CONTRACT 5044001

SUMMARY REPORT

FISH PASSAGE CLOSED BOTTOM STRUCTURE ASSESSMENTS

TOLKO INDUSTRIES LTD. MERRITT TSA



Prepared For:
Tolko Industries Ltd.

Prepared By;
Ecoscape Environmental Consultants Ltd.

Ecoscape File No. 08-317
March, 2009

ECOSCAPE
Environmental Consultants Ltd.

CONTRACT 5044001

Summary Report
Fish Passage Culvert Assessments

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March, 2009
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1.0 INTRODUCTION

Ecoscape Environmental Consultants Ltd. (Ecoscape), in association with GauTech Environmental Consulting (GauTech), was retained by Tolko Industries Ltd. (Tolko) to complete Fish Passage Assessments of Closed Bottom Structures within Tolko's Merritt Timber Supply Area (Contract 5044001). To address the issue of fish passage at stream crossings with closed bottom structures (CBS), a systematic watershed-based approach has been developed which is intended to prioritize, identify and restore fish passage at culverted stream crossings (BC MOE 2008a). The Fish Passage Working Group - including members from the British Columbia Ministry of Forests and Range, Ministry of Environment, Integrated Land Management Bureau, and Federal Department of Fisheries and Oceans - was developed to address the issue of maintaining and restoring fish passage at culverted road crossings on resource roads (Anonymous 2008; Forest Practices Board 2009). It has been estimated that over 550,000 km of resource roads occur in BC, with approximately 76,000 closed bottom structures occurring over known fish streams (Anonymous 2008; Forest Practices Board 2009). Limitations to fish passage associated with closed bottom structures potentially contributes to significant fish habitat losses province-wide (BC MOE 2008 a and b).

Within Tolko's Merritt TSA, the Tulameen and Pike Mountain / Myren Creek watersheds were selected as priority for 2008 and 2009 by Tolko based on review of Watershed Atlas polygons, fisheries values, and local priorities. Ecoscape completed fish passage assessments within these key areas following the new process protocol. Works completed and data collection and analysis results are presented in Section 3.0.

2.0 METHODOLOGY

The following section outlines the project requirements and methodology that was employed to meet each phase of the project. The Fish Passage Culvert Assessments project was based on the new Fish Passage Protocol for Culverted Sites that has been developed as a standard approach to review and address fish passage challenges within British Columbia watersheds. The field component of the project is based on the Field Assessment for Fish Passage Determination of Closed Bottom Structures guidebook. The methodology and identified project requirements included a Planning Phase, Data Collection Phase, Analysis Phase and Implementation Phase. Ecoscape's approach to meeting the requirements of each phase is outlined below.

2.1 Phase 1: Sampling Plan Development

A key element of the Planning Phase was to review the 1:50,000 BC Watershed Atlas polygons and associated "Fisheries Values" to determine the priority watersheds for the assessment. This component was largely addressed by Tolko and the priority areas for assessment were identified as being within the Tulameen and Pike Mountain/Myren Creek Watershed Areas. The other key element within the Planning Phase was to develop working maps by overlaying known fish presence data (FISS) and road networks within the

priority watersheds. Preliminary working maps were developed which illustrate each of the above items and formed part of the project RFP. Road networks considered included Forest Service Roads, pre 1995 Road Permit Roads, and non status roads within the priority watersheds where crossings with fish bearing streams occur.

It was understood that the proposed project locations were submitted by Tolko to the Ministry of Environment for review and comment. Ecoscape worked with Tolko to finalize the priority areas based on the identified BC Watershed Atlas polygons, road networks, and feedback from Ministry of Environment staff. The site locations were also reviewed with Weyerhaeuser to ensure no duplication of field work occurred within the Tulameen, Similkameen, and Allison Watershed Groups.

Ecoscape overlaid streams with known assumed or potential fish presence with the road networks, as well as stream macroreach data for respective watercourses, which helped to further narrow down sites for field assessment. Base data reviewed during the planning phase was provided by Tolko, Forsite, and obtained from the Fisheries Inventory Summary System (FISS) and BC Watershed Atlas data queries.

Prior to initiating the field data collection phase, Ecoscape created working maps which clearly depicted the priority watershed polygons, streams and respective fish classes, road network, and all proposed sites for field inspections and data collection. The high quality and level of detail included on Ecoscape's maps were found to be instrumental in maximizing the efficiency of field crews in mobilizing from site to site. The mapping and assessment work plan were submitted to Tolko for review and approval prior to initiation of the Field Sampling and Data Collection Phase.

2.2 Phase 2: Field Sampling and Data Collection

Data collection was conducted as per the Field Assessment for Fish Passage Determination of Closed Bottomed Structures guidebook. As per the protocol recommendations and past experience in conducting assessments of this nature, Ecoscape completed the field component with a two-person crew, one with a strong fish habitat background and one with a background in designing, costing and installing both closed and open bottomed structures. The field plan was developed so as to ensure that work would begin at higher elevation sites and work towards the lower elevations as the season progressed. This approach was taken to mitigate for heavy snowfall, but it was recognized that snow was probable and contingencies were made to ensure that weather did not impede the field schedule. Ecoscape experienced no problems with site access during the fish passage assessment program.

Following discussions with the FIA Program Coordinator, it was determined that sites assessed in the field as potential priority sites (for passage mitigation) may require that crews track both upstream and downstream 200m of the CBS crossing to confirm that no un-marked physical barriers occur within this zone. Instances of this may apply to a site that has been identified as a barrier to fish in an otherwise fish passable watercourse. If the professional completing the assessment deemed there was potential for an obstruction

(other than the CBS itself), such as a waterfall, steep channel gradient, velocity barrier or other, field crews walked upstream and downstream 200 m of the CBS to confirm such. Additional inspection of streams for fish passage in the vicinity of the crossing occurred at approximately five (5) sites, all of which were viewed as candidates for fish passage mitigation works. This exercise was effective in ruling out two (2) sites where downstream barriers were identified.

Ecoscape developed a digital data dictionary that incorporated all elements of the Closed Bottom Structure (CBS) Field Measurement Form for use on a sub-metric GPS data logger platform. The use of the hand-held Trimble XT GPS allowed for quick and efficient collection of spatially accurate data. All data collected has been incorporated into the GIS database and is spatially linked to each CBS site and readily available. As multiple photos were required for photo documentation of each crossing, photo points with relevant information were incorporated into the database. While fish sampling was not part of the protocol or work program, Ecoscape took note of any fish observations made upstream or downstream of culvert crossings at each site and any occurrences can be found within the GIS database, which has been submitted digitally and also included as a summary table in Appendix A.

All Digital Field Data and analysis results have been submitted to Tolko and the applicable provincial database, with Proof of Submission provided to Tolko.

Data Logging and Processing

GPS settings and use were in accordance with Resource Inventory Committee Standards to ensure the collection of spatially accurate data. Ecoscape processed all GPS data employing Trimble Pathfinder Software and the Data Dictionary Tools designed for ARC View 3.x. Subsequently, Ecoscape worked on an Arc GIS 9.3 platform to create project deliverables and associated files that are compatible with Tolko's software capabilities. This aspect of deliverable format was discussed subsequent to project initiation to ensure data files were compatible. Deliverables from this stage also include a summary of data collected in an Excel spreadsheet, as per the Request for Proposals.

Equipment used within the field assessment included the following:

- Rod and level;
- Trimble Geo Explorer XT and Trimble Nomad/Pro XH Receiver each with project specific data dictionary;
- Clinometer;
- 100 m fabric tape;
- 25 m carpenter tape;
- Meter stick;
- Digital camera with backup batteries;
- Waders;
- Waterproof data sheets and pencils;
- Felt pen;
- 4X4 truck equipped with chains for winter conditions; and

- VHF Radios for use on roads with active hauling activities.

2.3 Phase 3: Analysis

By integrating the GIS database developed from the data dictionary, which is comprised of all elements of the Field Measurement Form, Ecoscape and GauTech processed and analyzed field data in a systematic fashion.

The Habitat Gained Index (Table 1) was determined for each of the sites (as per the Fish Passage Protocol (*Rev. June, 2008 - Section 2.3.2*)) using obstruction information and digital elevational models derived from 1:20,000 TRIM contour information. The data was then merged into a single GIS file (culvert features) and sorted according to fish presence in respective watercourses, the various CBS attributes, hydraulic surrogates, Fish Barrier Scores, and Habitat Gained Index values, thus enabling the extraction of a priority list. Subsequently, a Cost Benefit Analysis was conducted to evaluate the sites of concern and modify restoration priorities where efforts will have the greatest net benefits.

Priority sites were established and summary tables were developed for each watershed area that highlights Priority Sites, Proposed Solutions (multiple options), Cost Estimates, and Cost Benefit Analysis (Tables 2 and 3), to be used for decision making in the Implementation Phase (the forth step of the process).

2.4 Phase 4: Implementation

In accordance with the protocol, Ecoscape and GauTech identified potential structures to be restored based on results of the Data Collection and Analysis Phases. A draft summary of the proposed sites was provided by Ecoscape to the FIA Program Coordinator (Theresa Peters) and Ministry of Environment representatives (Tara White and Rob Stewart). Communications were maintained throughout the project primarily by email and telephone with the FIA Program Coordinator to keep all parties apprised of project progress and findings.

Ecoscape developed spatially accurate maps, which depict the potential restoration sites within each priority area. This summary report also includes final maps (Figures 1-9), photo appendices, and spreadsheets; including the completed Field Data Submission Form and closed bottom structure database. As indicated above, all processed field data, summary tables, maps, and this report have been uploaded into the provincial database found through the FIA Fish Passage website - http://www.for.gov.bc.ca/hcp/fia/submit_Restoration_and_Rehabilitation.htm. A digital copy of the *Certificate of Project Completion* (FIA Schedule A) is attached within this summary report and has also been e-mailed to: fiaa@ca.pwc.com, tpeters@forsite.ca and michael.bragg@tolko.com.

The decision-making component of the Implementation Phase will need to be determined by Tolko and FIA representatives based on review of the Cost Benefit Analysis and recommendations made by Ecoscape and GauTech. Items such as detailed costing,

tendering and scheduling of the selected projects, implementation/construction of passage restoration measures and evaluation of restored structures are beyond the immediate scope of the Implementation Phase. Additionally, evaluation of restoration projects will be an important step in monitoring the effectiveness of restoration efforts in restoring fish passage. Evaluation of fish passage where restoration works occur should be carried out in accordance with the Fish Passage Protocol for Culverted Sites, and following the Field Assessment for Fish Passage Determination of Closed Bottom Structures (BC MOE 2008 a and 2008 b).

3.0 RESULTS / DATA ANALYSIS

Within Tolko's Merritt TSA, an estimated 117 stream crossings were identified in the Tulameen area and 391 crossing sites within the Myren Creek / Pike Mountain watersheds, based on a preliminary review of 1:50,000 BC Watershed Atlas Polygons by Tolko. During the pre-field mapping exercise of the Planning Phase, Ecoscape reviewed these crossing sites and the study area was narrowed down to a total of 424 sites – 83 within the Tulameen and 341 in the Myren Creek / Pike Mountain watershed areas. These sites were inspected in the field in October and November of 2008. Of these sites, 58 were assessed in detail following the Forest Investment Account (FIA) Fish Passage protocol (Appendix A) and 37 crossings were found to be bridges or open bottomed structures (OBS). The balance of sites inspected in the field were deemed not capable of supporting fish based on inspections and confirmations that the watercourses were ephemeral, had excessive gradients (>20%) and were not passable, or had a discontinuous to no defined channel.

Of the 37 bridges recorded in the field, 25 occurred within the Tulameen watershed and 12 were recorded within the Myren Creek / Pike Mountain watershed areas. All streams receiving High habitat scores occurred in the Tulameen watershed area; all of which had open bottomed structure crossings. Within the Myren Creek / Pike Mountain watershed areas, 7 of the 12 bridges occur in the valley bottom along Otter Lake Road. Each of the bridge features located during the fish passage assessment were recorded in the field (GPS) and have been provided as an ESRI shapefile – accompanied by representative photos.

During field inspections, it was found that many of the streams within the Myren Creek / Pike Mountain watershed areas identified as "assumed fish streams (S1-S4)" were such simply due to the fact that there is a stocked lake at the headwaters of respective watercourses. However, the streams draining these lakes were assessed as ephemeral. With the exception of the valley bottom, most of the lakes within the Myren Creek / Pike Mountain watershed have vernal/ephemeral outlets. These channels are typically seasonally wetted and often poorly defined to discontinuous, characterized as alder – willow thickets and very moist to wet riparian gullies. Formal CBS assessments following the fish passage protocol were not carried out for ephemeral sites or other watercourses that were simply not passable to fish based on topographic relief. Instead, GPS photo points were recorded in the field and accompanied by representative photos, all of which have been provided as ESRI shapefiles.

Stream crossings identified as being candidates for restoration have been provided by Ecoscape, in accordance with the Fish Passage Protocol for Culverted Sites. Eight (8) sites have been extracted from the database for potential fish passage mitigation (Table 1). The sites selected were the most significant of all the CBS sites inspected throughout the Tulameen and Myren Creek / Pike Mountain priority watershed areas. While not eligible under the FIA program, two (2) additional sites have been noted in Table 1 for consideration within Tolko's Merritt TSA. The attached figures and submitted digital ESRI shapefiles indicate the location of respective sites. In addition, summary data and representative photos of the above sites are included in Appendix B.

Table 1. Recommended sites for 2010 passage mitigation or other remedial works (e.g. erosion and sediment control).

Crossing ID	Stream Name	Road Name	Road KM	Habitat Rating
POD-0112 [1]	Chan Creek	Jacobsen	3	High
MYR-009	Myren Creek	Myren Creek FSR	5	Moderate
TUL-102	WC:31036780062000335	Smart's Road.	6	Moderate
K999 [2]	WC:3103678006200051200125007 6	Tulameen River FSR	17	Moderate
TUL-001	Sarah Creek	CP118	61	Low
POD-007	Trib 4.0	Tulameen River FSR	53	Low
MYR-004	WC:3103678006200035700348067 5	Pike Spur - P78	12	Low
COOKTRI-001	WC:310367800620003400032 90	192-8	8	Low
BUZCr-001 [3]	Acid Creek	Buzz Creek Road	3	Low
BRIT-010	WC:3103678006200051200173	Grasshopper spur - Z-2	1	Low

[1] POD-0112 is a failing wooden culvert with high likelihood of collapse into Chan Creek.
[2] An impassable barrier currently exists about 125m downstream of K999 preventing upstream fish migration. Therefore, passage mitigation at this site is not recommended at this time.
[3] BUZCr-001 has considerable erosion issues; where the pipe appears to be undersized and too short resulting in significant bank and headwall erosion.

3.1 Habitat Gained Index

The Habitat Gained Index for each site was derived using obstruction information and digital elevational models derived from 1:20,000 TRIM contour and stream macroreach gradient information (FISS). The Habitat Gained Index is simply an estimate of the direct measure of the stream length that could become accessible to fish if modifications to the existing CBS at stream crossings were implemented. FIA applicable streams identified as being of highest priority from a habitat stand point are TUL-102 and MYR-009 (Table 2).

Table 2. Habitat Gained Index for recommended 2010 sites for passage mitigation.

Crossing ID	FIA (y/n)	Habitat Rating	Habitat Gained Index (KM)
MYR-009	Y	Moderate	0.8
TUL-102	Y	Moderate	3.2
K999 [1]	Y	Moderate	2.0
TUL-001	N (Potential S5-S6)	Low	0.4
POD-007	N (Potential S5-S6)	Low	0.9
MYR-004	Y	Low	1.2
COOKTRI-001	N (Potential S5-S6)	Low	1.0
BRIT-010	Y	Low	0.4

[1] An impassable barrier currently exists about 125m downstream of K999 preventing upstream fish migration. Therefore, passage mitigation at this site is not recommended at this time.

3.2 Cost Benefit Analysis

Tables 3 and 4 provide a summary of the priority sites, their Habitat Gained Index, two (2) proposed solutions and two (2) cost estimates. Detailed cost estimates for each site are provided in Appendix C. The Cost Benefit score is derived from dividing the Habitat Gained Index by the cost estimate for each solution. It should be noted that, while the habitat to be gained by restoring crossings at the identified sites is relatively low for the streams evaluated in the Tulameen and Myren Creek / Pike Mountain watershed areas, the sites that Ecoscape and GauTech perceive to be the highest priority are TUL-102 and MYR-009. These crossings do not have the highest Cost Benefit score; however, the condition of the watercourse and potential for impacts to fish habitat appear greatest if these locations are left unaltered from their current state. Cost Benefit scores are highest for those restoration efforts that require the most minimal of resources, such as backwatering with riprap at POD-007 (a small first or second order drainage) in the Tulameen and installing baffles and substrate enhancement at COOKTRI-001 within the Myren Creek / Pike Mountain watershed areas.

Table 3. Cost benefit analysis for passage mitigation works in the Tulameen River Watershed

Site Identifier	Habitat Rating	Habitat Gained Index (km)	Proposed Solution 1 *	Span (m)	Cost Estimate 1 ($K)	Proposed Solution 2	Span (m)	Cost Estimate 2 ($K)	Cost Benefit 1	Cost Benefit 2
POD-0112	High	n/a	Removal (Wood Culvert)	10	$4,500				n/a	-
TUL-102	Moderate	3.2	Open Bottom Arch Culvert	2.4	$22,730	Bridge (L100 composite)	15	$78,545	0.14	0.04
K999 [1]	Moderate	2.0[a]	Open Bottom Arch Culvert		$22,730	Bridge		$78,545	0.09	0.03
TUL-001	Low	0.4	Open Bottom Arch Culvert	1.8	$20,430	Embedded Pipe Arch	1.4	$24,130	0.02	0.02
POD-007	Low	0.9	Backwater with rip-rap	n/a	$2,210	Open Bottom Arch Culvert	1.2	$15,480	0.41	0.06
BUZCr-001	Low	n/a	Open Bottom Arch Culvert	2.4	$21,975	Bridge (Composite)	12	$69,485	n/a	n/a

[1.] An impassable barrier currently exists about 125m downstream of K999 preventing upstream fish migration. Therefore passage mitigation at this site is not recommended at this time.

Table 4. Cost benefit analysis for passage mitigation works in the Myren Creek / Pike Mountain Watershed Area.

Site Identifier	Habitat Rating	Habitat Gained Index (km)	Proposed Solution 1 *	Span (m)	Cost Estimate 1 ($K)	Proposed Solution 2	Span (m)	Cost Estimate 2 ($K)	Cost Benefit 1	Cost Benefit 2
MYR-009	Moderate	0.8	Open Bottom Arch Culvert	1.8	$22,850	Bridge (composite)	15	$70,535	0.03	0.01
MYR-004	Low	1.2	Remove corrugated steel pipe	n/a	$4,500	Open Bottom Arch Culvert	1.2	$11,280	0.27	0.11
COOKTRI-001	Low	1.0	Install baffles and substrate	n/a	$2,280	Open Bottom Arch Culvert	2.4	$29,300	0.43	0.03

4.0 IMPLEMENTATION PLAN

The implementation plan would typically involve the identification of the proposed structures for fish passage restoration, followed by review of all structures and potential solutions at a regional or sub-regional level involving all stakeholders. As stated above, Ecoscape and GauTech found that the need for restoration of crossings within the Tulameen and Myren Creek / Pike Mountain watershed areas was limited. All streams receiving High habitat scores occurred in the Tulameen watershed area - all of which had open bottomed structure road crossings. Within the Myren Creek / Pike Mountain area, fish habitat ratings were generally low, with many streams not deemed capable of supporting viable fish populations due to ephemeral or intermittent flows and excessive gradient. As such, there were only nine (9) sites in total identified as candidates for restoration works, from installation of baffles and substrate addition to CBS replacement with open bottom arch culverts or bridge crossings. The costs associated with these restoration efforts are variable, and the amount of habitat gained is also quite limited. Nonetheless, there are opportunities for enhancement if the necessary funds are available to improve fish passage within Tolko's Merritt TSA. Ecoscape is confident that the sites identified above and detailed in appendices to this document are the most suitable for fish passage improvements within these watersheds on Status and Non Status forestry roads.

Given the limited number of sites identified as being suitable or even feasible (given the very low Cost Benefit Analysis) for passage mitigation within the Merritt TSA of Tolko's Operating Area, large-scale stakeholder involvement was not carried out for this project. Nevertheless, the information has been provided to the Ministry of Environment representatives for the area.

It is anticipated that the sites will be reviewed and further narrowed down by Tolko prior to submitting for FIA funding. While relatively detailed costs have been provided (Appendix C), it is likely that more detailed cost estimates will be developed once the restoration options have been chosen and level of resources is known. As works will be occurring instream, an environmental monitor will be required to document compliance with Best Management Practices, and to conduct fish salvages (where necessary) and assist with isolation of the work areas prior to implementation.

Once restoration works have been completed for the identified sites, monitoring and evaluation will need to be incorporated into the project. Evaluation of restored structures should occur, with fish passage monitoring based on the standard FIA protocol.

5.0 CERTIFICATE OF PROJECT COMPLETION (FIA SCHEDULE A).

A digital copy of the *Certificate of Project Completion* (FIA Schedule A) is attached within this summary report and has also been e-mailed to: fiaa@ca.pwc.com, tpeters@forsite.ca and michael.bragg@tolko.com.

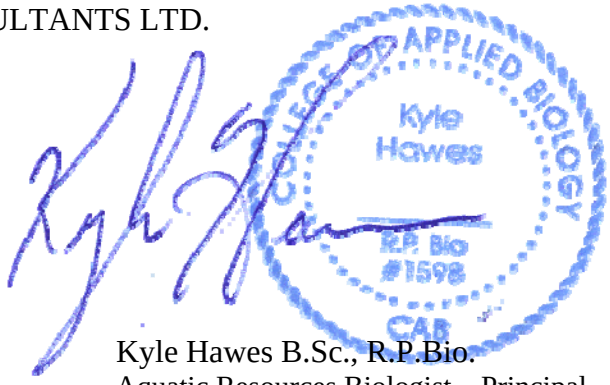
6.0 CLOSURE

This report has been prepared for the exclusive use of Tolko Industries Ltd. It has been prepared based upon data collected and analyzed as per the BC Ministry of Environment protocol for Field Assessment for Fish Passage Determination of Closed Bottom Structures and Fish Passage Protocol for Culverted Sites. Additionally, reporting and deliverables are generally prepared as per information provided within the Request for Proposal document (Tolko Reference No.: Contract 5044001). If you have any questions or comments, please contact the undersigned at your convenience.

Respectfully Submitted,

ECOSCAPE ENVIRONMENTAL CONSULTANTS LTD.





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Civil Technologist – Principal
GauTech Environmental Consulting

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FIGURES

Final Stream Crossing Maps

Figure 1

Podunk / Lower Tulameen

Project:	Tulameen and Myren Creek / Pike Mountain Fish Passage CBS Assessments (Contract 5044001)
Location:	Tolko - Merritt TSA
Project No.:	08-317
Prepared for:	Tolko Industries Ltd.
Prepared by:	Ecoscape Environmental Consultants Ltd.
Drawn by:	Robert Wagner
Checked by:	Kyle Hawes
Projection:	NAD83-UTM Zone 10
Date:	March 16, 2009

Legend

- **Recommended 2010 Passage Mitigation Sites**
- Bridge
- Obstruction
- Crossing Inspections Derived from Planning Phase
- Closed Bottom Structure Field Inspections
- City
- Road
- Railroads
- Watershed Atlas Stream
- Parks and Reserves

Operating Area

- Tolko
- Other

Tulameen Watershed Area

- Britton Creek
- Podunk Creek
- Tulameen River
- Vuich Creek

Myren Creek / Pike Mountain Watershed Area

- Allison Creek
- Cook Creek
- Gulliford Creek
- Myren Creek
- Otter Creek

500 250 0 500 1,000 1,500 2,000 Meters

1:20,000

N W E S

Source Information

Base Map:	92H
Stream / CBS Information:	Field Inventory
Location Information:	Field, GPS (trimble Nomad / XH rec.)
Feature Information:	Field Inventory
Date of Inventory:	October-November, 2008
Inventory Management:	K. Hawes

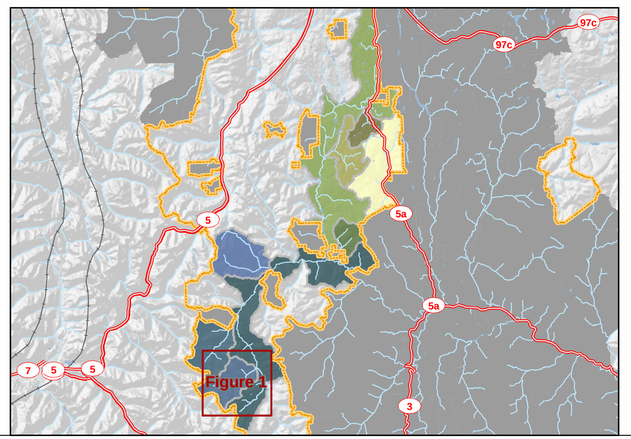


Figure 2

Mid Tulameen / Upper Vuich

Project:	Tulameen and Myren Creek / Pike Mountain Fish Passage CBS Assessments (Contract 5044001)
Location:	Tolko - Merritt TSA
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- Cook Creek
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- Myren Creek
- Otter Creek

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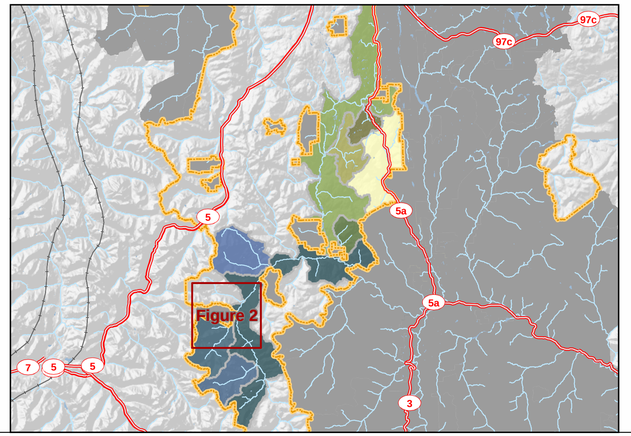


Figure 3

Britton

Project:	Tulameen and Myren Creek / Pike Mountain Fish Passage CBS Assessments (Contract 5044001)
Location:	Tolko - Merritt TSA
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- Myren Creek
- Otter Creek

500 250 0 500 1,000 1,500 2,000 Meters

1:20,000

N W E S

Source Information

Base Map:	92H
Stream / CBS Information:	Field Inventory
Location Information:	Field, GPS (trimble Nomad / XH rec.)
Feature Information:	Field Inventory
Date of Inventory:	October-November, 2008
Inventory Management:	K. Hawes

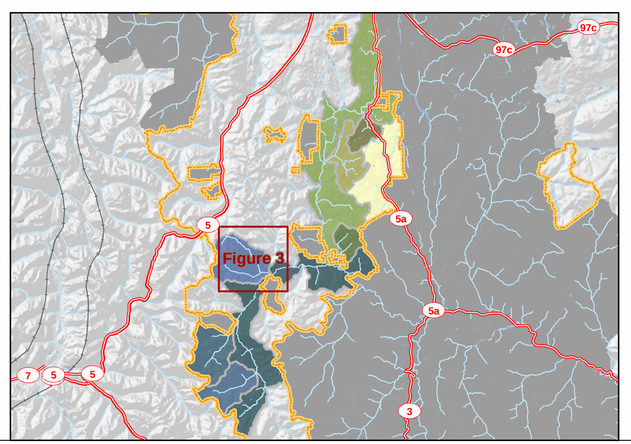


Figure 4

Cook / Upper Tulameen / Lower Otter

Project:	Tulameen and Myren Creek / Pike Mountain Fish Passage CBS Assessments (Contract 5044001)
Location:	Tolko - Merritt TSA
Project No.:	08-317
Prepared for:	Tolko Industries Ltd.
Prepared by:	Ecoscape Environmental Consultants Ltd.
Drawn by:	Robert Wagner
Checked by:	Kyle Hawes
Projection:	NAD83-UTM Zone 10
Date:	March 16, 2009

Legend

- **Recommended 2010 Passage Mitigation Sites**
- Bridge
- Obstruction
- Crossing Inspections Derived from Planning Phase
- Closed Bottom Structure Field Inspections
- City
- Road
- Railroads
- Watershed Atlas Stream
- Parks and Reserves

Operating Area

- Tolko
- Other

Tulameen Watershed Area

- Britton Creek
- Podunk Creek
- Tulameen River
- Vuich Creek

Myren Creek / Pike Mountain Watershed Area

- Allison Creek
- Cook Creek
- Gulliford Creek
- Myren Creek
- Otter Creek

500 250 0 500 1,000 1,500 2,000 Meters

1:20,000

N W E S

Source Information

Base Map:	92H
Stream / CBS Information:	Field Inventory
Location Information:	Field, GPS (trimble Nomad / XH rec.)
Feature Information:	Field Inventory
Date of Inventory:	October-November, 2008
Inventory Management:	K. Hawes

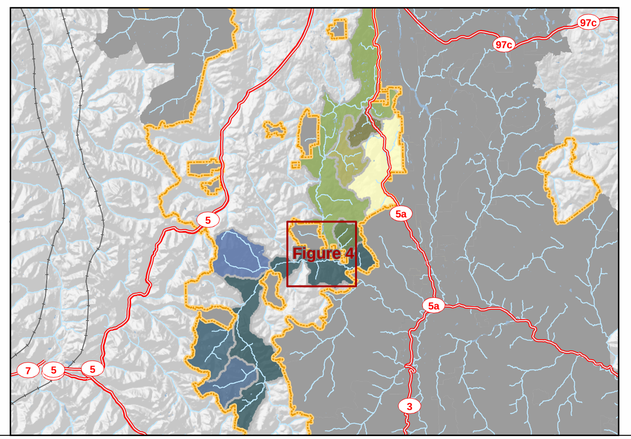


Figure 5

Lower-Mid Otter / Lower Myren

Project:	Tulameen and Myren Creek / Pike Mountain Fish Passage CBS Assessments (Contract 5044001)
Location:	Tolko - Merritt TSA
Project No.:	08-317
Prepared for:	Tolko Industries Ltd.
Prepared by:	Ecoscape Environmental Consultants Ltd.
Drawn by:	Robert Wagner
Checked by:	Kyle Hawes
Projection:	NAD83-UTM Zone 10
Date:	March 16, 2009

Legend

- **Recommended 2010 Passage Mitigation Sites**
- Bridge
- Obstruction
- Crossing Inspections Derived from Planning Phase
- Closed Bottom Structure Field Inspections
- City
- Road
- Railroads
- Watershed Atlas Stream
- Parks and Reserves

Operating Area

- Tolko
- Other

Tulameen Watershed Area

- Britton Creek
- Podunk Creek
- Tulameen River
- Vuich Creek

Myren Creek / Pike Mountain Watershed Area

- Allison Creek
- Cook Creek
- Gulliford Creek
- Myren Creek
- Otter Creek

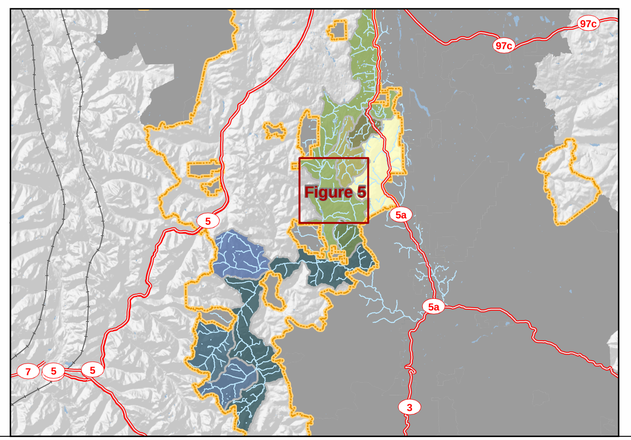
500 250 0 500 1,000 1,500 2,000 Meters

1:20,000

N W E S

Source Information

Base Map:	92H
Stream / CBS Information:	Field Inventory
Location Information:	Field, GPS (trimble Nomad / XH rec.)
Feature Information:	Field Inventory
Date of Inventory:	October-November, 2008
Inventory Management:	K. Hawes



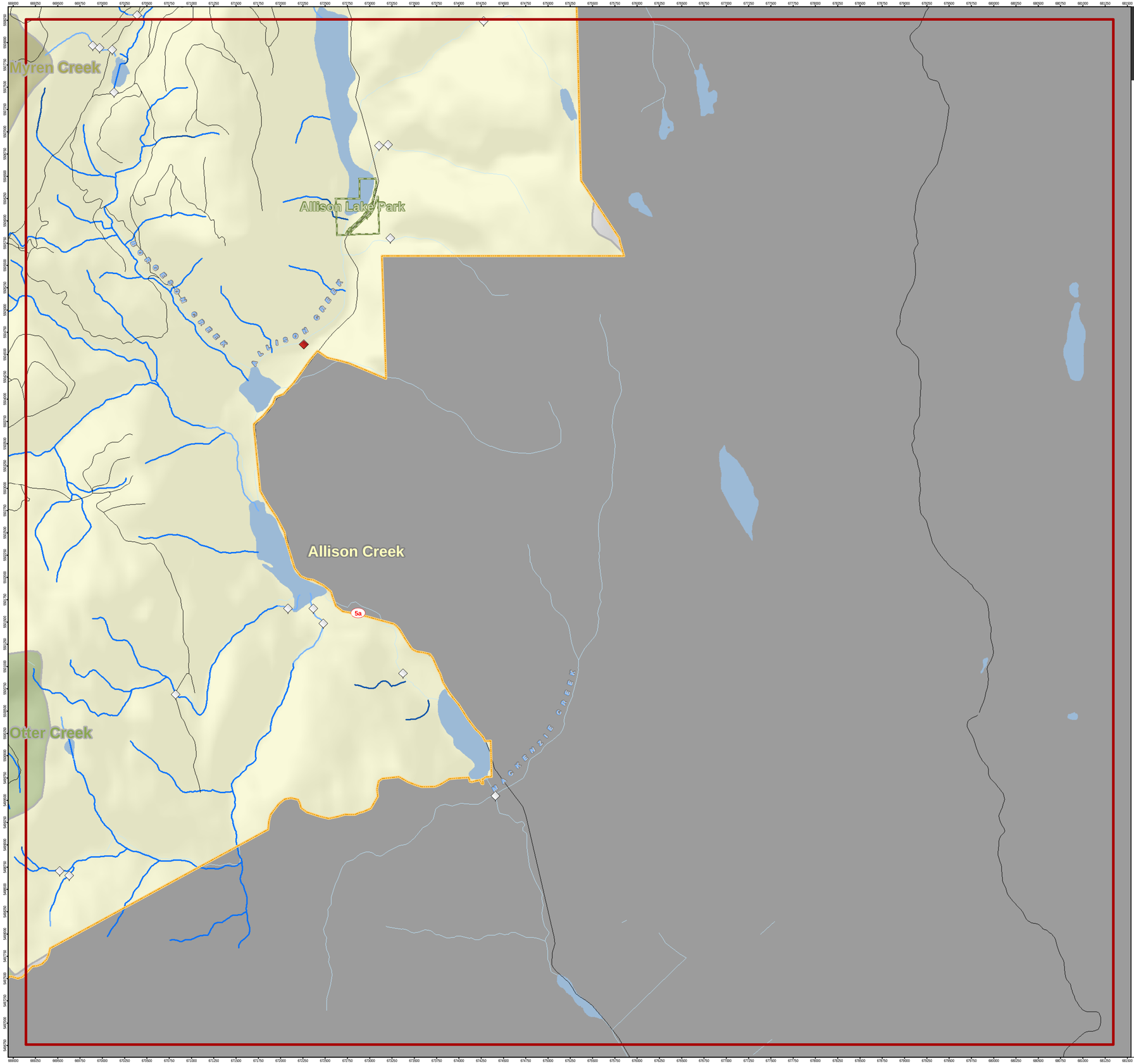


Figure 6

Lower Allison

Project:	Tulameen and Myren Creek / Pike Mountain Fish Passage CBS Assessments (Contract 5044001)
Location:	Tolko - Merritt TSA
Project No.:	08-317
Prepared for:	Tolko Industries Ltd.
Prepared by:	Ecoscape Environmental Consultants Ltd.
Drawn by:	Robert Wagner
Checked by:	Kyle Hawes
Projection:	NAD83-UTM Zone 10
Date:	March 16, 2009

Legend

- **Recommended 2010 Passage Mitigation Sites**
- Bridge
- Obstruction
- Crossing Inspections Derived from Planning Phase
- Closed Bottom Structure Field Inspections
- City
- Road
- Railroads
- Watershed Atlas Stream
- Parks and Reserves

Operating Area

- Tolko
- Other

Tulameen Watershed Area

- Britton Creek
- Podunk Creek
- Tulameen River
- Vuich Creek

Myren Creek / Pike Mountain Watershed Area

- Allison Creek
- Cook Creek
- Gulliford Creek
- Myren Creek
- Otter Creek

500 250 0 500 1,000 1,500 2,000 Meters

1:20,000

N W E S

Source Information

Base Map:	92H
Stream / CBS Information:	Field Inventory
Location Information:	Field, GPS (trimble Nomad / XH rec.)
Feature Information:	Field Inventory
Date of Inventory:	October-November, 2008
Inventory Management:	K. Hawes

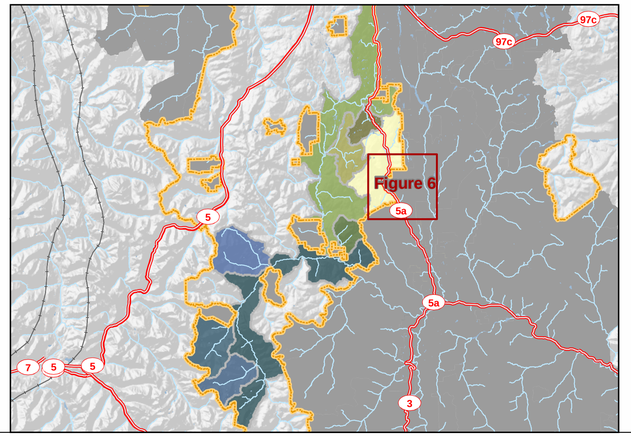


Figure 7

Mid Otter / Upper Myren

Project:	Tulameen and Myren Creek / Pike Mountain Fish Passage CBS Assessments (Contract 5044001)
Location:	Tolko - Merritt TSA
Project No.:	08-317
Prepared for:	Tolko Industries Ltd.
Prepared by:	Ecoscape Environmental Consultants Ltd.
Drawn by:	Robert Wagner
Checked by:	Kyle Hawes
Projection:	NAD83-UTM Zone 10
Date:	March 16, 2009

Legend

- **Recommended 2010 Passage Mitigation Sites**
- Bridge
- Obstruction
- Crossing Inspections Derived from Planning Phase
- Closed Bottom Structure Field Inspections
- City
- Road
- Railroads
- Watershed Atlas Stream
- Parks and Reserves

Operating Area

- Tolko
- Other

Tulameen Watershed Area

- Britton Creek
- Podunk Creek
- