Shoreacres Project # 0093-076	**Sample Number:**	2
Location:	Not Provided	**Depth (m):**	18.25-18.50
Client:	BGC Engineering Ltd.	**Lab ID No:**	186

Testing Results

Max Load (kN)	**312.00**
Stress σ (MPa)	**107.22**
Pace Rate (kN/s)	0.50
Lithology	Not Provided

Sample Measurements

Diameter (mm)	60.87
Height (mm)	121.61
Area (cm^2)	29.10
Volume (cm^3)	353.89
Mass (g)	1073.70
Moisture Content (%)	0.06
Wet Density (Kg/m^3)	3034
Dry Density (Kg/m^3)	3032

BEFORE TEST

Failure Mode

Type: **4**

Degrees:* **~30**

* Degrees measured with respect to core axis.

Notes

- Water content as received

Mode:

(1) Single diagonal shear plane
(2) Vertical fracture(s)
(3) Vertical splitting
(4) Shear along foliation /discontinuity
(5) Conical
(6) Spalling
(7) Other

AFTER TEST

Comments

Foliated ~ 30° with respect to core axis.

** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.*

G. Patton	October 21, 2009	J. Ramesch	October 22, 2009
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates

Golder Associates Ltd. - Burnaby Lab
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C6

Unconfined Compressive Strength of Intact Rock Core Specimens

Reference
ASTM D7012-07 Method C

Project No.:	09-1416-0029/7000	**Borehole:**	**BGC09-03**
Project:	Shoreacres Project # 0093-076	**Sample Number:**	3
Location:	Not Provided	**Depth (m):**	15.72 (Second depth number illegible)
Client:	BGC Engineering Ltd.	**Lab ID No:**	186

Testing Results		Sample Measurements	
Max Load (kN)	**668.90**	Diameter (mm)	60.91
		Height (mm)	124.23
Stress σ (MPa)	**229.56**	Area (cm^2)	29.14
		Volume (cm^3)	361.99
Pace Rate (kN/s)	0.50	Mass (g)	959.20
		Moisture Content (%)	0.13
Lithology	Not Provided	Wet Density (Kg/m^3)	2650
		Dry Density (Kg/m^3)	2646

BEFORE TEST

Failure Mode		Notes
		- Water content as received
Type:	**7**	**Mode:**
		(1) Single diagonal shear plane
Degrees:*	**Shattered**	(2) Vertical fracture(s)
		(3) Vertical splitting
		(4) Shear along foliation /discontinuity
		(5) Conical
* Degrees measured with respect to core axis.		(6) Spalling
		(7) Other

AFTER TEST

Comments

Foliated, variable orientation, one discontinuity.

** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.*

G. Patton	October 21, 2009	J. Ramesch	October 22, 2009
TESTED BY	DATE	CHECKED BY	DATE

APPENDIX IV

GEOPHYSICS REPORT

BGC ENGINEERING INC.

REPORT ON

SEISMIC REFRACTION INVESTIGATION

PROPOSED KOOTENAY RIVER OPTION B

GAS PIPELINE CROSSING,

CASTLEGAR AREA, B.C.

by

Kevin Payne, P.Eng.

Russell A. Hillman, P.Eng.

October, 2009 **PROJECT FGI-1102**

CONTENTS

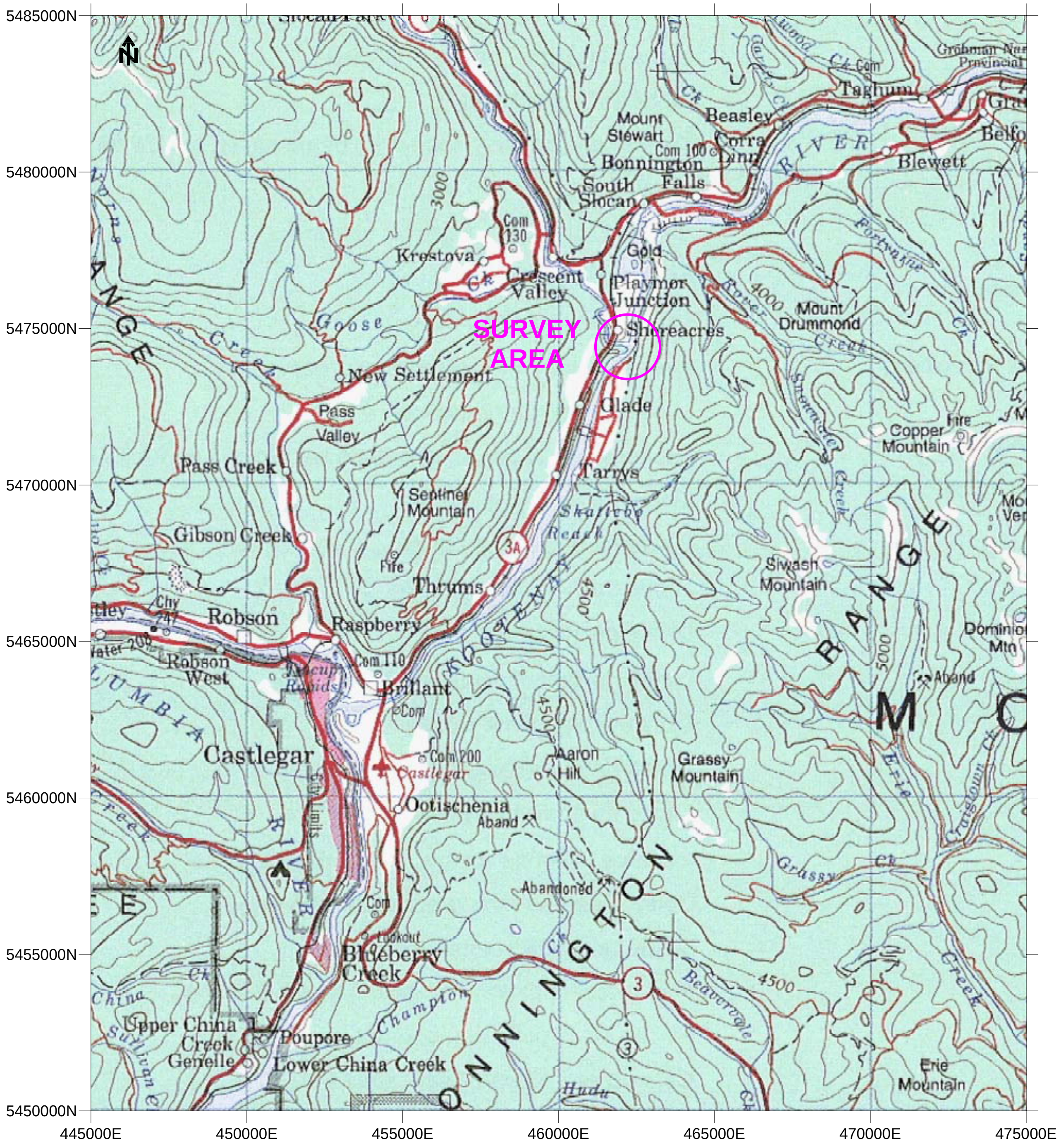
ILLUSTRATIONS

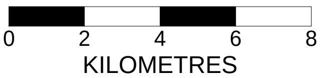
1. INTRODUCTION

In the period October 21 to October 25, 2009, Frontier Geosciences Inc. carried out a land and marine seismic refraction geophysical survey for BGC Engineering Inc. at a proposed Terasen Gas, Kootenay River crossing near Castlegar, B.C. The area of the proposed crossing near Shoreacres, is shown at 1:200,000 scale in the Survey Location Plan in Figure 1. A more detailed Site Plan illustrating the location of the proposed option B river crossing is presented at 1:2,500 scale in Figure 2. The location of the proposed crossing is very close to the most northern of three proposed crossing locations investigated last year by Frontier Geosciences Inc[1].

The seismic refraction testing was carried out along six lines. Three lines were surveyed on the west side of the Kootenay river, two lines were surveyed on the east side, and one line was surveyed across the river along the proposed pipeline axis. Geophone spacing was 5 metres for the seismic lines conducted on land, where a combination of 24-channel and 48-channel spreads were used to profile the subsurface seismic layering. The marine seismic line across the river used two 24-channel spreads with 5 metre spacings. One seismic spread was placed on each side of the river, and seismic shots were taken about every ten metres across the river. A total of about 1340 metres of marine and land seismic refraction surveying was carried out in the investigation.

[1] *BGC Engineering Inc, Report on Seismic Refraction, Bathymetric and Acoustic Sub-bottom Profiling Survey, Proposed Pipeline River Crossing, Kootenay River, B.C., July 2008, Project FGI-1021.*





BGC ENGINEERING INC.

OPTION B CROSSING, KOOTENAY RIVER, B.C.

GEOPHYSICAL SURVEY

SURVEY LOCATION PLAN

FRONTIER GEOSCIENCES INC.

DATE: OCT. 2009	SCALE 1:200,000	FIG. 1

2. THE SEISMIC REFRACTION SURVEY METHOD

2.1 Equipment

The seismic refraction investigation was carried out using two Geometrics, Geode, 24 channel, signal enhancement seismographs and Mark Products Ltd., 48 Hz geophones. Geophone intervals along the multicored seismic cables were maintained at 5 metres in order to produce high resolution data on subsurface layering. Energy input was provided by a seismic shotgun, firing blank, black powder, 8 gauge industrial shells into hand-excavated shotholes. Shot initiation or zero time was established by metal to metal contact of a striking hammer contacting the firing pin of the shotgun. For the marine seismic line, Gisco Seismic radio trigger links were used to trigger the two seismographs, which were located on both sides of the river.

2.2 Survey Procedure

For each spread, the seismic cable was stretched out in a straight line and the geophones implanted. Six separate ‘shots’ were then initiated: one at either end of the geophone array, two at intermediate locations along the seismic cable, and one off each end of the line to ensure adequate coverage of the basal layer. The shots were detonated individually and arrival times for each geophone were recorded digitally in the seismograph. Data recorded during field surveying operations was generally of good to excellent quality.

The overwater seismic refraction surveying was carried out with two land-based, fixed, geophone recording locations and a water-borne energy source. In operation, the “shooting” boat drifted in-line with the recording stations and the energy source was detonated. The recording stations were automatically triggered by a radio link between the shooting vessel and recording seismographs. Accurate positioning of the shooting vessel was determined by Electronic-Distance measuring (EDM) reflections recorded from one of the known shoreline positions. With numerous shot locations spanning the breadth of the river, detailed travel time data was established similar to land-based operations.

Throughout the survey, notes were recorded regarding seismic line positions in relation to topographic and geological features, and survey stations in the area. Relative elevations on the seismic lines were recorded by chain and inclinometer with absolute elevations taken from a digital elevation model provided by HinterLand Surveying and Geomatics Inc.

2.3 Interpretive Method

The final interpretation of the seismic data was arrived at using the method of differences technique. This method utilises the time taken to travel to a geophone from shotpoints located to either side of the geophone. Using the total time, a small vertical time is computed which represents the time taken to travel from the refractor up to the ground surface. This time is then multiplied by the velocity of each overburden layer to obtain the thickness of each layer at that point.

3. GEOPHYSICAL RESULTS

3.1 General

The interpreted results for seismic lines SL-1 through SL-6 are shown at a scale of 1:750 in Figures 3 to 9, in the Appendix. Ground surface profiles along land-based refraction lines were determined by chain and inclinometer and refered to absolute elevations provided by Hinterland Surveying and Geomatics Inc.

3.2 Discussion

The results of the seismic data analysis indicate deep bedrock along the proposed pipeline with the interpreted bedrock surface rising steeply to the northeast, along seismic line SL-5.

The subsurface in the site area is generally underlain by four distinct velocity layers. The thin surficial layer with velocities of 250 m/s to 300 m/s is consistent with surface exposures and shallow shothole intersections of loose sand and silt or gravel.

Underlying the surficial layer is an intermediate layer with velocities varying from 600 m/s to 850 m/s. Ranging up to 14 metres in thickness, this layer has been correlated with stiff silt and dense sand and gravel. This layer pinches out uphill and to the northeast on seismic line SL-5.

The seismic lines are underlain by a thick intermediate overburden layer with velocities varying from 1310 m/s to 1990 m/s. With the possible exception of segments of line SL-5B, these velocities are interpreted as saturated sediments. The higher velocities in this layer are more indicative of coarse materials whereas the lower velocities are consistent with finer-grained sediments.

The basal layer with velocities ranging from 2900 m/s to 4845 m/s is the interpreted bedrock surface. The lower 2900 m/s and 3000 m/s bedrock velocities are evident in the southwest segment of the survey area, with the higher velocities to the northeast. Lower velocities may be indicative of greater fracturing or jointing in the rock mass or possibly a separate lithology such as sedimentary rock. The higher velocities may be indicative of massive rock with few fractures or joints in the rock. Alternately, the higher basal velocities to the northeast may be indicative of competent crystalline bedrock.

4. LIMITATIONS

The depths to subsurface boundaries derived from seismic refraction surveys are generally accepted as accurate to within fifteen percent of the true depths to the boundaries. In some cases, unusual geological conditions may produce false or misleading data points with the result that computed depths to subsurface boundaries may be less accurate. In seismic refraction surveying difficulties with a ‘hidden layer’ or a velocity inversion may produce erroneous depths. The first condition is caused by the inability to detect the existence of a layer because of insufficient velocity contrasts or layer thicknesses. A velocity inversion exists when an underlying layer has a lower velocity than the layer directly above it. The interpreted depths shown on drawings are to the closest interface location, which may not be vertically below the measurement point if the refractor dip direction departs significantly from the survey line location.

In this survey, the substantial thicknesses of saturated sediments underlying the river and west landfall area resulted in limited data on the depths and configuration of the basal bedrock surface. The interpreted bedrock was at the limits of the seismic refraction spread lengths deployed and the shotgun energy source, resulting in limited data on the deeply-buried bedrock. As a result, bedrock depth errors may be greater than fifteen percent in some areas.

The results are interpretive in nature and are considered to be a reasonably accurate representation of existing subsurface conditions within the limitations of the seismic refraction method.

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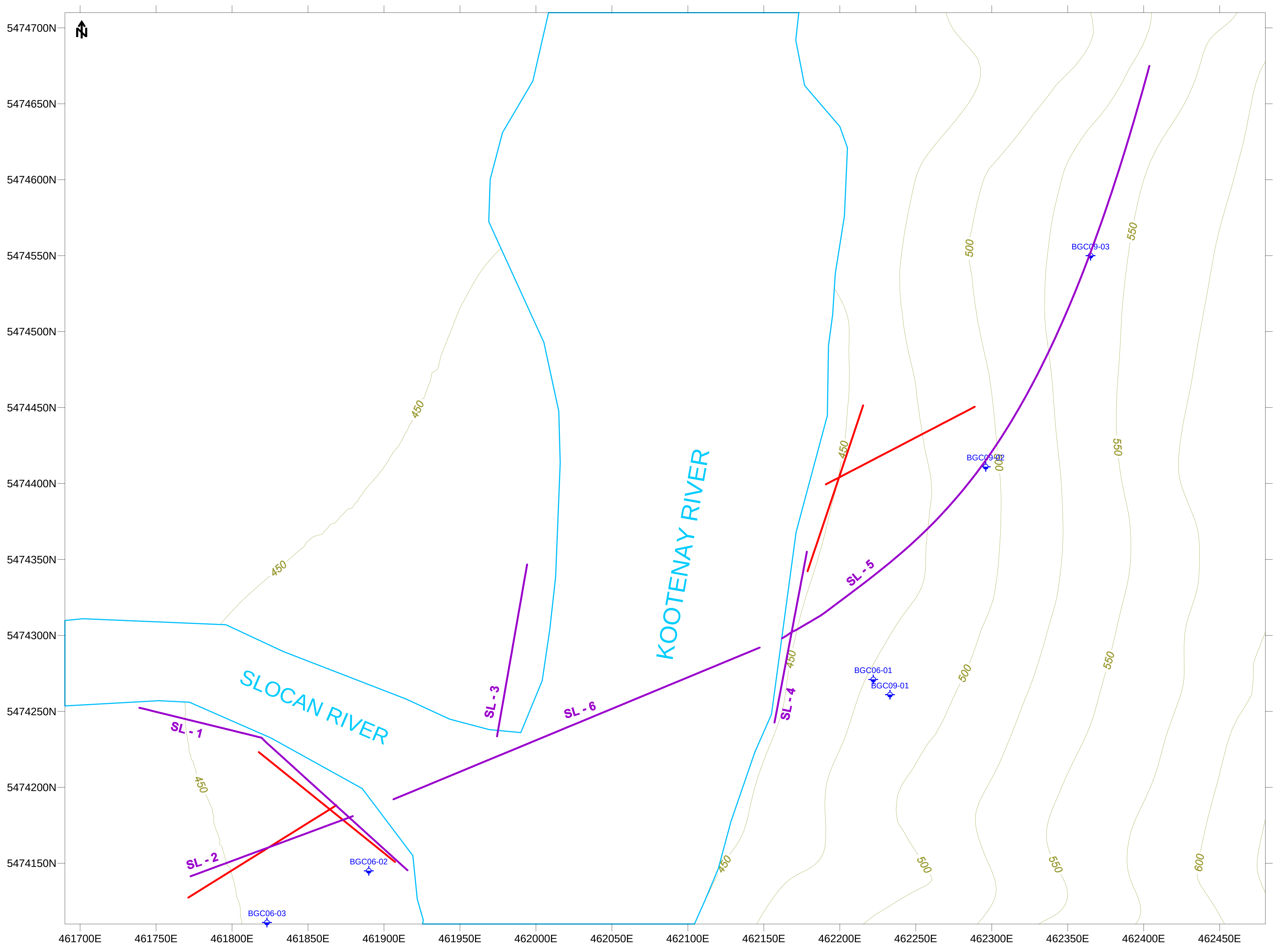
5. RECOMMENDATIONS

The very thick, saturated sediments overlying the bedrock in the river and western land segment of the survey area resulted in limited data on the deeply-buried bedrock surface. As a result, the thicknesses of the sediments and depths to bedrock are based on limited seismic data providing less reliability on the interpretation. More accurate interpretation of the seismic data could be realized with the addition of deep drillholes put down to the bedrock surface. One hole should be placed at the west shoreline area along seismic line 1 with a second hole positioned on seismic line SL-3, on the peninsula of land separating the Slocan and Kootenay Rivers.

For: Frontier Geosciences Inc.

Kevin Payne, P.Eng.

Russell A. Hillman, P.Eng



BGC ENGINEERING INC.

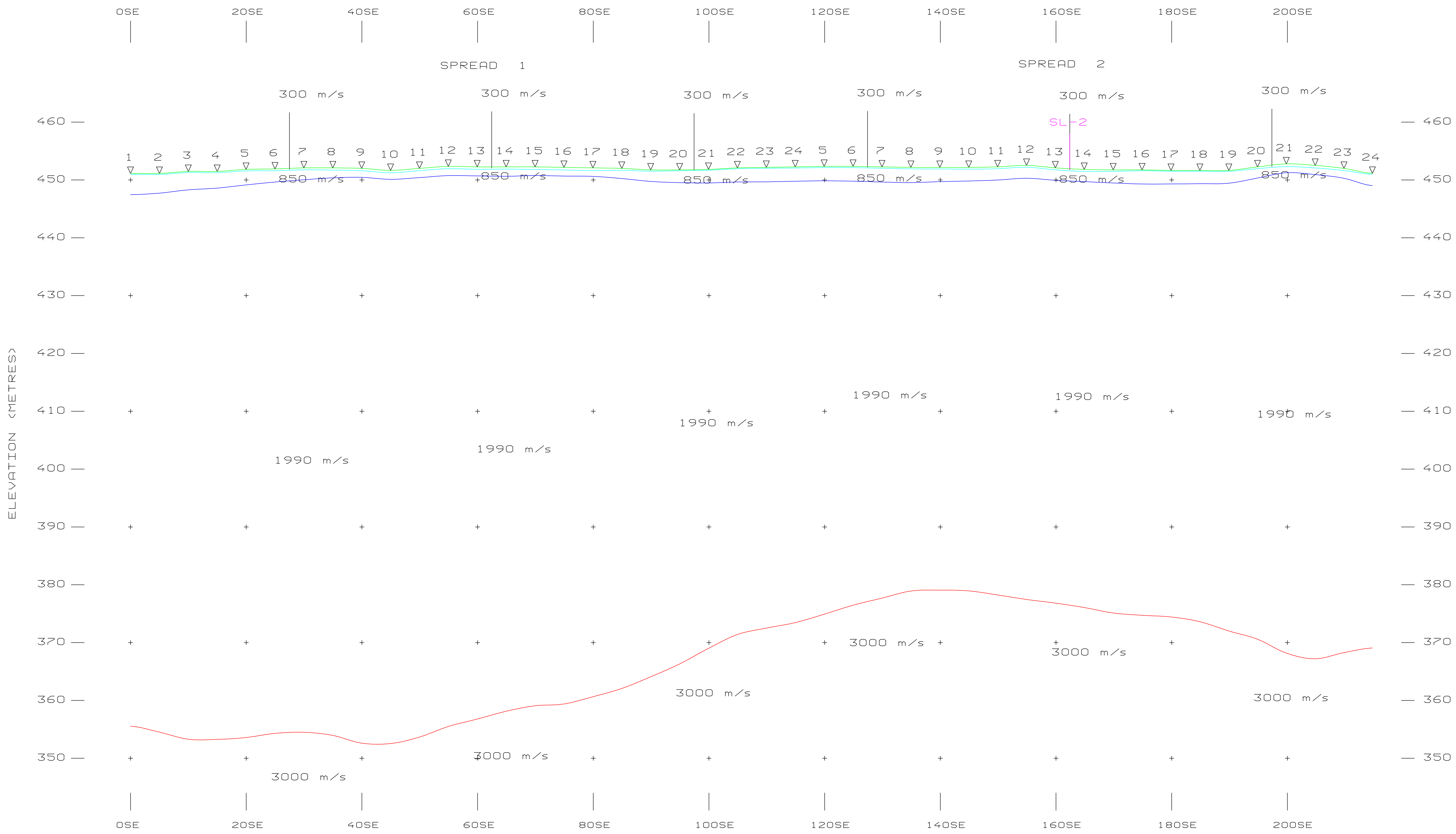
OPTIION B CROSSING, KOOTENAY RIVER, B.C.

SEISMIC REFRACTION SURVEY

SITE PLAN

FRONTIER GEOSCIENCES INC.

DATE: OCT. 2009	SCALE 1:2,500	FIG. 2



SEISMIC LINE SL-1

INSTRUMENT: GEOMETRICS GEODE

BGC ENGINEERING INC.

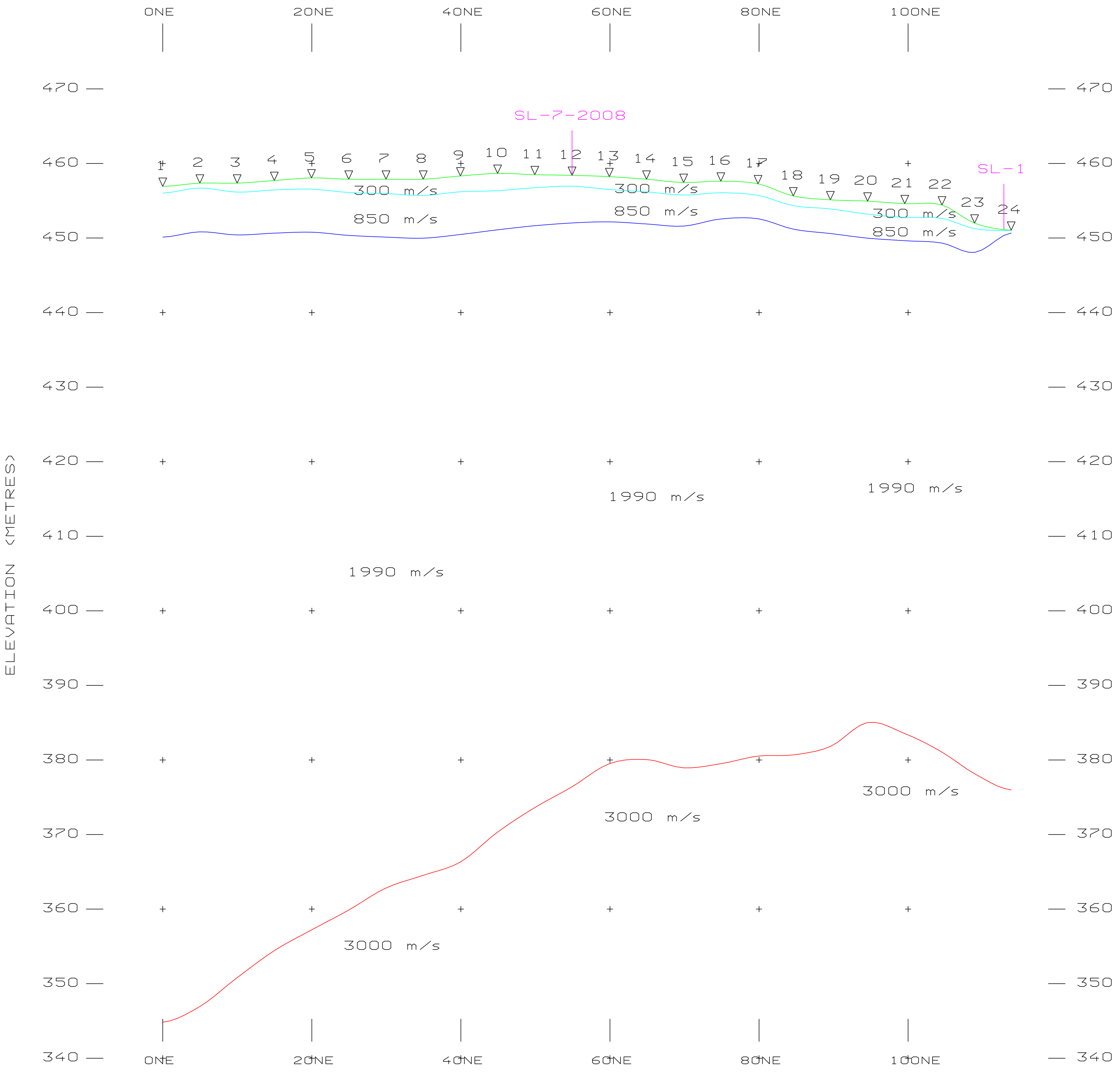
KOOTENAY RIVER OPTION B HDD CROSSING

SEISMIC REFRACTION SURVEY

INTERPRETED DEPTH SECTION SL-1

FRONTIER GEOSCIENCES INC.

DATE: OCT. 2009 | SCALE 1:750 | FIG. 3



SEISMIC LINE SL-2

INSTRUMENT: GEOMETRICS GEODE

BGC ENGINEERING INC.

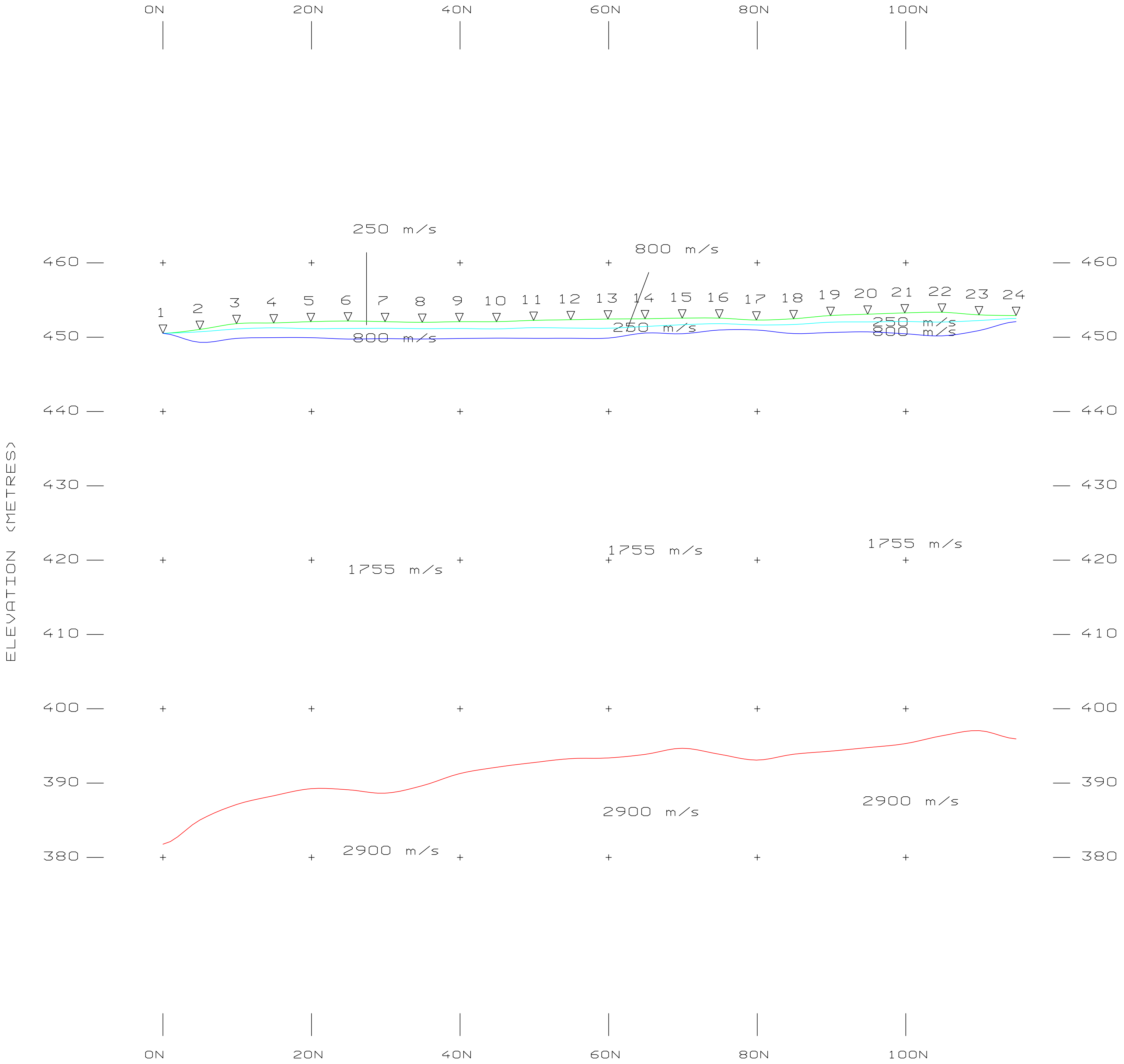
KOOTENAY RIVER OPTION B HDD CROSSING

SEISMIC REFRACTION SURVEY

INTERPRETED DEPTH SECTION SL-2

FRONTIER GEOSCIENCES INC.

DATE: OCT. 2009	SCALE 1:750	FIG. 4



SEISMIC LINE SL-3

INSTRUMENT: GEOMETRICS GEODE

BGC ENGINEERING INC.

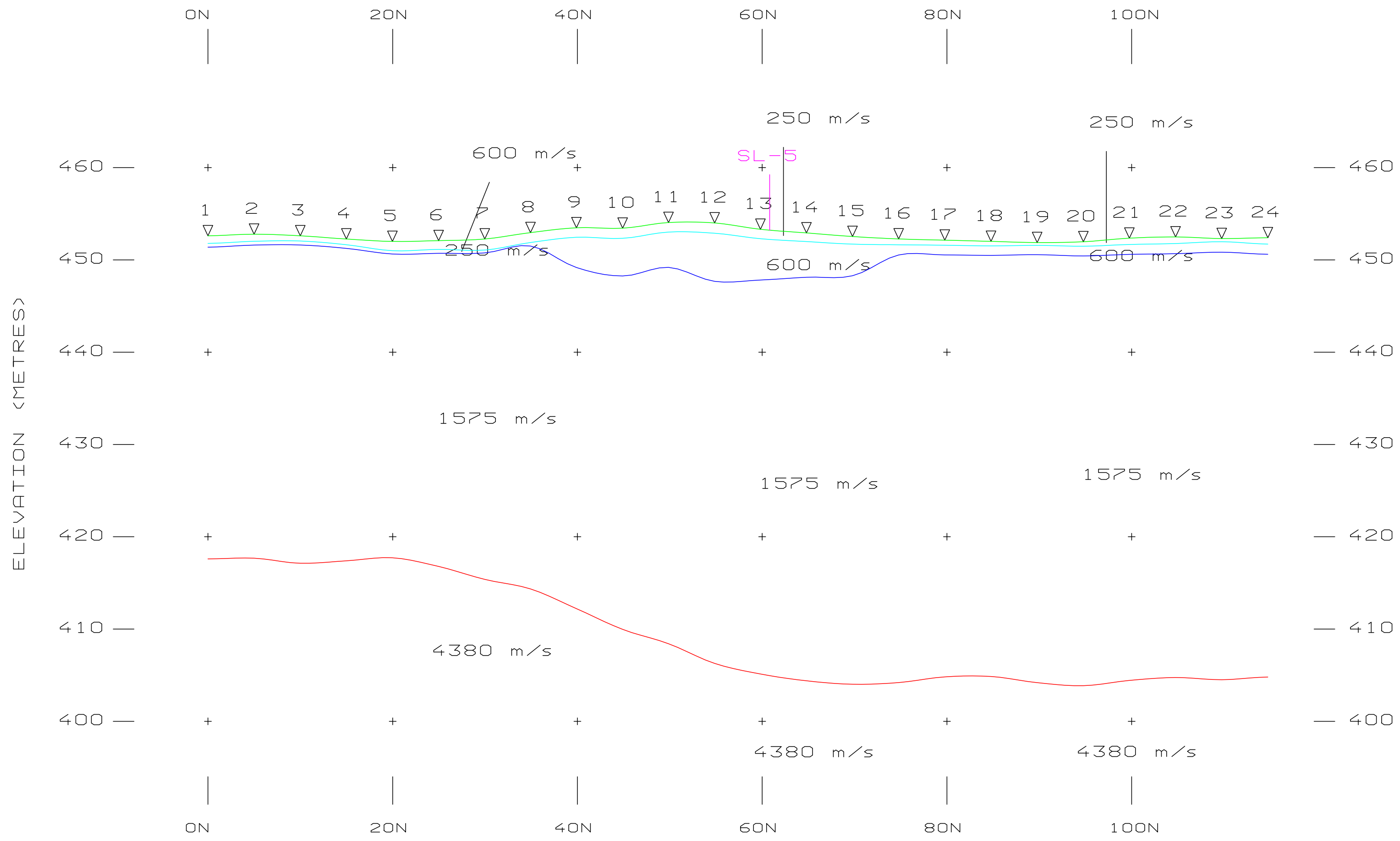
KOOTENAY RIVER OPTION B HDD CROSSING

SEISMIC REFRACTION SURVEY

INTERPRETED DEPTH SECTION SL-3

FRONTIER GEOSCIENCES INC.

DATE: OCT. 2009	SCALE 1:750	FIG. 5



SEISMIC LINE SL-4

INSTRUMENT: GEOMETRICS GEODE

BGC ENGINEERING INC.

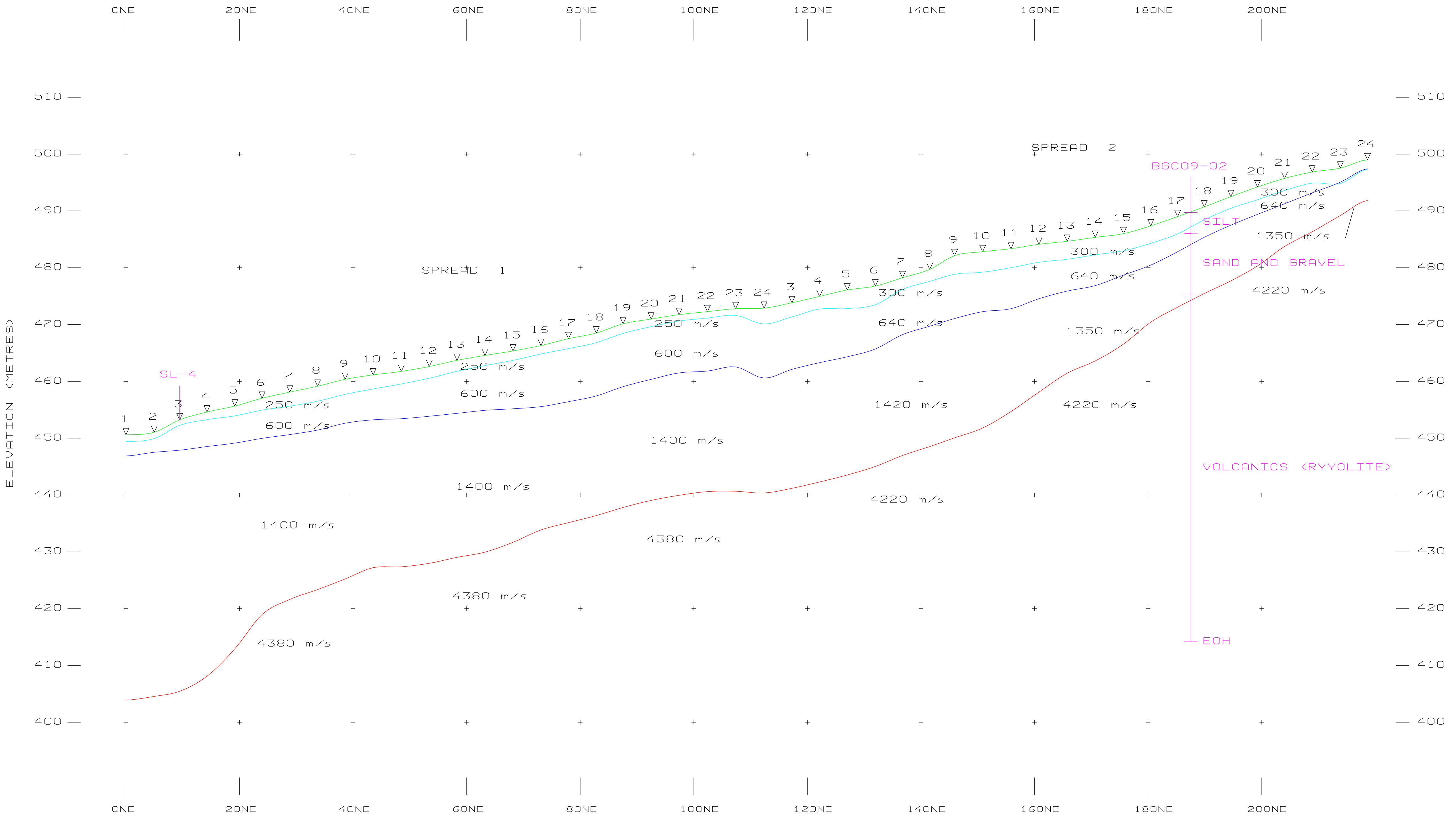
KOOTENAY RIVER OPTION B HDD CROSSING

SEISMIC REFRACTION SURVEY

INTERPRETED DEPTH SECTION SL-4

FRONTIER GEOSCIENCES INC.

DATE: OCT. 2009 | SCALE 1:750 | FIG. 6



SEISMIC LINE SL-5A

INSTRUMENT: GEOMETRICS GEODE

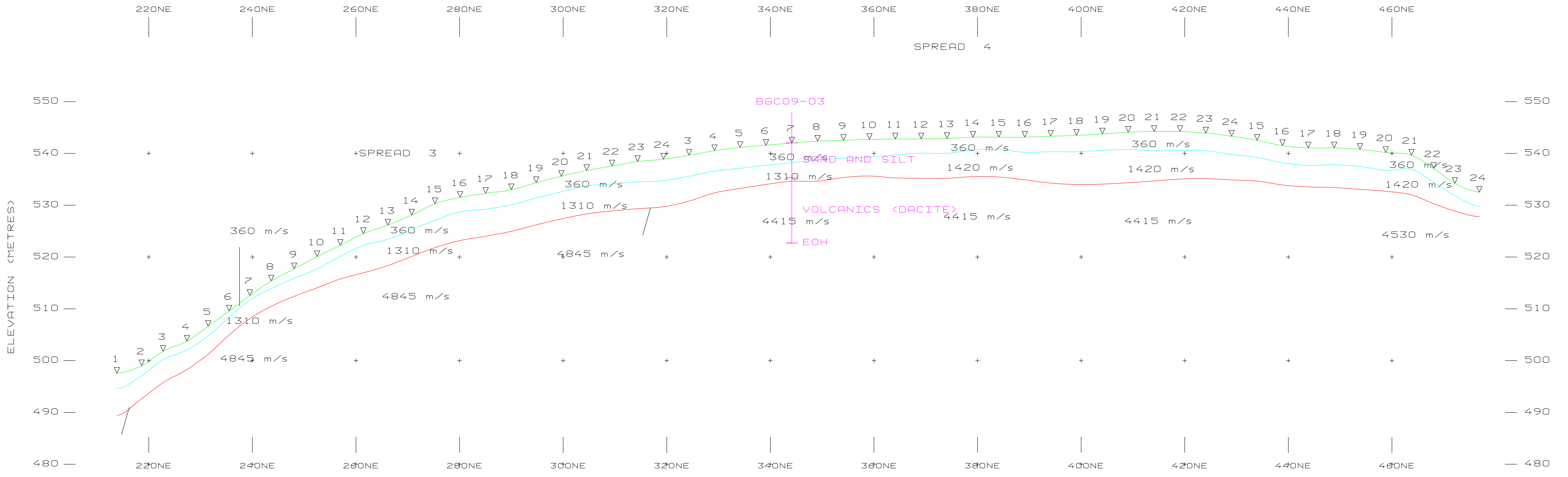
BGC ENGINEERING INC.
KOOTENAY RIVER OPTION B HDD CROSSING

SEISMIC REFRACTION SURVEY

INTERPRETED DEPTH SECTION SL-5A

FRONTIER GEOSCIENCES INC.

DATE: OCT. 2009	SCALE 1:750	FIG. 7



SEISMIC LINE SL-5B

INSTRUMENT: GEOMETRICS GEODE

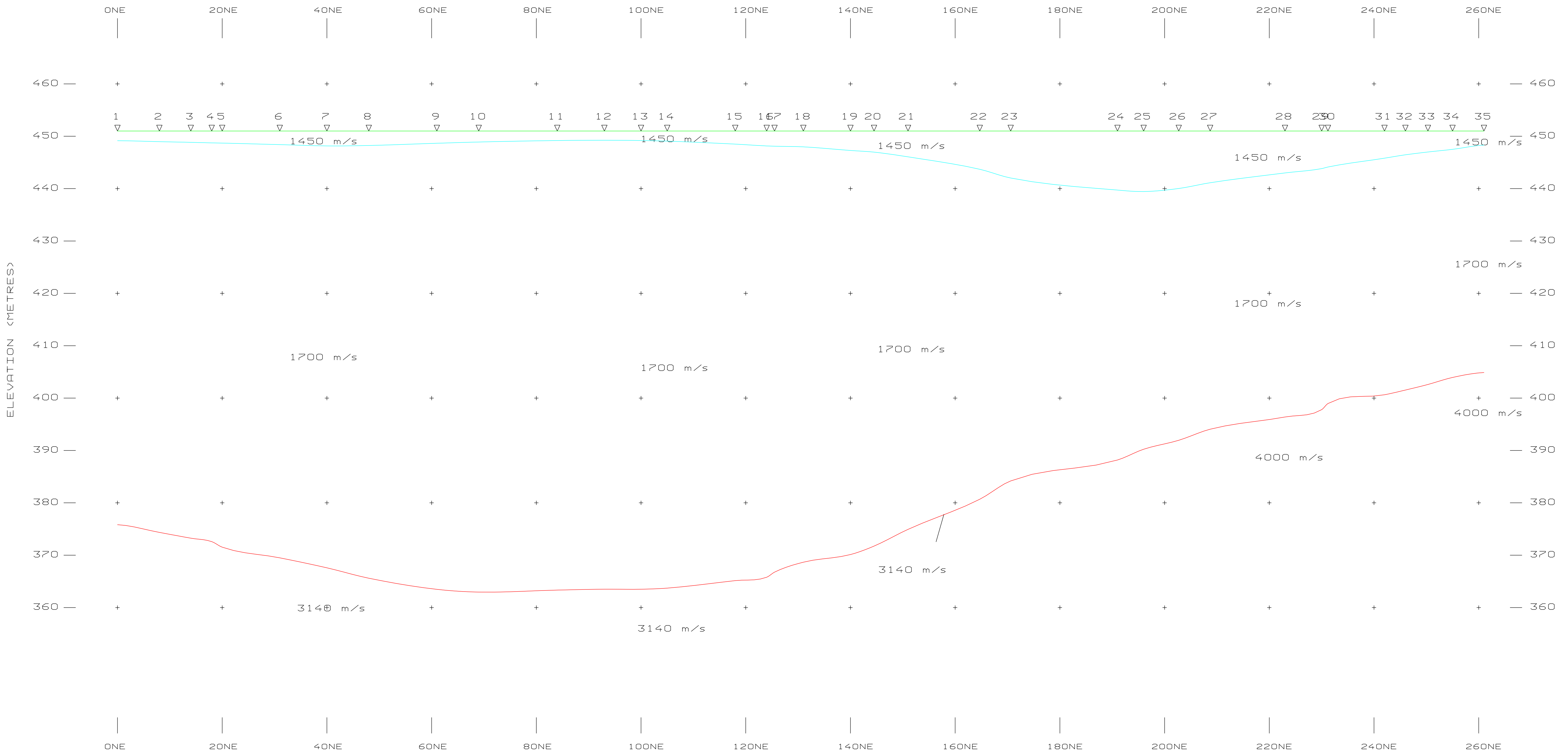
BGC ENGINEERING INC.
KOOTENAY RIVER OPTION B HDD CROSSING

SEISMIC REFRACTION SURVEY

INTERPRETED DEPTH SECTION SL-5B

FRONTIER GEOSCIENCES INC.

DATE: OCT. 2009 | SCALE 1:750 | FIG. 8



SEISMIC LINE SL-6

INSTRUMENT: GEOMETRICS GEODE

BGC ENGINEERING INC.
KOOTENAY RIVER OPTION B HDD CROSSING

SEISMIC REFRACTION SURVEY

INTERPRETED DEPTH SECTION SL-6

FRONTIER GEOSCIENCES INC.

DATE: OCT. 2009	SCALE 1:750	FIG. 9

Appendix F

HDD GEOTECHNICAL INVESTIGATION FOR KOOTENAY RIVER BRIDGE AND KOOTENAY CANAL BRIDGE, CWMM

MAR 10, 2009

TERASEN GAS INC.

