

23 March 2006
File: 2005-052

Tolko Industries Ltd. c/o Terrafor Resources
9304 Aberdeen Road
Coldstream, British Columbia
V1B 2K5

Attention: Glenn Dick, R.P.F.

**MONTE CREEK – FISH PASSAGE IMPROVEMENT
7.5 KM OF PYTHON ROAD
Okanagan-Shuswap Forest District**

Dear Glenn:

At your request, the author attended the above referenced site with Mr. Alan Bates, P.Eng. of Streamworks Unlimited on 15 November 2006. The purpose of the site visit was to assess the geotechnical and hydrological conditions at the existing crossing location with the goal of improving fish passage beneath the road. A visual assessment of the conditions, at and adjacent to, the subject stream crossing was undertaken. In addition, a sketch plan of the area was prepared along with a surveyed cross-section and profile of the stream channel at the subject site. Streamworks Unlimited undertook an office based hydrologic review of the watershed upstream of the crossing to estimate the Q_{100} design flows; evaluated hydrologic capacity of the existing culvert structure; and prepared a hydrologic mitigation plan to improve fish passage at this crossing. The following is a summary of the field and office assessments together with design details regarding construction of mitigation works to improve fish passage at this location.

General Conditions

Use of this report is subject to the Statement of General Conditions, which is attached. The reader's attention is specifically drawn to these conditions, as it is essential that they be followed for proper use and interpretation of this report.

Site Conditions

The Monte Creek FSR and Python Road are located within the Thompson Plateau of the Interior Plateau Physiographic Region, about 7km south-southwest of the community of Monte Lake, B.C. (see figures 1 and 2, attached). The site is within the Monte Creek drainage basin. Monte Creek flows northward and enters the South Thompson River at the community of Monte Creek. The site may be accessed by driving south on the Monte Creek FSR (Private Road) to about 7.3 km then turning right (west) onto the Python Road.

The terrain in the vicinity of the site consists of glaciofluvial and fluvial sand and gravel some of which has been historically quarried in the Stephen's Lakes area. The local bedrock comprises undivided Kamloops Group volcanic and sedimentary bedrock. No local quarry sites for bedrock were visited in the field. However, competent riprap was noted at the subject site suggesting that some quarry rock may be available close to the site.

At the time of the field assessment the outlet flows from the existing 1.8 m diameter CSP culvert were dropping about 0.6 m to the water surface in the pool area (see Photo 1 on Plate 1 and Photo 7 on Plate 4). It is understood that this has been considered (by others) to represent a barrier to fish passage for some (small) fish. It is also understood that fish stocks from Stephen's Lakes could utilize stream habitat upstream of the subject crossing if it was accessible.

The current channel downstream of the culvert outlet consists of a large pool (about 8 m in diameter) and a wide rock riffle that controls the pool water elevation and directs the stream flows through a narrow (about 4 m wide) channel that appears to have been recently incised into the native soils (see Photo 2 on Plate 1 and Photo 8 on Plate 4). To the left (west) of this channel there is an abandoned stream channel consisting of a gravel and cobble streambed.

The uprooted tree shown on Photo 2 of Plate 1 and Photo 3 of Plate 2 appears to have both partially blocked the original stream channel, likely elevating water levels; and weakened the channel bank at the root wad location. This appears to have: 1) caused the stream to create the current channel by eroding through the rot wad area; 2) abandoned the original channel; and 3) dropped the elevation of the water level in the pool at the culvert outlet.

The culvert inlet is bevelled and armoured with large angular boulders in the order of 0.7 m in diameter (see Photo 5 on Plate 3). Two of the boulders from the rock armour are currently located within the culvert and have created riffles within the culvert (see Photo 4 on Plate 2).

Upstream of the crossing the stream is in the order of four metres wide and has a channel bed consisting of gravel and cobbles with a maximum particle size of about 0.2 m in diameter (see Photo 6 on Plate 3).

Site Hydrology

Streamworks Unlimited conducted a review of the hydrology at the site. This review resulted in an estimated Q_{100} discharge rate of $5.7 \text{ m}^3/\text{s}$. The review also estimated the discharge capacity of the existing culvert to be about $7 \text{ m}^3/\text{s}$.

Proposed Construction

Removing and replacing the existing CSP culvert with either a bridge or other type of open bottom structure would provide the desired fish passage. Removing and replacing the existing structure, this would likely cost at least \$20,000. Alternatively, it is possible to re-establish the original pool water level elevation at the culvert outlet and thereby eliminate the vertical drop at the CSP outlet, by blocking the recently eroded channel and re-establishing stream flows within the abandoned channel. The attached 11 x 17 design drawing 2006-201 by Streamworks Unlimited, provides construction details for: 1) creating/reinforcing an elevation controlled rockfill riffle within the abandoned channel; and 2) blocking off the current, recently eroded channel.

It is estimated that the works proposed on the Streamworks Unlimited drawing will require approximately one (1) day to construct using a small to mid-sized excavator, a gravel truck, a compactor, 2 labours, 1 supervisor, water pumps, hose and non-woven geotextile fabric. The estimated probable cost to construct the designed works is approximately \$3,000.

The probable cost shown above does not include: taxes, engineering costs and mobilization and demobilization costs for equipment. Engineering costs for this project are being provided by TCL under a separate agreement. It is estimated that the engineering cost for field services and as-built report preparation will be in the order of \$3,000.

TCL should be contacted regarding the scheduling of the proposed works such that appropriated pre-work and construction field reviews can be carried out.

Closure

We trust that the above and attached information are sufficient for your present requirements. Please contact us if you wish to discuss any of this information or other issues regarding the planning, design and construction of the proposed works.

Yours truly,
Terratech Consulting Ltd.

A handwritten signature in blue ink is written over a circular professional engineer seal. The seal contains the text "PROFESSIONAL ENGINEER" around the top edge, "C. D. VanBuskirk" in the center, and "2006" at the bottom. The seal also features a small logo of a mountain range.

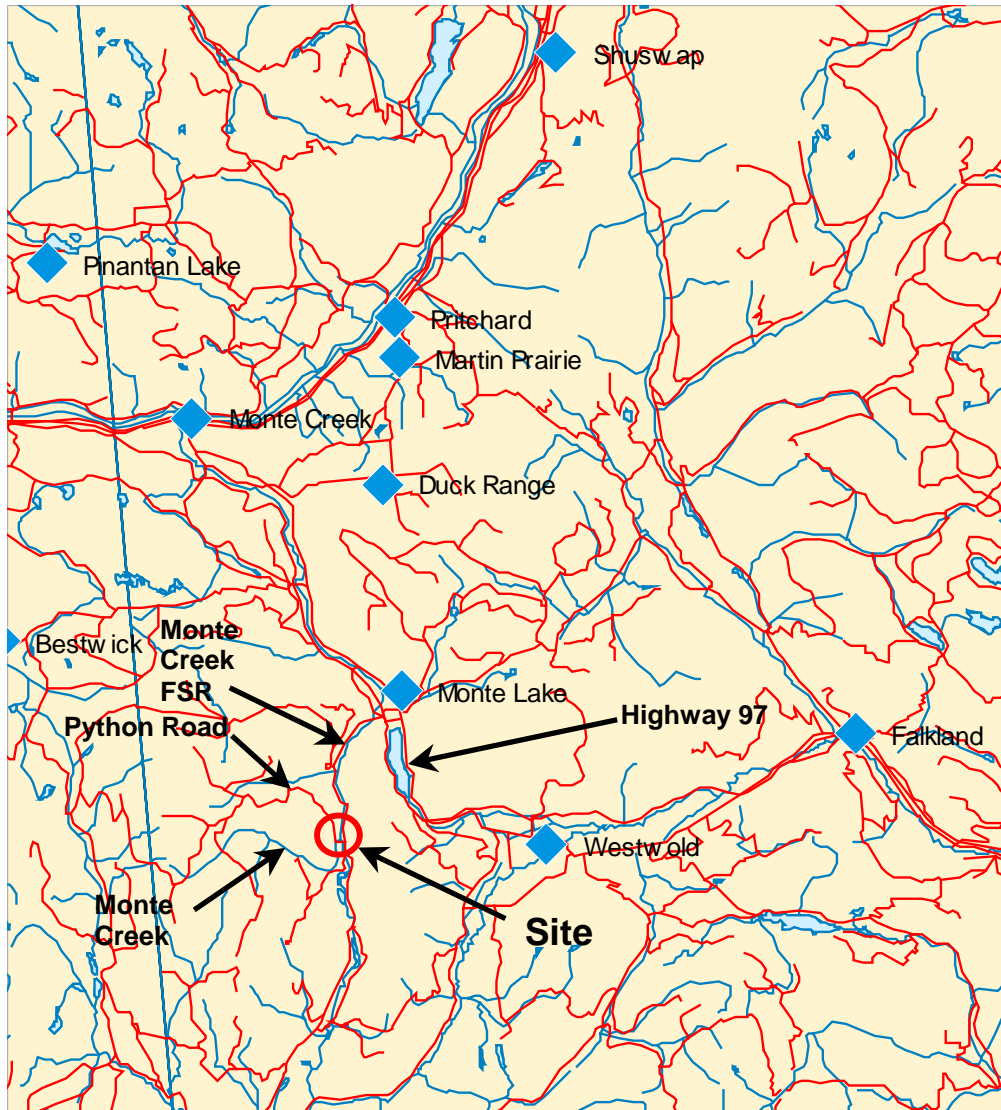
Calvin VanBuskirk, P.Eng. P.Geo.
Project Engineer

R.J. (Ron) Neden, P.Eng.
Review Engineer

cc: Jim Furlong, Tolko Industries – Lumby Division
Rob McGregor, Tolko Industries – Lumby Division

Attachments: Figures 1 and 2
Plates 1 to 3
Streamworks Unlimited Design Drawing
Statement of General Conditions

CVBData/Client/Tolko/2005-052Monte Creek Rpt



Scale 1:400,000

Base map from BC Government
Web-site: Mapplace

This figure to be read in conjunction with Terratech Consulting Ltd. report dated March 2006. The information contained in these drawings, figures and accompanying reports/letters are submitted to Tolko Industries Ltd. as information to assist in a specific forest resource development within a defined study area. The conclusions of this report/letter may not be valid if specifics of the development are altered. Information contained within this report and statements regarding this report may not be suitable for other uses. Accordingly, Terratech Consulting Ltd. cannot be responsible for use of this information beyond that stated herein.

Tolko Industries Ltd. c/o Terrafor Resources

KEY PLAN

7.5 km Python Road

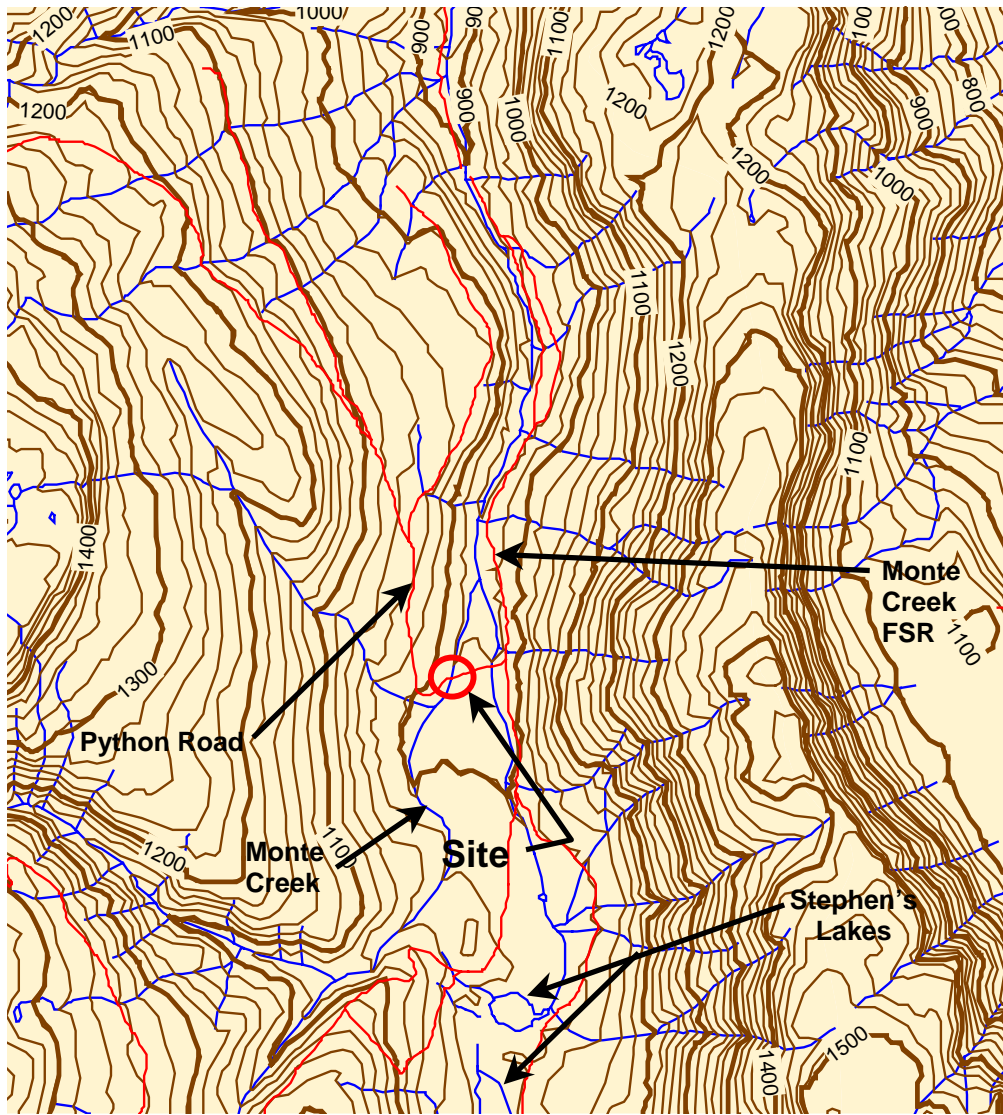
Monte Creek

Project No. 2005-052

March 2006

Figure 1





Scale 1:40,000

Base map from BC Government
Web-site: Mapplace

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LOCATION PLAN

7.5 km Python Road

Monte Creek

Project No. 2005-052

March 2006

Figure 2



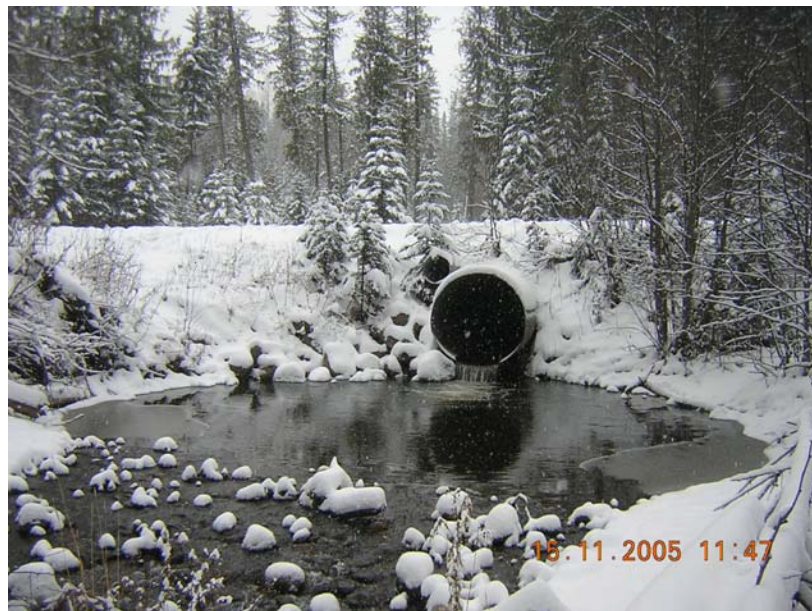


Photo 1 – View looking upstream at stream channel and culvert outlet. Existing rock riffle in foreground controls the elevation of the pool.

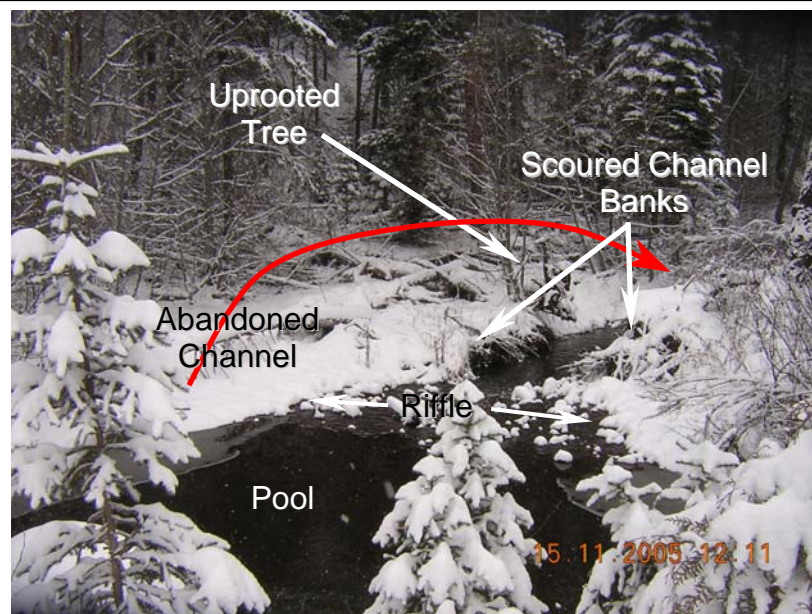


Photo 2 – View looking downstream at the pool, rock riffle, recently scoured new stream banks and abandoned channel.

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Tolko Industries Ltd., Lumby, c/o Terrafor Resources

Site Photographs

7.5 km Python Road

Monte Creek

Project No. 2005-052

March 2006

Plate 1





Photo 3 – View looking upstream at scoured channel, uprooted tree and culvert outlet.



Photo 4 – View looking upstream at riffle in culvert created by large angular boulder from rock-armoured inlet entering culvert.

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Tolko Industries Ltd., Lumby, c/o Terrafor Resources

Site Photographs

7.5 km Python Road

Monte Creek

Project No. 2005-052

March 2006

Plate 2



Photo 5 – View looking downstream at rock-armoured culvert inlet.



Photo 6 – View looking upstream at the channel reach upstream of the culvert inlet.

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Site Photographs

7.5 km Python Road

Monte Creek

Project No. 2005-052

March 2006

Plate 3





Photo 7 – View of perched culvert outlet and overflow culvert.



Photo 8 – Close up view of rock riffle and abandoned channel.

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Tolko Industries Ltd., Lumby, c/o Terrafor Resources

Site Photographs

7.5 km Python Road

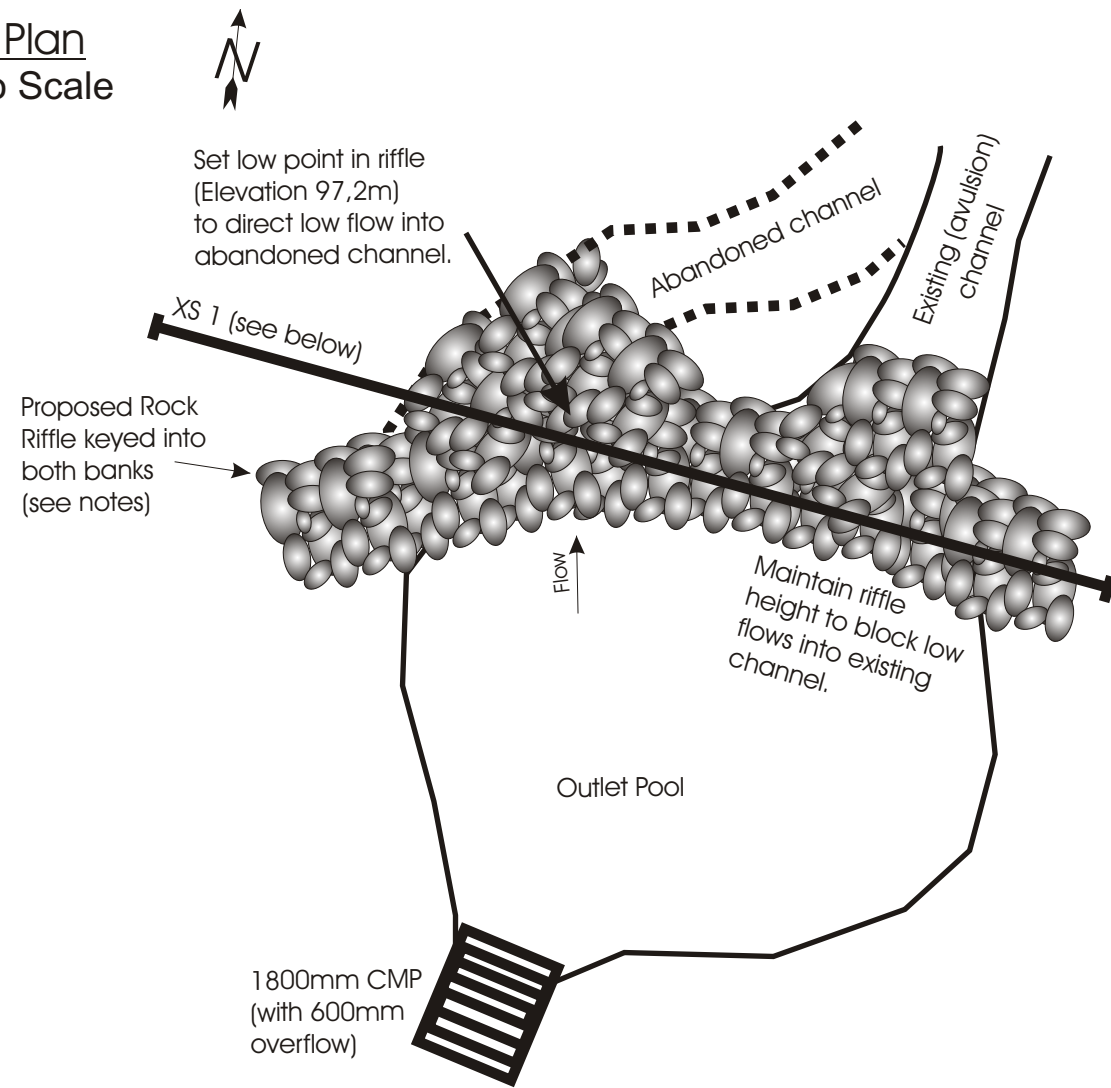
Monte Creek

Project No. 2005-052

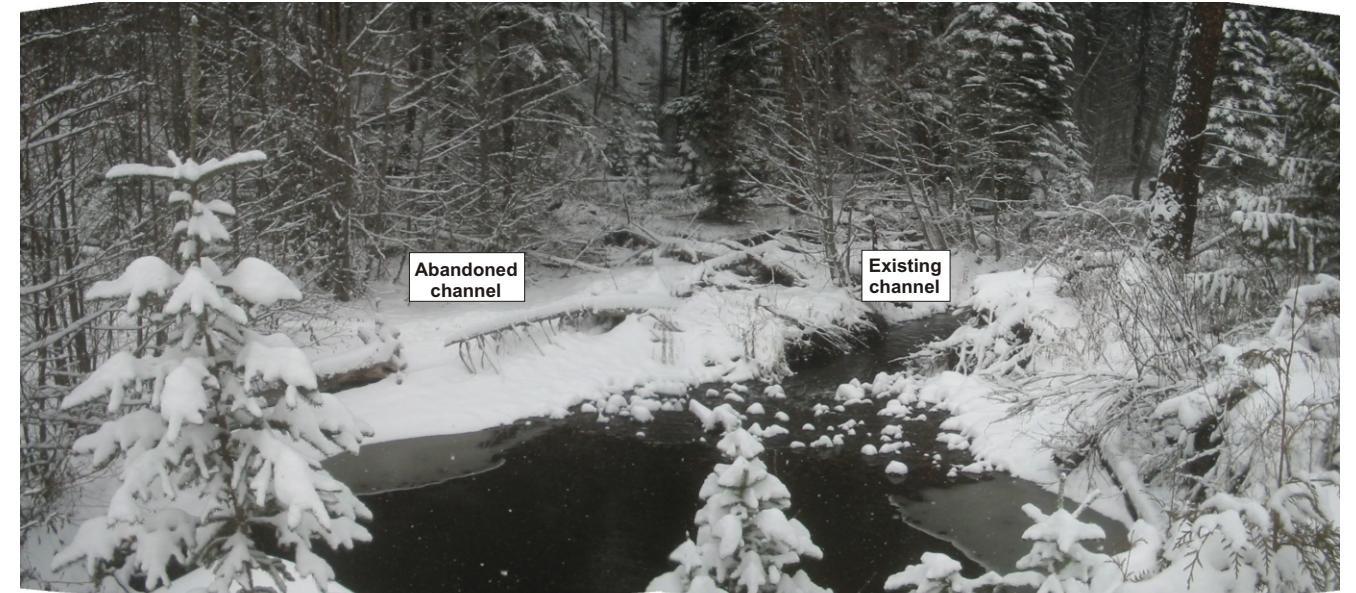
March 2006

Plate 4

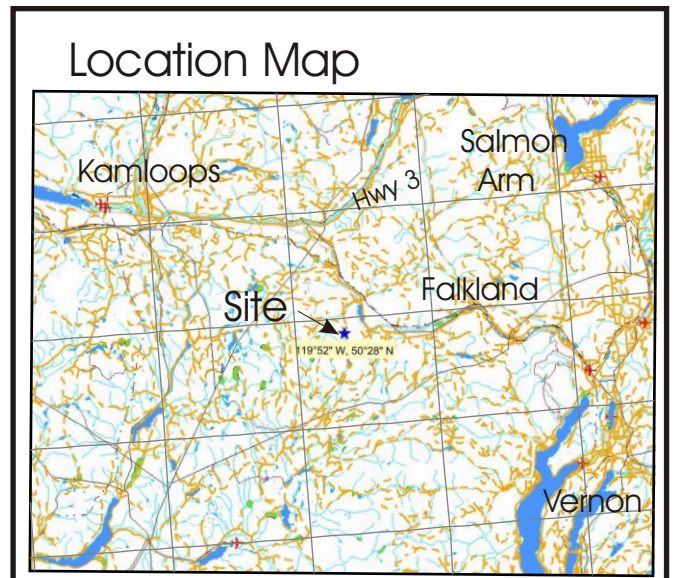
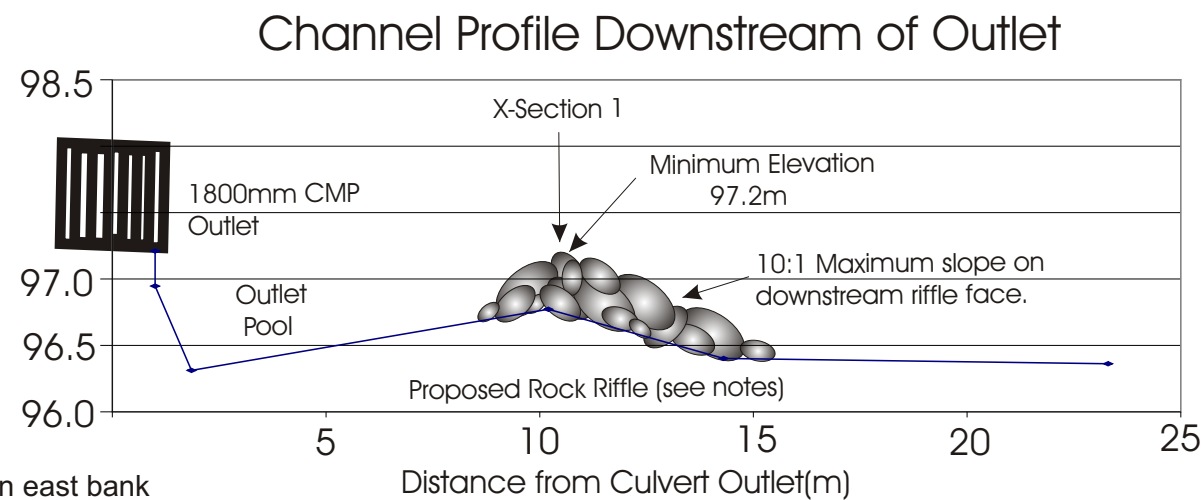
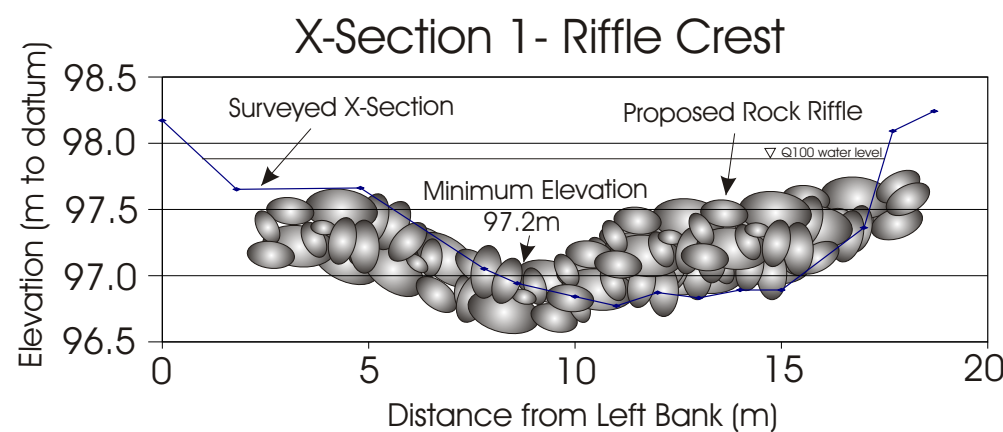
Site Plan
Not to Scale



Monte Creek - Fish Passage Improvement ?? FSR Crossing Km ??



Downstream view of existing riffle and channels from above the culvert outlet



Notes:

1. All elevations shown are tied to local datum (Nail in 25cm diam. cottonwood on east bank downstream of culvert. Assigned elevation = 100.0m)
2. All instream work shall be undertaken with written consent from the appropriate agencies (DFO and LWBC) during an approved fisheries construction window. Every effort shall be made to control sediment during construction.
3. All equipment
4. Riffle to be constructed of well-graded competent rock and/or riprap (D50 = 50cm). Mix with available sands and gravel to ensure a tight matrix and prevent through-flow. Use larger nuggets to anchor riffle, dissipate energy and create low flow channels.
5. Tie riffle crest a minimum 2m into each bank. Ensure a gentle transition into existing substrates at the downstream edge of the riffle.
6. All areas disturbed during construction, including access trails, shall be seeded and replanted with appropriate riparian species.

Design Flows	
Adapted to project site from WSC Gauge 08LE103 Monte Creek above Monte Lake 1981-1994, 12 years of record.	
100 year	5.7 m ³ /s
10 year	3.7 m ³ /s
Estimated Culvert Capacity = 7.0 m ³ /s	

Drawn by A. Bates, P.Eng.
DWG - 2006-201 20/01/06
www.streamworks@telus.net

STATEMENT OF GENERAL CONDITIONS

1. STANDARD OF CARE

This study and Report have been prepared in accordance with generally accepted engineering or environmental consulting practices in this area. No other warranty, expressed or implied, is made.

2. COMPLETE REPORT

All documents, records, data and files, whether electronic or otherwise, generated as part of this assignment are a part of the Report which is of a summary nature and is not intended to stand alone without reference to the instructions given to us by the Client, communications between us and the Client, and to any other reports, writings, proposals or documents prepared by us for the Client relative to the specific site described herein, all of which constitute the Report.

IN ORDER TO PROPERLY UNDERSTAND THE SUGGESTIONS, RECOMMENDATIONS AND OPINIONS EXPRESSED HEREIN, REFERENCE MUST BE MADE TO THE WHOLE OF THE REPORT. WE CANNOT BE RESPONSIBLE FOR USE BY ANY PARTY OF PORTIONS OF THE REPORT WITHOUT REFERENCE TO THE WHOLE REPORT.

3. BASIS OF REPORT

The Report has been prepared for the specific site, development, design objectives and purpose that were described to us by the Client. The applicability and reliability of any of the findings, recommendations, suggestions, or opinions expressed in the document are only valid to the extent that there has been no material alteration to or variation from any of the said descriptions provided to us unless we are specifically requested by the Client to review and revise the Report in light of such alteration or variation.

4. USE OF THE REPORT

The information and opinions expressed in the Report, or any documentation forming part of the Report, are for the sole benefit of the Client. NO OTHER PARTY MAY USE OR RELY UPON THE REPORT OR ANY PORTION THEREOF WITHOUT OUR WRITTEN CONSENT. WE WILL CONSENT TO ANY REASONABLE REQUEST BY THE CLIENT TO APPROVE THE USE OF THIS REPORT BY OTHER PARTIES AS "APPROVED USERS". The contents of the Report remain our copyright property and we authorize only the Client and Approved Users to make copies of the Report only in such quantities as are reasonably necessary for the use of the Report by those parties. The Client and Approved Users may not give, lend, sell, or otherwise make the Report, or any portion thereof, available to any party without our written permission. Any use which a third party makes of the Report, or any portion of the Report, are the sole responsibility of such third parties. We accept no responsibility for damages suffered by any third party resulting from unauthorized use of the Report.

5. INTERPRETATION OF THE REPORT

- a) Nature and Exactness of Soil and Containment Description: Classification and identification of soils, rocks, geological units, contaminant materials and quantities have been based on investigations performed in accordance with the standards set in Paragraph 1. Classification and identification of these factors are judgmental in nature and even comprehensive sampling and testing programs, implemented with the appropriate equipment by experienced personnel, may fail to locate some conditions. All investigations utilizing the standards of Paragraph 1 will involve an inherent risk that some conditions will not be detected and all documents or records summarizing such investigations will be based on assumptions of what exists between the actual points sampled. Actual conditions may vary significantly between the points investigated and all persons making use of such documents or records should be aware of, and accept, this risk. Some conditions are subject to change over time and those making use of the Report should be aware of this possibility and understand that the Report only presents the conditions at the sampled points at the time of sampling. Where special concerns exist, or the Client has special considerations or requirements, the Client should disclose them so that additional or special investigations may be undertaken which would not otherwise be within the scope of the investigations made for the purposes of the Report.

INTERPRETATION OF THE REPORT (continued)

- b) Reliance on Provided information: The evaluation and conclusions contained in the Report have been prepared on the basis of conditions in evidence at the time of site inspections and on the basis of information provided to us. We have relied in good faith upon representations, information and instructions provided by the Client and others concerning the site. Accordingly, we cannot accept responsibility for any deficiency, misstatement or inaccuracy contained in the Report as a result of misstatements, omissions, misrepresentations, or fraudulent acts of persons providing information.

6. RISK LIMITATION

Geotechnical engineering and environmental consulting projects often have the potential to encounter pollutants or hazardous substances and the potential to cause an accidental release of those substances. In consideration of the provisions of the services by us, which are for the Client's benefit, the Client agrees to hold harmless and to indemnify and defend us and our directors, officers, servants, agents, employees, workmen and contractors (hereinafter referred to as the "Company") from and against any and all claims, losses, damages, demands, disputes, liability and legal investigative costs of defense, whether for personal injury including death, or any other loss whatsoever, regardless of any action or omission on part of the Company, that result from an accidental release of pollutants or hazardous substances occurring as a result of carrying out this Project. This indemnification shall extend to all Claims brought or threatened against the Company under any federal or provincial statute as a result of conducting work on this Project. In addition to the above indemnification, the Client further agrees not to bring any claims against the Company in connection with any of the aforementioned causes.

7. SERVICES OF SUBCONSULTANTS AND CONTRACTORS

The conduct of engineering and environmental studies frequently requires hiring the services of individuals and companies with special expertise and/or services which we do not provide. We may arrange the hiring of those services as a convenience to our Clients. As these services are for the Clients' benefit, the Client agrees to hold the Company harmless and to indemnify and defend us from and against all claims arising through such hirings to the extent that the Client would incur had he hired those services directly. This includes responsibility for payment for services rendered and pursuit of damages for errors, omissions or negligence by those parties in carrying out their work. In particular, these conditions apply to the use of drilling, excavation and laboratory testing services.

8. CONTROL OF WORK AND JOBSITE SAFETY

We are responsible only for the activities of our employees on the jobsite. The presence of our personnel on the site shall not be construed in any way to relieve the Client or any contractors on site from their responsibilities for site safety. The Client acknowledges that he, his representatives, contractors or others retain control of the site and that we never occupy a position of control of the site. The Client undertakes to inform us of all hazardous conditions, or other relevant conditions of which the Client is aware. The Client also recognizes that our activities may uncover previously unknown hazardous conditions or materials and that such a discovery may result in the necessity to undertake emergency procedures to protect our employees as well as the public at large and the environment in general. These procedures may well involve additional costs outside of any budgets previously agreed to. The Client agrees to pay us for any expenses incurred as the result of such discoveries and to compensate us through payment of additional fees and expenses for time spent by us to deal with the consequences of such discoveries. The Client also acknowledges that in some cases the discovery of hazardous conditions and materials will require that certain regulatory bodies be informed and the Client agrees that notification to such bodies by us will not be a cause of action or dispute.

9. INDEPENDENT JUDGEMENTS OF CLIENT

The information, interpretations and conclusions in the Report are based on our interpretation of conditions revealed through limited investigation conducted within a defined scope of services. We cannot accept responsibility for independent conclusions, interpretations, interpolations and/or decisions of the Client, or others who may come into possession of the Report, or any part thereof, which may be based on information contained in the Report. This restriction of liability includes decisions to either purchase or sell land.