INSPECTION AND ASSESSMENT OF KOOTENAY RIVER BRIDGE AND KOOTENAY CANAL BRIDGE, NEAR NELSON, BC

Prepared for:

Terasen Gas Inc.
Design Engineering - Pipelines
16705 Fraser Highway
Surrey, B.C.
V4N 0E8

Prepared by:

CWMM Consulting Engineers Ltd.
200-1854 Kirschner Road
Kelowna, B.C., V1Y 4N6
Tel: 250-868-2308
Fax: 250-868-2374
Contact: Donald D. Bergman, P.Eng.
Email: dbergman@cwmm.ca

K3357

March 10, 2010

KOOTENAY RIVER BRIDGE AND KOOTENAY CANAL BRIDGE INSPECTION/ASSESSMENT REPORT

TABLE OF CONTENTS

1.0 Introduction and Scope

CWMM Consulting Engineers Ltd. has been retained by Terasen Gas Inc. to carry out an inspection and seismic assessment of the Kootenay River Bridge and Kootenay Canal Bridge. The two structures are located along Blewett Road, approximately 2.5 km apart, and within approximately 3km of the intersection of Blewett Road and Highway 3A, near Bonnington Falls, which is between the cities of Nelson and Castlegar, B.C. Figure1, below, shows the location of the two structures.

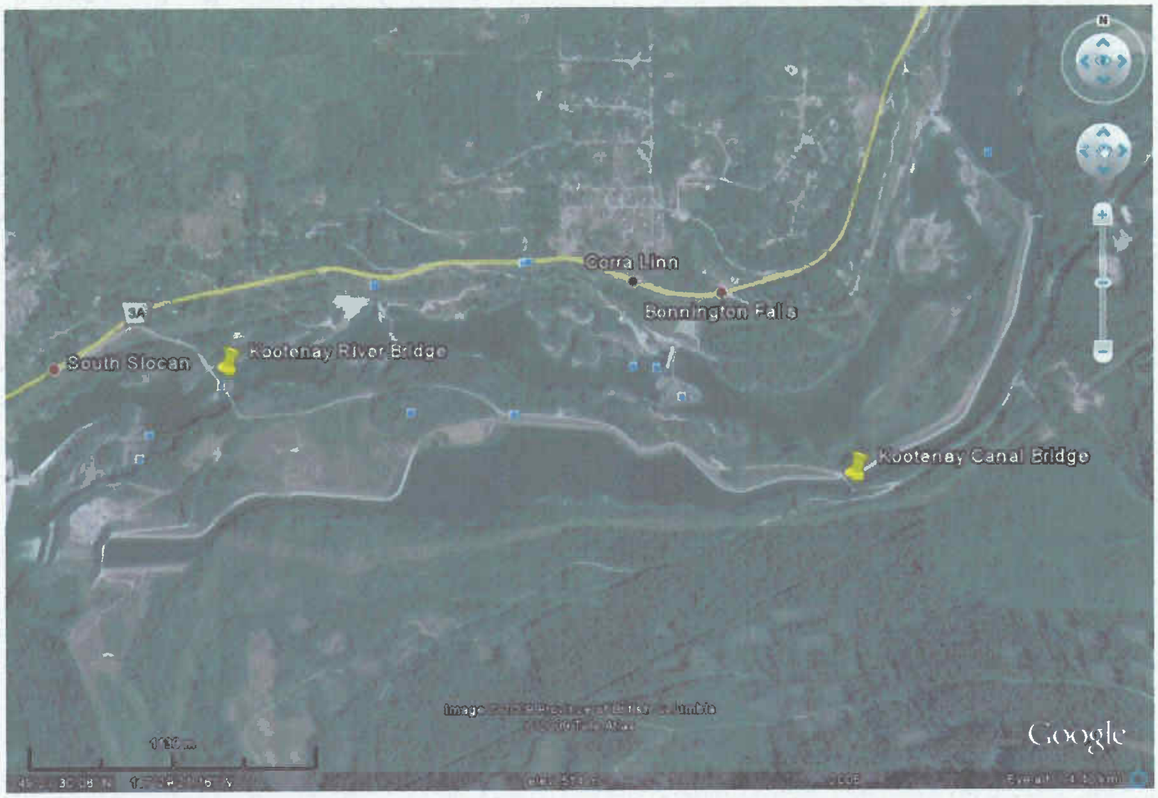


Fig. 1 – Project Location

The goal of the assignment is to determine whether the two structures would be suitable to carry natural gas transmission pipelines along a new alternate route to the present route, which crosses the Kootenay River at Shoreacres via a large and aging aerial crossing. This report summarizes our findings with respect to the general condition of the structures, and the ability of each structure to carry a gas pipeline, from the perspective of vertical load, and seismic capacity.

2.0 Structural Description

2.1 Kootenay River Bridge

The Kootenay River Bridge was built in 1972. It is made up of 5 spans, consisting of 4 post-tensioned/prestressed concrete girder spans and one precast concrete girder span. The span lengths, as measured from north to south at deck level are 158', 156', 135', 154'-5" and 35'. The 3rd span (referred to as the "Island Structure") has two piers constructed on a midstream island, with a span that cantilevers out over the river at each end, picking up the adjoining river spans. The deck structure incorporates a pair of girders with a haunched cast-in place concrete deck, and steel guardrails.

The substructure is made up of solid concrete wall type piers, and seat type abutments. All foundations are spread footings.

There are pairs of fixed bearings at north abutment, south end of girders of span 2, and the north end of girders of span 3, and there are bundled reinforcing steel dowels at the north pier of the Island structure, as restrainers to resist lateral loads. Expansion bearings exist for both spans at the North Pier and South Pier, as well as at the South Island Pier. The south end span girders are just simply resting on the south pier and the rock bed at south end of the bridge with no fixed restraint.

Figure 2.

Kootenay River Bridge

2.2 Kootenay Canal Bridge

The Kootenay Canal Bridge was constructed in 1972, and includes 2 spans of steel "I" girders with a composite concrete deck and steel guard rail. The long span and the short span are 139' and 58' (length of deck) respectively. 5 steel girders in each span are connected to the substructure through fixed and expansion bearings.

The substructure is made up of one solid concrete wall type pier, and seat type abutments. All foundations are spread footings.

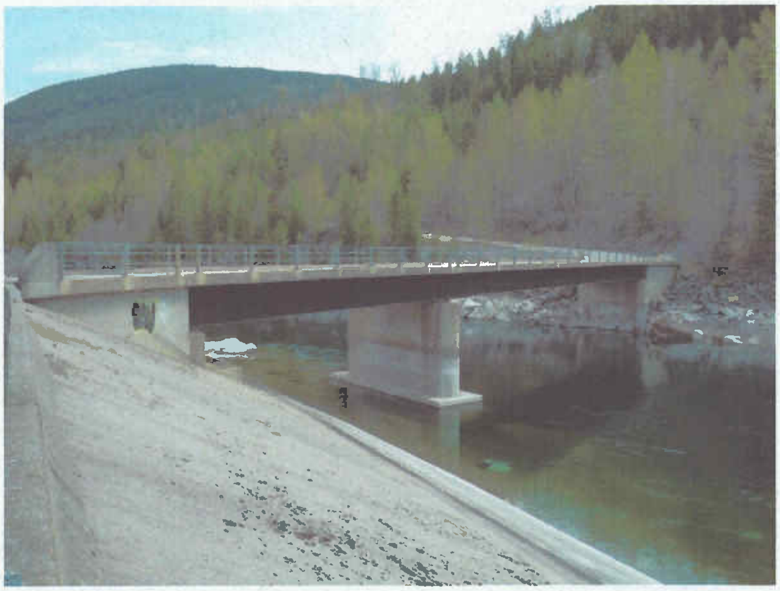


Figure 3.

Kootenay Canal Bridge

3.0 Inspection

The bridges were inspected by Jonathon Smith, Senior Technologist from our Creston Branch office, on April 30 and June 11, 2009. The bridge inspection component was not intended to be an exhaustive inspection of all elements, but rather a general visual inspection of the bridge condition, with observations focused on the structure's ability to support a suspended gas pipeline. In particular, verification of the key elements at bearing supports were a primary focus in terms of the structure's seismic resistance and measurements were taken to confirm sizes and dimensions as indicated on the available drawings.

4.0 Gravity Assessment

A detailed gravity loading assessment has not been carried out. However from a gravity load perspective, it is not expected that there would be any concern for either structure's ability to carry the weight of the added pipeline. The pipe would likely be suspended from the deck using roller supports, and could accommodate the various expansion joints by way of a transverse loop at either end, if required.

5.0 Seismic Assessment

5.1 Code Conformance

The Seismic assessment analysis is performed in accordance with the current Canadian Highway Bridge Code, CAN/CSA-S6-06. In particular, the method in Clause 4 is followed in the assessment of the bridges. Other pertinent clauses in the code are also followed to establish parameters such as member resistance capacity, resistance factors and zonal acceleration ratio, etc.

5.2 Evaluated Components

The two bridges are both located, near Nelson, BC, an area of low seismicity, where the zonal acceleration ratio is 0.05. As a result, they are all in the Seismic Performance Zone 1, considering that these bridges are not categorized as Lifeline Bridges. The evaluation is based on the 1/475 year seismic event (10% chance of exceedence in 50 years).

According to Clause 4.11 of CAN/CSA-S6-06 code, no seismic evaluation of existing bridges is required for the bridges in seismic performance zone 1. Therefore, we have followed the provisions for new bridge design to assess the seismic capacities of these two bridges. The analysis requirements for the multi-span bridges in seismic performance zone 1 are as follows:

1) Connectors and restrainers between the superstructure and the substructures shall be designed for minimum force requirements (Clause 4.4.10.2).

2) Minimum support length requirements shall be satisfied at each abutment and piers (Clause 4.4.10.5).

6.0 Seismic Analysis Results

6.1 Kootenay River Bridge

The dead load of superstructure is calculated independently from the information provided on the record drawings and assumed to include 2" of asphalt as a future wearing surface on the deck. Based on the analysis results, dead load reactions and code required seismic loads at each supporting location, along with the lateral capacities of the restraining mechanisms are shown in the Table 1 and Table 2 for transverse and longitudinal directions respectively. For transverse restraint, the capacity of the bearing element is added to the capacity of any concrete shear keys. For longitudinal restraint at fixed bearing locations, only the bearing itself provides any resistance. Support lengths for the expansion locations are shown in Table 3.

Table 1 Seismic Force and Restrainer Capacity (Transverse Direction)

Location		Bearing or Rebar	Factored Shear Capacity (kips)			Reaction (kips)	Seismic Load (kips)
			Bearing or Rebar	Block & Wall	Total		
North Abut	Restrained	2 - Conenco G24 24	94.0	145.7	**239.7**	688.0	**137.6**
North Pier	Restrained	4 - Conenco M24 24	105.2	167.8	**273.0**	1351.0	**270.1**
South Pier	Restrained	2 - Conenco M24 24	52.6	167.8	**220.4**	961.3	**192.3**
North End of Island Structure	Restrained	2 - Conenco G24 24	94.0	126.0	**220.0**	662.5	**132.5**
South End of	Restrained	2 - Conenco G24 24	94.0	126.0	**220.0**	673.3	**134.7**

Island Structure							
North Pier of Island Structure	Restrained	72 - #11 rebars	1953.6	0	**1953.6**	1609	**321.8**
South Pier of Island Structure	*	2 - Tetron SE 500	*	0		1620	

* = information not available

Table 2 Seismic Force and Restrainer Capacity (Longitudinal Direction)

Location		Bearing or Rebar	Factored Shear Capacity (kips)			Reaction (kips)	Seismic Load (kips)
			Bearing or Reinforcing	Block & Wall	Total		
North Abut	Fixed	2 - Conenco G24 24	94.0	0.0	94.0	688.0	275.2
North Pier	Expansion	4 - Conenco M24 24	105.0	0.0	105.0	1350.5	0.0
South Pier	Expansion	2 - Conenco M24 24	52.6	0.0	52.6	961.3	0.0
North End of Island Structure	Fixed	2 - Conenco G24 24	94.0	0.0	94.0	662.5	265.0
South End of Island Structure	Fixed	2 - Conenco G24 24	94.0	0.0	94.0	673.3	269.3
North Pier of Island Structure	Fixed	72 - #11 rebars	1953.6	0.0	1953.6	1609.0	643.6
South Pier of Island Structure	Expansion	2 - Tetron SE 500	*	0.0		1620.0	0.0

* = information not available

Table 3 Support Length (at expansion locations)

Span	Location	Provided (in)	Required (in)
Span 1	S. End	24	11.6
Span 2	N. End	24	13.2
Span 3	S. End	24	13.4
Island Span	S. Island Pier	24	10.6
S. End Span	N. End	16	10.5
S. End Span	S. End	216	8.6

As shown in Table 1, the total factored transverse lateral resistances (capacities) are greater than the required seismic loads at all locations, based on the 1/475 year seismic event, although the bearing at the South Island Pier remains unknown. However, as shown in Table 2, the factored longitudinal resistances are all considerably smaller than the required seismic loads at the fixed locations except at North Pier of the Island Structure. Deficiencies exist at the North Abutment, the north end of the Island Structure, and at the south end of the Island Structure, with capacities in the order of 1/3 of required loads. Bearings at expansion locations are not treated as restrained longitudinally. As shown in Table 3, support lengths are satisfactory with respect to code requirements for all expansion locations.

6.2 Kootenay Canal Bridge

As with the Kootenay River Bridge, the dead load of the superstructure is calculated independently from the information provided on the record drawings and is assumed to include 2" of asphalt as a future wearing surface on the deck. Based on the analysis results, total dead load reactions at each location along with the corresponding code required seismic forces are shown in the Table 4.

There are 5 stringers and 10 bearings in each span. Only 1 out of 10 bearings for a given span is fixed longitudinally which carries the total longitudinal seismic load that is calculated as 20% of total dead load of superstructure of that span. 2 out of 10 bearings (one each end) are fixed transversely, which in turn must be designed to carry transverse seismic loads which are calculated as 20% of the dead load reactions of the superstructure for that span.

Support lengths for the expansion locations are shown in Table 5.

Table 4 Seismic load and Bearing Capacity

Span	Location	Bearing	Factored Capacity (kips)	Total Reaction (kips)	Seismic Load (kips)	
					Long.	Trans.
Long	Pier	CT-100 & 4 – CE-75	53.4 *	384.5	153.8	77.0
	Abut.	CF-75 & 4 – CE-75	53.4 *	384.5	N/A	77.0
Short	Pier	CT-75 & 4 – CE-75	53.4 *	144.5	57.8	29.0
	Abut.	CF-75 & 4 – CE-75	53.4 *	144.5	N/A	29.0

* = internal bearing information not available

Table 5 Support Length (at expansion locations)

Span	Location	Provided (in)	Required (in)
Long	N. Abut.	24	11.9
Long	Pier	30	13.0
Short	S. Abut.	24	11.6
Short	Pier	30	10.6

As shown in Table 4, the bearing capacities are unknown, since they are not indicated on the drawings, and were not available on any literature that has been obtained. As a result, the values indicated are an estimate, based on visible details.

By considering the capacities of the anchor bolts, it is possible to obtain an estimate of the bearing shear resistances. There are four 1" diameter "H.S." anchor bolts connecting the bearing to the substructure, and six 3/8" diameter "H.S." bolts connecting the bearing to the superstructure at each bearing location. The "H.S." terminology is assumed to represent "High Strength". The capacities of these connections are checked by conservatively assuming the grade of bolts as A307 since the materials of the bolts are not shown on the drawings. The results indicate that the capacities are 63.4 kips and 53.4 kips for the four 1" bolts and six 3/8" bolts respectively. Therefore, the bearing capacity is taken as 53.4 kips, which does not meet the code requirements for longitudinal loading for either span segment at the pier, nor for transverse loading at the south abutment. As a result, the bridge can only carry approximately 1/3 of the required loading, based on the 1/475 year seismic event.

Table 5 indicates that all provided support lengths are substantially greater than required by the code.

7.0 Summary and Conclusion

An inspection and seismic assessment has been carried out for two bridge structures which are owned and maintained by the City of Nelson, including the Kootenay River Bridge and Kootenay Canal Bridge. It is considered that the two structures would be satisfactory from a gravity perspective but not from a seismic perspective, to carry the proposed new pipeline. To satisfy the seismic requirements of the bridge code, based on the 1/475 year seismic event, it would be necessary to retrofit the connections at piers and abutments in the longitudinal and transverse directions, as shown in the table below. (* = not confirmed)

Kootenay River Bridge		**Kootenay Canal Bridge**	
Location	Direction	Location	Direction
North Abut	Long.	Long Span at Pier	Long. & Trans.
North End of Island Structure	Long.	Short Span at Pier	Long.
South End of Island Structure	Long.	Long Span at Abut.	Trans.
South Pier of Island Structure	Trans. *		

Seismic retrofitting measures would consist of a combination of measures depending on the precise bearing condition. Transverse restraint can be upgraded by adding concrete shear keys or brackets to the pier or abutment top, which in turn bear against the girder or diaphragm. Longitudinal elements generally consist of bar or cable restrainers, attached through abutment end walls, and to brackets attached to the girders.

Based on preliminary design of upgrading measures, our rough cost estimate for upgrading of each of these structures to meet the 1/475 year event are:

Kootenay River Bridge:	$360,000
Kootenay Canal Bridge:	$290,000

It should be noted that this assessment is preliminary in nature, and has been based on information at hand to date. A more detailed assessment and design would be required to provide a more accurate assessment of the cost of retrofitting.

We trust this is satisfactory to you. Should you have any questions, please contact the undersigned.

Report Prepared by:

CWMM Consulting Engineers Ltd.

PROFESSIONAL PROVINCE OF BRITISH COLUMBIA ENGINEER
X. F. WANG
#27800

July 5/10

Greg Wang, Ph.D., P.Eng.

Reviewed by:

PROFESSIONAL PROVINCE OF BRITISH COLUMBIA ENGINEER
D. D. BERGMAN

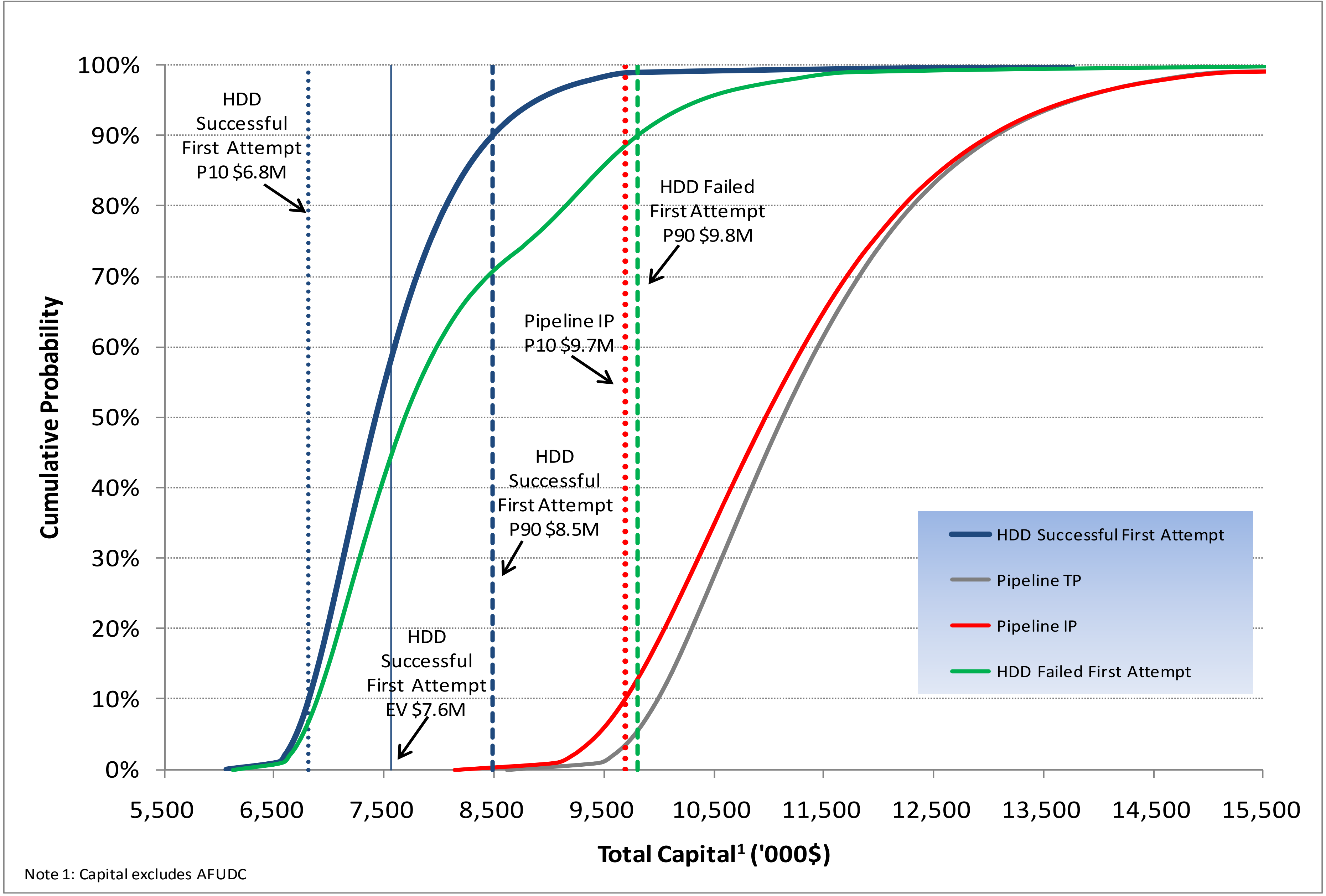
June 29/10

Don D. Bergman, M.Eng., P.Eng., Principal

Appendix G

PRELIMINARY MONTE CARLO ANALYSIS RESULTS

Kootenay River Crossing (Shoreacres) Upgrade Project
Appendix G – Preliminary Monte Carlo Analysis Results



Note 1: Capital excludes AFUDC

Appendix H

FINANCIAL SCHEDULES

Appendix H

Financial Schedules - Shoreacres Kootney River CPCN Filing

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Terasen Gas Inc.
Shoreacres - Kootenay River CPCN Filing
Cost of Service Model_Large Angle HDD Class 3 estimate - Financial Assumptions

1 Project Details and Capital Costs

a. For details on the Capital costs, refer to the Table 6-1 of the Application.
b. Plant in Service date is assumed to be July 1, 2011.
c. Plant additions are assumed to enter the rate base starting on July 1, 2011.

2 Capital Structure and AFUDC Rate

a.	ROE Rate	9.50%
b.	Equity Ratio	40.00%
c.	LTD Rate	6.95%
d.	LTD Ratio	58.37%
e.	STD Rate	4.50%
f.	STD Ratio	1.63%
g.	AFUDC Rate	6.90%
h.	Nominal WACC after Tax	6.90%

The discounted cash flow analysis and the Net Present Value analysis of the incremental annual revenue requirement are done for both 60 and 25 years using the discount factors of 6.9% (After tax WACC) and 10%.

3 Income Tax and Inflation Rates

a. The combined Federal and Provincial Income tax is assumed to be 26.5% for 2011 and to be 25% from 2012 onwards.
b. The inflation is assumed to be 2% per year.

4 Capital Cost Allowance / Eligible Capital Expenditures

a. Transmission Pipe (CCA Class 49) - 8%
b. Land Rights - 7%

5 Operating and Maintenance Costs

a. The HDD option incurs O&M savings, which are escalated using the assumed inflation factor of 2%. However, for the purposes of this model, no incremental O&M savings have been assumed as these savings are estimated to be materially small (about $3,000 per annum).
b. Capitalized Overhead Rate is assumed to be 14%. For tax purposes, the Capitalized Overhead rate is assumed to be 8%.

6 Property Tax

a. The option selected for the Project (i.e. HDD) incurs Property tax savings of about $1,800 per annum. However, for the purposes of this model, no incremental property tax savings have been assumed as these savings are estimated to be materially small.

7 Depreciation Rate

a. The Depreciation rate for the pipe is assumed to be 1.63%
b. For the puposes of depreciating the Capitalized Overheads, the average depreciation rate of 2.54% is assumed.

8 Deferred Charges

Terasen has proposed to create three non-rate base deferral accounts (discussed below), which will be added to rate base starting in 2012:

a. Gains and Losses on Asset Disposition Deferral Account - created to capture the gain/loss on the book value of the asset being removed/disposed. This account is assumed to be amortized over a period of 3 years starting in 2012, although the actual amortization period will be determined as part of the Company's next Revenue Requirement Application.
b. Removal Cost Deferral Account - cretaed to capture the removal costs associated with the asset being removed. This account attracts AFUDC and is assumed to be amortized over a period of 3 years starting in 2012 , although the actual amortization period will be determined as part of the Company's next Revenue Requirement Application.
c. The Kootenay River Cost of Service Deferral Account deferral account to capture the cost of service related to plant in service, consisting of depreciation expense, income taxes and earned return. The balance in this account would be transferred to the rate base in 2012 with three years amortization period.

9 Energy/Volumes

a. For the purposes of calculating the rate impact, Terasen has considered TGI Volumes including the sales and non-bypass transportation customers. The growth rate of 0.25% is assumed starting from the year 2015.

Terasen Gas Inc.

Shoreacres - Kootenay River CPCN Filing

Cost of Service Model_Large Angle HDD Class 3 estimate - Revenue Requirement Summary ($000's)

	Year (2011-2030)	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
1	Operating & Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2	Property & Other Taxes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	Depreciation & Amortization	56	677	677	677	112	112	112	112	112	112	112	112	112	112	112	112	112	112	112	112
4	Income Tax	(49)	127	135	141	(38)	(27)	(17)	(7)	1	9	16	22	28	33	37	41	45	48	51	54
5	Return on Equity	132	317	291	266	251	246	242	238	234	229	225	221	217	212	208	204	200	195	191	187
6	Interest	144	344	316	289	272	268	263	258	254	249	245	240	235	231	226	222	217	212	208	203
7	Other Revenue	(283)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	Total Revenue Requirement - Incremental	$0	$1,466	$1,420	$1,372	$596	$599	$600	$601	$600	$599	$597	$595	$591	$588	$583	$579	$573	$568	$562	$556
9																					
10	Total Volume (PJ)	157.7	158.1	158.4	158.8	159.2	159.6	160.0	160.4	160.8	161.2	161.6	162.0	162.4	162.8	163.2	163.6	164.0	164.4	164.8	165.2
11	Rate Impact ($/GJ)	0.000	0.009	0.009	0.009	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.003	0.003	0.003	0.003

Revenue Requirement Summary (continued)

	Year (2031-2050)	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
1	Operating & Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2	Property & Other Taxes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	Depreciation & Amortization	112	112	112	112	112	112	112	112	112	112	112	112	112	112	112	112	112	112	112	112
4	Income Tax	56	58	60	61	62	63	64	65	65	66	66	66	66	65	65	65	64	64	63	63
5	Return on Equity	183	179	174	170	166	162	157	153	149	145	140	136	132	128	123	119	115	111	106	102
6	Interest	198	194	189	185	180	175	171	166	162	157	152	148	143	139	134	129	125	120	116	111
7	Other Revenue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	Total Revenue Requirement - Incremental	$549	$542	$535	$527	$520	$512	$504	$496	$487	$479	$470	$461	$452	$443	$434	$425	$416	$406	$397	$387
9																					
10	Total Volume (PJ)	165.7	166.1	166.5	166.9	167.3	167.7	168.2	168.6	169.0	169.4	169.8	170.3	170.7	171.1	171.5	172.0	172.4	172.8	173.3	173.7
11	Rate Impact ($/GJ)	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.002	0.002	0.002	0.002	0.002

Revenue Requirement Summary (continued)

	Year (2051-2070)	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070
1	Operating & Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2	Property & Other Taxes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	Depreciation & Amortization	112	112	112	112	112	112	112	112	112	112	112	112	112	112	112	112	112	112	112	112
4	Income Tax	62	61	60	59	58	58	57	55	54	53	52	51	50	49	48	46	45	44	43	41
5	Return on Equity	98	94	89	85	81	77	72	68	64	60	55	51	47	43	38	34	30	26	21	17
6	Interest	106	102	97	92	88	83	79	74	69	65	60	56	51	46	42	37	33	28	23	19
7	Other Revenue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	Total Revenue Requirement - Incremental	$378	$368	$358	$349	$339	$329	$319	$309	$299	$290	$280	$270	$260	$250	$239	$229	$219	$209	$199	$189
9																					
10	Total Volume (PJ)	174.1	174.6	175.0	175.4	175.9	176.3	176.8	177.2	177.7	178.1	178.5	179.0	179.4	179.9	180.3	180.8	181.2	181.7	182.1	182.6
11	Rate Impact ($/GJ)	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001

	Revenue Requirement NPV ($M)	6.9%	10.0%
12	60 Years (2011-70)	10.1	7.8
13	25 Years (2011-35)	9.1	7.4

	Level Rate Impact ($/GJ)	6.9%	10.0%
14	60 Years (2011-70)	0.0044	0.0048
15	25 Years (2012-36)	0.0048	0.0051

Terasen Gas Inc.

Shoreacres - Kootenay River CPCN Filing

Cost of Service Model_Large Angle HDD Class 3 estimate - Rate Base and Plant in Service Summary ($M)

	Year (2011-2030)	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
1	Rate Base Summary ($M)																				
2	Plant	$3.5	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1
3	Accumulated Depreciation	(0.0)	(0.1)	(0.2)	(0.3)	(0.4)	(0.6)	(0.7)	(0.8)	(0.9)	(1.0)	(1.1)	(1.2)	(1.3)	(1.5)	(1.6)	(1.7)	(1.8)	(1.9)	(2.0)	(2.1)
4	Deferred Charges - (mid year)	0.0	1.4	0.8	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	Working Capital	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
6	Total Rate Base	$3.5	$8.3	$7.7	$7.0	$6.6	$6.5	$6.4	$6.3	$6.1	$6.0	$5.9	$5.8	$5.7	$5.6	$5.5	$5.4	$5.3	$5.1	$5.0	$4.9
7	Plant Summary ($M)																				
8	Opening Balance	$0.0	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1
9	Additions	7.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	Ending Balance	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1
11	Net Plant in Service	$3.5	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1

Rate Base and Plant Summary (continued)

	Year (2031-2050)	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
1	Rate Base Summary ($M)																				
2	Plant	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1
3	Accumulated Depreciation	(2.2)	(2.3)	(2.5)	(2.6)	(2.7)	(2.8)	(2.9)	(3.0)	(3.1)	(3.2)	(3.4)	(3.5)	(3.6)	(3.7)	(3.8)	(3.9)	(4.0)	(4.1)	(4.2)	(4.4)
4	Deferred Charges - (mid year)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	Working Capital	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
6	Total Rate Base	$4.8	$4.7	$4.6	$4.5	$4.4	$4.3	$4.1	$4.0	$3.9	$3.8	$3.7	$3.6	$3.5	$3.4	$3.2	$3.1	$3.0	$2.9	$2.8	$2.7
7	Plant Summary ($M)																				
8	Opening Balance	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1
9	Additions	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	Ending Balance	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1
11	Net Plant in Service	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1

Rate Base and Plant Summary (continued)

	Year (2051-2070)	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070
1	Rate Base Summary ($M)																				
2	Plant	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1
3	Accumulated Depreciation	(4.5)	(4.6)	(4.7)	(4.8)	(4.9)	(5.0)	(5.1)	(5.2)	(5.4)	(5.5)	(5.6)	(5.7)	(5.8)	(5.9)	(6.0)	(6.1)	(6.3)	(6.4)	(6.5)	(6.6)
4	Deferred Charges - (mid year)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	Working Capital	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
6	Total Rate Base	$2.6	$2.5	$2.4	$2.2	$2.1	$2.0	$1.9	$1.8	$1.7	$1.6	$1.5	$1.3	$1.2	$1.1	$1.0	$0.9	$0.8	$0.7	$0.6	$0.5
7	Plant Summary ($M)																				
8	Opening Balance	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1
9	Additions	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	Ending Balance	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1
11	Net Plant in Service	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1	$7.1

Terasen Gas Inc.

Shoreacres - Kootenay River CPCN Filing

Cost of Service Model_Large Angle HDD Class 3 estimate - Net Cash Flow Summary ($000's)

	Year (2010-2029)	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
1	Capital Expenditures																				
2	Pipe	$1,347	$5,279	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
3	Land Rights	50	150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	Removal Costs	61	1,162	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	O&M Cost/Savings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	Property Tax/Savings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	Tax Savings	0	(86)	(153)	(141)	(130)	(119)	(110)	(101)	(93)	(86)	(79)	(72)	(67)	(61)	(56)	(52)	(48)	(44)	(40)	(37)
8	Annual Cash Flow	$1,459	$6,505	($153)	($141)	($130)	($119)	($110)	($101)	($93)	($86)	($79)	($72)	($67)	($61)	($56)	($52)	($48)	($44)	($40)	($37)
9	Discounted Cash Flow - 6.9%	$1,367	$5,699	($125)	($108)	($93)	($80)	($69)	($59)	($51)	($44)	($38)	($33)	($28)	($24)	($21)	($18)	($15)	($13)	($11)	($10)
10	Discounted Cash Flow - 10.0%	$1,326	$5,376	($115)	($96)	($81)	($67)	($56)	($47)	($39)	($33)	($28)	($23)	($19)	($16)	($14)	($11)	($9)	($8)	($7)	($6)

Net Cash Flow Summary (continued)

	Year (2030-2049)	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
1	Capital Expenditures																				
2	Pipe	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
3	Land Rights	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	Removal Costs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	O&M Cost/Savings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	Property Tax/Savings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	Tax Savings	(44)	(40)	(37)	(34)	(32)	(29)	(27)	(25)	(23)	(21)	(19)	(18)	(16)	(15)	(14)	(13)	(12)	(11)	(10)	(9)
8	Annual Cash Flow	($44)	($40)	($37)	($34)	($32)	($29)	($27)	($25)	($23)	($21)	($19)	($18)	($16)	($15)	($14)	($13)	($12)	($11)	($10)	($9)
9	Discounted Cash Flow - 6.9%	($13)	($11)	($10)	($8)	($7)	($6)	($5)	($5)	($4)	($3)	($3)	($3)	($2)	($2)	($2)	($1)	($1)	($1)	($1)	($1)
10	Discounted Cash Flow - 10.0%	($8)	($7)	($6)	($5)	($4)	($3)	($3)	($2)	($2)	($2)	($1)	($1)	($1)	($1)	($1)	($1)	($0)	($0)	($0)	($0)

Net Cash Flow Summary (continued)

	Year (2050-2069)	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069
1	Capital Expenditures																				
2	Pipe	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
3	Land Rights	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	Removal Costs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	O&M Cost/Savings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	Property Tax/Savings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	Tax Savings	(11)	(10)	(9)	(8)	(8)	(7)	(6)	(6)	(5)	(5)	(5)	(4)	(4)	(4)	(3)	(3)	(3)	(3)	(2)	(2)
8	Annual Cash Flow	($11)	($10)	($9)	($8)	($8)	($7)	($6)	($6)	($5)	($5)	($5)	($4)	($4)	($4)	($3)	($3)	($3)	($3)	($2)	($2)
9	Discounted Cash Flow - 6.9%	($1)	($1)	($1)	($1)	($1)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)
10	Discounted Cash Flow - 10.0%	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)

	Net Cash Flow NPV ($M)	6.9%	10.0%
11	60 Years (2010-69)	6.13	5.98
12	25 Years (2010-34)	6.18	6.00

Terasen Gas Inc.

Shoreacres - Kootenay River CPCN Filing

Cost of Service Model_HDD (Class 5 estimate) - Financial Assumptions

1 Project Details and Capital Costs

a. For details on the Capital costs, refer to the Table 4-2 and Table 4-3 of the Application.
b. Plant in Service date is assumed to be July 1, 2011.
c. Plant additions are assumed to enter the rate base starting on July 1, 2011.

2 Capital Structure and AFUDC Rate

a.	ROE Rate	9.50%
b.	Equity Ratio	40.00%
c.	LTD Rate	6.95%
d.	LTD Ratio	58.37%
e.	STD Rate	4.50%
f.	STD Ratio	1.63%
g.	AFUDC Rate	6.90%
h.	Nominal WACC after Tax	6.90%

The discounted cash flow analysis and the Net Present Value analysis of the incremental annual revenue requirement are done for both 60 and 25 years using the discount factors of 6.9% (After tax WACC) and 10% (benchmark).

3 Income Tax and Inflation Rates

a. The combined Federal and Provincial Income tax is assumed to be 26.5% for 2011 and to be 25% from 2012 onwards.
b. The inflation is assumed to be 2% per year.

4 Capital Cost Allowance / Eligible Capital Expenditures

a. Transmission Pipe (CCA Class 49) - 8%
b. Land Rights - 7%

5 Operating and Maintenance Costs

a. The HDD option incurs O&M savings, which are escalated using the assumed inflation factor of 2%. However, for the purposes of this model, no incremental O&M savings have been assumed as these savings are estimated to be materially small (about $3,000 per annum).
b. Capitalized Overhead Rate is assumed to be 14%. For tax purposes, the Capitalized Overhead rate is assumed to be 8%.

6 Property Tax

a. The option selected for the Project (i.e. HDD) incurs Property tax savings of about $1,800 per annum. However, for the purposes of this model, no incremental property tax savings have been assumed as these savings are estimated to be materially small.

7 Depreciation Rate

a. The Depreciation rate for the pipe is assumed to be 1.63%
b. For the puposes of depreciating the Capitalized Overheads, the average depreciation rate of 2.54% is assumed.

8 Deferred Charges

Terasen has proposed to create three non-rate base deferral accounts (discussed below), which will be added to rate base starting in 2012:

a. Gains and Losses on Asset Disposition Deferral Account - created to capture the gain/loss on the book value of the asset being removed/disposed. This account is assumed to be amortized over a period of 3 years starting in 2012, although the actual amortization period will be determined as part of the Company's next Revenue Requirement Application.
b. Removal Cost Deferral Account - cretaed to capture the removal costs associated with the asset being removed. This account attracts AFUDC and is assumed to be amortized over a period of 3 years starting in 2012 , although the actual amortization period will be determined as part of the Company's next Revenue Requirement Application.
c. The Kootenay River Cost of Service Deferral Account deferral account to capture the cost of service related to plant in service, consisting of depreciation expense, income taxes and earned return. The balance in this account would be transferred to the rate base in 2012 with three years amortization period.

9 Energy/Volumes

a. For the purposes of calculating the rate impact, Terasen has considered TGI Volumes including the sales and non-bypass transportation customers. The growth rate of 0.25% is assumed starting from the year 2015.

Terasen Gas Inc.

Shoreacres - Kootenay River CPCN Filing

Cost of Service Model_HDD (Class 5 estimate) - Revenue Requirement Summary ($000's)

	Year (2011-2030)	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
1	Operating & Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2	Property & Other Taxes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	Depreciation & Amortization	53	695	695	695	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106
4	Income Tax	(48)	136	143	149	(40)	(29)	(19)	(10)	(1)	6	13	19	24	29	34	38	41	44	47	50
5	Return on Equity	125	303	277	251	235	231	227	223	219	215	211	207	203	199	195	191	187	183	179	175
6	Interest	135	330	301	272	256	251	247	243	238	234	229	225	221	216	212	207	203	199	194	190
7	Other Revenue	(265)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	Total Revenue Requirement - Incremental	$0	$1,464	$1,416	$1,367	$558	$560	$562	$562	$562	$561	$560	$557	$554	$551	$547	$542	$538	$532	$527	$521
9																					
10	Total Volume (PJ)	157.7	158.1	158.4	158.8	159.2	159.6	160.0	160.4	160.8	161.2	161.6	162.0	162.4	162.8	163.2	163.6	164.0	164.4	164.8	165.2
11	Rate Impact ($/GJ)	0.000	0.009	0.009	0.009	0.004	0.004	0.004	0.004	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003

Revenue Requirement Summary (continued)

	Year (2031-2050)	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
1	Operating & Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2	Property & Other Taxes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	Depreciation & Amortization	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106
4	Income Tax	52	54	55	57	58	59	60	60	61	61	61	61	61	61	61	61	60	60	59	58
5	Return on Equity	171	167	163	159	155	151	147	142	138	134	130	126	122	118	114	110	106	102	98	94
6	Interest	185	181	177	172	168	164	159	155	150	146	142	137	133	128	124	120	115	111	106	102
7	Other Revenue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	Total Revenue Requirement - Incremental	$514	$508	$501	$494	$487	$479	$472	$464	$456	$448	$440	$431	$423	$414	$405	$397	$388	$379	$370	$361
9																					
10	Total Volume (PJ)	165.7	166.1	166.5	166.9	167.3	167.7	168.2	168.6	169.0	169.4	169.8	170.3	170.7	171.1	171.5	172.0	172.4	172.8	173.3	173.7
11	Rate Impact ($/GJ)	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002

Revenue Requirement Summary (continued)

	Year (2051-2070)	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070
1	Operating & Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2	Property & Other Taxes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	Depreciation & Amortization	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106
4	Income Tax	58	57	56	55	55	54	53	52	51	50	49	48	46	45	44	43	42	41	39	38
5	Return on Equity	90	86	82	78	74	70	66	62	58	54	50	45	41	37	33	29	25	21	17	13
6	Interest	98	93	89	85	80	76	71	67	63	58	54	49	45	41	36	32	27	23	19	14
7	Other Revenue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	Total Revenue Requirement - Incremental	$352	$343	$333	$324	$315	$305	$296	$287	$277	$268	$258	$249	$239	$230	$220	$211	$201	$191	$182	$172
9																					
10	Total Volume (PJ)	174.1	174.6	175.0	175.4	175.9	176.3	176.8	177.2	177.7	178.1	178.5	179.0	179.4	179.9	180.3	180.8	181.2	181.7	182.1	182.6
11	Rate Impact ($/GJ)	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001

	Revenue Requirement NPV ($M)	6.9%	10.0%
12	60 Years (2011-70)	9.6	7.5
13	25 Years (2011-35)	8.7	7.1

	Level Rate Impact ($/GJ)	6.9%	10.0%
14	60 Years (2011-70)	0.0042	0.0047
15	25 Years (2012-36)	0.0046	0.0049

Terasen Gas Inc.
Shoreacres - Kootenay River CPCN Filing
Cost of Service Model_HDD (Class 5 estimate) - Rate Base and Plant in Service Summary ($M)

	Year (2011-2030)	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
1	Rate Base Summary ($M)																				
2	Plant	$3.3	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6
3	Accumulated Depreciation	(0.0)	(0.1)	(0.2)	(0.3)	(0.4)	(0.5)	(0.6)	(0.7)	(0.9)	(1.0)	(1.1)	(1.2)	(1.3)	(1.4)	(1.5)	(1.6)	(1.7)	(1.8)	(1.9)	(2.0)
4	Deferred Charges - (mid year)	0.0	1.5	0.9	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	Working Capital	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
6	Total Rate Base	$3.3	$8.0	$7.3	$6.6	$6.2	$6.1	$6.0	$5.9	$5.8	$5.7	$5.6	$5.5	$5.3	$5.2	$5.1	$5.0	$4.9	$4.8	$4.7	$4.6
7	Plant Summary ($M)																				
8	Opening Balance	$0.0	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6
9	Additions	6.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	Ending Balance	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6
11	Net Plant in Service	$3.3	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6

Rate Base and Plant Summary (continued)

	Year (2031-2050)	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
1	Rate Base Summary ($M)																				
2	Plant	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6
3	Accumulated Depreciation	(2.1)	(2.2)	(2.3)	(2.4)	(2.6)	(2.7)	(2.8)	(2.9)	(3.0)	(3.1)	(3.2)	(3.3)	(3.4)	(3.5)	(3.6)	(3.7)	(3.8)	(3.9)	(4.0)	(4.1)
4	Deferred Charges - (mid year)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	Working Capital	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
6	Total Rate Base	$4.5	$4.4	$4.3	$4.2	$4.1	$4.0	$3.9	$3.7	$3.6	$3.5	$3.4	$3.3	$3.2	$3.1	$3.0	$2.9	$2.8	$2.7	$2.6	$2.5
7	Plant Summary ($M)																				
8	Opening Balance	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6
9	Additions	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	Ending Balance	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6
11	Net Plant in Service	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6

Rate Base and Plant Summary (continued)

	Year (2051-2070)	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070
1	Rate Base Summary ($M)																				
2	Plant	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6
3	Accumulated Depreciation	(4.3)	(4.4)	(4.5)	(4.6)	(4.7)	(4.8)	(4.9)	(5.0)	(5.1)	(5.2)	(5.3)	(5.4)	(5.5)	(5.6)	(5.7)	(5.8)	(6.0)	(6.1)	(6.2)	(6.3)
4	Deferred Charges - (mid year)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	Working Capital	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
6	Total Rate Base	$2.4	$2.3	$2.2	$2.0	$1.9	$1.8	$1.7	$1.6	$1.5	$1.4	$1.3	$1.2	$1.1	$1.0	$0.9	$0.8	$0.7	$0.6	$0.5	$0.3
7	Plant Summary ($M)																				
8	Opening Balance	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6
9	Additions	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	Ending Balance	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6
11	Net Plant in Service	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6	$6.6

Table 3

Terasen Gas Inc.

Shoreacres - Kootenay River CPCN Filing

Cost of Service Model_HDD (Class 5 estimate) - Net Cash Flow Summary ($000's)

	Year (2010-2029)	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
1	Capital Expenditures																				
2	Pipe	$1,074	$5,245	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
3	Land Rights	27	80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	Removal Costs	66	1,245	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	O&M Cost/Savings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	Property Tax/Savings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	Tax Savings	0	(82)	(148)	(136)	(125)	(115)	(106)	(97)	(90)	(83)	(76)	(70)	(64)	(59)	(54)	(50)	(46)	(42)	(39)	(36)
8	Annual Cash Flow	$1,167	$6,487	($148)	($136)	($125)	($115)	($106)	($97)	($90)	($83)	($76)	($70)	($64)	($59)	($54)	($50)	($46)	($42)	($39)	($36)
9	Discounted Cash Flow - 6.9%	$1,093	$5,684	($121)	($104)	($90)	($77)	($66)	($57)	($49)	($42)	($36)	($31)	($27)	($23)	($20)	($17)	($15)	($13)	($11)	($9)
10	Discounted Cash Flow - 10.0%	$1,061	$5,362	($111)	($93)	($78)	($65)	($54)	($45)	($38)	($32)	($27)	($22)	($19)	($16)	($13)	($11)	($9)	($8)	($6)	($5)

Net Cash Flow Summary (continued)

	Year (2030-2049)	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
1	Capital Expenditures																				
2	Pipe	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
3	Land Rights	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	Removal Costs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	O&M Cost/Savings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	Property Tax/Savings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	Tax Savings	(42)	(39)	(36)	(33)	(30)	(28)	(26)	(24)	(22)	(20)	(18)	(17)	(16)	(14)	(13)	(12)	(11)	(10)	(9)	(9)
8	Annual Cash Flow	($42)	($39)	($36)	($33)	($30)	($28)	($26)	($24)	($22)	($20)	($18)	($17)	($16)	($14)	($13)	($12)	($11)	($10)	($9)	($9)
9	Discounted Cash Flow - 6.9%	($13)	($11)	($9)	($8)	($7)	($6)	($5)	($4)	($4)	($3)	($3)	($2)	($2)	($2)	($2)	($1)	($1)	($1)	($1)	($1)
10	Discounted Cash Flow - 10.0%	($8)	($6)	($5)	($4)	($4)	($3)	($3)	($2)	($2)	($2)	($1)	($1)	($1)	($1)	($1)	($1)	($0)	($0)	($0)	($0)

Net Cash Flow Summary (continued)

	Year (2050-2069)	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069
1	Capital Expenditures																				
2	Pipe	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
3	Land Rights	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	Removal Costs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	O&M Cost/Savings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	Property Tax/Savings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	Tax Savings	(10)	(9)	(9)	(8)	(7)	(7)	(6)	(6)	(5)	(5)	(4)	(4)	(4)	(3)	(3)	(3)	(3)	(2)	(2)	(2)
8	Annual Cash Flow	($10)	($9)	($9)	($8)	($7)	($7)	($6)	($6)	($5)	($5)	($4)	($4)	($4)	($3)	($3)	($3)	($3)	($2)	($2)	($2)
9	Discounted Cash Flow - 6.9%	($1)	($1)	($1)	($1)	($1)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)
10	Discounted Cash Flow - 10.0%	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)

	Net Cash Flow NPV ($M)	6.9%	10.0%
11	60 Years (2010-69)	5.87	5.72
12	25 Years (2010-34)	5.92	5.74

Terasen Gas Inc.

Shoreacres - Kootenay River CPCN Filing

Cost of Service Model_TP ReRoute Alternative (Class 5 estimate) - Financial Assumptions

1 Project Details and Capital Costs

a. For details on the Capital costs, refer to the Table 4-2 and Table 4-3 of the Application.
b. Plant in Service date is assumed to be July 1, 2011.
c. Plant additions are assumed to enter the rate base starting on July 1, 2011.

2 Capital Structure and AFUDC Rate

a.	ROE Rate	9.50%
b.	Equity Ratio	40.00%
c.	LTD Rate	6.95%
d.	LTD Ratio	58.37%
e.	STD Rate	4.50%
f.	STD Ratio	1.63%
g.	AFUDC Rate	6.90%
h.	Nominal WACC after Tax	6.90%

The discounted cash flow analysis and the Net Present Value analysis of the incremental annual revenue requirement are done for both 60 and 25 years using the discount factors of 6.9% (After tax WACC) and 10% (benchmark).

3 Income Tax and Inflation Rates

a. The combined Federal and Provincial Income tax is assumed to be 26.5% for 2011 and to be 25% from 2012 onwards.
b. The inflation is assumed to be 2% per year.

4 Capital Cost Allowance / Eligible Capital Expenditures

a. Transmission Pipe (CCA Class 49) - 8%
b. Land Rights - 7%

5 Operating and Maintenance Costs

a. The TP ReRoute option incurs O&M savings, which are escalated using the assumed inflation factor of 2%. However, for the purposes of this model, no incremental O&M savings have been assumed as these savings are estimated to be materially small (about $2,000 per annum).
b. Capitalized Overhead Rate is assumed to be 14%. For tax purposes, the Capitalized Overhead rate is assumed to be 8%.

6 Property Tax

a. The TP ReRoute alternative incurs Property tax expense of about $5,250 per annum. However, for the purposes of this model, no incremental property tax expenses have been assumed as these are estimated to be materially small.

7 Depreciation Rate

a. The Depreciation rate for the pipe is assumed to be 1.63%
b. For the puposes of depreciating the Capitalized Overheads, the average depreciation rate of 2.54% is assumed.

8 Deferred Charges

Terasen has proposed to create three non-rate base deferral accounts (discussed below), which will be added to rate base starting in 2012:

a. Gains and Losses on Asset Disposition Deferral Account - created to capture the gain/loss on the book value of the asset being removed/disposed. This account is assumed to be amortized over a period of 3 years starting in 2012, although the actual amortization period will be determined as part of the Company's next Revenue Requirement Application.
b. Removal Cost Deferral Account - cretaed to capture the removal costs associated with the asset being removed. This account attracts AFUDC and is assumed to be amortized over a period of 3 years starting in 2012 , although the actual amortization period will be determined as part of the Company's next Revenue Requirement Application.
c. The Kootenay River Cost of Service Deferral Account deferral account to capture the cost of service related to plant in service, consisting of depreciation expense, income taxes and earned return. The balance in this account would be transferred to the rate base in 2012 with three year amortization period.

9 Energy/Volumes

a. For the purposes of calculating the rate impact, Terasen has considered TGI Volumes including the sales and non-bypass transportation customers. The growth rate of 0.25% is assumed starting from the year 2015.

Terasen Gas Inc.

Shoreacres - Kootenay River CPCN Filing

Cost of Service Model_TP ReRoute Alternative (Class 5 estimate) - Revenue Requirement Summary ($000's)

	Year (2011-2030)	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
1	Operating & Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2	Property & Other Taxes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	Depreciation & Amortization	59	746	746	746	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118
4	Income Tax	(78)	138	148	157	(41)	(27)	(15)	(3)	8	17	26	34	41	48	54	59	64	68	72	75
5	Return on Equity	182	423	395	366	350	345	341	336	332	327	323	318	314	309	305	300	296	292	287	283
6	Interest	198	459	429	398	380	375	370	365	360	356	351	346	341	336	331	326	322	317	312	307
7	Other Revenue	(361)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	Total Revenue Requirement - Incremental	$0	$1,766	$1,717	$1,667	$806	$811	$814	$817	$818	$818	$818	$816	$814	$811	$808	$804	$799	$794	$789	$783
9																					
10	Total Volume (PJ)	157.7	158.1	158.4	158.8	159.2	159.6	160.0	160.4	160.8	161.2	161.6	162.0	162.4	162.8	163.2	163.6	164.0	164.4	164.8	165.2
11	Rate Impact ($/GJ)	0.000	0.011	0.011	0.010	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005

Revenue Requirement Summary (continued)

	Year (2031-2050)	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
1	Operating & Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2	Property & Other Taxes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	Depreciation & Amortization	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118
4	Income Tax	79	81	84	86	87	89	90	91	92	93	93	94	94	94	94	94	94	93	93	92
5	Return on Equity	278	274	269	265	260	256	251	247	242	238	233	229	224	220	215	211	206	202	197	193
6	Interest	302	297	292	287	283	278	273	268	263	258	253	249	244	239	234	229	224	219	214	210
7	Other Revenue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	Total Revenue Requirement - Incremental	$777	$770	$763	$756	$748	$740	$732	$724	$715	$707	$698	$689	$680	$671	$661	$652	$642	$632	$623	$613
9																					
10	Total Volume (PJ)	165.7	166.1	166.5	166.9	167.3	167.7	168.2	168.6	169.0	169.4	169.8	170.3	170.7	171.1	171.5	172.0	172.4	172.8	173.3	173.7
11	Rate Impact ($/GJ)	0.005	0.005	0.005	0.005	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004

Revenue Requirement Summary (continued)

	Year (2051-2070)	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070
1	Operating & Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2	Property & Other Taxes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	Depreciation & Amortization	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118
4	Income Tax	92	91	90	89	89	88	87	86	85	84	83	81	80	79	78	77	75	74	73	71
5	Return on Equity	188	184	180	175	171	166	162	157	153	148	144	139	135	130	126	121	117	112	108	103
6	Interest	205	200	195	190	185	180	176	171	166	161	156	151	146	141	137	132	127	122	117	112
7	Other Revenue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	Total Revenue Requirement - Incremental	$603	$593	$583	$572	$562	$552	$542	$531	$521	$511	$500	$490	$479	$469	$458	$448	$437	$426	$416	$405
9																					
10	Total Volume (PJ)	174.1	174.6	175.0	175.4	175.9	176.3	176.8	177.2	177.7	178.1	178.5	179.0	179.4	179.9	180.3	180.8	181.2	181.7	182.1	182.6
11	Rate Impact ($/GJ)	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.002	0.002	0.002	0.002	0.002

	Revenue Requirement NPV ($M)	6.9%	10.0%
12	60 Years (2011-70)	13.4	10.2
13	25 Years (2011-35)	11.8	9.6

	Level Rate Impact ($/GJ)	6.9%	10.0%
14	60 Years (2011-70)	0.0059	0.0063
15	25 Years (2012-36)	0.0062	0.0066

Terasen Gas Inc.

Shoreacres - Kootenay River CPCN Filing

Cost of Service Model_TP ReRoute Alternative (Class 5 estimate) - Rate Base and Plant in Service Summary ($M)

	Year (2011-2030)	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
1	Rate Base Summary ($M)																				
2	Plant	$4.8	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7
3	Accumulated Depreciation	(0.0)	(0.1)	(0.2)	(0.4)	(0.5)	(0.6)	(0.7)	(0.8)	(0.9)	(1.1)	(1.2)	(1.3)	(1.4)	(1.5)	(1.7)	(1.8)	(1.9)	(2.0)	(2.1)	(2.2)
4	Deferred Charges - (mid year)	0.0	1.6	0.9	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	Working Capital	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
6	Total Rate Base	$4.8	$11.1	$10.4	$9.6	$9.2	$9.1	$9.0	$8.9	$8.7	$8.6	$8.5	$8.4	$8.3	$8.1	$8.0	$7.9	$7.8	$7.7	$7.6	$7.4
7	Plant Summary ($M)																				
8	Opening Balance	$0.0	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7
9	Additions	9.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	Ending Balance	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7
11	Net Plant in Service	$4.8	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7

Rate Base and Plant Summary (continued)

	Year (2031-2050)	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
1	Rate Base Summary ($M)																				
2	Plant	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7
3	Accumulated Depreciation	(2.4)	(2.5)	(2.6)	(2.7)	(2.8)	(2.9)	(3.1)	(3.2)	(3.3)	(3.4)	(3.5)	(3.7)	(3.8)	(3.9)	(4.0)	(4.1)	(4.2)	(4.4)	(4.5)	(4.6)
4	Deferred Charges - (mid year)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	Working Capital	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
6	Total Rate Base	$7.3	$7.2	$7.1	$7.0	$6.8	$6.7	$6.6	$6.5	$6.4	$6.3	$6.1	$6.0	$5.9	$5.8	$5.7	$5.5	$5.4	$5.3	$5.2	$5.1
7	Plant Summary ($M)																				
8	Opening Balance	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7
9	Additions	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	Ending Balance	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7
11	Net Plant in Service	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7

Rate Base and Plant Summary (continued)

	Year (2051-2070)	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070
1	Rate Base Summary ($M)																				
2	Plant	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7
3	Accumulated Depreciation	(4.7)	(4.8)	(5.0)	(5.1)	(5.2)	(5.3)	(5.4)	(5.5)	(5.7)	(5.8)	(5.9)	(6.0)	(6.1)	(6.2)	(6.4)	(6.5)	(6.6)	(6.7)	(6.8)	(7.0)
4	Deferred Charges - (mid year)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	Working Capital	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
6	Total Rate Base	$5.0	$4.8	$4.7	$4.6	$4.5	$4.4	$4.3	$4.1	$4.0	$3.9	$3.8	$3.7	$3.5	$3.4	$3.3	$3.2	$3.1	$3.0	$2.8	$2.7
7	Plant Summary ($M)																				
8	Opening Balance	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7
9	Additions	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	Ending Balance	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7
11	Net Plant in Service	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7	$9.7

Terasen Gas Inc.

Shoreacres - Kootenay River CPCN Filing

Cost of Service Model_TP ReRoute Alternative (Class 5 estimate) - Net Cash Flow Summary ($000's)

	Year (2010-2029)	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
1	Capital Expenditures																				
2	Pipe	$1,672	$5,313	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
3	Land Rights	598	1,793	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	Removal Costs	67	1,265	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	O&M Cost/Savings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	Property Tax/Savings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	Tax Savings	0	(121)	(189)	(174)	(160)	(148)	(136)	(126)	(116)	(107)	(98)	(91)	(83)	(77)	(71)	(65)	(60)	(56)	(51)	(47)
8	Annual Cash Flow	$2,336	$8,250	($189)	($174)	($160)	($148)	($136)	($126)	($116)	($107)	($98)	($91)	($83)	($77)	($71)	($65)	($60)	($56)	($51)	($47)
9	Discounted Cash Flow - 6.9%	$2,189	$7,228	($155)	($133)	($115)	($99)	($85)	($74)	($63)	($55)	($47)	($41)	($35)	($30)	($26)	($22)	($19)	($17)	($14)	($12)
10	Discounted Cash Flow - 10.0%	$2,124	$6,818	($142)	($119)	($100)	($83)	($70)	($59)	($49)	($41)	($34)	($29)	($24)	($20)	($17)	($14)	($12)	($10)	($8)	($7)

Net Cash Flow Summary (continued)

	Year (2030-2049)	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
1	Capital Expenditures																				
2	Pipe	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
3	Land Rights	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	Removal Costs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	O&M Cost/Savings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	Property Tax/Savings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	Tax Savings	(56)	(51)	(47)	(44)	(40)	(37)	(34)	(31)	(29)	(27)	(25)	(23)	(21)	(19)	(18)	(16)	(15)	(14)	(13)	(12)
8	Annual Cash Flow	($56)	($51)	($47)	($44)	($40)	($37)	($34)	($31)	($29)	($27)	($25)	($23)	($21)	($19)	($18)	($16)	($15)	($14)	($13)	($12)
9	Discounted Cash Flow - 6.9%	($17)	($14)	($12)	($11)	($9)	($8)	($7)	($6)	($5)	($4)	($4)	($3)	($3)	($2)	($2)	($2)	($2)	($1)	($1)	($1)
10	Discounted Cash Flow - 10.0%	($10)	($8)	($7)	($6)	($5)	($4)	($3)	($3)	($2)	($2)	($2)	($1)	($1)	($1)	($1)	($1)	($1)	($0)	($0)	($0)

Net Cash Flow Summary (continued)

	Year (2050-2069)	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069
1	Capital Expenditures																				
2	Pipe	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
3	Land Rights	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	Removal Costs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	O&M Cost/Savings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	Property Tax/Savings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	Tax Savings	(14)	(13)	(12)	(11)	(10)	(9)	(9)	(8)	(7)	(7)	(6)	(6)	(5)	(5)	(4)	(4)	(4)	(4)	(3)	(3)
8	Annual Cash Flow	($14)	($13)	($12)	($11)	($10)	($9)	($9)	($8)	($7)	($7)	($6)	($6)	($5)	($5)	($4)	($4)	($4)	($4)	($3)	($3)
9	Discounted Cash Flow - 6.9%	($1)	($1)	($1)	($1)	($1)	($1)	($1)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)
10	Discounted Cash Flow - 10.0%	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)

	Net Cash Flow NPV ($M)	6.9%	10.0%
11	60 Years (2010-69)	8.25	8.04
12	25 Years (2010-34)	8.31	8.07

Terasen Gas Inc.

Shoreacres - Kootenay River CPCN Filing

Cost of Service Model_IP ReRoute Alternative (Class 5 estimate)_Looping in 2037 - Financial Assumptions

1 Project Details and Capital Costs

a. For details on the Capital costs, refer to the Table 4-2 and Table 4-3 of the Application. The total Capital cost includes $10.2M (in $2037) of Capital addition due to capacity looping required in 2037.
b. Plant in Service date is assumed to be July 1, 2011.
c. Plant additions are assumed to enter the rate base starting on July 1, 2011.

2 Capital Structure and AFUDC Rate

a.	ROE Rate	9.50%
b.	Equity Ratio	40.00%
c.	LTD Rate	6.95%
d.	LTD Ratio	58.37%
e.	STD Rate	4.50%
f.	STD Ratio	1.63%
g.	AFUDC Rate	6.90%
h.	Nominal WACC after Tax	6.90%

The discounted cash flow analysis and the Net Present Value analysis of the incremental annual revenue requirement are done for both 60 and 25 years using the discount factors of 6.9% (After tax WACC) and 10% (benchmark).

3 Income Tax and Inflation Rates

a. The combined Federal and Provincial Income tax is assumed to be 26.5% for 2011 and to be 25% from 2012 onwards.
b. The inflation is assumed to be 2% per year.

4 Capital Cost Allowance / Eligible Capital Expenditures

a. IP Pipe (CCA Class 49) - 8%
b. Land Rights - 7%
c. Station (CCA Class 51) - 6%

5 Operating and Maintenance Costs

a. The IP ReRoute option incurs no O&M savings.
b. Capitalized Overhead Rate is assumed to be 14%. For tax purposes, the Capitalized Overhead rate is assumed to be 8%.

6 Property Tax

a. The IP ReRoute alternative incurs Property tax expense of about $8,250 per annum. However, for the purposes of this model, no incremental property tax expenses have been assumed as these are estimated to be materially small.

7 Depreciation Rate

a. The Depreciation rate for the pipe is assumed to be 1.97% and 5.72% for the Station.
b. For the puposes of depreciating the Capitalized Overheads, the average depreciation rate of 2.54% is assumed.

8 Deferred Charges

Terasen has proposed to create three non-rate base deferral accounts (discussed below), which will be added to rate base starting in 2012:

a. Gains and Losses on Asset Disposition Deferral Account - created to capture the gain/loss on the book value of the asset being removed/disposed. This account is assumed to be amortized over a period of 3 years starting in 2012, although the actual amortization period will be determined as part of the Company's next Revenue Requirement Application.
b. Removal Cost Deferral Account - cretaed to capture the removal costs associated with the asset being removed. This account attracts AFUDC and is assumed to be amortized over a period of 3 years starting in 2012 , although the actual amortization period will be determined as part of the Company's next Revenue Requirement Application.
c. The Kootenay River Cost of Service Deferral Account deferral account to capture the cost of service related to plant in service, consisting of depreciation expense, income taxes and earned return. The balance in this account would be transferred to the rate base in 2012 with three year amortization period.

9 Energy/Volumes

a. For the purposes of calculating the rate impact, Terasen has considered TGI Volumes including the sales and non-bypass transportation customers. The growth rate of 0.25% is assumed starting from the year 2015.

Terasen Gas Inc.

Shoreacres - Kootenay River CPCN Filing

Cost of Service Model_IP ReRoute Alternative (Class 5 estimate)_Looping in 2037 - Revenue Requirement Summary ($000's)

	Year (2011-2030)	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
1	Operating & Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2	Property & Other Taxes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	Depreciation & Amortization	97	838	838	838	185	185	185	185	185	185	185	185	185	185	185	185	185	185	185	185
4	Income Tax	(59)	147	158	168	(38)	(23)	(9)	3	14	24	33	41	48	55	60	66	70	74	78	81
5	Return on Equity	190	440	408	376	356	349	341	334	327	319	312	305	298	290	283	276	268	261	254	246
6	Interest	207	478	443	408	387	379	371	363	355	347	339	331	323	315	307	299	291	284	276	268
7	Other Revenue	(435)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	Total Revenue Requirement - Incremental	$0	$1,902	$1,846	$1,789	$889	$889	$887	$884	$880	$875	$868	$861	$853	$845	$835	$825	$814	$803	$791	$779
9																					
10	Total Volume (PJ)	157.7	158.1	158.4	158.8	159.2	159.6	160.0	160.4	160.8	161.2	161.6	162.0	162.4	162.8	163.2	163.6	164.0	164.4	164.8	165.2
11	Rate Impact ($/GJ)	0.000	0.012	0.012	0.011	0.006	0.006	0.006	0.006	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005

Revenue Requirement Summary (continued)

	Year (2031-2050)	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
1	Operating & Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2	Property & Other Taxes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	Depreciation & Amortization	185	185	185	185	185	185	285	386	386	386	386	386	386	386	386	386	386	386	386	386
4	Income Tax	83	85	87	89	90	91	189	286	283	281	278	275	272	269	265	262	258	254	250	246
5	Return on Equity	239	232	225	217	210	203	387	569	554	539	524	509	494	479	464	449	434	419	404	389
6	Interest	260	252	244	236	228	220	421	618	602	585	569	553	537	520	504	488	472	455	439	423
7	Other Revenue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	Total Revenue Requirement - Incremental	$767	$754	$740	$726	$712	$698	$1,282	$1,859	$1,825	$1,791	$1,757	$1,723	$1,689	$1,654	$1,620	$1,585	$1,550	$1,515	$1,480	$1,445
9																					
10	Total Volume (PJ)	165.7	166.1	166.5	166.9	167.3	167.7	168.2	168.6	169.0	169.4	169.8	170.3	170.7	171.1	171.5	172.0	172.4	172.8	173.3	173.7
11	Rate Impact ($/GJ)	0.005	0.005	0.004	0.004	0.004	0.004	0.008	0.011	0.011	0.011	0.010	0.010	0.010	0.010	0.009	0.009	0.009	0.009	0.009	0.008

Revenue Requirement Summary (continued)

	Year (2051-2070)	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070
1	Operating & Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2	Property & Other Taxes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	Depreciation & Amortization	386	386	386	386	386	386	386	386	386	386	386	386	386	386	386	386	386	386	386	386
4	Income Tax	242	238	234	230	226	221	217	212	208	203	199	194	190	185	180	175	171	166	161	156
5	Return on Equity	374	359	344	329	315	300	285	270	255	240	225	210	195	180	165	150	135	120	105	90
6	Interest	407	390	374	358	342	325	309	293	277	260	244	228	212	195	179	163	147	130	114	98
7	Other Revenue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	Total Revenue Requirement - Incremental	$1,410	$1,374	$1,339	$1,303	$1,268	$1,232	$1,197	$1,161	$1,125	$1,090	$1,054	$1,018	$982	$946	$910	$875	$839	$803	$767	$731
9																					
10	Total Volume (PJ)	174.1	174.6	175.0	175.4	175.9	176.3	176.8	177.2	177.7	178.1	178.5	179.0	179.4	179.9	180.3	180.8	181.2	181.7	182.1	182.6
11	Rate Impact ($/GJ)	0.008	0.008	0.008	0.007	0.007	0.007	0.007	0.007	0.006	0.006	0.006	0.006	0.005	0.005	0.005	0.005	0.005	0.004	0.004	0.004

	Revenue Requirement NPV ($M)	6.9%	10.0%
12	60 Years (2011-70)	16.2	11.6
13	25 Years (2011-35)	12.5	10.2

	Level Rate Impact ($/GJ)	6.9%	10.0%
14	60 Years (2011-70)	0.0071	0.0072
15	25 Years (2012-36)	0.0066	0.0070

Terasen Gas Inc.

Shoreacres - Kootenay River CPCN Filing

Cost of Service Model_IP ReRoute Alternative (Class 5 estimate)_Looping in 2037 - Rate Base and Plant in Service Summary ($M)

	Year (2011-2030)	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
1	Rate Base Summary ($M)																				
2	Plant	$5.1	$10.1	$10.1	$10.1	$10.1	$10.1	$10.1	$10.1	$10.1	$10.1	$10.1	$10.1	$10.1	$10.1	$10.1	$10.1	$10.1	$10.1	$10.1	$10.1
3	Accumulated Depreciation	(0.0)	(0.2)	(0.4)	(0.6)	(0.8)	(1.0)	(1.1)	(1.3)	(1.5)	(1.7)	(1.9)	(2.1)	(2.3)	(2.5)	(2.7)	(2.9)	(3.1)	(3.3)	(3.5)	(3.6)
4	Deferred Charges - (mid year)	0.0	1.6	1.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	Working Capital	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
6	Total Rate Base	$5.0	$11.6	$10.7	$9.9	$9.4	$9.2	$9.0	$8.8	$8.6	$8.4	$8.2	$8.0	$7.8	$7.6	$7.4	$7.3	$7.1	$6.9	$6.7	$6.5
7	Plant Summary ($M)																				
8	Opening Balance	$0.0	$10.1	$10.1	$10.1	$10.1	$10.1	$10.1	$10.1	$10.1	$10.1	$10.1	$10.1	$10.1	$10.1	$10.1	$10.1	$10.1	$10.1	$10.1	$10.1
9	Additions	10.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	Ending Balance	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1
11	Net Plant in Service	$5.1	$10.1	$10.1	$10.1	$10.1	$10.1	$10.1	$10.1	$10.1	$10.1	$10.1	$10.1	$10.1	$10.1	$10.1	$10.1	$10.1	$10.1	$10.1	$10.1

Rate Base and Plant Summary (continued)

	Year (2031-2050)	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
1	Rate Base Summary ($M)																				
2	Plant	$10.1	$10.1	$10.1	$10.1	$10.1	$10.1	$15.3	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4
3	Accumulated Depreciation	(3.8)	(4.0)	(4.2)	(4.4)	(4.6)	(4.8)	(5.0)	(5.4)	(5.8)	(6.2)	(6.6)	(7.0)	(7.3)	(7.7)	(8.1)	(8.5)	(8.9)	(9.3)	(9.7)	(10.1)
4	Deferred Charges - (mid year)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	Working Capital	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
6	Total Rate Base	$6.3	$6.1	$5.9	$5.7	$5.5	$5.3	$10.2	$15.0	$14.6	$14.2	$13.8	$13.4	$13.0	$12.6	$12.2	$11.8	$11.4	$11.0	$10.6	$10.2
7	Plant Summary ($M)																				
8	Opening Balance	$10.1	$10.1	$10.1	$10.1	$10.1	$10.1	$10.1	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4
9	Additions	0.0	0.0	0.0	0.0	0.0	0.0	10.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	Ending Balance	10.1	10.1	10.1	10.1	10.1	10.1	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4
11	Net Plant in Service	$10.1	$10.1	$10.1	$10.1	$10.1	$10.1	$15.3	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4

Rate Base and Plant Summary (continued)

	Year (2051-2070)	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070
1	Rate Base Summary ($M)																				
2	Plant	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4
3	Accumulated Depreciation	(10.5)	(10.9)	(11.3)	(11.7)	(12.1)	(12.5)	(12.9)	(13.3)	(13.6)	(14.0)	(14.4)	(14.8)	(15.2)	(15.6)	(16.0)	(16.4)	(16.8)	(17.2)	(17.6)	(18.0)
4	Deferred Charges - (mid year)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	Working Capital	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
6	Total Rate Base	$9.9	$9.5	$9.1	$8.7	$8.3	$7.9	$7.5	$7.1	$6.7	$6.3	$5.9	$5.5	$5.1	$4.7	$4.3	$3.9	$3.6	$3.2	$2.8	$2.4
7	Plant Summary ($M)																				
8	Opening Balance	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4
9	Additions	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	Ending Balance	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4
11	Net Plant in Service	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4	$20.4

Terasen Gas Inc.

Shoreacres - Kootenay River CPCN Filing

Cost of Service Model_IP ReRoute Alternative (Class 5 estimate)_Looping in 2037 - Net Cash Flow Summary ($000's)

	Year (2010-2029)	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
1	Capital Expenditures																				
2	Pipe	$2,024	$7,042	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
3	Land Rights	127	381	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	Removal Costs	67	1,265	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	O&M Cost/Savings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	Property Tax/Savings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	Tax Savings	0	(119)	(209)	(193)	(178)	(163)	(150)	(139)	(128)	(117)	(108)	(100)	(92)	(84)	(78)	(72)	(66)	(61)	(56)	(51)
8	Annual Cash Flow	$2,217	$8,569	($209)	($193)	($178)	($163)	($150)	($139)	($128)	($117)	($108)	($100)	($92)	($84)	($78)	($72)	($66)	($61)	($56)	($51)
9	Discounted Cash Flow - 6.9%	$2,077	$7,508	($171)	($148)	($127)	($110)	($94)	($81)	($70)	($60)	($52)	($45)	($39)	($33)	($29)	($25)	($21)	($18)	($16)	($14)
10	Discounted Cash Flow - 10.0%	$2,016	$7,082	($157)	($132)	($110)	($92)	($77)	($65)	($54)	($45)	($38)	($32)	($27)	($22)	($19)	($16)	($13)	($11)	($9)	($8)

Net Cash Flow Summary (continued)

	Year (2030-2049)	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
1	Capital Expenditures																				
2	Pipe	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$10,241	$0	$0	$0	$0	$0	$0	$0	$0	$0
3	Land Rights	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	Removal Costs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	O&M Cost/Savings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	Property Tax/Savings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	Tax Savings	(61)	(56)	(51)	(47)	(44)	(40)	(37)	(34)	(31)	(29)	(27)	(25)	(23)	(21)	(19)	(18)	(16)	(15)	(14)	(13)
8	Annual Cash Flow	($61)	($56)	($51)	($47)	($44)	($40)	($37)	($34)	($31)	($29)	$10,215	($25)	($23)	($21)	($19)	($18)	($16)	($15)	($14)	($13)
9	Discounted Cash Flow - 6.9%	($18)	($16)	($14)	($12)	($10)	($9)	($7)	($6)	($6)	($5)	$1,579	($4)	($3)	($3)	($2)	($2)	($2)	($1)	($1)	($1)
10	Discounted Cash Flow - 10.0%	($11)	($9)	($8)	($6)	($5)	($4)	($4)	($3)	($3)	($2)	$708	($2)	($1)	($1)	($1)	($1)	($1)	($1)	($0)	($0)

Net Cash Flow Summary (continued)

	Year (2050-2069)	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069
1	Capital Expenditures																				
2	Pipe	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
3	Land Rights	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	Removal Costs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	O&M Cost/Savings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	Property Tax/Savings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	Tax Savings	(15)	(14)	(13)	(12)	(11)	(10)	(9)	(8)	(8)	(7)	(7)	(6)	(6)	(5)	(5)	(4)	(4)	(4)	(3)	(3)
8	Annual Cash Flow	($15)	($14)	($13)	($12)	($11)	($10)	($9)	($8)	($8)	($7)	($7)	($6)	($6)	($5)	($5)	($4)	($4)	($4)	($3)	($3)
9	Discounted Cash Flow - 6.9%	($1)	($1)	($1)	($1)	($1)	($1)	($1)	($1)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)
10	Discounted Cash Flow - 10.0%	($1)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)

	Net Cash Flow NPV ($M)	6.9%	10.0%
11	60 Years (2010-69)	9.88	8.81
12	25 Years (2010-34)	8.36	8.13

Appendix I

SHOREACRES AERIAL REPLACEMENT PROJECT ROUTE SELECTION ENVIRONMENTAL SCREENING REPORT

JULY 15, 2009

Shoreacres Aerial Replacement Project
Route Selection

Environmental Screening Report

Prepared for:

Terasen Gas

Prepared by:

WESTLAND
RESOURCE GROUP

July 15, 2009

Environmental Screening Report

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SUMMARY

Environmental screening of six potential pipeline routes was done by Westland Resource Group for the Terasen Gas Shoreacres Aerial Replacement Project.

The objective of this work is to provide Terasen project planners with information for the evaluation and comparison of the environmental risks, significant project cost items and land use constraints along the route options under consideration.

As of July 9, 2009, four of the six route options were dropped due to the confirmation of unsuitable subsurface conditions for horizontal directional drilling (HDD). Accordingly, only the Large Angle Route Option and the TP/IP Route Option are assessed.

The Large Angle Route Option is considered to be the preferred option from an environmental and land use perspective because land disturbances will be minimal, there are fewer potential environmental risks (*e.g.,* contaminated sites and domestic water), and little or no new right-of-way will be required. This HDD crossing will not impact the fish or fish habitat resources of the Lower Kootenay River or Slocan River.

The TP/IP Route Option can be constructed with minor environmental or land use impacts. However, the environmental (contaminated sites and domestic water) risks, increased land use constraints and higher costs due to the increased length of this option make it a distant second choice.

1.0 INTRODUCTION

1.1 Project description

Terasen Gas Inc. plans to replace the existing aerial pipeline crossing of the Kootenay River near Shoreacres, British Columbia. This aerial crossing will be replaced by a horizontal directional drill (HDD) crossing or attaching a new pipeline to the Blewett Road bridge structures near Bonnington Falls, British Columbia. These bridges are owned by the City of Nelson.

This aerial replacement project is part of the updating of the system reinforcement of Terasen Gas' Castlegar–Nelson Transmission Pipeline Project.

A new location for the proposed pipeline crossing is required because the existing Shoreacres aerial crossing and pipeline right-of-way cannot be used for an HDD, due to unfavourable sub-surface ground conditions at the aerial crossing, and the presence of at least one archaeological site nearby.

Terasen Gas identified a total of six potential route options in May 2009. Five of these route options involve a directional drill crossing of the Kootenay River and one option will utilize existing bridge structures for crossing the Kootenay River.

The route options considered for this environmental screening project are presented in Table 1.

Table 1. Route options evaluated for the Shoreacres Aerial Replacement Project

Route Option	Description
TP/IP Option*	A route that uses existing bridge structures along Blewett Road. Approximately 8.85 km in length. The TP and IP routes are identical. However, the IP Option will operate at a lower pressure and a pressure reducing station will be required north of the Slocan River if the IP Route Option is selected.
Shoreacres North	An option that includes an HDD crossing of the Kootenay River south of Ward's Bay and a new pipeline connection along rural–residential roads of Shoreacres. Total length of new pipeline is approximately 3.89 km.
Shoreacres South	An HDD crossing of the Kootenay River south of the Slocan–Kootenay confluence. The total length of new pipeline is approximately 2.06 km.
Large Angle*	An HDD crossing of the Kootenay River and the Slocan River near the existing aerial crossing. The total length of new pipeline is approximately 678 m.
Shallow Angle	An HDD crossing closest to the existing aerial pipeline crossing. (Total length is approximately 457 m.)
Lazaroff	An HDD crossing approximately 2.5 km south of the Slocan River confluence. The total length of new pipeline is approximately 4.64 km.

* Highlighted route options were selected for further investigation by Terasen Gas on July 9, 2009. All other options have been dropped from further consideration.

The main project components include:

- construction work areas for the HDD entry (disturbed area approximately 20 m wide and 40 m long or 800 m^2;
- containment berms, ditches;
- equipment staging areas;
- two test drill sites (disturbed area approximately 30 m^2)
- access roads/shoo-flys;
- new right-of-way and temporary workspace (if required);
- tie-ins to existing pipeline; and
- access to decommissioning and disassemble the towers and the existing aerial pipeline crossing.

1.2 Objectives

This environmental screening report has been prepared to provide the information necessary to evaluate and compare the environmental risks, significant project cost items and land use constraints along the various route options under consideration. The information contained in this report will be used by Terasen Gas project planners and will serve as a foundation for the BCUC/CPCN Application and the environmental permitting process for the preferred route option.

1.3 Study team and methods

Study Team

Data assembly, analysis, and report preparation work was completed by WRG Westland Resource Group Inc. personnel of Victoria, British Columbia with assistance from Eaglevision Geomatics & Archaeology of Cranbrook, British Columbia.

Key project team members include:

Westland Resource Group

- Wayne G. Biggs, M.Sc., P.Ag., R.P.Bio., Project Leader
- Carmen I. Holschuh, M.Sc., R.P.Bio., Biologist
- Rahul Ray, M.R.M., Environmental Planner
- Julia M. Roberts, B.Sc., Biologist
- Steve Young, M.E.S., GIS Specialist

Eaglevision Geomatics & Archaeology Ltd.

- Melissa Knight
- Wayne Choquette

Methods

Existing published and online information on the biological resources, land and water resources, and archaeology of the Shoreacres Project area was collected and reviewed. Specifically, government databases were searched for information about fish, fish habitat, wildlife, wildlife habitat, domestic water wells, land tenures, and surface water. Municipal, regional, and provincial land use plans were also reviewed for relevant information. Land status (Crown versus Private) and agricultural land information was assembled for all route options.

Aerial photographs and Google Earth images were examined and registered contaminated site information for the Shoreacres and Glade area was obtained through a BC Site Registry Search.

A field reconnaissance of the route options was conducted on June 3, 2009. Ground level photographs of the various route options were taken in June 2009. These photographs are presented in Appendix A.

Telephone interviews with planning staff from the City of Nelson and the Regional District of Central Kootenay (RDCK) were conducted in early July 2009.

No landowner discussions or First Nations discussions were conducted for this screening level investigation.

An Archaeological Overview Assessment (AOA) of the route options, with an emphasis on the riparian areas adjacent to the proposed HDD entry and exit points, was conducted by Eaglevision Geomatics & Archaeology Ltd. on July 9 and 10, 2009.

1.4 Report structure

This environmental screening report is presented in six sections. Section 2, following this introductory material, contains an overview of the environmental setting of the Shoreacres Project area and provides relevant regional information. Section 3 contains information on the biological resources and various land uses along the route options. This section of the report also outlines key findings of the archaeological overview conducted in July 2009, and a 2008 archaeological investigation near the existing Shoreacres aerial crossing. Section 4 presents a high-level review of the regulatory agency authorizations and environmental approvals required for the Project, and Section 5 contains a route comparison table. References are contained in Section 6.

2.0 ENVIRONMENTAL SETTING

The Shoreacres Project Area is primarily located in the Regional District of Central Kootenay, along the Lower Kootenay River near the confluence of the Slocan River. A segment of the TP/IP Option is located in the City of Nelson municipal boundary. The rural residential communities of Shoreacres and Glade are the closest populated areas. Shoreacres is located on the west bank of the Lower Kootenay River just north of the confluence of the Slocan River. The community is approximately 22 km west of Nelson, British Columbia, along Highway 3A. Glade is located on the east bank of the Lower Kootenay River just south of the confluence of the Slocan River. Glade is accessed by a cable ferry from Glade Ferry Road that runs south-southeast from Highway 3A about 24 km west of Nelson. The locations of both communities are shown on Figure 1.

2.1 Landforms and Physiography

The Shoreacres Project Area is located in the Columbia Mountains and Southern Rockies physiographic region (Valentine et al, 1978) of southeastern British Columbia. From east to west, the Columbia Mountains consist of the Purcell, Selkirk, and Monashee Ranges. The Bonnington Range, a sub-range of the Selkirk Mountains, lies to the east of the Lower Kootenay River. The range consists of bedrock smoothed by ancient glaciers and rising to 2,318 m at the summit of Siwash Mountain. To the west of the Lower Kootenay River is Slocan Ridge, which forms the northeast boundary of the Slocan River valley. In the project area, the Lower Kootenay and Slocan Rivers are at an elevation of about 500 m. Alluvial deposits are found along the banks of both rivers. At Shoreacres, Glade and along the lower reaches of the Slocan River, lithology from water wells shows the presence of sand and gravel to depths as great as 70 m.

2.2 Ecosystems

The Shoreacres Project Area lies within the Interior Cedar Hemlock (ICH) biogeoclimatic zone which is characterized by coniferous forests where western red cedar and western hemlock predominate, but ponderosa pine, Douglas fir, lodgepole pine, white pine, subalpine fir, spruce, and western yew are also found (Egan *et al.*, undated). The project area falls within the moist wet subzone of Interior Cedar Hemlock zone (ICHmw), where plants such as falsebox, twinflower, queen’s cup, and black huckleberry are characteristic. Red-stemmed feathermoss and step moss are the most common mosses in this subzone (Ketcheson *et al.*). On the west side of the Lower Kootenay River most of the native vegetation has been cleared or highly disturbed by hydroelectric projects, transportation corridors, and residential development.

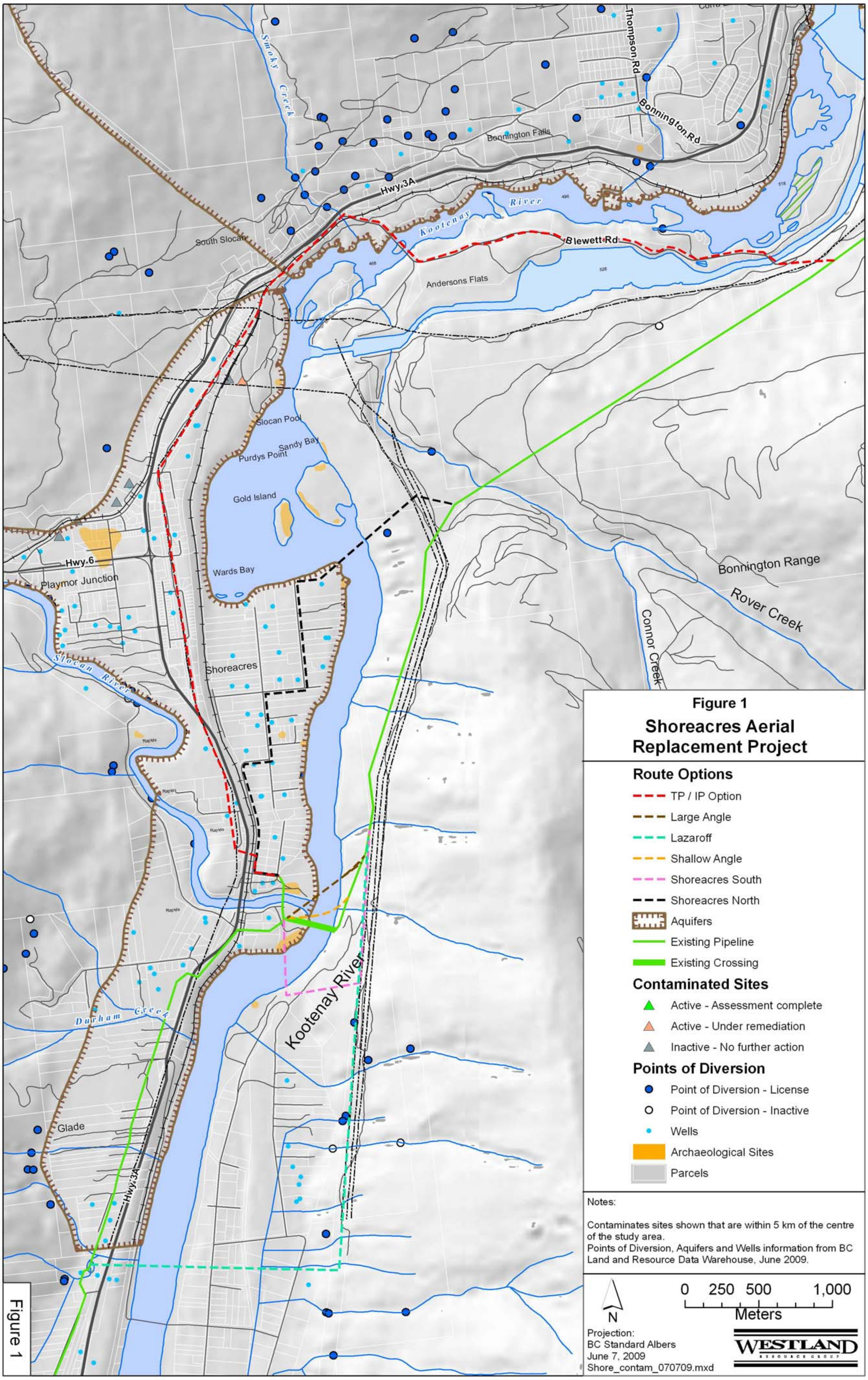

Figure 1

Shoreacres Aerial Replacement Project

Notes:

Contaminates sites shown that are within 5 km of the centre of the study area.
Points of Diversion, Aquifers and Wells information from BC Land and Resource Data Warehouse, June 2009.

Projection:
BC Standard Albers
June 7, 2009
Shore_contam_070709.mxd

2.3 Regional land use

The land uses in the Shoreacres Project Area include hydro-electricity generation, transportation, residential subdivisions, large-lot residential use, small farms, commercial buildings, and industrial operations.

Upstream of the Shoreacres Project Area, the Lower Kootenay River has been modified by construction of five hydro-electric generating sites. Traveling downstream from Nelson, the facilities are the Corra Linn Dam (1932), Upper Bonnington Falls (1905), Lower Bonnington Falls(1897), Kootenay Canal Generating Station (1976), and South Slocan Dam (1929). The Corra Linn Dam was the first concrete storage dam built on the Lower Kootenay. The powerhouses at Upper and Lower Bonnington and South Slocan are essentially run-of-river operations as water is not stored at those locations. The Kootenay Canal diverts water from just downstream of the Corra Linn Dam and directs it through a generating station returning it to the Lower Kootenay River at South Slocan (Touchstones Nelson, 2007). The South Slocan Dam can be seen from the north end of Shoreacres.

When the South Slocan Dam was constructed by West Kootenay Power and Light (WKPL), the predecessor of FortisBC, additional facilities were constructed including worker housing, a recreation hall, maintenance shops, and railway spurs. In time, this area became the operational hub for the five Kootenay River plants operated by WKPL and the centre for power line maintenance (Touchstones Nelson, 2007). A FortisBC powerline runs along the west side of the Lower Kootenay River and a substation is located just east of the intersection of Highway 3A and Sentinel Road.

A pole yard, used for treating power poles with preservatives was used during the construction of the South Slocan Dam. The pole yard came to the attention of the MoE in 1991. Over the years, there have been many investigations of soil and groundwater contamination resulting from wood treatment. In the fall of 2007, a notice of independent remediation was submitted to MoE on behalf of FortisBC. The BC Site Registry listed the site as “Active–Under Remediation” on May 31, 2009.

To the west of the Lower Kootenay River, Highway 3A and the Canadian Pacific Railway tracks follow the river valley. At Glade, a cable ferry connects the east and west sides of the river.

The ballast beneath the railway tracks in the project area is a mixture of angular, rust-coloured rock and grey gravel. The rust-coloured rock is probably float rock from the Sullivan Mine at Kimberley. This rock was used extensively for railroad ballast from the late 1940’s into the 1990’s, and has been shown to leach lead at a rate that classifies it as hazardous waste under the BC Hazardous Waste Regulation.

Rural residences are found in the project area in the Village of South Slocan, a subdivision at Sentinel Road, subdivisions near the Slocan Junction (Highway 3A and Highway 6), Shoreacres, and Glade. The lots in Shoreacres and Glade are large and lend themselves to hobby farms and market gardens. Kootenay River Farm Co. in Shoreacres, Glade Valley Gardens, and Glade Mountain Farm are certified organic vegetable and fruit farms.

A few businesses are located just east of the Slocan Junction including a credit union, general store and post office, a heli-skiing operation, and a mobile café.

Industrial land uses are found just north of the Slocan Junction on Highway 3A, where Selkirk Truss and Gold Island Forest Products are located. Selkirk Truss manufactures engineered floors and roof truss systems, and Gold Island Forest Products mills lumber from flooring and decking to dimension lumber and timbers.

3.0 ISSUES IDENTIFICATION AND ROUTE OPTION ASSESSMENT

3.1 Biophysical considerations

Fish and fish habitat

The Lower Kootenay River, the Slocan River, and tributaries in the project area provide habitat for several fish species. The Fisheries Information Summary System (FISS) maintained by MoE indicates that between 1961 and 2003, 32 fish species were observed in the Lower Kootenay River, and between 1986 and 2005, 18 species were found in the Slocan River. Of the tributaries of the Lower Kootenay River in the project area, only Rover Creek and Glade Creek are reported to support fish (rainbow trout in both cases).

The fish species observed in the project area include sculpins, suckers, five species of trout, burbot, whitefish, walleye, and yellow perch. Many species are native, but hatchery-produced rainbow trout have been released into the rivers repeatedly over the years. Cutthroat trout and brook trout have been released less often.

Of the fish species found in the Lower Kootenay and the Slocan Rivers, two are on the provincial red list indicating that they are endangered or threatened with extinction, and three are on the provincial blue list indicating that they are vulnerable to habitat changes (Beardmore, undated). Table 2 below summarizes the listed species in the project area.

Table 2. Listed fish species in the Lower Kootenay and Slocan rivers

Common Name	Scientific Name	Provincial Rank	Provincial Listing	Observed in
Umatilla Dace	*Rhynichthys umatilla*	S2	Red	Lower Kootenay and Slocan rivers
White Sturgeon	*Acipenser transmontanus*	S1	Red	Lower Kootenay River
Bull Trout	*Salvelinus confluentus*	S3	Blue	Lower Kootenay and Slocan rivers
Mottled Sculpin	*Cottus Bairdi*	S3	Blue	Lower Kootenay River
Shorthead Sculpin	*Cottus confusus*	S3	Blue	Slocan River

White Sturgeon in the Lower Kootenay River and the nearby Columbia River are the focus of the *White Sturgeon Recovery Initiative*, which began in 2000.

The fish and fish habitat resources of the Lower Kootenay River and Slocan River near Shoreacres have been documented by several consultants and Ministry of Environment staff.

The Fisheries Information Summary System (FISS) database maintained by the BC Ministry of Environment and the Ecological Reports Catalogue (EcoCat) database searches revealed the following fish information:

Table 3. Summary of FISS data for the Shoreacres Study Area

Stream	Watershed Code	Dates of FISS Records	No. of Records	No. of Species
Lower Kootenay River	340	1961–2003	94	32
Slocan River	340-047200	1986–2005	57	18
Smoky Creek	240-061900	–	0	Non fish-bearing
Rover Creek[1]	340-062200	1976–1996	4	1
Glade Creek[2]	340-033800	1994	1	1

[1] Not crossed by Shoreacres North Route option, but access routes leading to the HDD site and new ROW will cross Rover Creek.

[2] Glade Creek is located approximately 2.5 km south of the Lazaroff option and is unlikely to be affected by pipeline construction.

The fish and fish habitat resources of the watercourses crossed by the route options are presented below.

Smoky Creek

- Smoky Creek is located at South Slocan and is used as a community water supply. The creek appears to cross the TP Option just after it crosses the railway at Blewett Road.
- The report text states, “A fish and fish habitat assessment, conducted in 1998, confirmed that no fish were present in the Smoky Creek watershed” (Masse, 2001).
- The TP/IP Option would pass downstream of water intakes on Smoky Creek.

Rover Creek

- Rover Creek is known to support resident rainbow trout (*Oncorhynchus mykiss*) in the lower reaches although no fish were captured in the upper reaches (FISS, 1997). Rover Creek was stocked from 1942 to 1945 with rainbow trout. It is unknown whether this creek once supported migrating fish from the Kootenay River. Access to Rover Creek was eliminated following construction of the Kootenay Canal. The dominant Rover Creek channel type is cascade-pool and step-pool. Fish productivity is low to moderate due to limited deep overwintering habitat (Johnston and Slaney, 1996), and a surplus of active sediment within the system creating constant morphological fluctuation among habitat units. Deep pools are rare and those that are available are at risk to in-filling during conditions of high sediment transport such as during spring freshet. Fish size is typically small in this type of stream; (*i.e.*, <30 cm). A short growth period due to elevation and temperature, low nutrients, high gradient and limited good quality habitat all limit the ability of this type of stream to support larger fish and in large numbers.

- The most northerly portion of the Shoreacres North Route Option does not cross the Rover Creek. However, access to the Shoreacres North HDD site and new pipeline right-of-way will cross Rover Creek.

Brilliant Headpond (Kootenay River to the Slocan River confluence)

- The study area known as the Brilliant Headpond extends upstream from the Brilliant Dam to the Kootenay Canal Generating Station and, therefore, includes the Shoreacres Study Area. A report prepared by Golder Associates (Golder, 2002) describes the study area as follows: "South Slocan Dam and the Kootenay Canal Plant form the upstream boundary of Brilliant Headpond. The 1.0 km section below these powerplants consists of a fast flowing and deep channel, confined by a narrow canyon with steep bedrock banks. Abundant instream cover for fish is available although littoral area is limited and macrophyte growths are sparse. Below the outlet of the canyon, the valley opens up into the Wards Bay area, the widest point (approximately 1.0 km) in the headpond. Slocan Pool, situated in the upper section of the Wards Bay area, is a large scour hole formed at the outlet of the confined canyon section, with depths to 20 m. At the downstream end of this area, the headpond is generally shallow (maximum depths of 10 m to 12 m) and exhibits a braided channel form with a treed island and shallow shoals. Extensive macrophyte growth occurs in the area in the late spring to late fall period. Downstream from Wards Bay, the headpond narrows and deepens. The Slocan River, the main tributary to the headpond, enters on the west bank. Resident populations of rainbow trout, bull trout, and mountain whitefish are present in the Slocan system. The headpond from the mouth of the Slocan River downstream to the forebay of Brilliant Dam exhibits similar habitat characteristics. Maximum depths range from 10 m to 20 m, and most of the banks are steeply sloped. Extensive growths of macrophytes form dense weed beds along both shoreline margins, with the width of these beds dependent on shoreline slope. Velocities throughout the area are low to moderate.

  The importance of the Slocan River to headpond resident rainbow trout and the contribution to the headpond fishery by populations in the river has recently been investigated. In a concurrent study, radio tagged rainbow trout were tracked weekly for a period of one year to observe movement patterns within the headpond as well as patterns of entrainment through Brilliant Dam. In addition to the Slocan River, five small tributaries flow into the headpond (three on the east shore and two on the west shore). These streams exhibit precipitous lower reaches and, except for McPhee, Little McPhee, and Glade creeks, are intermittent streams that contain flow only during spring runoff or high precipitation events."

- Although McPhee and Glade creeks have fish habitat potential, these creeks are all south of the east-west portion of the Lazaroff Option and, hence, there appears to be no fish habitat concerns in creeks in that area.

The general location of important fish habitat in the Shoreacres Study Area are presented in Figure 2.

The fish habitat values are high near Wards Bay and at the confluence of the Slocan and Kootenay rivers. However, no fish or fish habitat impacts are anticipated for any of the route options as no in-stream work will be required for the HDD or bridge crossings.

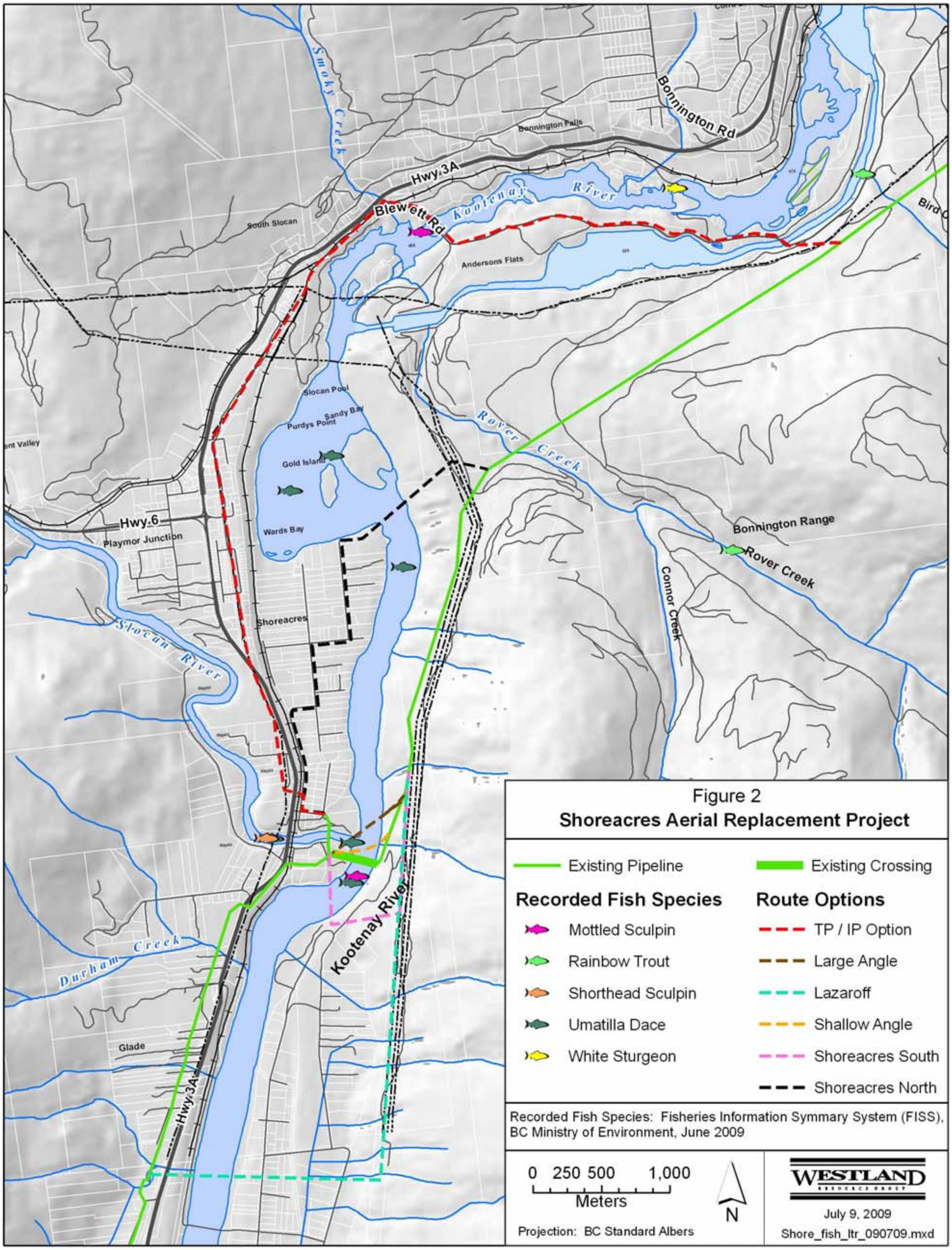

Figure 2

Shoreacres Aerial Replacement Project

Recorded Fish Species: Fisheries Information Symmary System (FISS), BC Ministry of Environment, June 2009

Wildlife and wildlife habitat

The Shoreacres area is largely valley bottom wildlife habitat that has been highly modified by the community of Shoreacres, roads, railways, logging and numerous utility rights of way. The wildlife habitat values near the community of Shoreacres and Glade are high.

Typical wildlife species in the area include moose, mule deer, grizzly and black bear, gray wolf, lynx, and Columbian ground squirrel. Near the river, beaver and muskrat may also be found. An active osprey nest was observed using a man-made nest platform at the confluence of the Slocan River (Figure 3). Other birds in the area include Bald Eagle, American Kestrel, Blue Grouse, Ruffed Grouse, Mountain Bluebird, and other songbirds. A number of amphibian and reptile species may occur in riparian areas near the Kootenay River, including western terrestrial garter snake, northern alligator lizard, rubber boa, western skink, western toad, and pacific tree frog.

The project routes occur in ungulate winter range for mule deer. There are no recorded occurrences of provincially red or blue-listed or COSEWIC listed wildlife species that occur along the route options. A number of records of western skink (provincially blue-listed, COSEWIC special concern) occur within 500 m of the TP/IP route option.

Both the TP/IP and Large Angle route options have low wildlife habitat values, because they occur within settled areas and adjacent to existing disturbances. Wildlife habitat can be restored after installation of the new crossing has been completed by using native plants to provide forage and cover, and replacing any wildlife habitat attributes that may be disturbed (such as an osprey nesting platform).

Plants and plant communities

There are no records of rare plants or rare plant communities in the Shoreacres area. Much of the route options occur in previously disturbed areas. Little removal of mature native plant communities is anticipated for either route option.

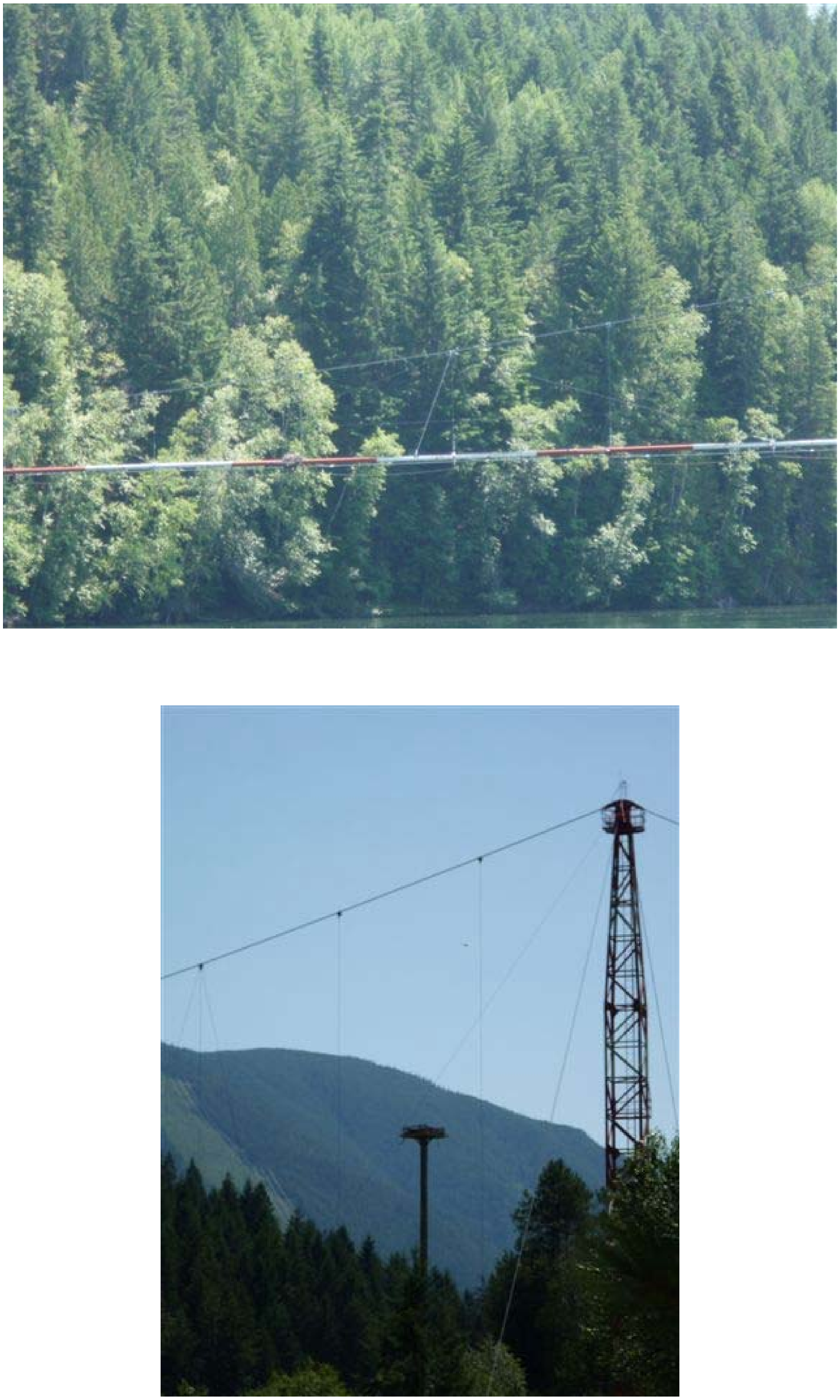

Figure 3. Active osprey nest on man-made nest platform structure – July 11, 2009.

3.2 Land use and community considerations

Existing Land Use

The TP/IP option is primarily located in existing rights-of-way (ROWs), along roads, rail lines, and transmission lines. The following general land uses were identified in the vicinity of the TP/IP option during a field reconnaissance:

- A subdivision at Sentinel Road contains residential property that includes an in-home hair dresser.
- Land immediately east of the junction of Highway 3A and Highway 6 includes residential property, and commercial operations, including a credit union, heli-skiing office, general store, and mobile café.
- A residential subdivision is located just south of the junction of Highway 3A and Highway 6. Residents park their trucks, boats, and trailers on the Fortis ROW. A greenhouse was also identified on the ROW.
- From the above noted subdivision to the community of Shoreacres, land use is primarily farms and forests.
- From the TP/IP option rail crossing to the connection with the existing pipeline, the land is rural residential and open space.
- Rural and suburban residences are located adjacent to the transmission ROW in which the TP/IP option would be constructed. Construction phase noise, dust, and traffic effects could be expected.

The segment of the Large Angle option on the east side of the Kootenay River is located in a forested area adjacent to major transmission lines. The Large Angle option would involve a HDD crossing of the Kootenay River that would connect with the existing pipeline on Terasen property on the east side of the River.

Planned Land Use

The TP/IP option crosses the jurisdictional boundaries of the City of Nelson and the Regional District of Central Kootenay. The City of Nelson Official Community Plan (OCP) identifies the portion of the TP/IP option in the City of Nelson as PU or Public Utility Lands. Discussion with Dave Wahn, Senior Planner with the City of Nelson confirmed the public utility designation. He did not identify potential issues with constructing the project in the TP/IP alignment in the City of Nelson. He noted that discussion with the road maintenance department would be useful as the project progresses.

The TP/IP option is located in existing ROWs in Electoral Areas H and I. Based on a review of the RDCK Property Information and Mapping System (PIMS), adjacent land uses are primarily designated as rural and suburban residential. Some commercial and industrial lands are also found in the vicinity. Discussion with Ramona Mattix, Manager of Development Services for the Regional District of Central Kootenay, did not identify any significant issues with constructing the TP/IP option, given the alignment in existing ROWs. She noted concern about potential highway traffic disruptions, due to the high volume of traffic between Castlegar and Nelson.

No OCP designation was identified for lands around the Large Angle Option on the east side of the Kootenay River. The zoning map identifies the area as Open Space. The Terasen property on the west side of the river is zoned as residential. Discussion with Ms. Mattix did not identify potential issues with the Large Angle Option.

The TP/IP and Large Angle options are located in the Kootenay-Boundary Higher Level Plan boundary. The provincial plan outlines broad management direction for provincial Crown lands. A review of the land use designations in the Kootenay Boundary Land Use Plan Implementation Strategy identified broad management direction related to human settlement, ungulate winter range, ecosystem restoration, biodiversity, and visual management. The use of HDD to cross the Kootenay River for the Large Angle option will minimize the level of physical disturbance, and as a result no potential conflict with the strategic level land use plan is expected. Construction of the TP/IP option in existing ROWs would limit potential conflicts with the broad management direction in the land use plan.

Agriculture

The TP/IP option will be primarily located in existing road, rail, and transmission line rights-of-way. A segment of the TP/IP route is located adjacent to rural residential properties, where agricultural activity may occur. The location of the TP/IP route in existing ROWs suggests disturbance to adjacent agricultural operation would be minimal.

The Large Angle route would be located under forested land on the east side of the Kootenay River, and land owned by Terasen Gas on the west side of the river. The Large Angle route will not cross agricultural land.

Neither the TP nor the Large Angle routes cross designated Agricultural Land Reserve (ALR) lands.

Forestry and related tenures

The TP/IP route crosses the boundary of two forest districts. The section of the route on the east side of the Kootenay River, including Blewett Road, is located in the Kootenay Lake Forest District. The segment on the west side of the river is in the Arrow Boundary Forest District.

The location of the TP/IP route in existing ROWs along linear corridors limits the potential impacts on forest resources.

The Large Angle option is located under forested lands on the east side of the Kootenay River. Restrictions may exist for forestry operations on the area above the route, but this will need to be confirmed.

The TP/IP and Large Angle routes do not cross any identified woodlots or old growth management areas (OGMAs) as identified in the British Columbia database.

Major utility and transportation corridors

The TP/IP and Large Angle routes are primarily located in defined, long-established utility and transportation corridors.

The TP/IP Option will be located in the following rights-of-way:

- Blewett Road
- Rail corridor
- Transmission line corridor
- Municipal roads

The TP/IP Option would involve an underground crossing of Highway 3A and rail lines on the west side of the Kootenay River. Construction of the TP/IP route would introduce construction phase impacts on traffic where the Project was constructed under or adjacent to roads. For much of the route, the TP/IP option would be located adjacent to a transmission line.

The Large Angle route will depart from a transmission line on the east side of the Kootenay River. No major utility or transportation corridors will be crossed.

Domestic and irrigation water supply

Water needs for homes, farms, and light industry in the Shoreacres Project Area are met with a combination of groundwater and surface water from tributaries of the Lower Kootenay River. A review of the BC Water Resources Atlas managed by the Water Stewardship Division of the BC Ministry of Environment (MoE) shows that homes north of Shoreacres towards the Blewett Bridge use groundwater wells except in the Village of South Slocan where there is a community water supply taken from Smoky Creek. In Shoreacres and around the Slocan Junction north of Shoreacres, groundwater wells are the most common water source. The database shows that residents of Glade use both groundwater wells and streams flowing down the slopes to the east of the community. (See Figure 1)

The wells at Shoreacres and Slocan Junction draw from the Crescent Valley Aquifer, which is described by MoE as a sand and gravel aquifer with moderate productivity and moderate demand. No aquifer mapping has been done for Glade. Most of the wells on the map are in sand and gravel, but one bedrock well was noted.

The Water Licences registered for the area are presented in Table 4.

Table 4. Water licences in the Shoreacres Project Area

Location	Water Licence Holder(s)	Stream Name	Purpose and No. of Licences	Quantity
South Slocan	Regional District of Central Kootenay	Smoky Creek	Waterworks – Local Authority (2)	32,850,000 GY
South Slocan	Private citizen	Smoky Creek	Domestic (1)	500 GD
South Slocan	BC Hydro	Rover Creek	Public Facilities (1)	5000 GD
South Slocan	FortisBC	Rover Creek	Waterworks (other) (1)	25000 GD
Glade	Private citizens	Shore Creek	Domestic (8) Irrigation (10)	4000 GD total 9.22 AF total
Glade	Glade Irrigation District	Glade Creek	Irrigation – Local Authority.(1) Waterworks Local Authority (2)	300 AF 29,565,000 GY

GY = gallons per year
GD = gallons per day
AF = acre-feet

The location of domestic water wells and points of diversion (PODs) for domestic and irrigation water are shown on Figure 1.

The number of wells and PODs within 50 m of each route option are as follows:

	Wells	PODs
TP/IP Route Option	5	0
Large Angle Option	0	0
Shallow Angle Option	0	0
Lazaroff Option	0	3
Shoreacres North	5	1
Shoreacres South	0	0

Parks and protected areas

No Provincial Parks or protected areas are crossed by any of the six options.

No regional or municipal parks were identified that would be affected by construction of operation of the TP/IP or Large Angle options.

Recreation and tourism

Discussion with the Manager of Development Services, Regional District of Central Kootenay (Mattix, pers. comm.), identified that the north bank of the Slocan River, at the confluence with the Kootenay River, is a well-used beach area. She stated that the parcel is owned by Cominco, and may be leased to the RDCK for recreational use. The parcel is zoned as R2I, Country Residential.

Based on preliminary routing maps, the Large Angle route will be located under a portion of the property, before reaching the Terasen property on the south bank of the Slocan River. Physical disruption of the beach use area is not expected to occur, due to the HDD crossing of the river.

A map reviewed for this study identified the Trans Canada Trail as being located in the transmission line right-of-way on the east side of the Kootenay River. A review of the Trans Canada Trail website (http/IP://www.tctrail.ca/tlocator/tlocator_en.html) did not identify this segment of the trail as part of the Trans Canada trail. The Large Angle route would depart from the transmission line ROW, as the existing Terasen pipeline shares the same alignment. Construction of the Large Angle option would require working space near the trail, but continued recreational access to the trail would be expected during the construction period.

Recreational fishing activity occurs in the Kootenay River for rainbow, cutthroat, ling cod, and bull trout (Ernst 2008). Fishing times occur between May and June, and August through October. A popular fishing location is identified at the Slocan Pool, where the Slocan River meets the Kootenay River. No fish or fish habitat impacts are anticipated for any of the route options as no in-stream work will be required for the HDD or bridge crossings.

Rafting also occurs in the Slocan and Kootenay Rivers. An “expert” section is identified as being located between Crescent Valley and the bridge on Highway 3A. A raft take-out area is identified at the junction of the Slocan and Kootenay Rivers. The project would not be expected to disrupt rafting activities.

Visual management

The provincial government has established visual management zones across British Columbia, including in the Project area. Visual management zones exist on east and west sides of the Kootenay River. The Large Angle project crosses an identified visual management polygon on both sides of the river (Table 5). The TP/IP option does not cross any visual management zones.

Table 5. Visual management polygons crossed by Project

Route Option	Partial Retention (m)	Modified (m)	Notes
TP/IP Option	0	0	N/A
Large Angle	290	0	Approximately 115 m in residential area

The Large Angle would be constructed as an HDD across the Kootenay River, resulting in minimal visual disturbance. Work space would be required to construct the Large Angle option, however the workspace required is small, and is not expected to introduce concern in the Partial Retention visual management zone. On the west side of the river, the Large Angle project will be located in a cleared area.

The replacement of the highly visible existing aerial crossing of the Kootenay River with an underground crossing is anticipated to be an improvement in the level of visual quality.

Guide outfitting

A review of provincial guide outfitting tenure information revealed that none of the six options are located in a guide outfitting territory.

Trapping

A review of the provincial database revealed that the six options are located in provincially managed trapping territories. The trapping territories crossed by the various options are identified in Table 6.

Table 6. Trapping territories crossed by the Project

Route Option	TR0408T008	TR0408T007	TR0415T003
TP/IP Option	X	X	X
Shoreacres North		X	X
Shoreacres South		X	X
Shallow Angle		X	X
Lazaroff		X	X
Large Angle		X	X

The TP/IP Option crosses the boundaries of three trapping territories, and the Large Angle Option crosses three. These are large areas that typically include a range of habitat types.

The TP/IP option is primarily located along existing linear corridors in a industrial and developed area. Extensive trapping activity is not likely to occur. Potential impacts of constructing the TP/IP option are limited.

A short segment of the Large Angle route will cross forested habitat on the east side of the Kootenay River. The use of an HDD technique will minimize disruption to forested habitat. Temporary working space will be required for project construction, but this site will be small, and is expected to introduce limited disruption to wildlife habitat.

Mining and mineral tenures

Based on a review of the provincial database, the TP/IP and Large Angle routes will not cross mineral or placer claims. No coal tenures were identified in the study area.

Contaminated sites

Detailed field investigations of contaminated sites in the Shoreacres Study Area were not conducted.

The firm of Gillespie Renkema Barnett Broadway LLP of Kamloops were retained to perform a search of the BC Site Registry in a 5 km circle around the centre of Shoreacres Study Area. The search revealed eight sites that had been investigated by MOE for possible site contamination issues. The sites had been investigated and remediated, if necessary, resulting in all eight sites having a status of “Assessment complete” or “No Further Action”. MOE does not consider a site as requiring “No Further Action” until both on-site contamination and off-site migration of contamination have been remediated. Hence, it is unlikely that any of the eight sites would have any impact on the proposed pipeline crossings or route options. The locations of known contaminated sites in the Shoreacres Project area are presented in Figure 1. Details of the site registry search are contained in Appendix B.

The main environmental contamination concern expected in the Shoreacres Study Area is related to disturbance of the Kimberley float rock that has been used for railway ballast. Float rock from the Sullivan Mine at Kimberley, British Columbia was used as railroad ballast by the Canadian Pacific Railway (CPR) starting in 1947. Float rock is identified in the field as angular, rust-coloured rock. (See Appendix A, photos 1 and 2). This material has a high iron content and has been found to leach lead at a rate that classifies it as a hazardous waste under the BC Hazardous Waste Regulation.

Float rock could be encountered along the TP/IP Route Option and possibly for the Shoreacres North Option. All other route options will not involve crossing of the CPR's Nelson subdivision or the Slocan spur of the Nelson–Castlegar rail line, and no contaminated site issues were identified for:

- Lazaroff Route Option,
- Shoreacres South Option,
- Shallow Angle Route Option, and
- Large Angle Route Option.

Site contamination due to spills of hydrocarbons and wood preservatives have a higher probability along the TP/IP Option and the Shoreacres North Option. No hydrocarbon or chemical spill sites were identified for the other four options.

3.3 Archaeology and Heritage

Eaglevision Geomatics & Archaeology Ltd. have assessed the archaeological potential of the existing Shoreacres Aerial Crossing in November 2008. Eaglevision's archaeologists re-examined this location and other route options in early July 2009. The findings of the 2008 investigation, centered on the HDD crossing site south of the Slocan River, was that "the proposed developments are to be situated within disturbed and/or boulder bar landforms considered to be inconsistent with the potential for archaeological resources. Thus no archaeological materials were observed, recorded or are otherwise suspected within the area of the identified development boundaries." (Eaglevision, 2008)

The location of registered archaeological sites in the Shoreacres Project Area, as determined by Eaglevision in 2008, are presented on Figure 1.

The results of the July 2009 archaeological overview were not available for this report.

4.0 REGULATORY APPLICATIONS AND APPROVALS

The proponent anticipates that the Shoreacres Aerial Replacement Project will not require an Environmental Assessment Certificate pursuant to the British Columbia *Environmental Assessment Act*. However, the project will likely require a screening under the *Canadian Environmental Assessment Act (CEAA)* as a result of the authorizations that may be required to comply with provisions of the *Fisheries Act* and *Navigable Waters Protection Act*.

Specific aspects of the construction and operation of the Project will require permits, licences, and approvals commensurate with the *Oil and Gas Commission Act*, administered by the BC Oil and Gas Commission.

The project will require a BC Utilities Commission (BCUC) Certificate of Public Convenience and Necessity (CPCN).

Federal Agencies with regulatory interests will likely include: CEAA, Fisheries and Oceans Canada (DFO), Transport Canada, and Environment Canada.

The decommissioning and demolition of the existing aerial crossing may trigger regulatory agency interest. The approvals for the decommissioning plan will likely be coordinated by the Oil and Gas Commission.

The TP/IP Route Option is expected to be the most challenging option from a regulatory agency approval perspective due to its length and complexity (*e.g.*, railway crossings, use of road rights-of-way, private land issues, etc.). Approvals for the Large Angle Option are expected to be less complicated and potentially less costly to obtain.

5.0 ROUTE COMPARISON AND CONCLUSION

5.1 Route comparison

The environmental features and issues identified for the six potential route options for the Shoreacres Aerial Replacement Project are presented in Table 7.

5.2 Conclusion and recommendations

The environmental screening indicates that the route option with the lowest environmental risk and lowest number of land use constraints is the Large Angle Route Option. The TP/IP Option is a viable, but distant second choice due to the higher potential of encountering Kimberley float rock ballast at the railway crossings, the considerably longer length, traffic disruptions along rural roads and highways, and higher potential to disturb domestic water wells and surface water supplies. Approximately 8.8 km of new right-of-way will be required for the TP/IP Option. This could significantly increase the cost of the project.

Recommendations
Once a preferred route is selected site-specific environmental and land use information should be assembled for use in the preparation of the BCUC Application and numerous environmental permits and authorizations.

Table 7. Terasen Gas Shoreacres Aerial Replacement Project–Route Comparison Table

ROUTE OPTION IDENTIFICATION	LENGTH (m)	CROSSING METHOD	FISH AND FISH HABITAT VALUE	APPROXIMATE AREA OF CLEARING REQUIRED	WILDLIFE AND WILDLIFE HABITAT VALUE	Number of RECORDED ARCHAEOLOGICAL SITES WITHIN 50m (based on archaeological data provided by Terasen)	Number of Active CONTAMINATED SITES RECORDED Within 50 m	DOMESTIC WATER. Number of Active Points of Diversion or Wells within 50 m	LAND USE or SOCIO-ECONOMIC CONSTRAINTS	Length of CROWN LAND CROSSED (m)	Length of PRIVATE LAND CROSSED (m)	WORK WINDOWS AND RESTRICTED ACTIVITY PERIODS	Anticipated ENVIRONMENTAL or SCHEDULE RISKS
TP/IP Option	8,850	Bridge	N/A	Approximately 38,000 m^2 adjacent to roads to be cleared	Low: area is highly disturbed and little wildlife habitat value remains.	1	1 parcel with a contaminated site is within 50 m. 1,800 m of rail bed is within 50 m	5 (wells)	Construction phase disturbance to suburban and rural residential properties; traffic disruption; cross recreational area	1,036 m	4,492 m	None – assumed no clearing required.	High
Shoreacres South	2,058	HDD	High	18,750 m^2 forest and riparian to be cleared	Moderate	1	0	0	N/A			Clearing Restriction May 1 to July 31 (nesting birds)	Moderate
Lazaroff	4,636	HDD	Moderate	28,850 m^2 (forest)	Low	1	100 m of rail bed is within 50 m	3 (POD)	N/A			Clearing Restriction May 1 to July 31 (nesting birds)	Moderate
Shallow Angle	457	HDD	High	1,500 m^2 (forest)	Low	0	0	0	N/A			Clearing Restriction May 1 to July 31 (nesting birds)	Low
Large Angle	678	HDD	High	4,200 m^2 (A)(forest) 4,900 m^2 (B)(forest)	Low: only a small area with potential wildlife habitat is affected.	0	0	0	Construction phase noise disturbance on recreational area; temporary access change to trail use	154 m	134 m	Clearing Restriction May 1 to July 31 (nesting birds)	Low
Shoreacres North	3,886	HDD	High	11,200 m^2 (forest)	Moderate	0	750 m of rail bed is within 50 m	5 (wells) + 1 POD	N/A			Clearing Restriction May 1 to July 31 (nesting birds)	Moderate

NOTE: HIGHLIGHTED ROUTE OPTIONS ARE UNDER CONSIDERATION as of July 15th, 2009. All other non-highlighted options have been dropped from further consideration due to unsuitable HDD conditions.

* Assumed ROW width of 18.3 m and Temporary Worskspace (TWS) of 10 m.

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Wahn, D. Senior Planner, City of Nelson. July, 2009.

APPENDIX A

Annotated Photographs of the Shoreacres Project Area

Photo 1. Tracks and ballast on northeast side of Blewett Road crossing.

Photo 2. Close up of ballast at the above location.

Photo 3. Looking southwest from the Blewett Road RR crossing at tracks and ballast.

Photo 4. Close up of ballast at the above location.

Photo 5. **Looking southwest between Blewett Road and the RR tracks at TP Option route.**

Photo 6. **Unidentified creek down slope of TP route and up slope of FortisBC power line. Wetted width = ~1.5 m**

Photo 7. Another view of the above creek.

Photo 8. Slocan spur line diverging from the Nelson-Castlegar rail line at South Slocan.

Photo 9. Close up of the above junction. Note rusty ballast.

Photo 10. FortisBC Playmor Substation on Sentinel Road, just east of Hwy 3A.

Photo 11. Above substation and power line looking northeast. Will the TP Option follow the power line?

Photo 12. **Signs to east of power line indicating access to industrial sites.**

Photo 13. **Looking north from Sentinel Road under the power line to Gold Island Forest Products operation.**

Photo 14. **Looking south-southeast from Sentinel Road along power line.**

Photo 15. Approximate location where TP Option will cross rail line, just north of Shoreacres Road.

Photo 16. Close up of ballast at above location.

Photo 17. Looking east from the north end of Davidson Road at the location of the Kootenay River crossing option known as Shoreacres North.

Photo 18. Signs at Kootenay River Farm, 2712 Davidson Road, Shoreacres indicating an organic farm. The farm gate is about 150 m south of the north end of Davidson Road.

Photo 19. Existing gas pipeline crossing of the Slocan River, near the river mouth.

Photo 20. Existing gas pipeline aerial crossing of the Kootenay River, just downstream of the confluence with the Slocan River.

Photo 21. Looking northeast from the north bank of the Slocan River at the approximate location of the Large Angle Option for the Kootenay River crossing.

Photo 22. **Rising water levels on the west bank of the Kootenay River just upstream of the mouth of the Slocan River.**

Photo 23. Looking upstream from the mouth of the Slocan River toward the railway and highway bridges. Water level is fairly high.

Photo 24. Sign at north end of Glade indicating reclamation of land by Columbia Power Corporation (CPC).

Photo 25. **Looking north from the north end of Glade, from property signed as belonging to CPC, towards existing tower for aerial crossing. The tower is located south of the Slocan River and west of the Kootenay River. This would be the approximate location of the crossing for the South Shoreacres Option.**

Photo 26. Zoomed version of the above photo.

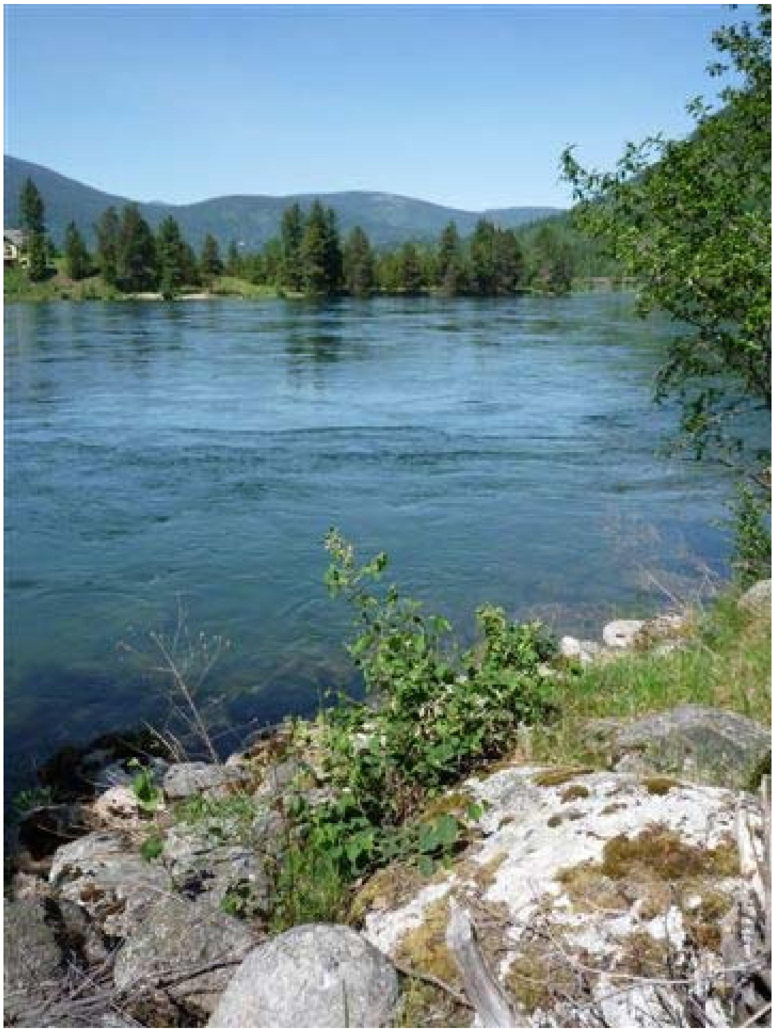

Photo 27. Looking north from the Ward's Ferry Trail at north end of Glade. This is also in the area where the South Shoreacres Option crossing could terminate.

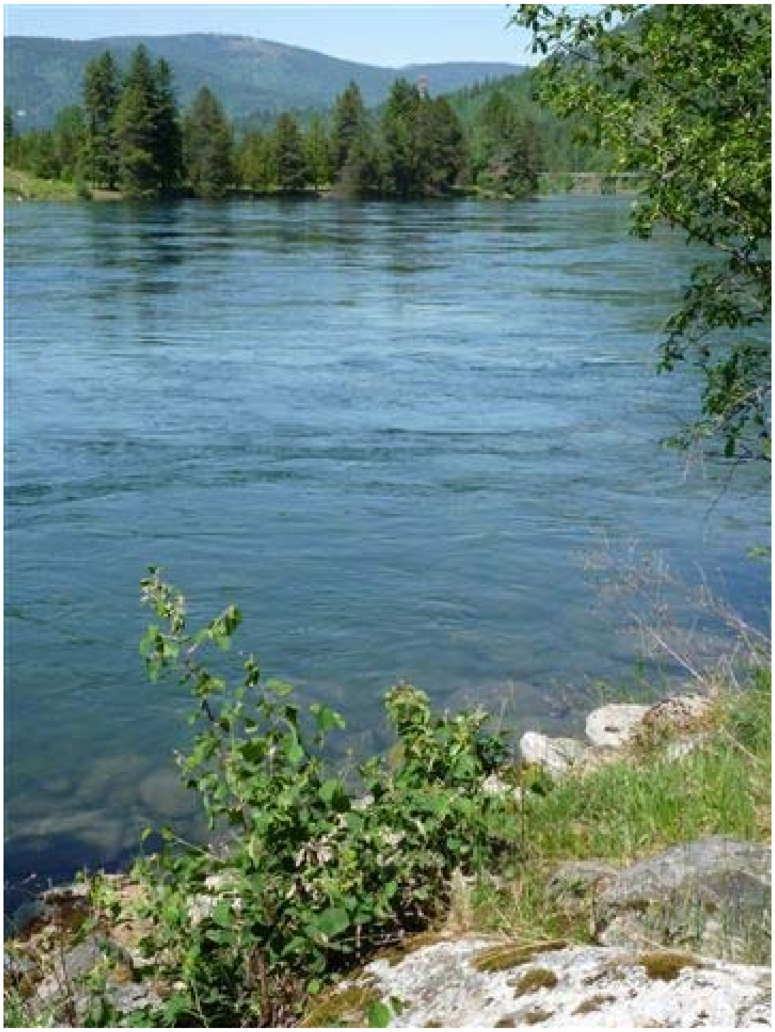

Photo 28. Zoomed version of the above photo.

Photo 29. Looking south from the Glade Ferry. The Lazaroff Option crossing is probably at the narrowing of the river.

Photo 30. Another version of the above photo.

APPENDIX B

Species at Risk in the Shoreacres Regional Study Area

Class (English)	**Scientific Name**	**English Name**	**BC Status**	**Identified Wildlife**	**COSEWIC**	**SARA**
Ray-finned fish	*Acipenser transmontanus* pop. 2	White Sturgeon (Columbia River population)	Red		E (Nov 2003)	1
	Acrocheilus alutaceus	Chiselmouth	Blue		NAR (May 2003)	
	Catostomus platyrhynchus	Mountain Sucker	Blue		NAR (May 1991)	
	Cottus bairdii	Mottled Sculpin	Blue			
	Cottus confusus	Shorthead Sculpin	Blue		T (May 2001)	1
	Cottus hubbsi	Columbia Sculpin	Blue		SC (May 2000)	1
	Oncorhynchus clarkii clarkii	Cutthroat Trout, *clarkii* subspecies	Blue			
	Oncorhynchus clarkii lewisi	Cutthroat Trout, *lewisi* subspecies	Blue	Y (Jun 2006)	SC (Nov 2006)	
	Rhinichthys osculus	Speckled Dace	Red		E (Apr 2006)	1
	Rhinichthys umatilla	Umatilla Dace	Red		SC (May 1988)	3
	Salvelinus confluentus	Bull Trout	Blue	Y (Jun 2006)		
	Salvelinus malma	Dolly Varden	Blue			

Class	Scientific Name	English Name	BC Status	Identified Wildlife	COSEWIC	SARA Schedule
Amphibians	*Ambystoma tigrinum*	Tiger Salamander	Red	Y (May 2004)	E (Nov 2001)	1
	Spea intermontana	Great Basin Spadefoot	Blue	Y (May 2004)	T (Apr 2007)	1
Birds	*Ardea herodias herodias*	Great Blue heron, *herodias* subspecies	Blue	Y (Jun 2006)		
	Asio flammeus	Short-eared Owl	Blue	Y (May 2004)	SC (Mar 2008)	3
	Botaurus lentiginosus	American Bittern	Blue			
	Buteo lagopus	Rough-legged Hawk	Blue		NAR (May 1995)	
	Catherpes mexicanus	Canyon Wren	Blue		NAR (May 1992)	
	Contopus cooperi	Olive-sided Flycatcher	Blue		T (Nov 2007)	
	Dolichonyx oryzivorus	Bobolink	Blue			
	Euphagus carolinus	Rusty Blackbird	Blue		SC (Apr 2006)	1
	Falco mexicanus	Prairie Falcon	Red	Y (Jun 2006)	NAR (May 1996)	
	Hirundo rustica	Barn Swallow	Blue			
	Icteria virens	Yellow-breasted Chat	Red	Y (May 2004)	E (Nov 2000)	1
	Megascops kennicottii macfarlanei	Western Screech-Owl, *macfarlanei* subspecies	Red	Y (May 2004)	E (May 2002)	1
	Melanerpes lewis	Lewis's Woodpecker	Red	Y (May 2004)	SC (Nov 2001)	1
	Melanitta perspicillata	Surf Scoter	Blue			
	Otus flammeolus	Flammulated Owl	Blue	Y (May 2004)	SC (Nov 2001)	1
	Picoides albolarvatus	White-headed Woodpecker	Red	Y (May 2004)	E (Nov 2000)	1
	Progne subis	Purple Martin	Blue			
	Sphyrapicus thyroideus thyroideus	Williamson's Sapsucker, *thyroideus* subspecies	Red	Y (Jun 2006)	E (May 2005)	1
	Tympanuchus phasianellus columbianus	Sharp-tailed Grouse, *columbianus* subspecies	Blue	Y (Jun 2006)		
Bivalves	*Gonidea angulata*	Rocky Mountain Ridged Mussel	Red		SC (Nov 2003)	1
Gastropods	*Anguispira kochi*	Banded Tigersnail	Blue			
	Cryptomastix mullani	Coeur d'Alene Oregonian	Blue			
	Fisherola nuttalli	Shortface Lanx	Red			
	Fluminicola fuscus	Ashy Pebblesnail	Red			
	Fossaria truncatula	Attenuate Fossaria	Blue			
	Hemphillia camelus	Pale Jumping-slug	Blue			
	Kootenaia burkei	Pygmy Slug	Red			
	Magnipelta mycophaga	Magnum Mantleslug	Blue			

Class	Scientific Name	English Name	BC Status	Identified Wildlife	COSEWIC	SARA Schedule
	Oreohelix strigosa	Rocky Mountainsnail	Blue			
	Oreohelix subrudis	Subalpine Mountainsnail	Blue			
	Physella columbiana	Rotund Physa	Red			
	Stagnicola apicina	Abbreviate Pondsnail	Blue			
	Vallonia cyclophorella	Silky Vallonia	Blue			
	Zonitoides nitidus	Black Gloss	Blue			
Insects	*Argia emma*	Emma's Dancer	Blue			
	Argia vivida	Vivid Dancer	Red			
	Callophrys affinis	Immaculate Green Hairstreak	Blue			
	Calopteryx aequabilis	River Jewelwing	Red			
	Cicindela decemnotata	Badlands Tiger Beetle	Red			
	Cicindela pugetana	Sagebrush Tiger Beetle	Blue			
	Danaus plexippus	Monarch	Blue		SC (Nov 2001)	
	Epargyreus clarus clarus	Silver-spotted Skipper, *clarus* subspecies	Blue			
	Gomphus graslinellus	Pronghorn Clubtail	Blue			
	Libellula pulchella	Twelve-spotted Skimmer	Blue			
	Limenitis archippus	Viceroy	Red			
	Lycaena nivalis	Lilac-bordered Copper	Blue			
	Macromia magnifica	Western River Cruiser	Blue			
	Pholisora catullus	Common Sootywing	Blue			
	Pyrgus communis	Checkered Skipper	Blue			
	Satyrium californica	California Hairstreak	Blue			
	Speyeria mormonia erinna	Mormon Fritillary, *erinna* subspecies	Red			
	Speyeria zerene garretti	Zerene Fritillary, *garretti* subspecies	Blue			
	Stylurus olivaceus	Olive Clubtail	Red			
Mammals	*Corynorhinus townsendii*	Townsend's Big-eared Bat	G4	S3		Blue
	Gulo gulo luscus	Wolverine, *luscus* subspecies	Blue	Y (May 2004)	SC (May 2003)	
	Martes pennanti	Fisher	Blue	Y (Jun 2006)		
	Myotis thysanodes	Fringed Myotis	Blue	Y (May 2004)	DD (May 2004)	3
	Neotamias ruficaudus simulans	Red-tailed Chipmunk, *simulans* subspecies	Blue			

Class	**Scientific Name**	**English Name**	**BC Status**	**Identified Wildlife**	**COSEWIC**	**SARA Schedule**
	Ovis canadensis	Bighorn Sheep	Blue	Y (Jun 2006)		
	Perognathus parvus	Great Basin Pocket Mouse	Red			
	Rangifer tarandus pop. 1	Caribou (southern population)	Red	Y (May 2004)	T (May 2000)	1
	Taxidea taxus	Badger	Red	Y (May 2004)	E (May 2000)	1
	Ursus arctos	Grizzly Bear	Blue	Y (May 2004)	SC (May 2002)	
Reptiles	*Coluber constrictor*	Racer	Blue	Y (Jun 2006)	SC (Nov 2004)	1
	Crotalus oreganus	Western Rattlesnake	Blue	Y (Jun 2006)	T (May 2004)	1
	Eumeces skiltonianus	Western Skink	Blue		SC (May 2002)	1
	Pituophis catenifer deserticola	Gopher Snake, *deserticola* subspecies	Blue	Y (May 2004)	T (May 2002)	1
Turtles	*Chrysemys picta pop. 2*	Western Painted Turtle - Intermountain - Rocky Mountain Population	Blue		SC (Apr 2006)	

Class	**Scientific Name**	**English Name**	**BC Status**	**Identified Wildlife**	**COSEWIC**	**SARA Schedule**
Conifers	*Pinus albicaulis*	whitebark pine	Blue			
	Agastache urticifolia	nettle-leaved giant-hyssop	Blue			
	Agoseris lackschewitzii	pink agoseris	Blue			
	Apocynum x *floribundum*	western dogbane	Blue			
	Arabis holboellii var. *pinetorum*	Holboell's rockcress	Blue			
	Astragalus microcystis	least bladdery milk-vetch	Red			
	Astragalus vexilliflexus var. *vexilliflexus*	bent-flowered milk-vetch	Blue			
	Bidens vulgata	tall beggarticks	Red			
	Brickellia grandiflora	large-flowered brickellia	Red		NAR (May 1996)	
	Brickellia oblongifolia ssp. *oblongifolia*	narrow-leaved brickellia	Blue			
	Castilleja tenuis	hairy owl-clover	Red			
	Chenopodium atrovirens	dark lamb's-quarters	Red			
	Clarkia rhomboidea	common clarkia	Red			
	Coreopsis tinctoria var. *atkinsoniana*	Atkinson's coreopsis	Red			
	Cryptantha ambigua	obscure cryptantha	Blue			
	Delphinium sutherlandii	Sutherland's larkspur	Blue			
	Dicentra uniflora	steer's head	Blue			
	Epilobium glaberrimum ssp. *fastigiatum*	smooth willowherb	Blue			
	Epilobium leptocarpum	small-fruited willowherb	Blue			
	Ericameria bloomeri	rabbitbrush goldenweed	Red		DD (May 1997)	
	Erysimum asperum	prairie rocket	Red			
	Floerkea proserpinacoides	false-mermaid	Blue		NAR (May 1984)	
	Gayophytum ramosissimum	hairstem groundsmoke	Red			
	Gentiana affinis	prairie gentian	Blue			
	Gilia tenerrima	slender gilia	Red			
	Glycyrrhiza lepidota	wild licorice	Blue			
	Halimolobos whitedii	Whited's halimolobos	Blue			
	Hesperochiron pumilus	dwarf hesperochiron	Red			
	Heterocodon rariflorum	heterocodon	Blue			

Class	**Scientific Name**	**English Name**	**BC Status**	**Identified Wildlife**	**COSEWIC**	**SARA Schedule**
Dicots	*Hypericum scouleri* ssp. *nortoniae*	western St. John's-wort	Blue			
	Idahoa scapigera	scalepod	Red			
	Impatiens ecalcarata	spurless touch-me-not	Blue			
	Lappula occidentalis var. *cupulata*	western stickseed	Red			
	Lepidium densiflorum var. *pubicarpum*	prairie pepper-grass	Red			
	Lewisia triphylla	three-leaved lewisia	Blue			
	Linanthus septentrionalis	northern linanthus	Blue			
	Megalodonta beckii var. *beckii*	water marigold	Blue			
	Mertensia paniculata var. *borealis*	tall bluebells	Blue			
	Mimulus breviflorus	short-flowered monkey-flower	Red			
	Mimulus breweri	Brewer's monkey-flower	Blue			
	Mimulus suksdorfii	Suksdorf's monkeyflower	Red			
	Polemonium occidentale ssp. *occidentale*	western Jacob's-ladder	Blue			
	Polygonum polygaloides ssp. *kelloggii*	Kellogg's knotweed	Blue			
	Potentilla diversifolia var. *perdissecta*	diverse-leaved cinquefoil	Blue			
	Potentilla nivea var. *pentaphylla*	five-leaved cinquefoil	Blue			
	Pyrola elliptica	white wintergreen	Blue			
	Ribes oxyacanthoides ssp. *cognatum*	northern gooseberry	Red			
	Rubus nivalis	snow bramble	Blue			
	Rumex paucifolius	alpine sorrel	Blue			
	Salix boothii	Booth's willow	Blue			
	Scrophularia lanceolata	lance-leaved figwort	Blue			
	Scutellaria angustifolia ssp. *micrantha*	small-flowered skullcap	Blue			
	Senecio hydrophiloides	sweet-marsh butterweed	Red			

Class	Scientific Name	English Name	BC Status	Identified Wildlife	COSEWIC	SARA Schedule
	Senecio hydrophilus	alkali-marsh butterweed	Red			
	Senecio megacephalus	large-headed groundsel	Blue			
	Solidago gigantea ssp. *serotina*	smooth goldenrod	Red			
	Sphaeralcea coccinea	scarlet globe-mallow	Red			
	Stellaria obtusa	blunt-sepaled starwort	Blue			
	Symphyotrichum ascendens	long-leaved aster	Red			
	Thalictrum dasycarpum	purple meadowrue	Blue			
	Trichostema oblongum	mountain blue-curls	Red			
	Trifolium cyathiferum	cup clover	Red			
	Valeriana edulis ssp. *edulis*	edible valerian	Red			
	Viola septentrionalis	northern violet	Red			
Ferns	*Dryopteris cristata*	crested wood fern	Blue			
	Gymnocarpium jessoense ssp. *parvulum*	Nahanni oak fern	Blue			
	Polystichum lemmonii	Lemmon's holly fern	Red		T (May 2003)	1
Monocots	*Carex adusta*	lesser brown sedge	Red			
	Carex lenticularis var. *lenticularis*	lakeshore sedge	Red			
	Carex pedunculata	peduncled sedge	Blue			
	Carex scoparia	pointed broom sedge	Blue			
	Carex scopulorum var. *bracteosa*	Holm's Rocky Mountain sedge	Blue			
	Carex scopulorum var. *prionophylla*	saw-leaved sedge	Red			
	Carex vulpinoidea	fox sedge	Blue			
	Cyperus squarrosus	awned cyperus	Blue			
	Eleocharis elliptica	Slender spike-rush	Blue			
	Epipactis gigantea	giant helleborine	Blue		SC (May 1998)	3
	Hesperostipa spartea	porcupinegrass	Red			
	Juncus confusus	Colorado rush	Red			
	Melica bulbosa var. *bulbosa*	oniongrass	Red			
	Melica spectabilis	purple oniongrass	Blue			

Class	Scientific Name	English Name	BC Status	Identified Wildlife	COSEWIC	SARA Schedule
	Olsynium douglasii var. *inflatum*	satinflower	Red			
	Scirpus pallidus	pale bulrush	Red			
	Sporobolus compositus var. *compositus*	rough dropseed	Blue			
Quilworts	*Isoetes minima*	midget quillwort	Red			

BEC Zone	**Scientific Name**	**English Name**	**BC Status**	**BGC**
ICH	*Alnus incana / Cornus stolonifera / Athyrium filix-femina*	mountain alder / red-osier dogwood / lady fern	Blue	ICHmc2/Fl02;ICHvc/52;ICHvc/Fl02;ICHwc/52;ICHwc/Fl02;ICHwk1/Fl02;ICHwk4/Fl02;SBSdk/Fl02;SBSmk2/Fl02;SBSvk/Fl02;SBSwk1/Fl02
	Alnus incana / Equisetum arvense	mountain alder / common horsetail	Blue	BWBSdk1/Fl01;CWHwm/Fl01;ICHvc/Fl01;ICHvk1/Fl01;MSxv/Fl01;SBSvk/Fl01
	Carex lasiocarpa / Drepanocladus aduncus	slender sedge / common hook-moss	Blue	BWBSdk1/Wf05;ICHdk/Wf05;ICHmc1/Wf05;ICHmc2/Wf05;ICHmw1/Wf05;ICHmw3/Wf05;ICHvk1/Wf05;ICHwk1/Wf05;ICHwk2/Wf05;IDFdk1/Wf05;IDFdk3/Wf05;IDFdk4/Wf05;IDFdm2/Wf05;MSdk/Wf05;MSdm1/Wf05;MSdm2/Wf05;MSdm3/Wf05;MSdm3w/Wf05;SBPSdc/Wf05;SBPSmk/Wf05;SBPSxc/Wf05;SBSdk/Wf05;SBSmc2/Wf05;SBSmk1/Wf05;SBSwk1/Wf05
	Dulichium arundinaceum Herbaceous Vegetation	three-way sedge	Red	CDFmm/Wm51;CWHmm1/Wm51;CWHxm2/Wm51;ICHwk1/Wm51
	Equisetum fluviatile - Carex utriculata	swamp horsetail - beaked sedge	Blue	BGxh2/Wm02;BWBSdk1/Wm02;ESSFmw/Wm02;ICHmw3/Wm02;ICHwk4/Wm02;IDFdm2/Wm02;MSdc2/Wm02;MSdm3/Wm02;MSdm3w/Wm02;MSmw2/Wm02;MSxk/Wm02;MSxv/Wm02;SBPSdc/Wm02;SBPSmk/Wm02;SBPSxc/Wm02;SBSdk/Wm02;SBSdw3/Wm02;SBSmk2/Wm02;SBSwk1/Wm02
	Menyanthes trifoliata - Carex lasiocarpa	buckbean - slender sedge	Blue	CDFmm/Wf06;CWHws1/Wf06;ICHwk1/Wf06;IDFdk2/Wf06;SBSdk/Wf06
	Picea engelmannii x *glauca / Ribes lacustre / Aralia nudicaulis*	hybrid white spruce / black gooseberry / wild sarsaparilla	Blue	ICHmk1/05
	Picea mariana / Menyanthes trifoliata / Sphagnum spp.	black spruce / buckbean / peat-mosses	Blue	ICHmc2/11;ICHmc2/Wb11;ICHmw3/Wb11;ICHvk2/09;ICHvk2/Wb11;ICHwk3/11;ICHwk3/Wb11;SBSdw2/12;SBSdw2/Wb11;SBSmc2/16;SBSmc2/Wb11;SBSwk1/16;SBSwk1/Wb11
	Pinus contorta / Alnus viridis ssp. sinuata / Calamagrostis rubescens	lodgepole pine / Sitka alder / pinegrass	Blue	ICHmk1/04

BEC Zone	Scientific Name	English Name	BC Status	BGC
	Pseudotsuga menziesii / Calamagrostis rubescens - Linnaea borealis	Douglas-fir / pinegrass - twinflower	Blue	ICHmk1/03;IDFdm1/01;IDFdm2/01
	Pseudotsuga menziesii / Mahonia nervosa / Cryptogramma acrostichoides	Douglas-fir / dull Oregon-grape / parsley fern	Red	ICHdw1/02
	Pseudotsuga menziesii / Penstemon fruticosus - Calamagrostis rubescens	Douglas-fir / shrubby penstemon - pinegrass	Blue	ICHmk1/02;IDFmw1/03;MSdm1/02
	Salix sitchensis / Carex sitchensis	Sitka willow / Sitka sedge	Blue	CWHvm1/Ws06;CWHvm2/Ws06;ICHvk1/Ws06;MSdc1/Ws06;MSdm1/Ws06;MSmw2/Ws06;SBSvk/Ws06;SBSwk1/Ws06
	Thuja plicata / Paxistima myrsinites - Lonicera utahensis	western redcedar / falsebox - Utah honeysuckle	Blue	ICHmk1/01
	Thuja plicata - Tsuga heterophylla / Equisetum arvense	western redcedar - western hemlock / common horsetail	Blue	ICHmw1/07;ICHmw2/07
	Trichophorum cespitosum / Campylium stellatum	tufted clubrush / golden star-moss	Blue	BWBSdk1/Wf11;ESSFdc1/Wf11;ESSFdc2/Wf11;ESSFdc3/Wf11;ESSFdv d/Wf11;ESSFdv/Wf11;ESSFwc2/Wf11;ESSFwc3/Wf11;ESSFwk1/Wf11;ESSFxc/Wf11;ICHmc2/Wf11;ICHmw1/Wf11;ICHmw3/Wf11;ICHvk1/Wf11;MSdm2/Wf11;SBSdk/Wf11;SBSwk1/Wf11
	Tsuga heterophylla / Symphoricarpos albus	western hemlock / common snowberry	Red	ICHxw/01

APPENDIX C

Details of Contaminated Site Information for Shoreacres Study Area

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As Of: MAY 31, 2009          BC Online: Site Registry                  09/06/01
                     For: PB77627  GILLESPIE RENKEMA BARNETT BROADWAY  14:18:37
Folio:                                                                Page    1
   8 records selected for 5.0 km from latitude 49  deg, 25 min, 44   sec
     and Longitude 117 deg, 31 min, 22   sec
   Site Id        Lastupd  Address / City
   0002365                 CRESCENT VALLEY NDB
                           CASTLEGAR
   0002698        07OCT01  RR#1 HIGHWAY 3A
                           SOUTH SLOCAN
   0003615        00NOV03  1099 PLAYMOR ROAD
                           SOUTH SLOCAN
   0003946        04AUG10  HIGHWAY 3A
                           SOUTH SLOCAN
   0004603        00APR07  PLAYMOUR ROAD
                           SOUTH SLOCAN
   0005913        04APR01  1056 PLAYMOR ROAD
                           CRESCENT VALLEY
   0008076        03MAY09  PINECREST ROAD
                           CRESCENT VALLEY
   0008656        04AUG10  CORRA LINN ROAD
                           SOUTH SLOCAN
```

```
 As of: MAY 31, 2009        BC Online: Site Registry                09-06-01
                      For: PB77627  GILLESPIE RENKEMA BARNETT BROADWAY 14:20:04
 Folio:                                                                 Page   1
                                 Detail Report
SITE LOCATION
       Site ID:       2365                              Latitude:  49d 26m 50.2s
 Victoria File:                                        Longitude: 117d 34m 30.2s
 Regional File: 4018-70/C1100
        Region: FEDERAL PACIFIC YUKON REGION

 Site Address: CRESCENT VALLEY NDB
         City: CASTLEGAR                        Prov/State: BC
  Postal Code:

 Registered: MAR 14, 2001  Updated:                Detail Removed:

 Notations:   0  Participants:   0   Associated Sites:   0
 Documents:   0 Susp. Land Use:   0 Parcel Descriptions:   0

Location Description: * TOMBSTONE DATA ONLY FOR SITE REGISTRY * 30KM N OF
 CASTLEGAR & 3KM W OF CRESCENT VALLEY.  LAT/LONG DERIVED BY BC ENVIRONMENT
 REFERENCING THE TRANSPORTATION CENTERLINE NETWORK (TCN),NAD 83.

Record Status: ACTIVE - ASSESSMENT COMPLETE
 Fee category: NOT APPLICABLE

No activities were reported for this site

                              End of Detail Report
```

```
                                  Detail Report
SITE LOCATION
       Site ID:       3946                             Latitude:  49d 27m 07.5s
 Victoria File:                                       Longitude: 117d 31m 35.0s
 Regional File: 26250-20/3496
        Region: NELSON, KOOTENAY

 Site Address: HIGHWAY 3A
         City: SOUTH SLOCAN                      Prov/State: BC
  Postal Code:

 Registered: JAN 14, 1998  Updated: AUG 10, 2004  Detail Removed: AUG 10, 2004

 Notations:   2  Participants:   4   Associated Sites:   1
 Documents:   0 Susp. Land Use:   3 Parcel Descriptions:   1

Location Description: E OF HWY 3A ON W KOOTENAY POWER SERVICE RD. LAT/LONG
 COORDINATES OBTAINED BY BC ENVIRONMENT REFERENCING TRIM DATA (1:20,000).

Record Status: INACTIVE - NO FURTHER ACTION
 Fee category: SMALL SITE, COMPLEX CONTAMINATION

 = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = =
NOTATIONS

  Notation Type: CASE MANAGEMENT ITEM
 Notation Class: ADMINISTRATIVE
      Initiated: SEP 10, 2003                       Approved: SEP 10, 2003

 Ministry Contact: MURDOCH, WENDY R (CRANBROOK)

 Note: THIS SITE WAS THE ORIGINAL POLE YARD SITE.  THE ADJOINING PROPERTY WAS
 MERGED WITH THIS SITE AND ALL FURTHER INFORMATION ABOUT THE COMBINED AREA IS
 NOW LOCATED IN FILE 26250-20/2698.
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  Notation Type: SITE INVESTIGATION REPORT SUBMITTED
 Notation Class: ADMINISTRATIVE
      Initiated: MAY 22, 1997                       Approved: MAY 22, 1997

 Ministry Contact: STOCKERL, ED (NELSON)

 Note: SITE INVESTIGATION OF WEST KOOTENAY POWER'S SOUTH SLOCAN POLE YARD
 REVEALED CONTAMINATION IN A BOREHOLE 2.7 METERS WITHIN COMINCO'S PROPERTY
 BOUNDARY. PAH'S AND PHENOLS EXCEED AQUATIC LIFE STANDARDS IN GROUNDWATER.
 = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = =
SITE PARTICIPANTS

   Participant: COMINCO LTD. (VANCOUVER, B.C.)
       Role(s): PROPERTY OWNER
    Start Date: SEP 01, 1947                          End Date:
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
   Participant: MURDOCH, WENDY R (CRANBROOK)
       Role(s): ALTERNATE MINISTRY CONTACT
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SITE PARTICIPANTS

    Start Date: SEP 10, 2003                           End Date:
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
   Participant: STOCKERL, ED (NELSON)
       Role(s): MAIN MINISTRY CONTACT
    Start Date: FEB 11, 1991                           End Date:
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
   Participant: WEST KOOTENAY POWER LTD. (HEAD OFFICE - TRAIL, B.C.)
       Role(s): POTENTIALLY AFFECTED PARTY
    Start Date: MAY 01, 1909                           End Date:
 = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = =
ASSOCIATED SITES

     Site id:      2698                                    Date: MAY 22, 1997
       Notes: WEST KOOTENAY POWER & COMINCO SITES ARE IMMEDIATELY ADJACENT TO
              EACH OTHER.  COMINCO LAND OF ISSUE IS A NARROW STRIP UPGRADIENT
              TO WEST.  BOTH PROPERTIES HISTORICALLY INVOLVED POLE TREATMENT
              (PRESERVATION) ACTIVITIES AND INVOLVE RELATED CONTAMINATION.
 = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = =
SUSPECTED LAND USE

 Description: WASTE OIL, REPROCESSING, RECYCLING OR BULK STORAGE
       Notes:
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 Description: WOOD TREATMENT (ANTISAPSTAIN OR PRESERVATION)
       Notes:
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 Description: WOOD TREATMENT CHEMICAL MANUFACTURING, WHOLESALE BULK STORAG
       Notes:
 = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = =
PARCEL DESCRIPTIONS

  Date Added: MAY 22, 1997                   Crown Land PIN#:
    LTO PID#: 007544294                     Crown Land File#:
   Land Desc: LOT 1 DISTRICT LOTS 303 AND 5163, KOOTENAY DISTRICT PLAN 17486
              EXCEPT PART  INCLUDED IN PLAN 17870
No activities were reported for this site

                                End of Detail Report
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SITE LOCATION
       Site ID:       2698                                Latitude:  49d 27m 06.5s
 Victoria File: 26250-20/2698                            Longitude: 117d 31m 30.6s
 Regional File: 26250-20/2698
        Region: NELSON, KOOTENAY

 Site Address: RR#1 HIGHWAY 3A
         City: SOUTH SLOCAN                        Prov/State: BC
  Postal Code: V0G 2G0

 Registered: DEC 23, 1997  Updated: OCT 01, 2007  Detail Removed: SEP 28, 2007

 Notations:  12   Participants:  12    Associated Sites:   1
 Documents:   6 Susp. Land Use:   3 Parcel Descriptions:   1

Location Description: APPROX 240 NE OF HWY 3A ON W KOOTENAY POWER SERVICE RD.
 LAT/LONG DERIVED BY BCE REFERENCING THE TRANSPORTATION CENTERLINE NETWORK
 (TCN), NAD 83.

Record Status: ACTIVE - UNDER REMEDIATION
 Fee category: UNRANKED

 = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = =
NOTATIONS

  Notation Type: NOTICE OF INDEPENDENT REMEDIATION INITIATION SUBMITTED
 Notation Class: ENVIRONMENTAL MANAGEMENT ACT: GENERAL
      Initiated: SEP 18, 2007                        Approved: SEP 18, 2007

 Ministry Contact: ROSSER, CRAIG L

 Notation Participants                               Notation Roles
 JACQUES WHITFORD ENVIRONMENT LIMITED (BURNABY,      SUBMITTED BY
 DOMINION STREET)
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  Notation Type: NOTICE OF INDEPENDENT REMEDIATION COMPLETION SUBMITTED (WMA
                 28(2))
 Notation Class: WASTE MANAGEMENT ACT: CONTAMINATED SITES NOTATIONS
      Initiated: APR 20, 2004                        Approved: MAR 24, 2004

 Ministry Contact: MURDOCH, WENDY R (CRANBROOK)

 Notation Participants                               Notation Roles
 MURDOCH, WENDY R (CRANBROOK)                        RECEIVED BY
 ACRES INTERNATIONAL LIMITED (CASTLEGAR)             ISSUED BY

 Note: CLOSURE LETTER FOR INDEPENDENT REMEDIATION AT SOUTH SLOCAN SWITCHYARD
 (YOUR FILE 26250-20/2698)
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  Notation Type: NOTICE OF INDEPENDENT REMEDIATION INITIATION SUBMITTED (WMA
                 28(2))
 Notation Class: WASTE MANAGEMENT ACT: CONTAMINATED SITES NOTATIONS
```

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NOTATIONS

     Initiated: FEB 26, 2004                          Approved: FEB 26, 2004

Ministry Contact: MURDOCH, WENDY R (CRANBROOK)

Notation Participants                                 Notation Roles
MURDOCH, WENDY R (CRANBROOK)                          RECEIVED BY
ACRES INTERNATIONAL LIMITED (CASTLEGAR)               ISSUED BY
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 Notation Type: SITE INVESTIGATION REPORT SUBMITTED
Notation Class: ADMINISTRATIVE
     Initiated: MAY 20, 1997                          Approved: MAY 20, 1997

Ministry Contact: STOCKERL, ED (NELSON)

Notation Participants                                 Notation Roles
WEST KOOTENAY POWER LTD. (SOUTH SLOCAN, B.C.)         SUBMITTED BY
STOCKERL, ED (NELSON)                                 RECEIVED BY

Note: LETTER SUBMITTED IN RESPONSE TO MINISTRY REQUEST FOR UPDATE ON
REMEDIAL/ASSESSMENT PROGRESS AT THE SUBJECT SITE.  A LETTER REPORT DATED
97-04-25 CONCERNING GROUNDWATER MONITORING RESULTS FOR SAMPLING CONDUCTED
NOV/DEC 1995 AT THREE MONITORING WELLS ALSO SUBMITTED.
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 Notation Type: REMEDIATION PLAN REQUESTED
Notation Class: ADMINISTRATIVE
     Initiated: JAN 30, 1997                          Approved: JAN 30, 1997

Ministry Contact: STOCKERL, ED (NELSON)

Notation Participants                                 Notation Roles
STOCKERL, ED (NELSON)                                 REQUESTED BY
WEST KOOTENAY POWER LTD. (SOUTH SLOCAN, B.C.)         RECEIVED BY

Note: BC ENVIRONMENT REQUESTS A WRITTEN UPDATE SUMMARIZING THE STATUS OF THE
REMEDIAL WORKS INCLUDING A REMEDIAL SCHEDULE SUMMARIZING THE REMEDIAL
INITIATIVES WHICH WEST KOOTENAY POWER INTENDS TO UNDERTAKE IN 1997 IN EFFORT
TO ADDRESS SITE CONTAMINATION
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 Notation Type: SITE INVESTIGATION REPORT SUBMITTED
Notation Class: ADMINISTRATIVE
     Initiated: JUN 22, 1995                          Approved: JUN 22, 1995

Ministry Contact: STOCKERL, ED (NELSON)

Notation Participants                                 Notation Roles
WEST KOOTENAY POWER LTD. (SOUTH SLOCAN, B.C.)         SUBMITTED BY

Note: UPDATED VERSIONS OF THE SITE INVESTIGATION AND REMEDIAL PLAN REPORTS
DATED 93-12-10 AND 94-05-26.
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 Notation Type: REMEDIATION PLAN REPORT SUBMITTED
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Notation Class: ADMINISTRATIVE
     Initiated: MAY 26, 1994                        Approved: MAY 26, 1994

Ministry Contact: STOCKERL, ED (NELSON)

Notation Participants                               Notation Roles
WEST KOOTENAY POWER LTD. (SOUTH SLOCAN, B.C.)       SUBMITTED BY
STOCKERL, ED (NELSON)                               RECEIVED BY

Note: DRAFT REMEDIAL PLAN TO EXCAVATE AND TREAT APPROXIMATELY 2000 CUBIC
METERS OF CONTAMINATED SOIL AND GROUNDWATER ON-SITE.
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 Notation Type: SITE INVESTIGATION REPORT SUBMITTED
Notation Class: ADMINISTRATIVE
     Initiated: DEC 10, 1993                        Approved: DEC 10, 1993

Ministry Contact: STOCKERL, ED (NELSON)

Notation Participants                               Notation Roles
WEST KOOTENAY POWER LTD. (SOUTH SLOCAN, B.C.)       SUBMITTED BY
STOCKERL, ED (NELSON)                               RECEIVED BY

Note: LEVEL I AND II ENVIRONMENTAL SITE ASSESSMENT TO DETERMINE CONTAMINATION
FROM HISTORIC ACTIVITIES.  SOIL AND GROUNDWATER CONTAMINATION WAS FOUND IN
EXCESS OF LEVEL 'C' AND SPECIAL WASTE STANDARDS.  IT WAS DETERMINED THAT
ADDITIONAL INVESTIGATION WOULD BE NECESSARY TO FULLY CHARACTERIZE EXTENT OF
CONTAMINATION.

Required Actions: BC ENVIRONMENT REVIEW OF REPORT 93-12-21 CONCURRED WITH
CONSULTANTS RECOMMENDATION THAT FURTHER INVESTIGATION WAS REQUIRED TO ALLOW
DEVELOPMENT OF A REMEDIAL PLAN.
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 Notation Type: CONCENTRATION CRITERIA APPROACH USED
Notation Class: ADMINISTRATIVE
     Initiated: DEC 10, 1993                        Approved: DEC 10, 1993

Ministry Contact: STOCKERL, ED (NELSON)
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 Notation Type: SITE INVESTIGATION REPORT SUBMITTED
Notation Class: ADMINISTRATIVE
     Initiated: AUG 16, 1993                        Approved: AUG 16, 1993

Ministry Contact: STOCKERL, ED (NELSON)

Notation Participants                               Notation Roles
WEST KOOTENAY POWER LTD. (SOUTH SLOCAN, B.C.)       SUBMITTED BY
STOCKERL, ED (NELSON)                               REVIEWED BY

Note: WEST KOOTENAY POWER SUBMITTED A PROPOSAL FROM SEACOR ENVIRONMENTAL
ENGINEERING TO CONDUCT AN ENVIRONMENTAL ASSESSMENT OF THE SITE FOR BC
ENVIRONMENT REVIEW.  INVESTIGATION WILL INCLUDE CONTAMINATION ASSOCIATED WITH
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NOTATIONS

 HISTORICAL ACTIVITIES AS A UTILITY POLE TREATMENT STATION.  BC ENVIRONMENT
 GENERALLY AGREED WITH THE PROPOSAL AND PROVIDED COMMENTS.
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  Notation Type: SITE INVESTIGATION REQUESTED
 Notation Class: ADMINISTRATIVE
      Initiated: MAY 14, 1991                        Approved: MAY 14, 1991

 Ministry Contact: STOCKERL, ED (NELSON)

 Notation Participants                               Notation Roles
 STOCKERL, ED (NELSON)                               REQUESTED BY
 WEST KOOTENAY POWER LTD. (SOUTH SLOCAN, B.C.)       RECEIVED BY

 Note: BC ENVIRONMENT RECEIVED ANALYTICAL RESULTS FROM SOIL SAMPLES AT THE OIL
 STORAGE SITE INDICATING SPECIAL WASTE LEVEL CONTAMINATION.

 Required Actions: BC ENVIRONMENT REQUESTS FURTHER INVESTIGATIVE WORKS BE DONE
 TO DELINEATE PENTACHLOROPHENOL CONTAMINATION ON-SITE.
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  Notation Type: SPILL REPORTED
 Notation Class: ADMINISTRATIVE
      Initiated: FEB 11, 1991                        Approved: FEB 11, 1991

 Ministry Contact: STOCKERL, ED (NELSON)

 Notation Participants                               Notation Roles
 WEST KOOTENAY POWER LTD. (SOUTH SLOCAN, B.C.)       SUBMITTED BY
 STOCKERL, ED (NELSON)                               RECEIVED BY

 Note: 25-30 GALLONS OF WASTE OIL SPILLED TO THE GROUND DUE TO A SMALL LEAK IN
 THE SAMPLE LINE 91-02-09.  MINISTRY INSPECTION AFTER INITIAL RESPONSE
 CONCLUDED ADDITIONAL CLEAN-UP WAS NECESSARY.

 Required Actions: MINISTRY REQUESTS WEST KOOTENAY POWER REMOVE ALL REMAINING
 VISIBLE CONTAMINATED SOILS FROM THE SITE AND SUBMIT SOIL SAMPLES TO DOCUMENT
 LEVELS OF CONTAMINATION REMAINING.
 = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = =
SITE PARTICIPANTS

   Participant: ACRES INTERNATIONAL LIMITED (CASTLEGAR)
       Role(s): PROPERTY INTEREST HOLDER
    Start Date: FEB 26, 2004                           End Date:
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
   Participant: ANALYTICAL SERVICE LABORATORIES LTD (VANCOUVER)
       Role(s): ANALYTICAL LAB
    Start Date: FEB 12, 1991                           End Date:
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
   Participant: COMINCO METALS (TRAIL)
       Role(s): FORMER OPERATOR
                FORMER PROPERTY OWNER
                POTENTIALLY AFFECTED PARTY
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SITE PARTICIPANTS

    Start Date: SEP 01, 1947                           End Date:
         Notes: HISTORICAL START DATE; CURRENT PROPERTY OWNER OF THE LAND
                IMMEDIATELY ADJACENT TO THE WKP PROPERTY.
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
   Participant: FORTISBC INC.
       Role(s): PROPERTY OWNER
    Start Date: SEP 18, 2007                           End Date:
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
   Participant: HARROP RECYCLING
       Role(s): ENVIRONMENTAL CONSULTANT/CONTRACTOR
    Start Date: NOV 21, 1991                           End Date:
         Notes: ASSOCIATED WITH STORAGE TANK REMOVAL
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
   Participant: JACQUES WHITFORD ENVIRONMENT LIMITED (BURNABY, DOMINION
                STREET)
       Role(s): ENVIRONMENTAL CONSULTANT/CONTRACTOR
    Start Date: SEP 18, 2007                           End Date:
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
   Participant: MURDOCH, WENDY R (CRANBROOK)
       Role(s): ALTERNATE MINISTRY CONTACT
    Start Date: FEB 26, 2004                           End Date:
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
   Participant: ROSSER, CRAIG L
       Role(s): ALTERNATE MINISTRY CONTACT
    Start Date: SEP 18, 2007                           End Date:
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
   Participant: SEACOR ENVIRONMENTAL ENGINEERING INC (VANCOUVER (WEST 6TH
                AVENUE))
       Role(s): ENVIRONMENTAL CONSULTANT/CONTRACTOR
    Start Date: SEP 17, 1993                           End Date:
         Notes: CONTACT:  ROB CHAISSON
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
   Participant: STOCKERL, ED (NELSON)
       Role(s): MAIN MINISTRY CONTACT
    Start Date: FEB 11, 1991                           End Date:
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
   Participant: WEST KOOTENAY POWER LTD. (HEAD OFFICE - TRAIL, B.C.)
       Role(s): PROPERTY OWNER
    Start Date: JAN 04, 1990                           End Date:
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
   Participant: WEST KOOTENAY POWER LTD. (SOUTH SLOCAN, B.C.)
       Role(s): OPERATOR
    Start Date: MAY 01, 1909                           End Date:
         Notes: HISTORICAL START DATE; CONTACT:  PETER COTTER
 = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = =
DOCUMENTS

 Title: CLOSURE LETTER FOR INDEPENDENT REMEDIATION AT SOUTH SLOCAN SWITCHYARD
        (YOUR FILE 26250-20/2698)
              Authored: MAR 24, 2004                Submitted: APR 20, 2004
 Participants                                         Role
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DOCUMENTS

 ACRES INTERNATIONAL LIMITED (CASTLEGAR)                AUTHOR
 MURDOCH, WENDY R (CRANBROOK)                           RECIPIENT
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 Title: GROUNDWATER MONITORING FORMER UTILITY POLE AND STUB TREATMENT AREA
        BONNINGTON SUB-STATION SOUTH SLOCAN, BC
              Authored: APR 25, 1997             Submitted: MAY 20, 1997
 Participants                                           Role
 SEACOR ENVIRONMENTAL ENGINEERING INC (VANCOUVER        AUTHOR
 (WEST 6TH AVENUE))
 WEST KOOTENAY POWER LTD. (SOUTH SLOCAN, B.C.)          COMMISSIONER
 STOCKERL, ED (NELSON)                                  RECIPIENT
Notes: GROUNDWATER MONITORING FOR 95-11-30 AND 95-12-19.
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 Title: PHASE I AND PHASE II SITE ASSESSMENT FORMER UTILITY POLE AND STUB
        TREATMENT AREA BONNINGTON SUB-STATION SOUTH SLOCAN, B.C.
              Authored: JUN 14, 1994             Submitted: JUN 22, 1995
 Participants                                           Role
 SEACOR ENVIRONMENTAL ENGINEERING INC (VANCOUVER        AUTHOR
 (WEST 6TH AVENUE))
 WEST KOOTENAY POWER LTD. (SOUTH SLOCAN, B.C.)          COMMISSIONER
 STOCKERL, ED (NELSON)                                  REVIEWER
Notes: DETAILED SITE INVESTIGATION REPORT IS AN UPDATED VERSION OF THE
       PROGRESS AND INTERPRETIVE REPORTS SUBMITTED 93-12-10.
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 Title: REMEDIAL PLAN FORMER UTILITY POLE AND STUB TREATMENT AREA BONNINGTON
        SUB-STATION SOUTH SLOCAN, B.C.
              Authored: APR 29, 1994             Submitted: MAY 26, 1994
 Participants                                           Role
 SEACOR ENVIRONMENTAL ENGINEERING INC (VANCOUVER        AUTHOR
 (WEST 6TH AVENUE))
 WEST KOOTENAY POWER LTD. (SOUTH SLOCAN, B.C.)          COMMISSIONER
 STOCKERL, ED (NELSON)                                  REVIEWER
Notes: A DETAILED REMEDIAL PLAN FOR ON-SITE TREATMENT OF CONTAMINATED SOIL IN
       A BIOCELL.
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 Title: INTERPRETIVE REPORT FORMER UTILITY POLE TREATMENT FACILITY WEST
        KOOTENAY POWER, SOUTH SLOCAN, B.C.
              Authored: DEC 06, 1993             Submitted: DEC 10, 1993
 Participants                                           Role
 SEACOR ENVIRONMENTAL ENGINEERING INC (VANCOUVER        AUTHOR
 (WEST 6TH AVENUE))
 WEST KOOTENAY POWER LTD. (SOUTH SLOCAN, B.C.)          COMMISSIONER
 STOCKERL, ED (NELSON)                                  RECIPIENT
Notes: REPORT PROVIDES RECOMMENDATIONS FOR FUTURE INVESTIGATION.
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 Title: PROGRESS REPORT LEVEL I AND LEVEL II SITE ASSESSMENT FORMER UTILITY
        POLE AND STUB TREATMENT AREA BONNINGTON SUB-STATION SOUTH SLOCAN,
        B.C.
              Authored: NOV 19, 1993             Submitted: DEC 10, 1993
 Participants                                           Role
 SEACOR ENVIRONMENTAL ENGINEERING INC (VANCOUVER        AUTHOR
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DOCUMENTS

 (WEST 6TH AVENUE))
 WEST KOOTENAY POWER LTD. (SOUTH SLOCAN, B.C.)       COMMISSIONER
 STOCKERL, ED (NELSON)                               RECIPIENT
Notes: REPORT DESCRIBES FINDINGS OF PRELIMINARY INVESTIGATION (HISTORY,
       LOCATION), AS WELL AS RESULTS OF SAMPLE ANALYSIS.
 = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = =
ASSOCIATED SITES

    Site id:      3946                                     Date: MAY 22, 1997
      Notes: WEST KOOTENAY POWER & COMINCO SITES ARE IMMEDIATELY ADJACENT TO
             EACH OTHER.  COMINCO LAND OF ISSUE IS A NARROW STRIP UPGRADIENT
             TO WEST.  BOTH PROPERTIES HISTORICALLY INVOLVED POLE TREATMENT
             (PRESERVATION) ACTIVITIES AND INVOLVE RELATED CONTAMINATION.
 = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = =
SUSPECTED LAND USE

 Description: WASTE OIL, REPROCESSING, RECYCLING OR BULK STORAGE
       Notes: THREE LARGE ABOVE GROUND STORAGE TANKS WERE DECOMMISSIONED AND
             REMOVED PRIOR TO 1993; ONE TANK STORED CREOSOTE, THE OTHER TWO
             TANKS STORED VARIOUS WASTE PRODUCTS.
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 Description: WOOD TREATMENT (ANTISAPSTAIN OR PRESERVATION)
       Notes: HISTORIC ACTIVITY
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 Description: WOOD TREATMENT CHEMICAL MANUFACTURING, WHOLESALE BULK STORAG
       Notes: HISTORIC ACTIVITY
 = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = =
PARCEL DESCRIPTIONS

  Date Added: MAR 08, 1996                     Crown Land PIN#:
    LTO PID#: 011436727                       Crown Land File#:
   Land Desc: LOT A DISTRICT LOT 303 AND 5163 KOOTENAY DISTRICT PLAN 17870
No activities were reported for this site

                              End of Detail Report
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                                Detail Report
SITE LOCATION
       Site ID:       3615                              Latitude:  49d 26m 47.1s
 Victoria File:                                        Longitude: 117d 32m 12.4s
 Regional File: 26250-20/3615
        Region: NELSON, KOOTENAY

 Site Address: 1099 PLAYMOR ROAD
         City: SOUTH SLOCAN                     Prov/State: BC
  Postal Code: V0G 2G0

 Registered: DEC 23, 1997  Updated: NOV 03, 2000  Detail Removed: OCT 20, 2000

 Notations:   4   Participants:   8   Associated Sites:   1
 Documents:   1 Susp. Land Use:   1 Parcel Descriptions:   1

Location Description: LAT/LONG INFORMATION DERIVED BY BC ENVIRONMENT
 REFERENCING TRIM DATA (1:20,000).

Record Status: INACTIVE - NO FURTHER ACTION
 Fee category: SMALL SITE, SIMPLE CONTAMINATION

 = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = =
NOTATIONS

  Notation Type: SITE INVESTIGATION REPORT SUBMITTED
 Notation Class: ADMINISTRATIVE
      Initiated: JAN 08, 1998                          Approved: JAN 08, 1998

 Ministry Contact: STOCKERL, ED (NELSON)

 Notation Participants                                 Notation Roles
 EBA ENGINEERING CONSULTANTS LTD (NELSON)              SUBMITTED BY
 STOCKERL, ED (NELSON)                                 RECEIVED BY

 Note: SITE INVESTIGATION OF DIESEL FUEL SPILL AND REMEDIATION ON SOUTH SLOCAN
 SPORTS ASSOCIATION PROPERTY.
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  Notation Type: CASE MANAGEMENT ITEM
 Notation Class: ADMINISTRATIVE
      Initiated: DEC 01, 1997                          Approved: DEC 01, 1997

 Ministry Contact: STOCKERL, ED (NELSON)

 Notation Participants                                 Notation Roles
 SCHOOL DISTRICT 8 (KOOTENAY LAKE) (NELSON)            REQUESTED BY
 REGIONAL DISTRICT OF CENTRAL KOOTENAY (NELSON,        RECEIVED BY
 B.C.)

 Note: CONTAMINATED SOILS EXCAVATED FROM SPILL SITE (SOUTH SLOCAN SPORTS
 ASSOC. PROPERTY) WERE TRANSPORTED TO REGIONAL DISTRICT OF CENTRAL KOOTENAY'S
 ROSEBERY LANDFILL FACILITY FOR USE AS INTERIM COVER MATERIAL.
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
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NOTATIONS

  Notation Type: SPILL REPORTED
 Notation Class: ADMINISTRATIVE
      Initiated: NOV 12, 1997                          Approved: NOV 12, 1997

 Ministry Contact: STOCKERL, ED (NELSON)

 Notation Participants                                 Notation Roles
 SCHOOL DISTRICT 8 (KOOTENAY LAKE) (NELSON)            SUBMITTED BY
 PROVINCIAL EMERGENCY PROGRAM                          RECEIVED BY
 STOCKERL, ED (NELSON)                                 RECEIVED BY

 Note: SCHOOL DISTRICT #8 REPORTED (DGI # 82330) THAT VANDALS HAD DISCHARGED
 THE CONTENTS OF AN ABOVE GROUND FUEL STORAGE TANK TO THE GROUND AT THE MT.
 SENTINEL SCHOOL, SOUTH SLOCAN.  APPROXIMATELY 2600 LITRES OF DIESEL FUEL
 SPILLED TO GROUND (GRAVEL/DIRT AREA) ADJACENT TO TENNIS COURTS.  THE IMPACTED
 AREA IS PROPERTY OWNED BY THE SOUTH SLOCAN SPORTS ASSOCIATION.

 Required Actions: SCHOOL DISTRICT #8 IS TO EXCAVATE CONTAMINATED SOILS AND
 TREAT SPECIAL WASTE SOILS IN A BIOCELL FACILITY.  CONFIRMATION SAMPLING OF
 EXCAVATION LIMITS TO BE CONDUCTED TO ENSURE REMEDIATION COMPLETE.  SPECIAL
 WASTE SOILS TO BE MANAGED IN ACCORDANCE WITH SW REGULATION.
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  Notation Type: SPILL REPORTED
 Notation Class: ADMINISTRATIVE
      Initiated: AUG 18, 1993                          Approved: SEP 14, 1993

 Ministry Contact: JENSEN, JIM

 Notation Participants                                 Notation Roles
 JENSEN, JIM                                           REVIEWED BY
 SEACOR ENVIRONMENTAL ENGINEERING INC (KAMLOOPS)       REQUESTED BY

 Note: DURING THE EXCAVATION OF TWO HEATING OIL UNDERGROUND STORAGE TANKS
 VISUAL AND OLFACTORY OBSERVATIONS OF SOIL AROUND THE FILL PIPE INDICATED THE
 PRESENCE OF HYDROCARBON.  THIS SOIL WAS REMOVED TO A SOIL CELL AND THE
 EXCAVATION BACKFILLED WITH CLEAN GRAVEL.

 Required Actions: SEACOR REQUESTS BC ENVIRONMENT APPROVAL TO TRANSPORT 92
 CUBIC METERS OF HYDROCARBON CONTAMINATED SOIL TO THE OOTISCHENIA LANDFILL
 NEAR CASTLEGAR.  1993-09-14 - BC ENVIRONMENT ACCEPTS REQUEST THAT
 CONTAMINATED SOIL IS SUITABLE FOR DISPOSAL AT A LANDFILL.
 = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = =
SITE PARTICIPANTS

   Participant: EBA ENGINEERING CONSULTANTS LTD (NELSON)
       Role(s): ENVIRONMENTAL CONSULTANT/CONTRACTOR
    Start Date: DEC 01, 1997                             End Date:
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
   Participant: JENSEN, JIM
       Role(s): ALTERNATE MINISTRY CONTACT
    Start Date: AUG 18, 1993                             End Date: MAR 31, 2004
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SITE PARTICIPANTS

 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
   Participant: PROVINCIAL EMERGENCY PROGRAM
       Role(s): ASSOCIATED PROVINCIAL GOVERNMENT CONTACT
    Start Date: NOV 12, 1997                          End Date:
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
   Participant: REGIONAL DISTRICT OF CENTRAL KOOTENAY (NELSON, B.C.)
       Role(s): FILL RECIPIENT
                LANDFILL OPERATOR/OWNER
                MUNICIPAL/REGIONAL CONTACT
    Start Date: DEC 01, 1997                          End Date:
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
   Participant: SCHOOL DISTRICT 7 (NELSON)
       Role(s): PROPERTY OWNER
    Start Date: JAN 04, 1983                          End Date:
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
   Participant: SCHOOL DISTRICT 8 (KOOTENAY LAKE) (NELSON)
    Start Date: NOV 12, 1997                          End Date:
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
   Participant: SEACOR ENVIRONMENTAL ENGINEERING INC (KAMLOOPS)
       Role(s): ENVIRONMENTAL CONSULTANT/CONTRACTOR
    Start Date: JUL 19, 1993                          End Date:
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
   Participant: STOCKERL, ED (NELSON)
       Role(s): MAIN MINISTRY CONTACT
    Start Date: SEP 16, 1993                          End Date:
 = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = =
DOCUMENTS

 Title: SCHOOL DISTRICT NO. 8 SITE ASSESSMENT AND REMEDIATION MOUNT SENTINEL
        SECONDARY SCHOOL SOUTH SLOCAN, B.C.
              Authored: DEC 01, 1997                Submitted: JAN 08, 1998
 Participants                                         Role
 EBA ENGINEERING CONSULTANTS LTD (NELSON)             AUTHOR
 SCHOOL DISTRICT 8 (KOOTENAY LAKE) (NELSON)           COMMISSIONER
 STOCKERL, ED (NELSON)                                RECIPIENT
Notes: SITE INVESTIGATION OF DIESEL FUEL SPILL INCLUDING CONTAMINATED SOIL
       EXCAVATION AND REMOVAL TO LANDFILL, AND CONFIRMATORY SAMPLING.
 = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = =
ASSOCIATED SITES

     Site id:       4603                                 Date: NOV 25, 1997
       Notes: MT. SENTINEL SCHOOL IS RESPONSIBLE FOR REMEDIATION OF THE SPILL
              FROM ITS ABOVE GROUND DIESEL FUEL STORAGE TANK LOCATED ON SOUTH
              SLOCAN SPORTS ASSOCIATION PROPERTY. CONTAMINATED SOIL WAS
              EXCAVATED AND REMOVED. CONFIRMATORY SAMPLING WAS CONDUCTED.
 = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = =
SUSPECTED LAND USE

 Description: EDUCATION / HEALTH FACILITIES
       Notes:
 = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = =
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PARCEL DESCRIPTIONS

  Date Added: JAN 07, 1997                   Crown Land PIN#:
    LTO PID#: 016067991                     Crown Land File#:
   Land Desc: PARCEL 1 (SEE 83650I) OF BLOCK A DISTRICT LOT 303 KOOTENAY
              DISTRICT PLAN 872
No activities were reported for this site

                              End of Detail Report
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                                  Detail Report
SITE LOCATION
       Site ID:        4603                            Latitude:  49d 26m 43.3s
 Victoria File:                                       Longitude: 117d 32m 17.4s
 Regional File: 26250-20/4603
        Region: NELSON, KOOTENAY

 Site Address: PLAYMOUR ROAD
         City: SOUTH SLOCAN                     Prov/State: BC
  Postal Code: V0G 2G0

 Registered: JAN 15, 1998  Updated: APR 07, 2000  Detail Removed: APR 07, 2000

 Notations:   5  Participants:   5   Associated Sites:   1
 Documents:   1 Susp. Land Use:   2 Parcel Descriptions:   1

Location Description: RECREATION AREA NEXT TO THE MT. SENTINEL SCHOOL IN SOUTH
 SLOCAN. LAT/LONG COORDINATES OBTAINED BY BC ENVIRONMENT USING TRIM DATA
 (1:20,000).

Record Status: INACTIVE - NO FURTHER ACTION
 Fee category: SMALL SITE, COMPLEX CONTAMINATION

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NOTATIONS

  Notation Type: SITE INVESTIGATION REPORT SUBMITTED
 Notation Class: ADMINISTRATIVE
      Initiated: JAN 08, 1998                         Approved: JAN 08, 1998

 Ministry Contact: STOCKERL, ED (NELSON)

 Notation Participants                                Notation Roles
 EBA ENGINEERING CONSULTANTS LTD (NELSON)             SUBMITTED BY
 STOCKERL, ED (NELSON)                                RECEIVED BY

 Note: INVESTIGATION OF REMEDIAL EXCAVATION AND RESULTS OF CONFIRMATORY
 SAMPLING FOR DIESEL FUEL SPILL.

 Required Actions: REPORT SUBMITTED TO BC ENVIRONMENT FOR INFORMATION PURPOSES
 ONLY, NOT FOR REVIEW.
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  Notation Type: CASE MANAGEMENT ITEM
 Notation Class: ADMINISTRATIVE
      Initiated: DEC 01, 1997                         Approved: DEC 01, 1997

 Ministry Contact: STOCKERL, ED (NELSON)

 Notation Participants                                Notation Roles
 SCHOOL DISTRICT 8 (KOOTENAY LAKE) (NELSON)           REQUESTED BY
 REGIONAL DISTRICT OF CENTRAL KOOTENAY (NELSON,       RECEIVED BY
 B.C.)
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NOTATIONS

Note: CONTAMINATED SOILS EXCAVATED FROM THE SPILL SITE (SOUTH SLOCAN SPORTS ASSOC. PROPERTY) WERE TRANSPORTED TO REGIONAL DISTRICT OF CENTRAL KOOTENAY'S ROSEBERY LANDFILL FACILITY FOR USE AS INTERIM COVER MATERIAL.

Notation Type: CASE MANAGEMENT ITEM
Notation Class: ADMINISTRATIVE
Initiated: NOV 27, 1997 Approved: NOV 27, 1997

Ministry Contact: STOCKERL, ED (NELSON)

Notation Participants	Notation Roles
STOCKERL, ED (NELSON)	REVIEWED BY
EBA ENGINEERING CONSULTANTS LTD (NELSON)	REQUESTED BY
SCHOOL DISTRICT 8 (KOOTENAY LAKE) (NELSON)	RECEIVED BY

Note: EBA (CONSULTANT FOR SCHOOL DISTRICT #8) SUBMITTED REQUEST TO REGIONAL DISTRICT OF CENTRAL KOOTENAY (RDCK) TO DISPOSE APPROX. 200 CUBIC METRES OF HYDROCARBON CONTAMINATED SOILS (NON-SPECIAL WASTE) TO RDCK'S PERMITTED LANDFILL AT ROSEBERRY. SOILS HAD BEEN EXCAVATED AT SPILL SITE AS A REMEDIAL ACTION.

Notation Type: INSPECTION / VISIT
Notation Class: ADMINISTRATIVE
Initiated: NOV 12, 1997 Approved: NOV 12, 1997

Ministry Contact: STOCKERL, ED (NELSON)

Notation Participants	Notation Roles
SCHOOL DISTRICT 8 (KOOTENAY LAKE) (NELSON)	REQUESTED BY
STOCKERL, ED (NELSON)	ISSUED BY

Note: E. STOCKERL OF NELSON MOE INSPECTED SPILL SITE ON NOV. 12/97 PM AND PROVIDED RECOMMENDATION TO SCHOOL DIST.# 8 REGARDING ENVIRONMENTAL ASSESSMENT AND REMEDIATION OPTIONS.

Required Actions: SCHOOL DISTRICT TO RETAIN SERVICES OF CONSULTANT TO ASSESS AND REMEDIATE SITE TO WITHIN RESIDENTIAL LAND USE STANDARDS

Notation Type: SPILL REPORTED
Notation Class: ADMINISTRATIVE
Initiated: NOV 12, 1997 Approved: NOV 12, 1997

Ministry Contact: STOCKERL, ED (NELSON)

Notation Participants	Notation Roles
SCHOOL DISTRICT 8 (KOOTENAY LAKE) (NELSON)	SUBMITTED BY
STOCKERL, ED (NELSON)	RECEIVED BY

Note: SCHOOL DISTRICT #8 REPORTED (DGI # 82330) THAT VANDALS HAD DISCHARGED THE CONTENTS OF AN ABOVE GROUND FUEL STORAGE TANK TO THE GROUND AT THE MT. SENTINEL SCHOOL, SOUTH SLOCAN. APPROXIMATELY 2600 LITRES OF DIESEL FUEL

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NOTATIONS

 SPILLED TO GROUND (GRAVEL/DIRT AREA) ADJACENT TO TENNIS COURTS.  THE IMPACTED
 AREA IS PROPERTY OWNED BY THE SOUTH SLOCAN SPORTS ASSOCIATION.

 Required Actions: SCHOOL DISTRICT #8 IS TO EXCAVATE CONTAMINATED SOILS AND
 TREAT SPECIAL WASTE SOILS IN A BIOCELL FACILITY.  CONFIRMATION SAMPLING OF
 EXCAVATION LIMITS TO BE CONDUCTED TO ENSURE REMEDIATION COMPLETE.  SPECIAL
 WASTE SOILS TO BE MANAGED IN ACCORDANCE WITH SW REGULATION.
 = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = =
SITE PARTICIPANTS

   Participant: EBA ENGINEERING CONSULTANTS LTD (NELSON)
       Role(s): ENVIRONMENTAL CONSULTANT/CONTRACTOR
    Start Date: NOV 27, 1997                           End Date:
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
   Participant: REGIONAL DISTRICT OF CENTRAL KOOTENAY (NELSON, B.C.)
       Role(s): FILL RECIPIENT
    Start Date: DEC 01, 1997                           End Date:
         Notes: CONTAMINATED SOIL DISPOSED AT ROSEBERY LANDFILL.
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
   Participant: SCHOOL DISTRICT 8 (KOOTENAY LAKE) (NELSON)
       Role(s): OPERATOR
                RESPONSIBLE PERSON
    Start Date: NOV 12, 1997                           End Date:
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
   Participant: SOUTH SLOCAN SPORTS ASSOCIATION (SOUTH SLOCAN)
       Role(s): PROPERTY OWNER
    Start Date: NOV 12, 1997                           End Date:
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
   Participant: STOCKERL, ED (NELSON)
       Role(s): MAIN MINISTRY CONTACT
    Start Date: NOV 12, 1997                           End Date:
 = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = =
DOCUMENTS

 Title: SCHOOL DISTRICT NO.8 SITE ASSESSMENT AND REMEDIATION MOUNT SENTINEL
        SECONDARY SCHOOL SOUTH SLOCAN, B.C.
              Authored: DEC 01, 1997               Submitted: JAN 08, 1998
 Participants                                        Role
 EBA ENGINEERING CONSULTANTS LTD (NELSON)            AUTHOR
 SCHOOL DISTRICT 8 (KOOTENAY LAKE) (NELSON)          COMMISSIONER
 STOCKERL, ED (NELSON)                               RECIPIENT
Notes: SITE INVESTIGATION OF DIESEL FUEL SPILL.
 = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = =
ASSOCIATED SITES

     Site id:       3615                                 Date: NOV 25, 1997
       Notes: MT. SENTINEL SCHOOL IS RESPONSIBLE FOR REMEDIATION OF THE SPILL
              FROM ITS ABOVE GROUND DIESEL FUEL STORAGE TANK LOCATED ON SOUTH
              SLOCAN SPORTS ASSOCIATION PROPERTY. CONTAMINATED SOIL WAS
              EXCAVATED AND REMOVED. CONFIRMATORY SAMPLING WAS CONDUCTED.
 = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = =
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SUSPECTED LAND USE

 Description: EDUCATION / HEALTH FACILITIES
       Notes: SPORTS FACILITIES NEXT TO GRADE SCHOOL
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 Description: PERTO. PROD., /PRODUCE WATER STRG ABVEGRND/UNDERGRND TANK
       Notes: 1 ABOVE GROUND DIESEL FUEL STORAGE TANK
 = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = =
PARCEL DESCRIPTIONS

  Date Added: NOV 25, 1997                 Crown Land PIN#:
    LTO PID#: 016022602                   Crown Land File#:
   Land Desc: THAT PART OF PARCEL 1 (REFERENCE PLAN 13446D) OF BLOCK A
              DISTRICT LOT 303    KOOTENAY DISTRICT PLAN 872 SHOWN OUTLINED
              RED ON REFERENCE PLAN 47364I,      EXCEPT PARCEL 1 (REFERENCE
              PLAN 83650I)
No activities were reported for this site

                              End of Detail Report
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                                Detail Report
SITE LOCATION
      Site ID:       5913                          Latitude:  49d 26m 37.3s
 Victoria File: 26250-20/5913                     Longitude: 117d 32m 37.9s
 Regional File:
       Region: NELSON, KOOTENAY

 Site Address: 1056 PLAYMOR ROAD
         City: CRESCENT VALLEY                Prov/State: BC
  Postal Code:

 Registered: MAY 28, 1999  Updated: APR 01, 2004  Detail Removed: MAR 24, 2004

 Notations:   4  Participants:   2   Associated Sites:   1
 Documents:   0 Susp. Land Use:   0 Parcel Descriptions:   3

Location Description: SITE CREATED BY SITE PROFILE, ENTERED 1999-05-19.
 LAT/LONG CONFIRMED USING GOAT BY MINISTRY STAFF

Record Status: INACTIVE - NO FURTHER ACTION
 Fee category: NOT APPLICABLE

 = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = =
NOTATIONS

  Notation Type: SITE PROFILE REVIEWED - NO FURTHER INVESTIGATION REQUIRED BY
                 THE MINISTRY
 Notation Class: ENVIRONMENTAL MANAGEMENT ACT: GENERAL
      Initiated: MAY 19, 1999                        Approved:

 Ministry Contact: WARD, JOHN E H
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  Notation Type: SITE PROFILE - NO FURTHER INVESTIGATION REQUIRED BY THE
                 MINISTRY
 Notation Class: WASTE MANAGEMENT ACT: CONTAMINATED SITES NOTATIONS
      Initiated: MAY 19, 1999                        Approved:

 Ministry Contact: WARD, JOHN E H
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  Notation Type: SITE PROFILE RECEIVED
 Notation Class: ENVIRONMENTAL MANAGEMENT ACT: GENERAL
      Initiated: APR 09, 1999                        Approved:

 Ministry Contact: WARD, JOHN E H

 Notation Participants                               Notation Roles
 SELKIRK PAVING LTD (CRESCENT VALLEY)                SITE PROFILE SUBMITTED
                                                     BY
 SELKIRK PAVING LTD (CRESCENT VALLEY)                SITE PROFILE SUBMITTED
                                                     BY
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  Notation Type: SITE PROFILE RECEIVED
 Notation Class: WASTE MANAGEMENT ACT: CONTAMINATED SITES NOTATIONS
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NOTATIONS

      Initiated: APR 09, 1999                           Approved:

 Ministry Contact: WARD, JOHN E H

 Notation Participants                                  Notation Roles
 SELKIRK PAVING LTD (CRESCENT VALLEY)                   SITE PROFILE SUBMITTED
                                                        BY
 SELKIRK PAVING LTD (CRESCENT VALLEY)                   SITE PROFILE SUBMITTED
                                                        BY
 = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = =
SITE PARTICIPANTS

   Participant: SELKIRK PAVING LTD (CRESCENT VALLEY)
       Role(s): PROPERTY OWNER
                SITE PROFILE COMPLETOR
                SITE PROFILE CONTACT
    Start Date: MAR 10, 1999                              End Date:
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
   Participant: WARD, JOHN E H
       Role(s): MAIN MINISTRY CONTACT
    Start Date: APR 09, 1999                              End Date:
 = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = =
ASSOCIATED SITES

     Site id:       8072                                      Date: NOV 07, 2002
       Notes: SITE PROFILE HAD BEEN SUBMITTED FOR ADJACENT PARCEL (SITE 5913).
 = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = =
PARCEL DESCRIPTIONS

  Date Added: MAR 10, 1999                    Crown Land PIN#:
    LTO PID#: 015433412                      Crown Land File#:
   Land Desc: PARCEL A (REFERENCE PLAN 101786I) DISTRICT LOT 303 KOOTENAY
              DISTRICT         EXCEPT PLAN NEP65559
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  Date Added: NOV 06, 1999                    Crown Land PIN#:
    LTO PID#: 024619621                      Crown Land File#:
   Land Desc: LOT 1  DISTRICT LOT 303  KOOTENAY DISTRICT  PLAN NEP65559
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  Date Added: FEB 26, 2000                    Crown Land PIN#:
    LTO PID#: 024700185                      Crown Land File#:
   Land Desc: LOT 1  DISTRICT LOT 303  KOOTENAY DISTRICT  PLAN NEP66204
 = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = =
CURRENT SITE PROFILE INFORMATION (Sec. III to X)
                              Site Profile Completion Date: MAR 10, 1999

Local Authority          Received: MAR 29, 1999

Ministry Regional Manager Received: APR 09, 1999         Decision: MAY 19, 1999
   Decision: INVESTIGATION NOT REQUIRED

Site Registrar        Received: APR 09, 1999          Entry Date: MAY 19, 1999
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AREAS OF POTENTIAL CONCERN
 Petroleum, solvent or other polluting substance spills to the environment
    greater than 100 litres?..........................................NO
 Residue left after removal of piled materials such as chemicals, coal,
    ore, smelter slag, air quality control system baghouse dust?............NO
 Discarded barrels, drums or tanks?.........................................NO

FILL MATERIALS
 Fill dirt, soil, gravel, sand or like materials from a contaminated site
    or from a source used for any of the activiities listed under Schedule
    2?......................................................................NO
 Discarded or waste granular materials such as sand blasting grit, asphalt
    paving or roofing material, spent foundry casting sands, mine ore,
    waste rock or float?....................................................NO
 Dredged sediments, or sediments and debris materials originating from
    locations adjacent to foreshore industrial activities, or municipal
    sanitary or stormwater discharges?......................................NO

WASTE DISPOSAL
 Materials such as household garbage, mixed municipal refuse, or demolition
    debris?.................................................................NO
 Waste or byproducts such as tank bottoms, residues, sludge, or
    flocculation precipitates from industrial processes or wastewater
    treatment?..............................................................NO
 Waste products from smelting or mining activities, such as smelter slag,
    mine tailings, or cull materials from coal processing?..................NO
 Waste products from natural gas and oil well drilling activities, such as
    drilling fluids and muds?...............................................NO
 Waste products from photographic developing or finishing laboratories;
    asphalt tar manufacturing; boilers, incinerators or other thermal
    facilities (eg. ash); appliance, small equipment or engine repair or
    salvage; dry cleaning operations (eg. solvents); or automobile and
    truck parts cleaning or repair?.........................................NO

TANKS OR CONTAINERS USED OR STORED
 Underground fuel or chemical storage tanks?................................NO
 Above ground fuel or chemical storage tanks?...............................NO

SPECIAL (HAZARDOUS) WASTES OR SUBSTANCES
 PCB-containing electrical transformers or capacitors either at grade,
    attached above ground to poles, located within buildings, or stored?....NO
 Waste asbestos or asbestos containing materials such as pipe wrapping,
    blown-in insulation or panelling buried?................................NO
 Paints, solvents, mineral spirits or waste pest control products or pest
    control product containers stored in volumes greater than 205 litres?...NO

LEGAL OR REGULATORY ACTIONS OR CONSTRAINTS
 Government orders or other notifications pertaining to environmental
    conditions or quality of soil, water, groundwater or other
    environmental media?....................................................NO
 Liens to recover costs, restrictive covenants on land use, or other
    charges or encumbrances, stemming from contaminants or wastes remaining
```

```
   onsite or from other environmental conditions?.........................NO
Government notifications relating to past or recurring environmental
   violations at the site or any facility located on the site?............NO

X    ADDITIONAL COMMENTS AND EXPLANATIONS

                              End of Detail Report
```

```
                                  Detail Report
SITE LOCATION
       Site ID:       8076                          Latitude:  49d 26m 40.3s
 Victoria File:                                    Longitude: 117d 32m 31.4s
 Regional File: 26250-20/8076
        Region: NELSON, KOOTENAY

 Site Address: PINECREST ROAD
         City: CRESCENT VALLEY                 Prov/State: BC
  Postal Code: V0G 1H0

 Registered: NOV 29, 2002  Updated: MAY 09, 2003  Detail Removed: APR 29, 2003

 Notations:   2   Participants:   5   Associated Sites:   0
 Documents:   1 Susp. Land Use:   2 Parcel Descriptions:   1

Location Description: LAT/LONG COORDINATES PROVIDED BY PROPERTY OWNER

Record Status: INACTIVE - NO FURTHER ACTION
 Fee category: LARGE SITE, SIMPLE CONTAMINATION

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NOTATIONS

  Notation Type: NOTICE OF INDEPENDENT REMEDIATION COMPLETION SUBMITTED (WMA
                 28(2))
 Notation Class: WASTE MANAGEMENT ACT: CONTAMINATED SITES NOTATIONS
      Initiated: APR 03, 2003                      Approved: APR 03, 2003

 Ministry Contact: STOCKERL, ED (NELSON)

 Notation Participants                                 Notation Roles
 WESTERN BIORESOURCES CONSULTING LTD (CASTLEGAR        SUBMITTED BY
 (17TH STREET))
 SELKIRK PAVING LTD (CRESCENT VALLEY)                  REFERRED BY
 EICHENBERGER, KATHY(KOOTENEY)                         RECEIVED BY

 Note: LETTER NOTIFICATION OF REMEDIAL PROGRAM COMPLETION SUBMITTED TO
 REGIONAL MANAGER.  SUBMISSION INCLUDED A COPY OF REMEDIAL CONFIRMATION REPORT
 DATED MARCH 25/03.
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  Notation Type: NOTICE OF INDEPENDENT REMEDIATION INITIATION SUBMITTED (WMA
                 28(2))
 Notation Class: WASTE MANAGEMENT ACT: CONTAMINATED SITES NOTATIONS
      Initiated: OCT 28, 2002                      Approved: OCT 28, 2002

 Ministry Contact: STOCKERL, ED (NELSON)

 Notation Participants                                 Notation Roles
 WESTERN BIORESOURCES CONSULTING LTD (CASTLEGAR        SUBMITTED BY
 (17TH STREET))
 STOCKERL, ED (NELSON)                                 REVIEWED BY
 JOHNSON, CARL                                         RECEIVED BY
```

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NOTATIONS


 Note: WRITTEN NOTICE PROVIDED TO MANAGER OUTLINING PROPOSAL TO EXCAVATE
 SOILS IMPACTED BY HISTORIC DISCHARGES OF WASTE OIL AND DIESEL FUEL.  SOILS TO
 BE TEMPORARILY MANAGED ON-SITE IN LINED CELL UNTIL UTILIZED/DISPOSED AS FEED
 MATERIAL IN MANUFACTURE OF ASPHALT.

 Required Actions: AN AMENDED REMEDIAL NOTICE WAS SUBMITTED TO MANAGER ON DEC.
 6/02 WITH REVISED VOLUMES OF SOILS TARGETED FOR EXCAVATION, REVISED INTERIM
 SOIL STORAGE/MANAGEMENT PLAN AND REVISED DATES FOR UTILIZATION OF SOILS IN
 ASPHALT MANUFACTURE.
 = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = =
SITE PARTICIPANTS

   Participant: EICHENBERGER, KATHY(KOOTENEY)
       Role(s): ALTERNATE MINISTRY CONTACT
    Start Date: MAR 25, 2003                           End Date:
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
   Participant: JOHNSON, CARL
       Role(s): ALTERNATE MINISTRY CONTACT
    Start Date: OCT 28, 2002                           End Date:
         Notes: ASSISTANT REGIONAL WASTE MANAGER
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
   Participant: SELKIRK PAVING LTD (CRESCENT VALLEY)
       Role(s): OPERATOR
                PROPERTY OWNER
    Start Date: OCT 28, 2002                           End Date:
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
   Participant: STOCKERL, ED (NELSON)
       Role(s): MAIN MINISTRY CONTACT
    Start Date: OCT 28, 2002                           End Date:
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
   Participant: WESTERN BIORESOURCES CONSULTING LTD (CASTLEGAR (17TH STREET))
       Role(s): ENVIRONMENTAL CONSULTANT/CONTRACTOR
    Start Date: OCT 28, 2002                           End Date:
 = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = =
DOCUMENTS

 Title: CONFIRMATION OF REMEDIATION REPORT FOR WILLIAMSON PIT, CRESCENT
        VALLEY, BC PID# 019-174-292
              Authored: MAR 25, 2003               Submitted: APR 03, 2003
 Participants                                        Role
 WESTERN BIORESOURCES CONSULTING LTD (CASTLEGAR      AUTHOR
 (17TH STREET))
 SELKIRK PAVING LTD (CRESCENT VALLEY)                COMMISSIONER
 EICHENBERGER, KATHY(KOOTENEY)                       RECIPIENT
Notes: LETTER REPORT SUMMARIZING REMEDIAL PROGRAM AND RESULTS OF REMEDIAL
       CONFIRMATION TESTING.  DOCUMENT WAS SUBMITTED TO MINISTRY IN SUPPORT OF
       NOTICE OF
 = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = =
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SUSPECTED LAND USE

 Description: ASPHALT TAR MANUFACTURE/WHOLESALE STORAGE/DISTRIBUTE
       Notes: GRAVEL PIT ASSOCIATED WITH ASPHALT MANUFACTURE
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 Description: MISCELLANEOUS INDUSTRIES, OPERATIONS OR ACTIVITIES
       Notes: SITE UTILIZED AS GRAVEL PIT, ROCK CRUSHER OPERATION AND HISTORIC
              ASPHALT MANUFACTURE
 = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = =
PARCEL DESCRIPTIONS

  Date Added: NOV 29, 2002                   Crown Land PIN#:
    LTO PID#: 019174292                     Crown Land File#:
   Land Desc: LOT 1 DISTRICT LOT 303 KOOTENAY DISTRICT PLAN NEP22029
No activities were reported for this site

                                End of Detail Report
```

```
                                Detail Report
SITE LOCATION
      Site ID:       8656                          Latitude:  49d 28m 09.6s
 Victoria File:                                   Longitude: 117d 28m 08.6s
 Regional File: 26250-20/8656
        Region: NELSON, KOOTENAY

 Site Address: CORRA LINN ROAD
         City: SOUTH SLOCAN                   Prov/State: BC
  Postal Code: V0G 2G0

 Registered: NOV 21, 2003  Updated: AUG 10, 2004  Detail Removed: AUG 09, 2004

 Notations:   2  Participants:   3   Associated Sites:   0
 Documents:   2 Susp. Land Use:   1 Parcel Descriptions:   1

Record Status: INACTIVE - NO FURTHER ACTION
 Fee category: UNRANKED

 = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = =
NOTATIONS

  Notation Type: NOTICE OF INDEPENDENT REMEDIATION COMPLETION SUBMITTED (WMA
                 28(2))
 Notation Class: WASTE MANAGEMENT ACT: CONTAMINATED SITES NOTATIONS
      Initiated: APR 20, 2004                        Approved: MAR 24, 2004

 Ministry Contact: MURDOCH, WENDY R (CRANBROOK)

 Notation Participants                               Notation Roles
 MURDOCH, WENDY R (CRANBROOK)                        RECEIVED BY
 ACRES INTERNATIONAL LIMITED (CASTLEGAR)             ISSUED BY

 Note: CLOSURE LETTER FOR INDEPENDENT REMEDIATION AT CORRA LINN SWITCHYARD
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  Notation Type: NOTICE OF INDEPENDENT REMEDIATION INITIATION SUBMITTED (WMA
                 28(2))
 Notation Class: WASTE MANAGEMENT ACT: CONTAMINATED SITES NOTATIONS
      Initiated: NOV 13, 2003                        Approved: NOV 13, 2003

 Ministry Contact: MURDOCH, WENDY R (CRANBROOK)

 Notation Participants                               Notation Roles
 AQUILA NETWORKS CANADA (TRAIL)                      REQUESTED BY
 MURDOCH, WENDY R (CRANBROOK)                        RECEIVED BY
 ACRES INTERNATIONAL LIMITED (CASTLEGAR)             ISSUED BY

 Note: THREE AREAS OF IMPACT WHERE THERE WERE PREVIOUSLY CIRCUIT BREAKERS
 CONTAINING MINERAL OIL DIELECTRIC FLUID WHICH HAD LEAKED INTO THE SOIL.

 Required Actions: PROPOSE EXCAVATING IMPACTED SOILS, REMOVING TO OFF-SITE
 FACILITY FOR TREATMENT AND PERFORMING CONFIRMATORY SAMPLING PRIOR TO
 BACKFILLING WTH CLEAN SOIL.
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 = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = =
SITE PARTICIPANTS

   Participant: ACRES INTERNATIONAL LIMITED (CASTLEGAR)
       Role(s): ENVIRONMENTAL CONSULTANT/CONTRACTOR
    Start Date: SEP 26, 2003                           End Date:
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
   Participant: AQUILA NETWORKS CANADA (TRAIL)
       Role(s): PROPERTY OWNER
                RESPONSIBLE PERSON
    Start Date: SEP 26, 2003                           End Date:
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
   Participant: MURDOCH, WENDY R (CRANBROOK)
       Role(s): MAIN MINISTRY CONTACT
    Start Date: SEP 26, 2003                           End Date:
 = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = =
DOCUMENTS

 Title: CLOSURE LETTER FOR INDEPENDENT REMEDIATION AT CORRA LINN SWITCHYARD
        (YOUR FILE 26250-20/8656)
              Authored: MAR 24, 2004                Submitted: MAY 20, 2004
 Participants                                         Role
 ACRES INTERNATIONAL LIMITED (CASTLEGAR)              AUTHOR
 MURDOCH, WENDY R (CRANBROOK)                         RECIPIENT
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 Title: NOTIFICATION OF INDEPENDENT REMEDIATION
              Authored: SEP 26, 2003                Submitted: SEP 26, 2003
 Participants                                         Role
 ACRES INTERNATIONAL LIMITED (CASTLEGAR)              AUTHOR
 AQUILA NETWORKS CANADA (TRAIL)                       COMMISSIONER
 MURDOCH, WENDY R (CRANBROOK)                         RECIPIENT
 = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = =
SUSPECTED LAND USE

 Description: ELECTRICAL TRANSMISSION OR DISTRIBUTION SUBSTATIONS
       Notes:
 = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = =
PARCEL DESCRIPTIONS

  Date Added: NOV 13, 2003                Crown Land PIN#:
    LTO PID#: 009393307                  Crown Land File#:
   Land Desc: DISTRICT LOT 14536 KOOTENAY DISTRICT
No activities were reported for this site

                              End of Detail Report
```

Appendix J

SHOREACRES AERIAL REPLACEMENT PROJECT PRELIMINARY FIELD RECONNAISSANCE AND FINAL REPORT

JULY 16, 2009

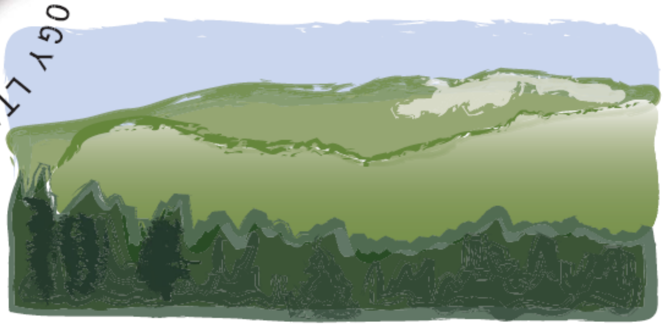
Shoreacres Aerial Replacement Project

Preliminary Field Reconnaissance & Final Report

Wayne Choquette & Eagle Vision Geomatics & Archaeology Ltd.
July 16, 2009

Prepared for:

Westland Resources Group Inc.



EAGLE VISION
GEOMATICS & ARCHAEOLOGY LTD.
T250-417-4022 F250-489-2438
201-14th Avenue North • Cranbrook • B.C. V1C 3W3
www.eagle-vision.ca

Conscientious and accountable stewardship of archaeological heritage

PRELIMINARY FIELD RECONNAISSANCE FINAL REPORT

Wayne T. Choquette
P.O. Box 25, Yahk, BC V0B 2P0
wchoquette@cyberlink.bc.ca

Eagle Vision Geomatics & Archaeology Ltd.
201-14th Ave. N, Cranbrook, BC V1C 3W3
eaglevision@ktunaxa.org

Project Contacts and Details

Project Name: *PFR of Shoreacres Aerial Replacement Project*	**Project Area:** Situated along the right and left banks of the Kootenay River at its confluence with the Slocan River.
Proponent: Westland Resource Group Inc. **Contact:** Wayne Biggs Telephone: (250) 592-8500 Email: biggs@westland.com	
Interim Report Authors: Wayne T. Choquette & Nicole Kapell **Mapping:** Jose Galdamez	**Contractor:** Eagle Vision Geomatics & Archaeology Ltd. **Contact:** Melissa Knight Telephone: (250) 420-2724 Fax: (250) 489-2438 Email: eaglevision@ktunaxa.org
Attachments: *Figure 1:* Shoreacres Aerial Replacement Overview Map; *Figure 2:* Shoreacres Aerial Replacement development map, North; *Figure 3:* Shoreacres Aerial Replacement development map, South; *Photo Plate 1:* View northwest of the TP Option Crossing; *Photo Plate 2:* View of soil stratigraphy on the left bank of the Kootenay River at the TP Option Crossing.	

Administrative / Legal Context

Archaeological sites that pre-date 1846 are automatically protected under the *Heritage Conservation Act* whether on public or private land. Sites that are of an unknown age that have a likely probability of dating to prior to 1846 (e.g. lithic scatters) as well as Aboriginal pictographs, petroglyphs, and burials (which are likely not as old but are still considered to have historical or archaeological value) are also automatically protected. Under the *HCA*, protected sites may not be damaged, altered or moved in any way without a Section 12 or 14 Permit as issued through the *HCA*. Sites which do not predate 1846 and not necessarily automatically protected under the *HCA* may still represent cultural heritage resources as defined by the *Forest Practices Code Act* (*FPC*), specifically Sections 2 and 17, which require that cultural heritage resources such as CMT sites be inventoried and considered in both operational and strategic planning.

Study Objectives and Limitations

The objectives of this particular Preliminary Field Reconnaissance (PFR) were: (1) to identify and assess archaeological resource potential or sensitivity within identified P/L crossings of the proposed Shoreacres Aerial Replacement Project and (2) to develop recommendations regarding any future archaeological stewardship concerns, including possible mitigative options for identified potential conflicts.

This assessment does not address potential impacts to traditional use sites within or near the study area. This report is provided without prejudice toward Aboriginal Rights and Title that any affected First Nation groups may have and as such should not be used to fulfill First Nation consultation requirements.

Executive Summary

The P/L crossing area(s) encompassed by the proposed Shoreacres Aerial Replacement Project was assessed for archaeological potential via field reconnaissance. Eight (8) pipeline crossing route options were assessed with seven (7) having archaeological concern. With the exception of the Kootenay Canal Crossing, all proposed crossings were located on terraces with semi-intact soils within close proximity (50-100m) of previously recorded archaeological sites. Monitoring and/or Archaeological Impact Assessments are recommended for these areas. Please see below for more detailed descriptions of the areas assessed.

Location

Location Descriptions:

TP Option – Kootenay Canal Crossing: Located on the left and right banks of the Kootenay Canal, just southwest of Bird Creek.

TP Option – Kootenay River Crossing: Located on the left and right banks of the Kootenay River, along the Blewett Road Bridge.

Shoreacres North: Located on the left and right banks of the Kootenay River in the north portion of the community of Shoreacres.

Existing Transmission, Large Angle, Shallow Angle & Shoreacres South: Located at the confluence of the Slocan River and the Kootenay River.

Lazaroff: Located on the left and right banks of the Kootenay River just north of the Glade Cable Ferry Crossing.

NTS Map: 82F.05/0-6

Forest Region/District: Arrow Boundary and Kootenay Lake Forest Districts

Landforms: Terracing along the Kootenay River and at its confluence with the Slocan River.

Biogeo Zone: IDF un

Aspect: E and W

UTM (11 U): Kootenay Canal Crossing: 465564e 5478207n; Shoreacres North Crossing: 462424e 5476450n; Existing Transmission, Large Angle, Shallow Angle & Shoreacres South: 461768e 5474325n.

Disturbance Factor(s): Existing pipeline right-of-way, agriculture (clearing, repeated cultivation, machinery movements), construction of the Kootenay Canal, residential construction and occupation, highway/bridge construction, bulldozing of roads and trails, borrowing, reservoir erosion

Background Research

Before conducting the field inspection, a search for archaeological sites was conducted using the Remote Access to Archaeological Data *(RAAD)* system maintained by the Archaeology Branch, Ministry of Tourism, Culture and the Arts. *RAAD* provides detailed geographical information for previously recorded archaeological sites in British Columbia.

Previously Recorded Sites in Area	Site Description	General Location (estimated)
DiQj-1	Surface Lithics, House Pit	All previously recorded sites are located within a 10km radius of the proposed development areas surrounding the Kootenay and Slocan Rivers.
DiQj-2	Surface Lithics, House Pit, Cache Pit	
DiQj-3	Surface Lithics, Mound, House Pit, Cache Pit, Burial	
DiQj-4	Surface Cultural Material	
DiQj-5	Cultural Depression	
DiQj-6	House Pit, Cache Pit	
DiQj-7	Surface Lithics	
DiQj-8	House Pit, Cache Pit, Cultural Depression	
DiQj-9	Surface Lithics, Cache Pit	
DiQj-10	Surface Lithics, Burial	
DiQj-11	Surface Lithics	
DiQj-12	Burial, Cache Pit, Cultural Depression, Cultural Surface Material	
DiQj-13	Surface Lithics	
DiQj-14	Burial	
DiQj-15	Pictograph	
DiQj-16	Petroglyph, Pictograph	
DiQj-18	Surface Lithics, Cache Pit, Mat Lodge	
DiQj-19	Surface and Subsurface Lithics, Cache Pit	
DiQj-20	Cultural Depression	
DiQj-25	Surface Lithics	
DiQj-26	House Pit, Cache Pit	
DiQj-27	Subsurface Lithics	
DiQj-28	Pictograph	
DiQi-1	Subsurface Lithics	
DiQi-4	Surface Lithics	
DiQi-6	Surface Lithics	
DiQi-7	Subsurface Cultural Material	
DiQi-8	Surface Lithics	
DiQi-10	Surface Lithics	
DiQi-11	Surface Lithics	
DiQi-12	Surface Lithics, Burial, Fishing Feature	
DiQi-13	Surface Lithics	
DiQi-14	Surface Lithics	
DiQi-15	Surface Lithics	
DjQi-2	House Pit, Subsurface Cultural Material	

Potential Assessment

Methods: Search of archaeological and historical records available through *RAAD* and search of archaeological and historical records located at the *Kootenay Cultural Heritage Centre* and at the *Eagle Vision Geomatics & Archaeology Ltd.* office.

Criteria: Archaeological potential was projected and assessed on the basis of documented relationships amongst archaeological remains and specific landforms and postglacial stratigraphic units in the region.

Results: High archaeological potential based on relatively level, low elevation terrain near a perennial watercourse confluence in a major valley and in some cases immediately adjacent to recorded pre-contact archaeological sites and in the vicinity of numerous other recorded sites.

Field Methodology

Survey Dates: July 9, 2009

Survey Crew: Wayne Choquette, Nicole Kapell & Kayla Casimer

Sampling Objective: Ground truth the landscape and stratigraphy delineated by the archaeological potential assessment, assess the degree to which the identified landscape components survive in the subject property environment, and identify any potential threats to archaeological values posed by the proposed development.

Traverse Type(s): 75% systematic pedestrian survey oriented to subsurface exposures to facilitate assessment of disturbance and identification of pre-contact archaeological deposits and features in context.

Subsurface Exposures: deflated and bulldozed areas, road and bridge cut banks, wave-eroded terrace margins

Field Survey Results

Survey Results:

While assessing all eight proposed pipeline crossings, the field crew received word that only the TP Option Crossing and the Large Angle Crossing were going to be utilized. Therefore only portions of the remaining crossings were assessed.

<u>TP Option - Kootenay Canal Crossing:</u> (100% assessed) Extensive surface disturbance (100%) due to the construction of the Kootenay Canal. No pre-contact archaeological deposits or features were observed and no significant intact archaeological remains are expected to occur within the area of the identified development boundaries.

<u>TP Option – Kootenay River Crossing:</u> (85% assessed) Portions of the proposed development area are disturbed due to road and bridge construction, however some small pockets of intact soils remain on either side of the Kootenay River. Further examination is needed of a small island (accessible by small boat) which could be affected by the development. More intensive investigation of this development may be required depending upon locations and character of specific components (eg pipe location) as it has the potential to contain archaeological remains which would be disturbed by development.

<u>Shoreacres North:</u> (50% assessed) Portions of the proposed development are disturbed due to agricultural activity, however due to the presence of at least half a metre of visible fine sediment accumulation (thus potential for buried archaeological remains obscured by vegetation which provided very little exposure) and proximity to two previously recorded archaeological sites, if development were to go through in this area an Archaeological Impact Assessment would be required.

<u>Existing Transmission, Large Angle, Shallow Angle & Shoreacres South Crossings:</u> (50% assessed) Only the left bank of the proposed developments was assessed during the present investigation. The right bank was previously assessed by Wayne T. Choquette for Terasen Gas on November 9, 2008. The left bank of these crossings is located at the confluence of the Kootenay River and the Slocan River in the immediate vicinity of three previously recorded pre-contact archaeological sites. If the proposed crossing were to stay within the existing pipeline right-of-way, monitoring of the construction is recommended. If disturbance were to occur outside of the existing right-of-way, an Archaeological Impact Assessment is required which Eagle Vision Geomatics & Archaeology would be willing to facilitate.

<u>Lazaroff Crossing:</u> (50% assessed) Only the left bank of the proposed pipeline crossing was assessed

by ground inspection; it is situated on an intact narrow terrace with an east-facing margin along the Kootenay River. The right bank is a lower terrace covered with vegetation. The potential for the presence of archaeological remains is at least moderate on both sides, therefore if this crossing were to be used, an Archaeological Impact Assessment would be recommended.

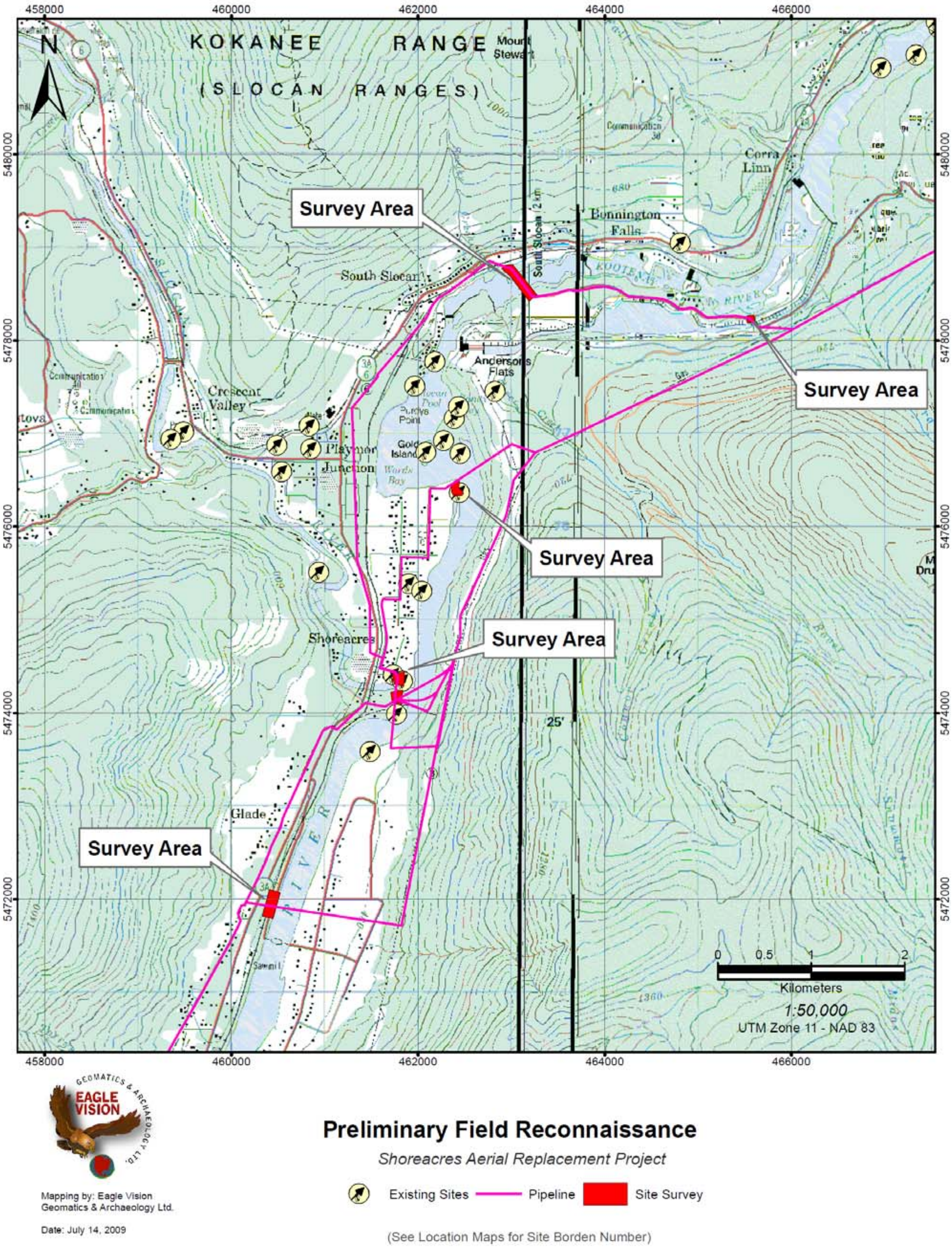
Recommendations
The proponent has indicated that they are only developing the TP Option Crossing and the Large Angle Crossing, both of which have some cause for archaeological concern. At the Long Angle Crossing, if the proposed crossing were to stay within the existing pipeline right-of-way, monitoring of the construction is recommended. If disturbance is necessary outside of the existing right-of-way, an Archaeological Impact Assessment is required beforehand, which Eagle Vision Geomatics & Archaeology would be willing to undertake. At the TP Option Crossing, more intensive investigation may be required depending upon locations and character of specific components (eg pipe location), as there is potential for the presence of archaeological remains which could be disturbed by development.

I trust that this report provides you with sufficient information to facilitate project management. Should you have any further questions or require additional information, please do not hesitate to contact Wayne Choquette or Melissa Knight at Eagle Vision Geomatics and Archaeology Ltd.

Sincerely,

Wayne T. Choquette
Archaeologist

Figure 1: **Shoreacres Aerial Replacement Overview Map**



Preliminary Field Reconnaissance

Shoreacres Aerial Replacement Project

Mapping by: Eagle Vision Geomatics & Archaeology Ltd.

Date: July 14, 2009

(See Location Maps for Site Borden Number)

Figure 2: **Shoreacres Aerial Replacement Development Map, North**

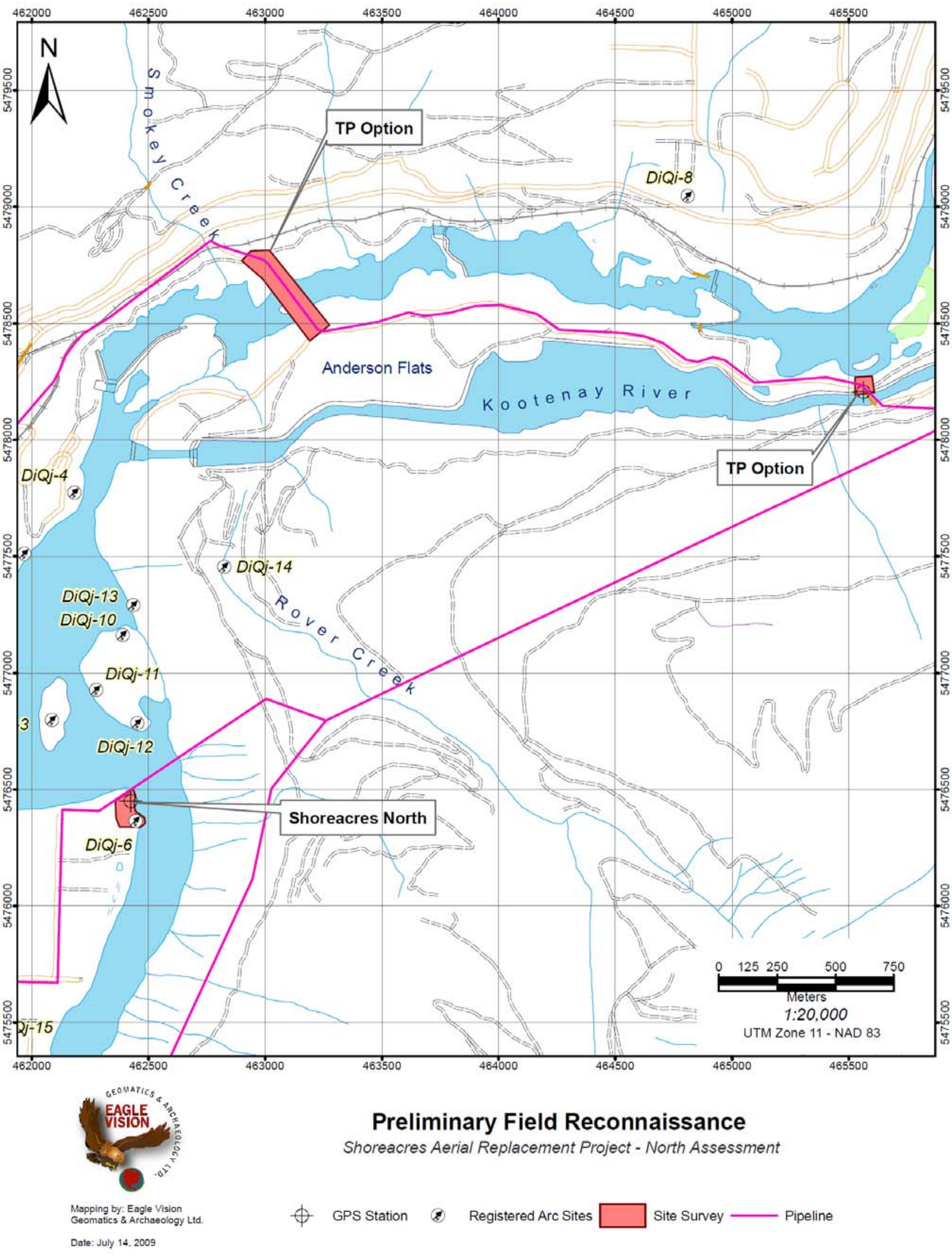


Figure 3: **Shoreacres Aerial Replacement Development Map, South**

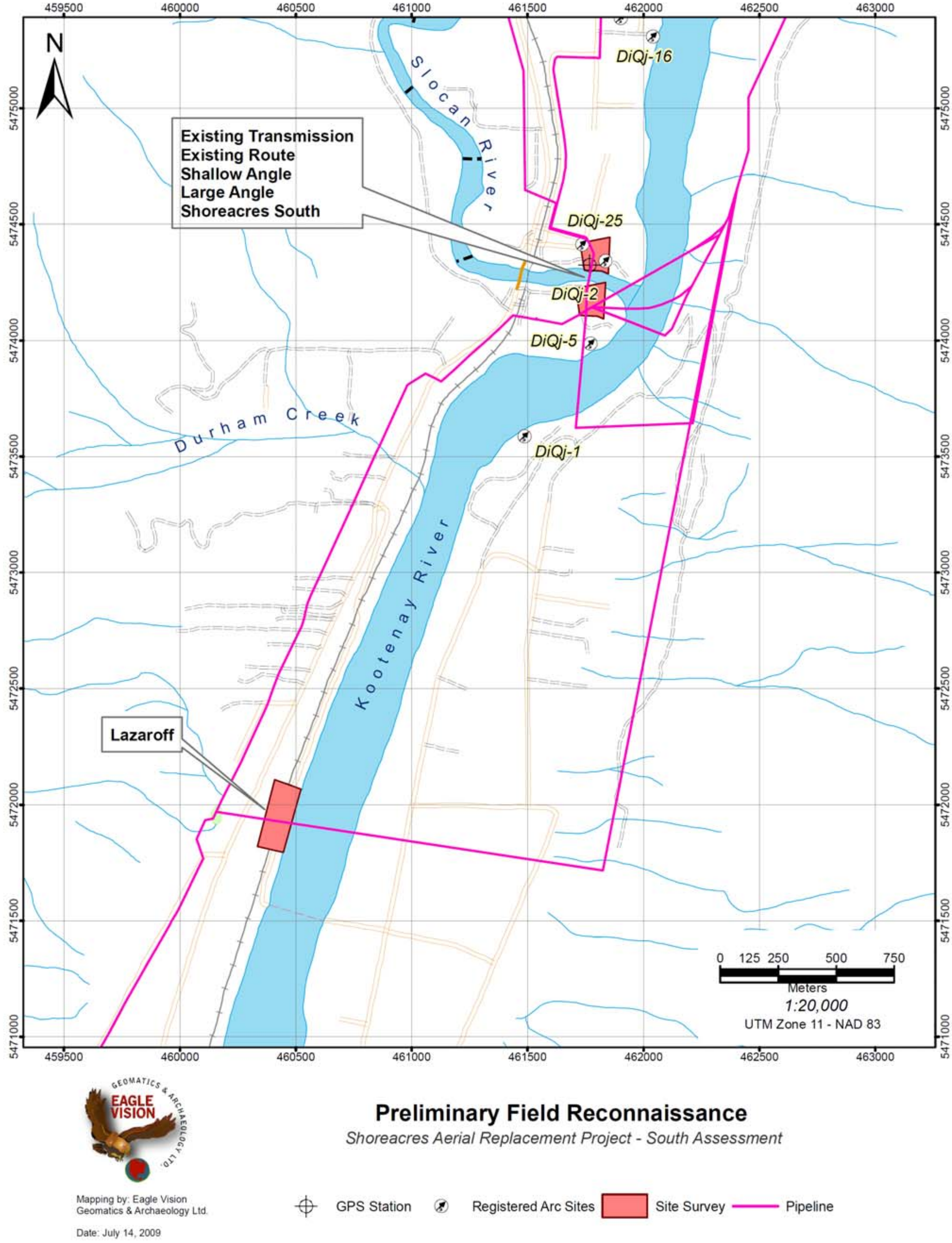


Figure 4: **View northwest of the TP Option Crossing**

Figure 5: **View of soil stratigraphy on the left bank of the Kootenay River at the TP Option Crossing**

Appendix K

SCREENING FACTORS – DEFINITIONS AND RATIONALE FOR SCORING

Kootenay River Crossing (Shoreacres) Upgrade Project

Appendix K – Screening Analysis

Non-Financial Screening Factors - Definitions

- Natural Hazards Vulnerability
    - Considers the vulnerability of constructed facilities to natural hazards including seismic impacts, slope stability concerns and river erosion.
- Safety
    - Takes into account the risk to the public in the event of a pipeline failure.
    - Takes into account the risk to TGI with respect to any scheduled maintenance or emergency repair work required.
- Environmental
    - Considers the level of impact during construction and post construction pipeline operations the alternatives have on the surrounding environment including, environmentally sensitive areas and agricultural lands.
- Land Issues
    - Takes into account the effect that the construction activities will have on any surrounding land owners, such as loss of business and land use restrictions.
    - Considers the amount of additional ROW required and the potential impacts on the market value of real estate in the Project area.
- First Nations

    - Considers the effect of the Project on the cultural values, economic well being and quality of life of First Nations citizens.
- Operational Impacts
    - Considers accessibility and operability of the facilities by TGI employees and contractors performing routine maintenance and undertaking potential system repairs.
- System Capacity
    - Considers the impact of the proposed alternative on system capacity.
- Aesthetics
    - Considers the visual effects of the proposed facilities that may be observed by residents and visitors in the Project area.

\

Rationale for Scoring of Non-Financial Factors

Natural Hazard Vulnerability

- The TP and IP alternatives will have some vulnerability to natural hazards; in particular, the bridge crossings will have some seismic vulnerability.
- The HDD will be at a considerable depth and will be relatively immune to natural hazards. The location where it joins the existing pipeline will be outside of the area of slope stability concern associated with the east terminus of the existing crossing.

Safety

- The TP and IP alternatives will have the typical safety concerns associated with buried pipelines, for example vulnerability to third party damage.
- The HDD alternative is buried at considerable depth for its entire length and will not pose a safety concern for TGI employees or contractors.

Environmental

- The TP and IP alternatives have the typical environmental risks associated with construction and operation of buried pipelines. In addition, there is the potential for construction through areas with contaminated soils.
- The HDD is buried at considerable depth so it poses minimal environmental risk during operation. There is a small risk due to the

possibility of a leak of drilling fluids into the Kootenay River during construction.

Land Issues

- Both the TP and IP alternatives require considerable new ROW and there is some potential impact on private properties. There is also the issue of securing rights on the two bridges owned by the city of Nelson and the impact on the Kootenay Canal structure owned by BC Hydro.
- The west end of the HDD alternative will be on land owned by TGI and the east end will terminate on TGI's existing ROW. There will be some temporary working space required on crown land; however, this alternative will see some ROW returned to the Crown.

First Nations

- There are no known archaeological sites associated with the TP and IP alternatives and the impact on First Nations should be minimal.
- There are known archaeological sites close to the HDD drill entry point and this alternative has a slightly greater potential to impact First Nations.

Operational Impacts

- The TP alternative will require additional line patrol and bridge inspections.
- The IP alternative has a pressure reduction station which will require on-going inspection and maintenance.
- The HDD alternative is buried at depth and will have no impact on on-going operations.

System Capacity

- The TP and HDD alternatives have approximately the same capacity and both meet the 20 year load forecast for the downstream system.
- The IP alternative has less capacity than the TP alternatives and would require reinforcement earlier that the other alternatives. The alternative would also have a lesser ability to allow expansion beyond the existing service area.

Aesthetics

- The HDD alternative will have no visible infrastructure beyond the pipeline markers that are already in place.
- The TP and IP alternatives will require additional pipeline markers and likely some signs to denote the bridge crossings. In addition, the IP alternative will require an above ground station which will be visible to the public.

Appendix L

SITE PLAN

KOOTENAY RIVER CROSSING (SHOREACRES) UPGRADE PROJECT SITE PLAN

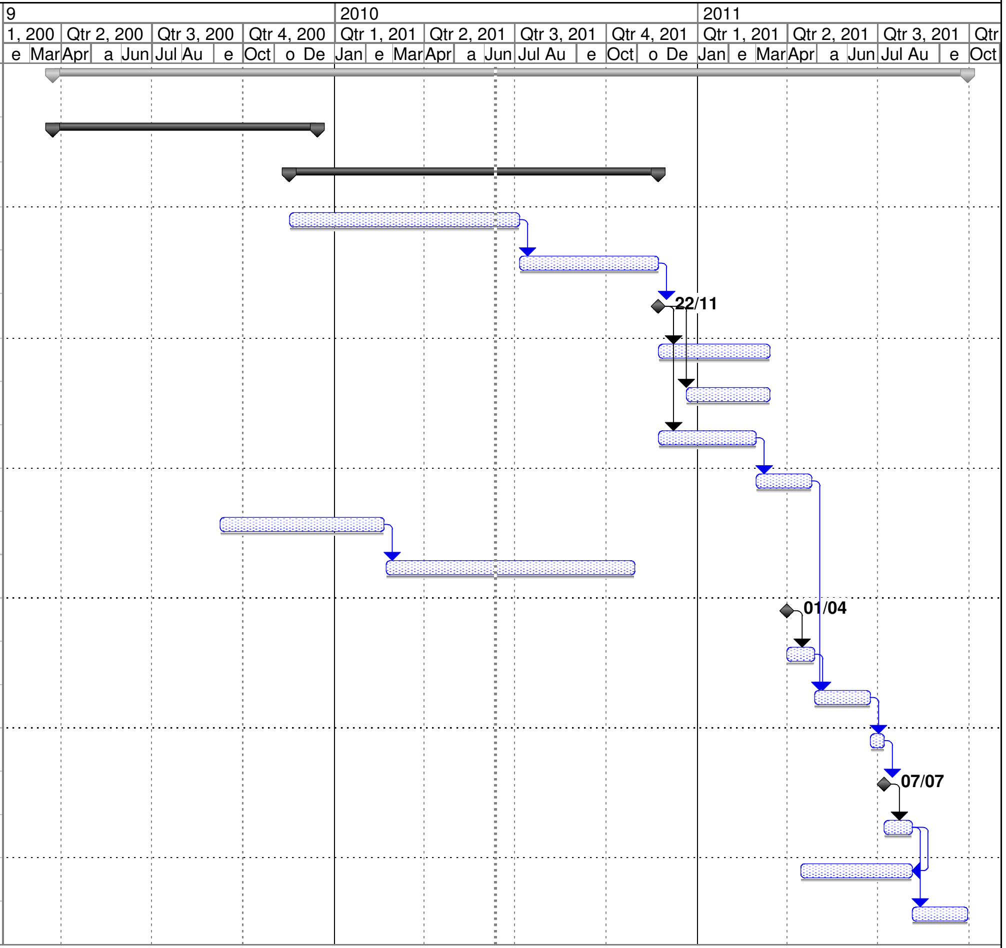
Appendix M

SCHEDULE

Kootenay River Crossing (Shoreacres) Upgrade

Preliminary CPCN Application Schedule

ID	ℹ	Task Name	Duration	Start	Finish
0		**Shoreacres Crossing Upgrade**	**658 days**	**Tue 24/03/09**	**Thu 29/09/11**
1		**Preliminary Engineering**	**190 days**	**Tue 24/03/09**	**Mon 14/12/09**
8		**CPCN**	**265 days**	**Tue 17/11/09**	**Mon 22/11/10**
9		Draft CPCN Application	33 wks	Tue 17/11/09	Mon 05/07/10
10		Application Review	5 mons	Tue 06/07/10	Mon 22/11/10
11		**CPCN approval**	0 days	Mon 22/11/10	Mon 22/11/10
12		Detailed Engineering	4 mons	Tue 23/11/10	Mon 14/03/11
13	▦	Material Procurement	3 mons	Tue 21/12/10	Mon 14/03/11
14		Contract Preparation	14 wks	Tue 23/11/10	Mon 28/02/11
15		Contract Award	8 wks	Tue 01/03/11	Mon 25/04/11
16		Develop OGC application	119 days	Tue 08/09/09	Fri 19/02/10
17		OGC Approval	9 mons	Mon 22/02/10	Fri 29/10/10
18	▦	Construction Window	0 days	Fri 01/04/11	Fri 01/04/11
19		Access construction and Mobilization	1 mon	Fri 01/04/11	Thu 28/04/11
20		Drill Contract	2 mons	Fri 29/04/11	Thu 23/06/11
21		Tie ins	2 wks	Fri 24/06/11	Thu 07/07/11
22		In service	0 days	Thu 07/07/11	Thu 07/07/11
23		Site clean up	1 mon	Fri 08/07/11	Thu 04/08/11
24		Tender demolition	4 mons	Fri 15/04/11	Thu 04/08/11
25		Demo existing crossing	2 mons	Fri 05/08/11	Thu 29/09/11



Project: Shoreacres Crossing Upgrade
Date: Fri 11/06/10

Task	▨	Milestone	◆	External Tasks	▭
Split	┆	Summary	▬	External MileTask	◇
Progress	▬	Project Summary	▬	Split	⇩

Appendix N

PROJECT COMMUNICATION PLAN

Terasen
Gas

Kootenay River Crossing (Shoreacres) Upgrade Project
Communications Plan
June 2010

Overview

Terasen Gas has applied to the British Columbia Utilities Commission (BCUC) for a permit to upgrade an aerial crossing that is located on the TGI Interior Transmission System Savona-Nelson Main Line. The crossing, built in 1957, spans the Kootenay River near the community of Shoreacres (a small community approximately mid way between Castlegar and Nelson) and serves approximately 5,200 customers downstream of the crossing.

The Project is intended to ensure the integrity of an existing pipeline crossing which is nearing the end of its useful structural life and is challenged by slope instability that endangers the anchor structures on the east side of the crossing.

The Project involves:

- decommissioning of the existing nominal pipeline size (“NPS”) 8 (219.1mm) Kootenay River aerial crossing near the community of Shoreacres,
- abandonment of approximately 650 m of NPS 6 (168.3 mm) transmission pressure pipe, and
- replacement of both with approximately 880 m of new NPS 6 transmission pressure pipe to be installed using Horizontal Directional Drill (“HDD”) technology.

The installation of new pipelines ensures the continued safe and reliable supply of natural gas to customers in the region. The use of Horizontal Directional Drilling (HDD) technology addresses the risks related to both the deteriorating condition of the crossing structure and pipe and the slope instability concerns at the east terminus of the crossing.

Terasen Gas expects to submit a Certificate of Public Convenience and Necessity (CPCN) to the (BCUC for this project in July 2010.

Approval for the project is expected in late 2010, with project construction beginning in spring 2011.

Communication Objectives

The following communication objectives guide the strategies and actions of this plan:

- Create awareness of the Kootenay River Crossing (Shoreacres)Upgrade Project (“Shoreacres”)
- Ensure that stakeholders and interested parties are informed and aware of the project
- Address any stakeholder concerns
- Support company values of safety, environmental commitment, customer value and community in all communications, as appropriate
- Position Terasen as a leading integrated energy solutions provider in B.C.

Audiences/Stakeholders

- Residents living within one kilometre of the project site
- City of Castlegar
- City of Nelson
- Central Kootenay Regional District
- Teck Cominco
- BC Hydro
- Recreational Users of the Ward’s Ferry Trail
- Agricultural Land Reserve and Ministry of Environment
- Oil and Gas Commission
- Department of Fisheries and Oceans and Transport Canada

Key Messages

- The Shoreacres project will ensure the continued safe, reliable supply of natural gas to more than 5,200 customers in the area.

- The Shoreacres upgrade project addresses the risks related to both the deteriorating condition of the crossing structure and pipe and the slope instability concerns at the east terminus of the crossing.

- This project is driven by safety and reliability considerations and is part of our on-going integrity management of our system.

- Natural gas delivery will not be affected during construction of the pipeline upgrade.

- The upgraded pipelines will remain within existing Terasen Gas right-of-way, both on land and across the water.

- The project is estimated to cost approximately $8 million.

Project Timeline

- The project is scheduled to be completed and in service by the end of 2011.

HDD Technology

- HDD technology is the safest method with the lowest environmental and property impact.

- HDD technology is a common industry accepted method for replacing river pipeline crossings, and Terasen Gas has utilized the technology on numerous occasions.

- HDD technology is considered the best choice on the basis of cost, low environmental impact and the ability to mitigate the deteriorating condition of the crossing structure and pipe and the slope instability concerns at the east terminus of the crossing.

Environment

- Terasen Gas conducts business in a safe and environmentally responsible manner. Any potential environmental impacts associated with this project will be mitigated through the implementation of an environmental management plan during construction and site restoration.

Safety

The Terasen Gas transmission and distribution pipeline system has an excellent safety record. This project is part of our on-going system maintenance, which takes place around the province every year.

Public Consultation

- Terasen Gas has been consulting with stakeholders and landowners with regard to this project since January 2010.

- With respect to issues of public safety, schedule, right of ways, temporary construction space, access and accommodation, Terasen Gas will continue to consult with property owners.

Strategies and Actions

To support the communication objectives, the following strategies and actions are recommended for communicating with the identified audiences.

- Project update communications between Terasen Gas and the following:
    - Mayor Lawrence Chernoff, City of Castlegar,
    - Mayor John Dooley, City of Nelson,
    - Residents living within one kilometre of the project site
    - Teck Cominco, Pat Murray
    - Trans Canada Trail, Blair Baldwin
    - Ministry of Transportation and Highways, Deborah Tan and Rajeeta Bains
    - BC Hydro, Larry Serko, Valerie Fay and Patricia Richardson
- Project communication to Terasen Gas employees
- Newspaper advertising

Activity	Completed by	Date
Initial communication of project with local residents	Community Relations, Property Services	January 2010
Informational meeting with Mayor Lawrence Chernoff, City of Castlegar	Community Relations	April 2010
Communication with government agencies	Community Relations, Property Services	November 2009 – May 2010
Ad in local newspaper	Community Relations	February 2010
Communication with local residents and stakeholders	Community Relations	One month prior to project start
Ad in local newspaper	Community Relations	Two weeks prior to project start
Project information on TGI website	Communications	Two weeks prior to project start
Communication with local residents and stakeholders	Community Relations	At project completion
Ad in local newspaper	Community Relations	At project completion
Project information on TGI website	Communications	At project completion

Obstacles and Opportunities

To the point of filing this CPCN application, feedback on the project has been positive and encouraging. Terasen Gas believes all identified issues can be mitigated.

Stakeholder concerns that have been cited, or are anticipated, include:
- spread of noxious weeds
- stakeholder vehicular access
- site restoration and remediation
- noise impacts associated with construction equipment and movement of support vehicles

In all cases, Terasen Gas will work with the affected property or business owner to mitigate issues.

It is our intent that good relationships with property owners, First Nations and other stakeholders will be maintained through all phases of the project. Terasen Gas has every expectation that the public consultation and communication process will help diminish potential impacts, ensure the project remains on schedule, and mitigate unexpected project issues.

This project represents an opportunity to showcase our integrity program and other good work practices – including environmental management and First Nations relationships.

Appendix O

STAKEHOLDER CONTACT SUMMARY

Kootney River Crossing (Shoreacres) Upgrade Project

Public Consultation
Contact Log

Agency/Party	Terasen Representative	Contact Information (i.e. phone, address, etc)	Date of Contact	Summary of Party's Response to Contact	Email
Communities/Local Government					
Central Kootenay Regional District (CKRD)	E. Picco	John Voykin, Director, CKRD	11-Jun-10	Spoke with John Voykin and informed him about the project. I mailed a letter with the information and a copy of the ad.	(no email avaialble)
Central Kootenay Regional District (CKRD)	E. Picco	Walter Popoff, CKRD	11-Jun-10	Spoke with Walter Popoff and emailed General information about the Project. He referred me to John Voykin, who is also a Director of the Regional District of Centreal Kootenay	walteck@telus.net
Central Kootenay Regional District (CKRD)	E. Picco	Jim Gustafson, Chief Administrative Officer	11-Jun-10	Spoke with Jim Gustafson and sent him an email with general Project information. He suggested I advise Walter Popoff, who is involved with the Regional District Board as an area director for the Slocan Valley.	jgustafson@rdck.bc.ca
City of Nelson	E. Picco	Mayor John Dooley	11-Jun-10	Left voice mail and sent email with general Project information. Mentioned that I would call him week of June 14. He replied to the email and noted for Terasen to keep up the good work.	jdooley@nelson.ca
City of Castlegar	E. Picco and A. Hennessy	Mayor Lawrence Chernoff	13-Apr-10	Spoke to Mayor Chernoff about the Project starting Spring 2011. Advised we will keep him updated and informed. He mentioned he saw advertisements in the local papers.	mayor@castlegar.ca
ENVIRONMENT					
Trans Canada Trail	E. Picco	Harold Seller, Project Facilitator	4-Jun-10	Confirmed by email that the Ward's Ferry Trail is not part of the Trans Canada Trail	hikerharold@gmail.com
Trans Canada Trail	R. Sulentich	Blair Baldwin	Dec-09 & 25-Jan-10	Blair is the trail stewart for the Trans Canada trail. Sent him an email regarding the project and a map of the proposed location. Blair is going to determine if there is any impact to the trail when we go ahead with construction. Typically the group is concerned about restoring the trail to the original condition.	Blair Baldwin (pincon@shaw.ca)
MEDIA					
Media - Castlegar News	E. Picco	Nelson Lee - Media Buyer - Wasserman-Partners	19-Jan-10	Two Terasen project ad placements in the Castlegar News on Thursday, February 4 and 11, 2010	Nlee@Wasserman-Partners.com
Media - Nelson Star	E. Picco	Nelson Lee - Media Buyer - Wasserman-Partners	19-Jan-10	Two Terasen project ad placements in the Nelson Star on Thursday, February 4 and 11, 2010	Nlee@Wasserman-Partners.com
Media - Nelson Daily News	E. Picco	Nelson Lee - Media Buyer - Wasserman-Partners	19-Jan-10	Two Terasen project ad placements in the Nelson Daily News on Thursday, February 4 and 11, 2010	Nlee@Wasserman-Partners.com
Ministry of Transportation and Highways - Nelson	C. Bohun	Deborah Tan - Project Management Technician	4-Dec-09	Initial email sent requesting jurisdiction information for access road. Deborah forwarded request to Rajeeta Bains.	
Ministry of Transportation and Highways - Nelson	C. Bohun	Rajeeta Bains - Development Technician	7-Dec-09	Follow up email sent re: road status. Response email received from Rajeeta on Jan 6/10. Public road does not include the access road in question.	Rajeeta.Bains@gov.bc.ca
Arrow Boundary Forest District	C. Bohun	Edward Nagy - Small Scale Salvage Coordinator	26-Nov-09	Email sent to Ed requesting information regarding clearing, status of property as woodlot and confirmation of whether forestry road affected. Response from Ed rec'd Nov 30/09 requesting additional info.	edward.nagy@gov.bc.ca
Arrow Boundary Forest District	C. Bohun	Edward Nagy - Small Scale Salvage Coordinator	7-Dec-09	Additional info sent to Arrow Boundary Forestry District	
Arrow Boundary Forest District	C. Bohun	Edward Nagy - Small Scale Salvage Coordinator	14-Dec-09	Name of licensee (Kalesnikoff Lumber Co.) for area provided to determine if project area falls within license. Ed confirmed that no forestry service road runs within project area and that road appears to be BC Hydro access road	
Resident Communication					
Valerie and Desmond Fipke	E. Picco	2460 Filipoff Rd, Castlegar, BC V1N 4R9 Tel: 250-399-4287	24-Jun-10	Received email from Valerie Fipke confirming their concerns are resolved with respect to the access to the Project construction Site.	
Valerie and Desmond Fipke	E. Picco	2460 Filipoff Rd, Castlegar, BC V1N 4R9 Tel: 250-399-4287	22-Jun-10	Emailed summary responses acknowledging their concerns. Requested a reply to confirm she received email.	

Kootney River Crossing (Shoreacres) Upgrade Project

Public Consultation
Contact Log

Agency/Party	Terasen Representative	Contact Information (i.e. phone, address, etc)	Date of Contact	Summary of Party's Response to Contact	Email
Valerie and Desmond Fipke	E. Picco	2460 Filipoff Rd, Castlegar, BC V1N 4R9 Tel: 250-399-4287	16-Jun-10	Telephoned Valerie Fipke and responded to their concerns outlined in her email of May 11.	
Residents closest to the project	E. Picco		28-Jan-10	Letter and ad introducing the project, proposed timelines and Terasen contact information.	
Residences within 1 km of project site	E. Picco		28-Apr-10	Letter with ad introducing the project, proposed timelines and Terasen contact information	
Resident close to project site	Property Services		Ongoing	Reconfirming use of driveway/addressing access.	
Wallace and David Popoff	E. Picco	2515 Alexis Rd, Castlegar, BC V1N 4P6 Tel: 250-359-7657	11-May-10	Left voice mail regarding project and follow up to mailed letter. I provided my contact information and informed then to call me if they had any questions or concerns.	
Walter and Winnie Rezanoff	E. Picco	2506 Alexis Rd, Castlegar, BC V1N 4P6 Tel: 250-359-7200	11-May-10	Left voice mail regarding project and follow up to mailed letter. I provided my contact information and informed then to call me if they had any questions or concerns.	
Shelly Lee Skarsen	E. Picco	2730 Mount Dale PL. Blind Bay, BC V0E 1H1 (No number available)	11-May-10	No number listed. Looked at 411.ca and contacted Telus directory assistance as a double check.	
Lester (Les) and Theano Mary Thiessen		2354 Filipoff Rd, Castlegar, BC V1N 4R9 Tel: 250-359-2909	11-May-10	No answer. Not able to leave a voice mail. Number seems like a fax number. Family name in 411.ca number was not the same family I called. Needs further work.	
Neil David and Linda Yvonne Fipke	E. Picco	2456 Filipoff Rd, Castlegar, BC V1N 4R9 Tel: 250-399-4287	11-May-10	This number listed in 411.ca is not in service.	
Desmond and Valerie Fipke	E. Picco	2460 Filipoff Rd, Castlegar, BC V1N 4R9 Tel: 250-399-4287	11-May-10	Spoke with Valerie Fipke and she was concerned about the access road used for project and some other items as per her email to me. Forwarded email to Neil Bolger for comments and response.	
George Robert (Bob) and Karen Gretchen	E. Picco	Bob and Karen Gretchen, 2466 Filipoff Rd, Castlegar,BC V1N 4R9 Tel: 250-399-4244	11-May-10	Left voice mail regarding project and follow up to mailed letter. I provided my contact information and informed then to call me if they had any questions or concerns.	
Bob and Karen Gretchen	C. Bohun	Bob and Karen Gretchen,owners of Lots 1 and 2 Plan 16570	27-Oct-09	Telephone call to Gretchens advising that Terasen reps would be visiting tower site adjacent to their property and would be gaining access through their property. Gretchens have no issues with Terasen using property for access and are aware of plans to replace aerial crossing.	
INDUSTRY					
BC Hydro and Power Authority	C. Bohun	Larry Serko, Property Rep Tel: 250-549-8561	9-Feb-10	Telephone call and email to Larry requesting Hydro's consideration of temporary access agreement through Kootenay Canal. Larry referred question to Joan Muir. Joan Muir forwarded request to Valerie Fay.	larry.serko@bchydro.com
BC Hydro and Power Authority	C. Bohun	Valerie Fay, Property Coordinator Tel: 1-604-528-7796	18-Feb-10	Valerie confirmed that she is party responsible for coordinating responses for technical comments and clearances. Requested additional information.	valerie.fay@bchydro.com
BC Hydro and Power Authority	C. Bohun	Valerie Fay, Property Coordinator Tel: 1-604-528-7796	26-Feb-10, 1 Mar-10, 8-Mar-10	Emails exchanged regarding location, use of access route and request for onsite meeting for David Kan and Hydro rep.	
BC Hydro and Power Authority	C. Bohun	Patricia Richardson	9-Mar-10	Email received providing Chris Dahl's name as contact for on site meeting with David Kan	
Kalesnikoff Lumber Co.	C. Bohun	Stan Hadikin Tel: 250-399-4211	14-Dec-09	Telephone call to Stan to determine whether project area falls within Kalesnikoff's license area. Stan confirmed that project area falls outside of their license area and is within unlicensed Crown land. Stan offered assistance with clearing and with purchasing any cleared wood.	stanhd1@kalesnikoff.com
Teck Cominco	Property Services	Pat Murray, Consultant, for Teck Cominco	Jan-10	Requesting ROW from Teck Cominco for new pipeline. Permission for geotechnical investigation on their property.	pat.murray@amec.com

Appendix P

FIRST NATIONS INFORMATION

Ktunaxa Nation Council

The Ktunaxa Nation Council originated in 1970 as the Kootenay Indian District Council to promote the political and social development of the Nation.

In 1991 the Council's name was changed to Ktunaxa/Kinbasket Tribal Council (K/KTC) to reflect the origins of the two language groups (Ktunaxa and Secwepemc) in the Traditional Territory. In 2005 the Council's name was changed to Ktunaxa Nation Council (KNC).

The majority of Ktunaxa Nation citizens originate from the Ktunaxa or Kootenai culture. However, the Nation also contains descendants of the Kinbasket family, a small group of Shuswap (Secwepemc) people who journeyed east from Shuswap territory in the mid-1800's into Ktunaxa territory looking for a permanent home. Ktunaxa leadership allowed the Shuswap Kinbasket people to stay in Ktunaxa territory where they eventually settled in the Invermere area and became members of the Ktunaxa Nation.

The goals of the Ktunaxa Nation Council include preservation and promotion of Ktunaxa traditional knowledge, language and culture, community and social development and wellness, land and resource development, economic investment and self-government.

The Ktunaxa Nation Council (KNC) is accountable to the Chiefs and Council of the Ktunaxa Nation.

The programs and services of the KNC and its affiliates are available to KNC member Bands, Nation members living on and off reserve, and to other status and non-status persons living within Ktunaxa Traditional Territory.

The KNC also serves as an umbrella organization for several societies, committees and corporations which are engaged in the provision of programs and services to Ktunaxa citizens.

It is also the goal of the Ktunaxa Nation Council and its member Bands to work with our neighbours and build strong relationships to strengthen the regional economy within the Kootenays.

The Traditional Territory of the Ktunaxa Nation covers approximately 70,000 square kilometres (27,000 square miles) in south-eastern British Columbia and historically included parts of Alberta, Montana, Washington and Idaho.

All lands and resources in the Traditional Territory are to be managed according to the natural law given to the Ktunaxa Nation by the Creator:

ʔaknumuȼtiⱡiⱡ
Human beings have the ability to destroy the land and many livings things. Therefore, the Creator gave the Ktunaxa Nation a set of laws on how to live with the land and not against it.

The Ktunaxa Nation is developing both operational and governance structures to take on this responsibility as outlined by the Creator and to realize the Lands Sector Vision.

LANDS SECTOR VISION STATEMENT

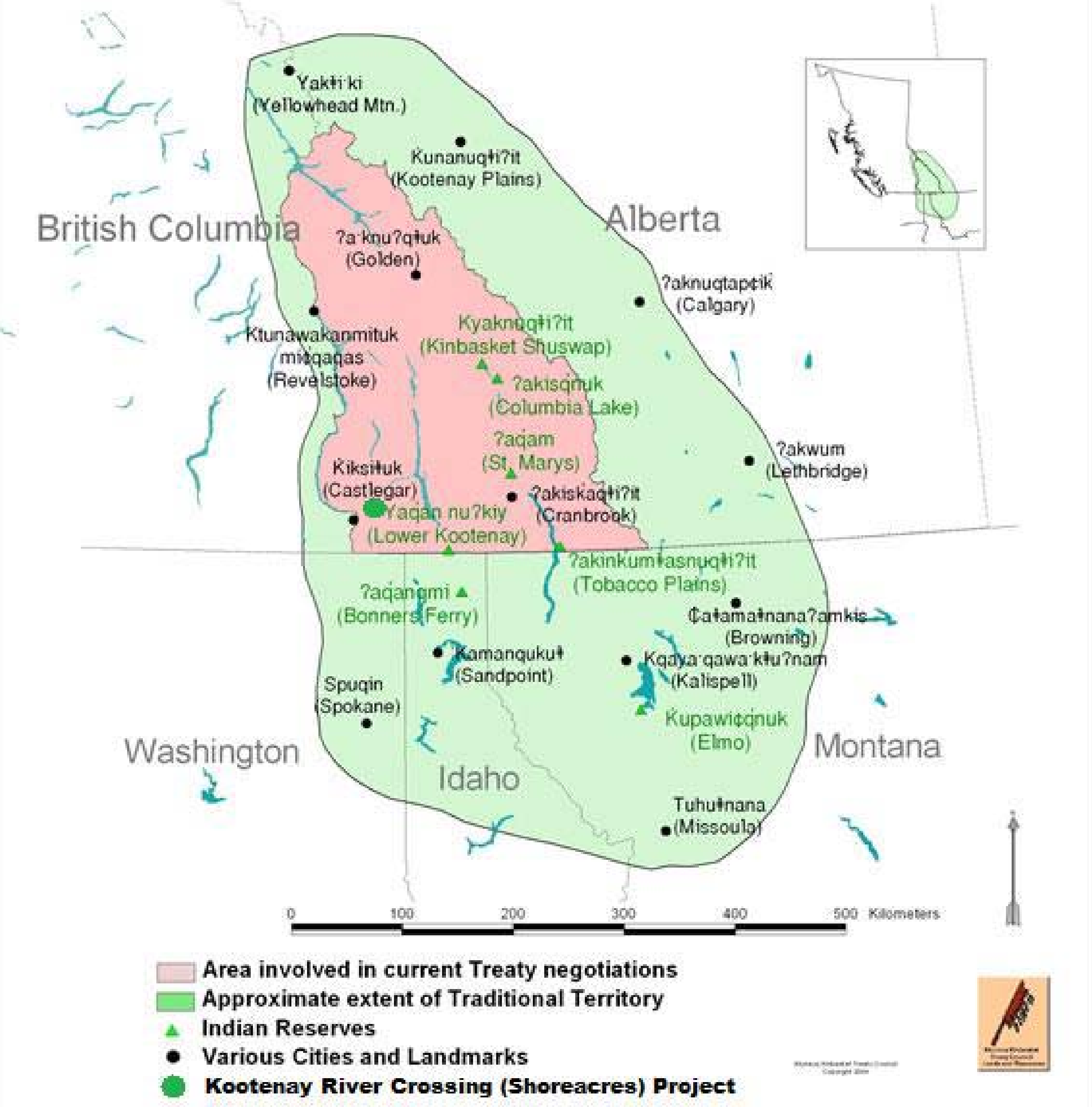
We the Ktunaxa and Kinbasket people envision ourselves working together as one Nation to responsibly care for the lands and resources within our Territory. Our stewardship of the lands and resources will be based on our sacred covenant with the Creator and our traditional values of:

- Ensuring land, air and water will be clean and healthy.
- Ensuring access to, and protection of, traditional foods and medicines.
- Balancing the economic use of land with cultural and spiritual values.
- Ensuring that long-term sustainability and ecological integrity take precedence.
- Following natural law; taking only what you need.

We envision a healthy environment in which all Ktunaxa and Kinbasket people can move freely throughout the Territory. We will exercise our rights to derive benefits from the lands and resources without compromising the future for our grandchildren and their grandchildren. Not only will our past heritage be preserved but we will be developing new connections with the land and each other.

We envision ourselves playing a central role in all decisions pertaining to lands and resources in our Territory. We will manage the lands and resources through healthy working relationships with ourselves and others based on understanding, respect and equality.

TRADITIONAL TERRITORY OF THE KTUNAXA NATION



Terasen
Gas

16705 Fraser Highway
Surrey, BC V4N 0E8
Tel: 604 576-7000
Fax: 604 592-7677
Toll Free: 1-800-773-7001
terasengas.com

February 19, 2010

Mr. Rae Warden
Ktunaxa Nation Council
7468 Mission Road
Cranbrook, British Columbia
V1C 7E5

Dear Mr. Warden

RE: Kootenay River Crossing (Shoreacres) Upgrade

As you know Terasen Gas is planning decommissioning the existing pipeline at Terasen's Kootenay River aerial crossing near the community of Shoreacres and replacing it with approximately 880 m of new NPS 6 transmission pressure pipe installed using Horizontal Directional Drill technology. This project will address two primary concerns; the deteriorating condition of the crossing pipe and structure and slope stability concerns at the east terminus of the crossing. The existing crossing is nearing the end of its useful life and recent inspections have identified the need for significant refurbishment if it is to remain in service. The east end of the crossing is located on a steep slope and inspections have regularly identified surface sloughing as a concern.

The new crossing begins on Terasen owned land near the west end of the existing crossing and will rejoin the existing right-of-way approximately 650 m north of the east terminus of the aerial crossing, thereby avoiding the area of slope instability at the east terminus. The new alignment will require approximately 475 m of new right-of-way. The installation of the new crossing and the decommissioning and removal of the existing crossing pipe and structure is being planned to occur in 2011.

Temporary working space may be required at certain locations during the Horizontal Directional Drill pipe string pull back and other installation staging. These working spaces will be included while securing right-of-way from Crown Land. A narrow strip of Crown Land will be needed for right-of-way for the new Horizontal Directional Drill alignment.

All required environmental permits and approvals for the project will be identified and applied for during the planning phase of the project. Agency notifications, permits and approvals are anticipated under, but not limited to, the Fisheries Act, Species at Risk Act, Navigable Waters Protection Act, Water Act, Forest and Range Practices Act, Heritage Conservation Act and Land Act. Terasen requires an approval from the British Columbia Oil and Gas Commission (OGC) to support this project as well as approval of a Certificate of Public Convenience and Necessity from the British Columbia Utilities Commission.

Ktunaxa Nation's Nupqu Development Corporation has been working with Terasen on opportunities arising from the project and is registered in the Terasen procurement process. Terasen has also been working with Eagle Vision on Archeological Studies.

In 2008 Terasen worked with Scott Bissett to obtain employment for members during Terasen's Brilliant Horizontal Directional Drill in Castlegar and we look forward to continuing that relationship.

It is my hope you will find this letter and attached maps useful in your review of the proposed Kootenay River Crossing (Shoreacres) Upgrade project. I will be your main contact for the planning and permitting stages of this project and I can be reached at my office at: 604-592-7686 or on my cell phone at: 604-785-8947 also I am always available to visit your community to discuss the project in person. I look forward to working with you on this project.

Respectfully;

Bruce Falstead
Aboriginal Relations Manager

cc: Neil Bolger, Terasen Gas

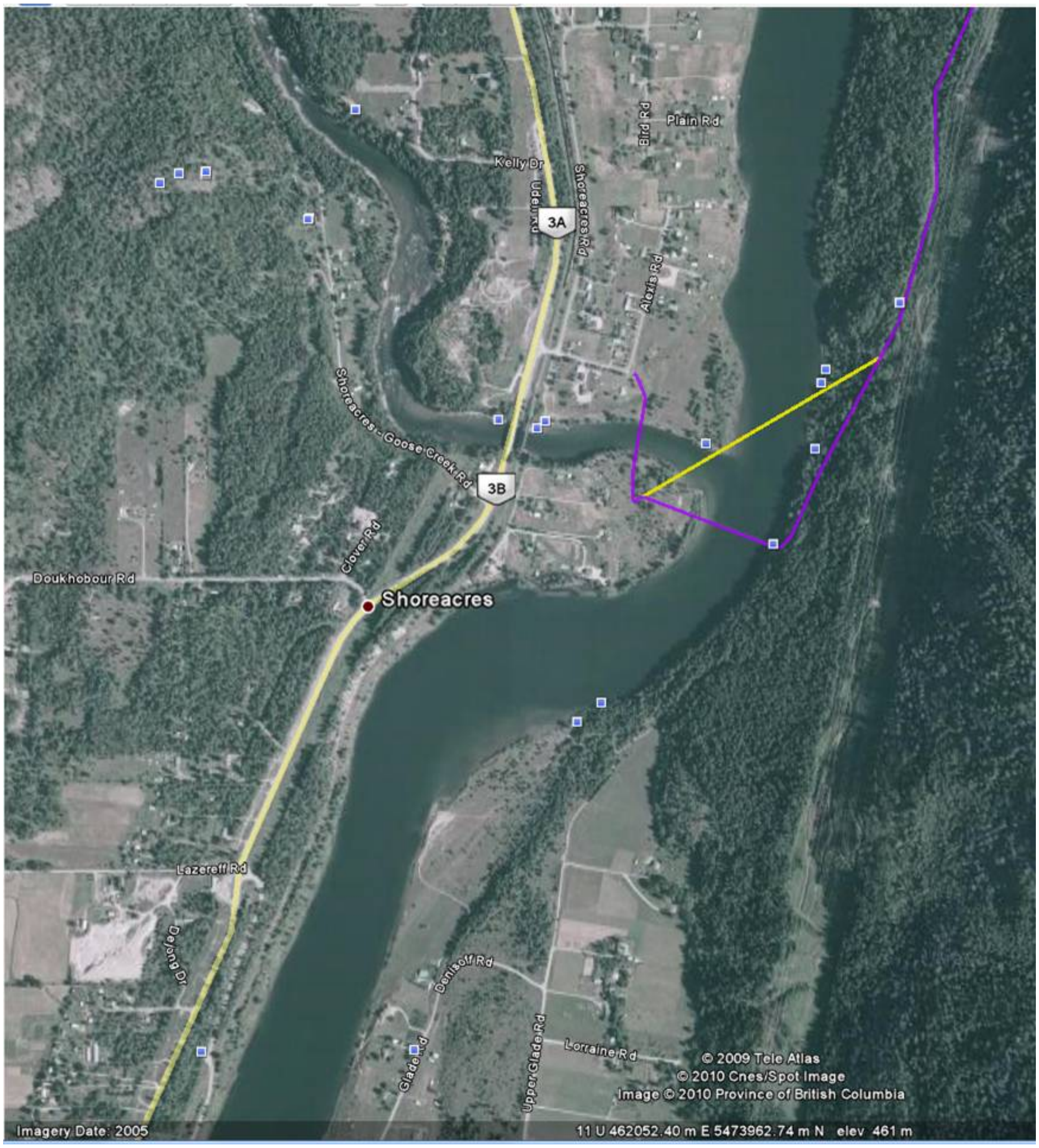
Attachment: Site Maps

Shoreacres Aerial Crossing Upgrade Project

- Existing Transmission
- Proposed HDD Route
- Archaeological Site
- Crown Land

Revision 2
Prepared by Ted Norcott
ESRI ArcMap ver 9.3
January 7, 2010

Purple line is our existing transmission pipeline (over the river)
Yellow is the proposed path for the new transmission pipeline (under the river)



Okanagan Nation Alliance

The seven member bands of the Okanagan Nation Alliance are Lower Similkameen Indian Band, Okanagan Indian Band, Osoyoos Indian Band, Penticton Indian Band, Upper Nicola Indian Band, Upper Similkameen Indian Band and Westbank First Nation.

Traditionally, Okanagans (syilx) occupied an area which extended over approximately 69 000 square kilometers. The northern area of this territory was close to the area of Mica Creek, just north of modern day Revelstoke, BC, and the eastern boundary was Kootenay Lake. The southern boundary extended to the vicinity of Wilbur, Washington and the western border extended into the Nicola Valley.

"S-Ookanhkchinx" in the Okanagan language translates to mean "transport toward the head or top end this refers to the people traveling from the head of the Okanagan Lake to where the Okanagan river meet the Columbia river. In other words Okanagan Lake and Okanagan River as well as other water systems were the traditional transportation routes of the syilx.

The Okanagan people were hunters and gatherers, and were noted to be semi-nomadic. Their staple diet consisted of deer, salmon, rabbit and other wild game. The Okanagan's were also gatherers of roots, berries and various other plants.

The first contact with the Okanagans was probably made in the late 1700's through the Hudson's Bay Company. One of the first actual contact dates was recorded in 1805 at Fort Kamloops. The Hudson's Bay "brigade trail" led right through the Okanagan Nation's territory, from Fort Kamloops to Fort Colville, presently know as Colville, Washington. U.S.A.

From that point the influx of European settlers was slow and yet steady, and both the Okanagans and Europeans worked towards a living arrangement that would satisfy both. It was understood that Okanagans would continue to use their traditional hunting, fishing and gathering grounds.

As settlement of the Okanagan increased, the establishment of the international border and the colony of British Columbia joining confederation, put considerable pressure on the Provincial government in B.C. to designate reserves for Native people. This would allow for the settlers to formally own the lands they settled on.

Reserves were finally established in the early 1900's. The Okanagan people opposed the establishment of the reserves without first having negotiated a treaty. Today the Okanagan people still believe that the land is theirs, as no treaty has been negotiated.

Okanagan Nation Traditional Territory

Terasen
Gas

16705 Fraser Highway
Surrey, BC V4N 0E8
Tel: 604 576-7000
Fax: 604 592-7677
Toll Free: 1-800-773-7001
terasengas.com

February 19, 2010

Mr. Jay Johnson
Okanagan Nation Alliance
3255C Shannon Lake Road,
Westbank, British Columbia
V4T 1V4

Dear Mr. Johnson

RE: Kootenay River Crossing (Shoreacres) Upgrade

As you know Terasen Gas is planning decommissioning the existing pipeline at Terasen's Kootenay River aerial crossing near the community of Shoreacres and replacing it with approximately 880 m of new NPS 6 transmission pressure pipe installed using Horizontal Directional Drill technology. This project will address two primary concerns; the deteriorating condition of the crossing pipe and structure and slope stability concerns at the east terminus of the crossing. The existing crossing is nearing the end of its useful life and recent inspections have identified the need for significant refurbishment if it is to remain in service. The east end of the crossing is located on a steep slope and inspections have regularly identified surface sloughing as a concern.

The new crossing begins on Terasen owned land near the west end of the existing crossing and will rejoin the existing right-of-way approximately 650 m north of the east terminus of the aerial crossing, thereby avoiding the area of slope instability at the east terminus. The new alignment will require approximately 475 m of new right-of-way. The installation of the new crossing and the decommissioning and removal of the existing crossing pipe and structure is being planned to occur in 2011.

Temporary working space may be required at certain locations during the Horizontal Directional Drill pipe string pull back and other installation staging. These working spaces will be included while securing right-of-way from Crown Land. A narrow strip of Crown Land will be needed for right-of-way for the new Horizontal Directional Drill alignment.

All required environmental permits and approvals for the project will be identified and applied for during the planning phase of the project. Agency notifications, permits and approvals are anticipated under, but not limited to, the Fisheries Act, Species at Risk Act, Navigable Waters Protection Act, Water Act, Forest and Range Practices Act, Heritage Conservation Act and Land Act. Terasen requires an approval from the British Columbia Oil and Gas Commission (OGC) to support this project as well as approval of a Certificate of Public Convenience and Necessity from the British Columbia Utilities Commission.

It is my understanding that the Okanagan Nation Alliance has developed a process to address appropriate consultation and I look forward to working with you to accomplish what is required.

It is my hope you will find this letter and attached maps useful in your review of the proposed Kootenay River Crossing (Shoreacres) Upgrade project. I will be your main contact for the planning and permitting stages of this project and I can be reached at my office at: 604-592-7686 or on my cell phone at: 604-785-8947 also I am always available to visit your community to discuss the project in person. I look forward to working with you on this project.

Respectfully,

Bruce Falstead
Aboriginal Relations Manager

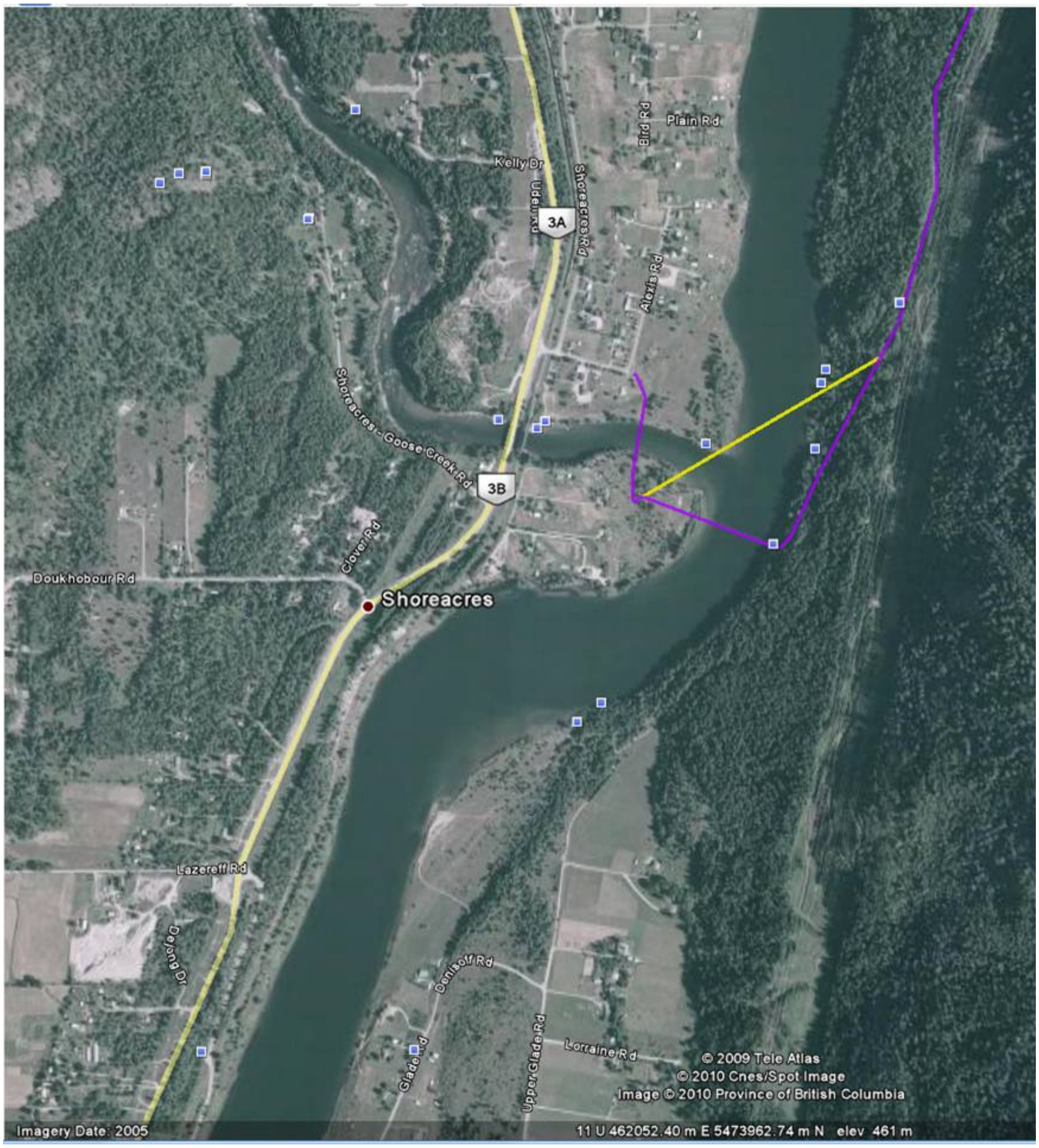
cc: Neil Bolger, Terasen Gas

Attachment: Site Maps

Shoreacres Aerial Crossing Upgrade Project

Revision 2
Prepared by Ted Norcott
ESRI ArcMap ver 9.3
January 7, 2010

Purple line is our existing transmission pipeline (over the river)
Yellow is the proposed path for the new transmission pipeline (under the river)



The Sinixt Nation Society

http://www.firstnations.eu/invasion/sinixt.htm

The Sinixt, known also as the Arrow Lakes Indian Band, are the First Peoples of the Upper Columbia Basin, a watershed area that spans British Columbia (BC) and Washington State. The "Lakes" indigenous people were given their name because their territory was centered on the waterways of the Arrow Lakes region.

"When the first European explorers arrived in this area, they encountered a rich culture that had flourished in this region for many thousands of years. Despite an apparent genocide perpetrated against the Sinixt, and having been declared officially extinct by the Canadian government, descendants of the Arrow Lakes Peoples continue to maintain a presence locally"

When the International Boundary line was being surveyed in 1857-1861, the major portion of the large Indian band then living in this area moved to the reservation at Colville, Washington. In 1956 Canada declared the Sinixt officially extinct, a decision that left those Sinixt members living on the Colville Reservation or scattered among other ethnic groups in BC without recognition under the Indian Act.

Neighbouring peoples to the Sinixt did not bury their dead in a sitting position, making burial grounds an accurate determinator of territorial boundaries. For the Sinixt, who are asking for recognition and reinstatement, such evidence is vital. Traditional Sinixt burial grounds were located alongside lakes and rivers and it is a great loss that so many have been destroyed by hydro development.

In 1902, Canada established a small reserve near Burton for a group of aboriginals which authorities called “the Arrow Lakes Indian Band”. Six families numbering 22 people in all were assigned to the reserve. But living on the reserve was incompatible with the traditional livelihood of the local aboriginals, who called themselves sngaytskstx, or Sinixt.

For thousands of years prior, the Sinixt had traversed the waters of the Columbia basin, fishing, hunting and gathering over seasonal rounds so as to avoid depleting the natural resources of any one site. The Sinixt could not sustain themselves by remaining sedentary. Living on the Burton reserve was not a viable option.

So when Canada conducted its roll-call of the Arrow Lakes Indian Band, they found that by the 1920s, only six people lived on the reserve, the last of which whom died in 1953. Notwithstanding that there were more than 250 Sinixt in Washington State at the time, the Canadian government declared in 1956 that the Arrow Lakes Indian Band ceased to exist as a band for the purposes of the *Indian Act*.

As a result of this declaration of extinction, many Sinixt remain disenfranchised from their statutory rights under the *Indian Act*, including the right to enter and remain in Canada.

But the Canadian government has explicitly acknowledged that the cessation of the Arrow Lakes Indian Band for the purpose of the *Indian Act* does not mean that the Sinixt ceased to exist as a tribal group. Further, with the enactment of the *Constitution Act* of 1982, Canada recognized and affirmed "aboriginal rights" which far exceed those rights set out in the *Indian Act*.

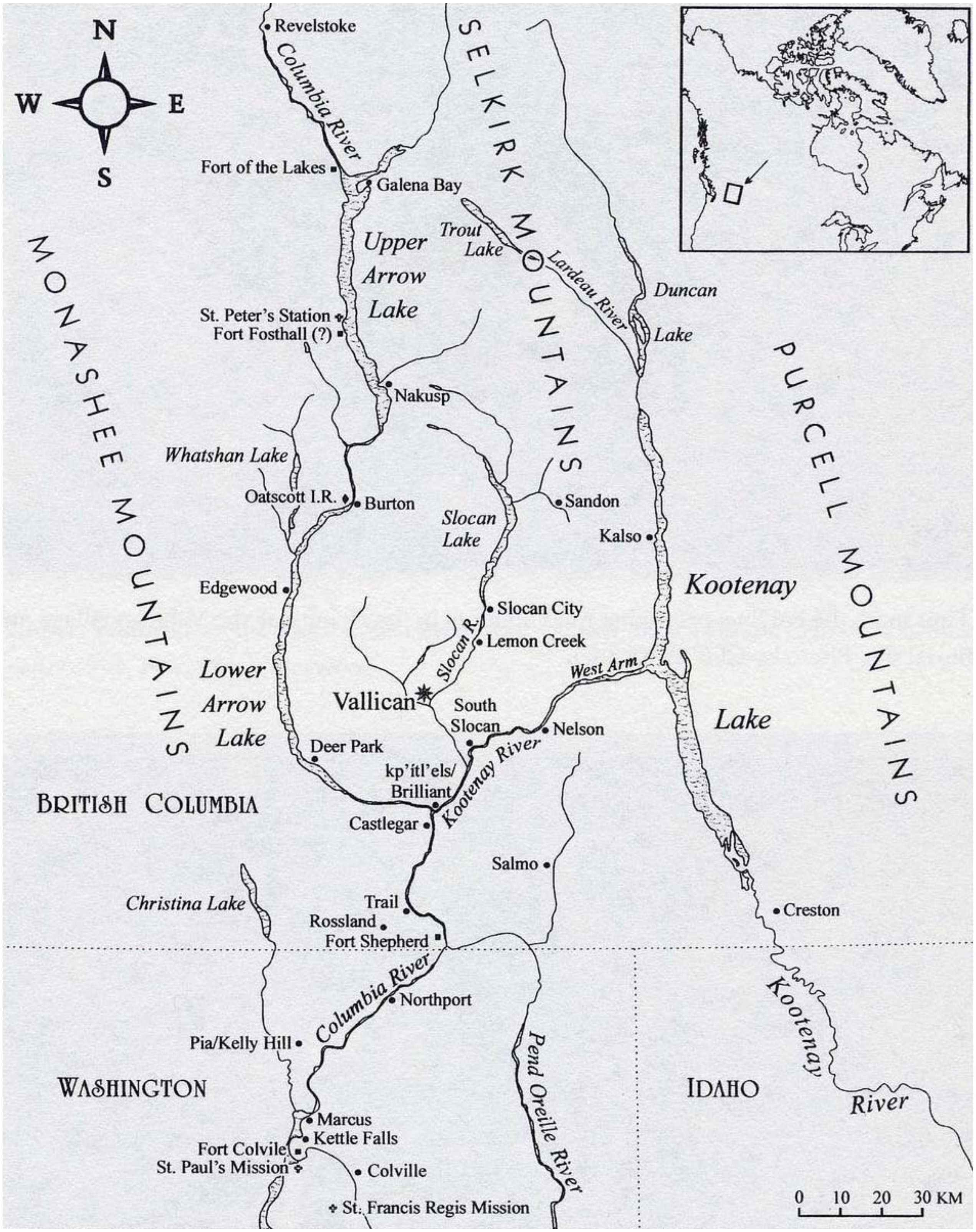
While the relevance of the extinction is limited to the *Indian Act*, it is the *Constitution Act*, not the *Indian Act*, on which the Sinixt rely in asserting;

(1) their right to enter and remain in Canada;

(2) their aboriginal title claim to their indigenous territory; and

(3) their right to be consulted regarding the Province's land and water decisions within their claimed territory, including:

  a) the approval of the Glacier-Howser independent power project;
  b) the approval of slaughterhouse facilities;
  c) the development of commercial forestry infrastructure;
  d) commercial harvesting of timber;
  e) the damming of waterways for hydroelectricity or other reasons;
  f) tourism development;
  g) maters affecting water quality;
  h) developments in caribou and/or wildlife habitat;
  i) transfer of property previously held by Pope & Talbot;
  j) mining activity;
  k) the development of mining infrastructure;
  l) resource and land use management decisions; and
  m) the issuance of water diversion licences.



From the headwaters of the Columbia River north of Nakusp, to Kaslo in the West, Revelstoke in the East, and down into what is now known as Washington State, the Sinixt people lived in harmony with this land.

Terasen
Gas

Ms. Marilyn James
Appointed Spokesperson
The Sinixt Nation Society,
RR1 G-16 C-2
Winlaw, British Columbia
Canada V0G 2J0

Date: April 26, 2010
File:

Dear Ms. James

RE: Kootenay River Crossing (Shoreacres) Upgrade

Further to our recent telephone conversation I am pleased to provide you with some information about the proposed Kootenay River Crossing (Shoreacres) Upgrade project.

Terasen Gas is planning decommissioning the existing pipeline at Terasen's Kootenay River aerial crossing near the community of Shoreacres and replacing it with approximately 880 m of new NPS 6 transmission pressure pipe installed using Horizontal Directional Drill technology. This project will address two primary concerns; the deteriorating condition of the crossing pipe and structure and slope stability concerns at the east terminus of the crossing. The existing crossing is nearing the end of its useful life and recent inspections have identified the need for significant refurbishment if it is to remain in service. The east end of the crossing is located on a steep slope and inspections have regularly identified surface sloughing as a concern.

The new crossing begins on Terasen owned land near the west end of the existing crossing and will rejoin the existing right-of-way approximately 650 m north of the east terminus of the aerial crossing, thereby avoiding the area of slope instability at the east terminus. The new alignment will require approximately 475 m of new right-of-way. The installation of the new crossing and the decommissioning and removal of the existing crossing pipe and structure is being planned to occur in 2011.

Temporary working space may be required at certain locations during the Horizontal Directional Drill pipe string pull back and other installation staging. These working spaces will be included while securing right-of-way from Crown Land. A narrow strip of Crown Land will be needed for right-of-way for the new Horizontal Directional Drill alignment.

All required environmental permits and approvals for the project will be identified and applied for during the planning phase of the project. Agency notifications, permits and approvals are anticipated under, but not limited to, the Fisheries Act, Species at Risk Act, Navigable Waters Protection Act, Water Act, Forest and Range Practices Act, Heritage Conservation Act and Land Act. Terasen requires an approval from the British Columbia Oil and Gas Commission (OGC) to support this project as well as approval of a

Certificate of Public Convenience and Necessity from the British Columbia Utilities Commission.

I look forward to working with you on the project. I will be your main contact for the planning and permitting stages of this project and I can be reached at my office at: 604-592-7686 or on my cell phone at: 604-785-8947. I am also always available to discuss the project in person.

Respectfully;

Bruce Falstead
Aboriginal Relations Manager
Terasen Gas Inc.

Attachment: Site Map

cc: David M. Aaron, Barrister & Solicitor
Neil Bolger, Terasen Gas
Oil and Gas Commission


N
Slocan River
Kootenay River
0
0.5
1
2 Km
Shoreacres Aerial Crossing Upgrade Project
Existing Transmission
Proposed HDD Route
Archaeological Site
Crown Land
Revision 2
Prepared by Ted Norcott
ESRI ArcMap ver 9.3
January 7, 2010

Kootney River Crossing (Shoreacres) Upgrade Project

First Nations Consultation
Contact Log

Agency/Party	Terasen Representative	Contact Information (i.e. phone, address, etc)	Date of Contact	Summary of Party's Response to Contact	Email
Ktunaxa Nation Council					
Ktunaxa Nation Council	B. Falstead	Ray Warden	June 22 2010	Left and phone message and followed up with an email message regarding the Kootenay River Crossing (Shoreacres) asking if Ray would like a paper copy of the CPCN or would he perfer to review it online.	rwarden@ktunaxa.org
Ktunaxa Nation Council	B. Falstead	Ray Warden	February 19, 2010	Mailed a registered letter with two maps attached RE: Kootenay River Crossing (Shoreacres) Upgrade to Ray Warden's attention outlining the project.	rwarden@ktunaxa.org
Ktunaxa Nation Council	B. Falstead	Ray Warden	February 10, 2010	Ray Warden asked that any environmental studies be shared with him. Responded in email to Ray Warden's question regarding the time a more detailed report and field reconnaissance will be available. It will be done on the selected option and will be available in April 2010.	rwarden@ktunaxa.org
Ktunaxa Nation Council	R.Sulentich	Ray Warden	January 25, 2010	Email sent regarding the project. Ray is responsible for Ktunaxa referrals. Bruce Falstead has a copy of the follow up email that was sent to Ray. On the same day, per Ray's request, a preliminary environmental screening report was provided.	rwarden@ktunaxa.org
Ktunaxa Nation Council	R.Sulentich	Norm Fraser	November 5, 2009	Follow up email request from Norm Fraser to start discussion regarding the Shoreacres project business opportunities well in advance to set up for success. Norm is the Business Manager for Nupqu Development Corporation the Ktunaxa Nation's business arm.	nfraser@ktunaxa.org
Ktunaxa Nation Council	R.Sulentich	Norm Fraser	October 16, 2009	Email follow up from Norm Fraser after a face to face meeting in Kelowna confirming the Nupqu Development Corporation's (Ktunaxa Nation Council) interest contracting for the Shoreacres project.	nfraser@ktunaxa.org
Ktunaxa Nation Council	R.Sulentich	Norm Fraser	October 14, 2009	Email vendor application from Norm Fraser to Terasen Gas regarding name change of Ktunaxa Nation development arm, Nupqu Development Corporation.	nfraser@ktunaxa.org
Ktunaxa Nation Council	R.Sulentich	Norm Fraser	August 17, 2009	Email follow up from Norm Fraser after a face to face meeting in Vancouver confirming the Nupqu Development Corporation's (Ktunaxa Nation Council) interest in contracting for the Shoreacres project.	nfraser@ktunaxa.org
Ktunaxa Nation Council	R.Sulentich	Norm Fraser	August 14, 2009	Face to face meeting with Norm Fraser in Vancouver about the Nupqu Development Corporation's (Ktunaxa Nation Council) interest in contracting for the Brilliant Project and the Shoreacres Project.	nfraser@ktunaxa.org
Ktunaxa Nation Council	B. Falstead	Ray Warden	March 17, 2008	Phone and email message to Ktunaxa Nation Council requesting a meeting to review their protocols regarding Terasen planned projects that may require consultation.	rwarden@ktunaxa.org
Okanagan Nation Alliance					
Okanagan Nation Alliance	B. Falstead	Jay Johnson - Responsible for Industry Referrals	June 22 2010	Spoke with Jay on the phone. Discussed the ONA's participation in the upcoming archaeological work. Kathy or Dallas from the ONA Westbank office will be working on getting ONA members involved. Jay would like a paper copy of the CPCN.	johnson-jay@shaw.ca
Okanagan Nation Alliance	B. Falstead	Jay Johnson - Responsible for Industry Referrals	May 12 2010	Spoke with Jay on the phone. Discussed the ONA proposed budget for engagement on the project. Discussed an overall engagement agreement with Terasen Gas and FortisBC. Jay explained that the ONA have internal protocols regarding engagement around a member First Nation's reserve. The Kootenay River Crossing (Shoreacres) Upgrade is not close to any ONA members reserve. ONA wish to look over the existing archaeological work. Following phone call, Jay provided via email a copy of ONA's newly developed decision making process, stating that the ONA does not recognize archaeological work conducted within ONA territory that does not have ONA participation and that ONA needs to carry out background literary research to satisfy ONA decision making process.	johnson-jay@shaw.ca
Okanagan Nation Alliance	B. Falstead	Jay Johnson - Responsible for Industry Referrals	April 19 2010	Provided copies by email of Feb 19 2010 letter and map as well as Shoreacres Archeological Report July 2009 to identify and assess archaeological resource potential or sensitivity.	johnson-jay@shaw.ca

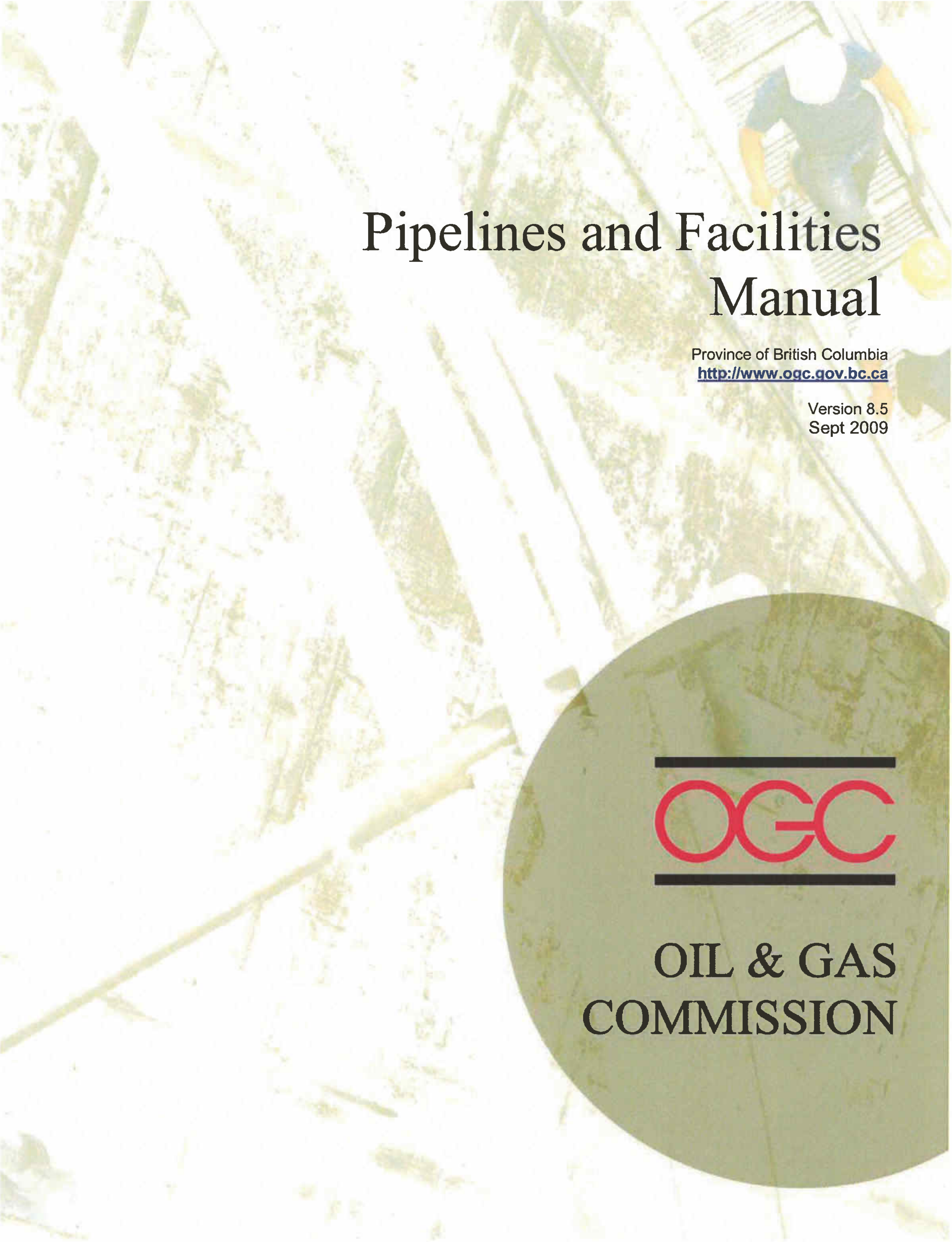
Kootney River Crossing (Shoreacres) Upgrade Project

First Nations Consultation
Contact Log

Agency/Party	Terasen Representative	Contact Information (i.e. phone, address, etc)	Date of Contact	Summary of Party's Response to Contact	Email
Okanagan Nation Alliance	B. Falstead	Jay Johnson - Responsible for Industry Referrals	April 19 2010	Left Jay with phone message and followed up with an email requesting that he provide the proposal for funding to proceed with consultation that we spoke about on the 12th of April.	johnson-jay@shaw.ca
Okanagan Nation Alliance	B. Falstead	Jay Johnson - Responsible for Industry Referrals	April 12 2010	Face to face meeting with Jay Johnson at 1111 West Georgia Vancouver (meeting notes). Main topics: (1) resending the Feb. 19 information and preliminary field reconnaissance; (2) ONA does not recognize archaeology studies unless it is involved; (3) ONA has a new decision making process.	johnson-jay@shaw.ca
Okanagan Nation Alliance	B. Falstead	Jay Johnson - Responsible for Industry Referrals	March 29, 2010	Talked with Jay Johnson on the phone about Shoreacres and ONA process. Scheduled a meeting in West bank for April 12th 2010.	johnson-jay@shaw.ca
Okanagan Nation Alliance	B. Falstead	Jay Johnson - Responsible for Industry Referrals	February 19, 2010	Mailed a registered letter (Okanagan Nation Alliance letter 2010-02-19) with two maps attached RE: Kootenay River Crossing (Shoreacres) Upgrade to Jay Johnson's attention outlining the project.	johnson-jay@shaw.ca
Okanagan Nation Alliance	R.Sulentich	Jay Johnson - Responsible for Industry Referrals	January 25, 2010	Phone call followed up by an email regarding the project. Jay is responsible for Okanagan Nation Alliance referrals. Bruce Falstead has a copy of the follow up email that was sent to Jay.	johnson-jay@shaw.ca
The Sinixt Nation Society					
The Sinixt Nation Society	B. Falstead	Ms. Marilyn James-Appointed Spokesperson The Sinixt Nation Society	June 22 2010	Received an email from Marilyn regarding potential contact for archeological field work, Taress Alexis. Marilyn also requested a copy of the study.	mjames@selkirk.ca
The Sinixt Nation Society	B. Falstead	Ms. Marilyn James-Appointed Spokesperson The Sinixt Nation Society	June 8 2010	Responded to Marilyn's June 1, 2010 email questions concerning alignment, archeological overview assessment, and employment opportunities. Also requested budget proposal for Sinixt consultation activities.	mjames@selkirk.ca
The Sinixt Nation Society	B. Falstead	Ms. Marilyn James-Appointed Spokesperson The Sinixt Nation Society	June 1 2010	Received an email from Marilyn with questions regarding alignment, archeology and employment.	mjames@selkirk.ca
The Sinixt Nation Society	B. Falstead	Ms. Marilyn James-Appointed Spokesperson The Sinixt Nation Society	May 31 2010	Spoke with Marilyn James on the telephone to confirm that she had received the April 24, 2010 information package. She confirmed receipt.	mjames@selkirk.ca
The Sinixt Nation Society	B. Falstead	Ms. Marilyn James-Appointed Spokesperson The Sinixt Nation Society	April 26 2010	Mailed a registered letter with map attached RE: Kootenay River Crossing (Shoreacres) Upgrade to Marilyn James and David Aaron attention outlining the project.	mjames@selkirk.ca
The Sinixt Nation Society	B. Falstead	Ms. Marilyn James-Appointed Spokesperson The Sinixt Nation Society	April 24 2010	Spoke with Marilyn James on the telephone to confirm her position and address, she advised to send copies of all information to the Sinixt Nation Society's lawyer David M. Aaron.	mjames@selkirk.ca

Appendix Q

OGC PIPELINE MANUAL FIRST NATIONS CONSULTATION SECTION



Pipelines and Facilities Manual

Province of British Columbia
http://www.ogc.gov.bc.ca

Version 8.5
Sept 2009

OGC

OIL & GAS
COMMISSION

TABLE OF CONTENTS

NOTE: At this time a Global Glossary is being created and will be available on the OGC website for use in 2007. Please refer to this for the terms and acronyms used in this manual.

6.2.14 First Nations Consultation and Aboriginal Community Notification

FIRST NATIONS CONSULTATION / ABORIGINAL COMMUNITY NOTICE

Ensure the following are attached to application for First Nations consultation purposes:

Aboriginal Community Notice	Consultation		Attachments
☐ KLCN	☐ BRFN	☐ MLIB	☐ Cover letter (2 copies for EACH Consultation and notification area affected) ☐ Application Form ☐ Construction Plan ☐ 1:20,000 BCGS sketch; 1:50,000 & 1:250,000 ☐ First Nation Notification Form ☐ Archaeological Assessment Information Form ☐ Archaeological Reports, if available
☐ KLFN	☐ DENE THA	☐ PRFN	
☐ KLMSS	☐ DRFN	☐ SFN	
☐ FLFN	☐ FNFN	☐ WMFN	
☐ Other ______	☐ HRFN	☐ Other ______	

The OGC is responsible for conducting consultations with First Nations communities in relation to potential adverse impacts of statutory decisions on constitutionally recognized rights. In order to effectively carry out this responsibility, the OGC has entered into consultation agreements with Treaty 8 First Nations. These agreements outline how the OGC consults with Treaty 8 First Nations. These First Nation communities review applications submitted by industry; and, are provided the opportunity to identify any potential adverse impacts on treaty rights and make suggestions for minimizing those impacts.

Note: New Consultation Process Agreements (CPAs) have been negotiated with Doig River, Prophet River, Fort Nelson, Halfway River, Saulteau, and West Moberly First Nations. These CPAs will be implemented over the next few months through direction from the CPA Implementation Committee. Once the implementation details are known, this section of the manual will be updated

The OGC also provides copies of applications to a number of aboriginal communities in Northeast BC.

For applications outside Northeast BC, contact OGC's Aboriginal Relations staff.

Company Responsibilities

General guidance for engaging First Nation people and communities is provided in OGC's *A Guide to Public Engagement and Appropriate Dispute Resolution* Link to Public Engagement Guideline

To assist OGC in fulfilling their obligation, companies are requested to provide consultation notification material with each application for every First Nation community that may potentially be impacted by the pipeline or facility. Maps are available for review at the OGC.

☐ First Nations Consultation and Notification Package - the required consultation attachments are outlined under the First Nations Consultation Section of the Pipeline Application Form. (Link to OGC Forms)

Pre-application – prior to submitting an application to the OGC, companies are encouraged to initiate and build relationships with First Nations communities directly, discuss intended development plans, and begin to understand the people, issues, and concerns.

Further documentation demonstrating that an applicant has followed industry Best Management Practices in preparing the application and responding to FN concerns will assist in application review by the OGC. Refer to industry standards. (Canadian Association of Petroleum Producers (CAPP) Home)

The documented information should include the following:

☐ Description of what information exchange has occurred
☐ Identification of any potential adverse impacts
☐ What, if any, mitigation of those potential adverse impacts has been incorporated into the application?

OGC Responsibilities

OGC Aboriginal Relations staff conducts consultation/notification and liaison activities with First Nations, organize meetings between oil and gas companies and First Nations communities, and provide recommendations to support program managers in making decisions about oil and gas development applications. Program managers serve as statutory decision makers and have overall responsibility to determine if there has been adequate and meaningful consultation and mitigation of potential adverse impacts and whether sufficient information is available to make those determinations. Each First Nations community has a designated contact person within the OGC so that the community can work with someone who is familiar with its particular interests and issues.

OGC Process

OGC consults through the process and timelines established in agreements. (Consultation Agreements)

Consultation/notification packages are delivered to the First Nations communities based on an established delivery schedule. If concerns are identified in First Nations responses, the OGC will, where appropriate, facilitate meetings with the community (involving the oil and gas company as necessary) to discuss their concerns and proposed mitigation measures. If the First Nations communities do not respond within the specified timeframes, the OGC will advise the community as to when a decision will be made, and will then proceed with the application review

The OGC also sends packages for Notification only to aboriginal communities when applications occur on areas where they have identified having interests on the land.

Abbreviations within this section of the form are as follows:

Notification Only Communities/Bands	
KLCN	Kelly Lake Cree Nation
KLFN	Kelly Lake First Nation
KLMSS	Kelly Lake Métis Settlement Society
FLFN	Fort Liard First Nation

Consultation Communities/Bands	
BRFN	Blueberry River First Nations
DENE THA	Dene Tha' First Nation
DRFN	Doig River First Nation
FNFN	Fort Nelson First Nation
HRFN	Halfway River First Nation
MLIB	McLeod Lake Indian Band
PRFN	Prophet River First Nation
SFN	Saulteau First Nations
WMFN	West Moberly First Nations

6.2.15 First Nations Notification (formerly called Pre-Assessments)

Notification (formerly called pre-assessment) of First Nations is in the main consultation method in situations where the proposed project changes are minimal and may not require full First Nations consultation. Generally, this would apply for minor revisions or amendments. In these cases, companies are to submit a First Nations Notification Form (formerly called pre-assessment) for each community. The OGC will review this form and determine if more extensive First Nations consultation is required. If the notification method is acceptable in the circumstances, the relevant First Nations communities will be notified of the changes.

☐ Notification form (Link to First Nations Forms)

☐ First Nations Consultation Package - the required consultation attachments are outlined above.

It is recommended that companies submit full consultation and notification packages with all notification forms, in order to promote timely processing in case more extensive First Nations consultation is deemed necessary by the OGC.

Appendix R

DRAFT ORDERS

BRITISH COLUMBIA
UTILITIES COMMISSION

ORDER
NUMBER G-XX-10

SIXTH FLOOR, 900 HOWE STREET, BOX 250
VANCOUVER, B.C. V6Z 2N3 CANADA
web site: http://www.bcuc.com

TELEPHONE: (604) 660-4700
BC TOLL FREE: 1-800-663-1385
FACSIMILE: (604) 660-1102

IN THE MATTER OF
the Utilities Commission Act, R.S.B.C. 1996, Chapter 473

and

An Application by Terasen Gas Inc.
for a Certificate of Public Convenience and Necessity
for the Upgrade of Transmission Pipeline Crossing of the Kootenay River near Shoreacres

BEFORE:

XXXX YY, 2010

ORDER

WHEREAS:

A. On July 15, 2010, Terasen Gas Inc. ("TGI") applied (the "Application") to the British Columbia Utilities Commission (the "Commission"), pursuant to sections 45 and 46 of the Utilities Commission Act (the "Act"), for a Certificate of Public Convenience and Necessity ("CPCN") to install a natural gas transmission pipeline, using horizontal directional drilled ("HDD") technology, that crosses the Kootenay River near the community of Shoreacres approximately half way between Castlegar and Nelson (the "Kootenay River Crossing (Shoreacres) Upgrade Project" or the "Project"; and

B. The HDD crossing, as proposed by TGI in the Kootenay River Crossing (Shoreacres) Upgrade Project, will be approximately 880 metres (0.5 mile) of 168 mm (6 inch) pipeline. The Project will replace the existing 219 mm (8 inch) aerial crossing; and

C. TGI states that it considered several alternatives in the Application, one of which was the replacement of the existing aerial crossing with a new 9 km 168 mm (6 inch) transmission pressure ("TP") pipe alignment and another the replacement with a new 9 km 219 mm (8 inch) intermediate pressure ("IP") pipe alignment, together with a TP/IP station; and

D. TGI is proposing the Kootenay River Crossing Upgrade Project as the preferred solution to address potential consequences from the slope instability at the east terminus of the existing aerial crossing and the deteriorating condition of the aerial crossing structure and pipe; and

E. TGI proposes to start installation of the new crossing in April 2011 and to have the new crossing in-service by July 2011 with the aerial crossing removal and final site clean up as soon as practical thereafter. TGI has estimated the cost of the project will be approximately $8.3 million including Allowance for Funds Used During Construction (“AFUDC”); and

F. TGI considers that a written hearing process is appropriate for the review of the Application and has proposed a regulatory timetable; and

G. Concurrent with the filing of the Application, TGI provided notice of filing of the Application to registered parties in the TGI 2010-2011 Revenue Requirements Application, as well as to identified stakeholders, which were set out in Appendices O and P of the Application; and

H. The Commission considers that establishing a written public hearing and regulatory timetable for the registration of Intervenors and for the review of the Application is necessary and in the public interest.

NOW THEREFORE the Commission orders as follows:

1. The Application will be examined by a Written Public Hearing process, in accordance with the Regulatory Timetable for the hearing that is established and attached as Appendix A to this Order.

2. The Application, together with any supporting materials, will be made available for inspection at the TGI Office, 16705 Fraser Highway, Surrey, BC, V4N 0E8 and at the British Columbia Utilities Commission, Sixth Floor, 900 Howe Street, Vancouver, BC, V6Z 2N3, and will also be available on the TGI and Commission websites at www.terasengas.com and www.bcuc.com.

3. Intervenors or Interested Parties should register with the Commission, in writing or electronic submission, by Thursday, August 24, 2010. Intervenors should specifically state the nature of their interest in the Application, and identify generally the nature of the issues that they intend to pursue during the proceeding and the nature and extent of their anticipated involvement in the review process.

4. TGI will publish the Notice of Application and Written Public Hearing, attached as Appendix B, in the local papers in Castelgar and Nelson, as soon as it is possible to do so.

DATED at the City of Vancouver, in the Province of British Columbia, this XX day of July 2010.

BY ORDER

Original signed by:

Commissioner

Attachments

BRITISH COLUMBIA UTILITIES COMMISSION

SIXTH FLOOR, 900 HOWE STREET, BOX 250
VANCOUVER, BC V6Z 2N3 CANADA
web site: http://www.bcuc.com

TELEPHONE: (604) 660-4700
BC TOLL FREE: 1-800-663-1385
FACSIMILE: (604) 660-1102

APPENDIX A
to Order G-XX-10
Page 1 of 1

An Application by Terasen Gas Inc.
for a Certificate of Public Convenience and Necessity
for the Upgrade of Transmission Pipeline Crossing of the Kootenay River near Shoreacres

REGULATORY TIMETABLE

ACTION	**DATES (2010)**
Commission Information Request No. 1	Tuesday, August 17
Intervenor and Interested Party Registration	Tuesday, August 24
Intervenor Information Request No. 1	Tuesday, August 24
TGI Response to Information Requests No. 1	Thursday, September 9
Commission and Intervenor Information Requests No. 2	Thursday, September 23
TGI Response to Information Requests No. 2	Thursday, October 7
TGI Written Final Submission	Thursday, October 21
Intervenor Written Final Submission	Thursday, November 4
TGI Written Reply Submission	Thursday, November 18

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An Application by Terasen Gas Inc. ("Terasen Gas", "TGI")
for a Certificate of Public Convenience and Necessity
for the Upgrade of Transmission Pipeline Crossing of the Kootenay River near Shoreacres

NOTICE OF APPLICATION AND WRITTEN PUBLIC HEARING

THE APPLICATION

On July 15, 2010 Terasen Gas applied to the British Columbia Utilities Commission (the "Commission") for a Certificate of Public Convenience and Necessity (the "Application") for the Kootenay River Crossing (Shoreacres) Upgrade Project. Terasen Gas requests approval for installation of a natural gas transmission pipeline crossing of the Kootenay River near Shoreacres, using the Horizontal Directional Drill ("HDD") construction method to tunnel under the river bed at a depth where the river is unaffected. The crossing will replace the existing aerial crossing that Terasen Gas considers to be no longer reliable due to potential consequences from river bank slope instability and the deteriorating condition of the aerial crossing structure and pipe.

The proposed crossing will be 168 mm (6 inch) outside diameter pipe, approximately 880 metres long. The HDD drill will enter near the existing western terminus of the aerial crossing and exit 650 m north of the existing east terminus to avoid the unstable slope. The replacement crossing, with an estimated cost of approximately $8.3 million, is to be in-service by July 2011 and the existing aerial crossing removed from service by October 2011.

In its Application Terasen Gas considered several alternatives, one of which is to replace the existing 291 mm (8 inch) aerial crossing with a new 9 km 168 mm (6 inch) transmission pressure ("TP") pipe alignment and another the replacement with a new 9 km 219 mm (8 inch) intermediate pressure ("IP") pipe alignment, together with a TP/IP station. The location of the crossings are shown on the map below.

THE REGULATORY PROCESS

The Commission has established a Written Public Hearing and Regulatory Timetable for the regulatory review of the Application. The Regulatory Timetable can be viewed on the Commission's web site at www.bcuc.com.

INTERVENTION

Persons who expect to actively participate in the Terasen Gas proceeding should register as Intervenors with the Commission, and should identify the issues that they intend to pursue as well as the nature and extent of their anticipated involvement in the review process. Intervenors will each receive a copy of the Application, all correspondence and filed documentation and should provide an e-mail address, if available.

Persons not expecting to actively participate, but who have an interest in the proceeding, should register as Interested Parties. Interested Parties will receive a copy of the Executive Summary in the Application, and all Orders and Decisions issued.

Intervenors and Interested Parties should register in writing, no later than Thursday, August 24, 2010. Notification by mail, courier delivery, fax or e-mail is acceptable.

All submissions and/or correspondence received from active participants or the general public relating to the Application will be placed on the public record and posted to the Commission's web site.

PUBLIC INSPECTION OF THE DOCUMENTS

The Application and supporting materials will be available for inspection at the following locations:

British Columbia Utilities Commission, Sixth Floor, 900 Howe Street
Vancouver, BC V6Z 2N3 Telephone: 1-800-663-1385 **Internet:** www.bcuc.com

Terasen Gas Office
16705 Fraser Highway
Surrey, BC V6N 0E8
Internet www.terasengas.com

For further information, please contact Ms. Erica Hamilton, Commission Secretary, or Mr. Robert Brownell, Senior Energy Analyst as follows:

Telephone: (604) 660-4700	BC Toll Free: 1-800-663-1385
Facsimile: (604) 660-1102	E-mail: Commission.Secretary@bcuc.com

BRITISH COLUMBIA
UTILITIES COMMISSION

ORDER
NUMBER C-XX-10

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IN THE MATTER OF
the Utilities Commission Act, R.S.B.C. 1996, Chapter 473

and

An Application by Terasen Gas Inc.
for a Certificate of Public Convenience and Necessity
for the Upgrade of Transmission Pipeline Crossing of the Kootenay River near Shoreacres

BEFORE:

XXX YY, 2010

CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY

WHEREAS:

A. On July 15, 2010, Terasen Gas Inc. (“TGI”) applied (the “Application”) to the British Columbia Utilities Commission (the “Commission”), pursuant to sections 45 and 46 of the Utilities Commission Act (the “Act”), for a Certificate of Public Convenience and Necessity (“CPCN”) to install a natural gas transmission pipeline, using horizontal directional drilled (“HDD”) technology, that crosses the Kootenay River near the community of Shoreacres (the “Kootenay River Crossing (Shoreacres) Upgrade Project” or the “Project”); and

B. The HDD crossing, as proposed by TGI in the Kootenay River Crossing (Shoreacres) Upgrade Project, will be approximately 880 metres (0.5 mile) of 168 mm (6 inch) pipeline. The Project will replace the existing 219 mm (8 inch) aerial crossing; and

C. TGI states that it considered several alternatives in the Application, one of which was the replacement of the existing aerial crossing with a new 9 km 168 mm (6 inch) transmission pressure (“TP”) pipe alignment and another the replacement with a new 9 km 219 mm (8 inch) intermediate pressure (“IP”) pipe alignment, together with a TP/IP station; and

D. TGI is proposing the Kootenay River Crossing Upgrade Project as the preferred solution to address potential consequences from the slope instability at the east terminus of the existing aerial crossing and the deteriorating condition of the aerial crossing structure and pipe; and

E. TGI proposes to start installation of the new crossing in April 2011 and to have the new crossing in-service by July 2011 with the aerial crossing removal and final site clean up as soon as practical thereafter. TGI has estimated the cost of the project will be $8.3 million including Allowance for Funds Used During Construction (“AFUDC”); and

F By Order G-XX-10 dated <date>, the Commission determined that the Application would be examined by a Written Public Hearing process, and established a Regulatory Timetable; and

G. The Written Public Hearing process concluded with the filing of TGI's Reply Submission; and

H. The Commission Panel has considered the Application, the evidence and submissions filed in the proceeding and has determined that the Project is in the public interest and that a CPCN should be granted to TGI for the Project for the reasons set out in the Reasons for Decision that accompany this Order.

NOW THEREFORE pursuant to sections 45 and 46 of the Act, the Commission orders as follows:

1. A Certificate of Public Convenience and Necessity is granted to TGI for construction and operation of the Kootenay River Crossing (Shoreacres) Upgrade Project, as applied for in the Application.

2. TGI shall file with the Commission by April 29, 2011, a report (the "Report") providing a description of the contract with the HDD contractor; identification of the components of the Project where cost risk is with the utility and its ratepayers; a description and analysis of risk allocation; a detailed control budget for the Project; an updated Project schedule; TGI's intentions and recommendations with regard to the completion of the Project; and cost estimates that have a 50 percent probability ("P50") and a 90 percent probability ("P90") that the actual cost of the Project will not exceed the cost estimates. The control budget will be consistent with the P50 cost estimate.

3. TGI shall file with the Commission Quarterly Progress Reports on the Project using a format similar to that used in the Fraser River Crossing Upgrade Project.

4. TGI shall file with the Commission a final Report, within six months of the end or substantial completion of the Project, that provides a complete breakdown of the final costs of the Project, compares these costs to the updated cost estimate, and provides an explanation and justification of material cost variances.

5. TGI shall comply with the directives of the Commission Panel in the Reasons for Decision that accompany this Order.

DATED at the City of Vancouver, in the Province of British Columbia, this XX day of December 2010.

BY ORDER

Original signed by:

Commissioner/Panel Chair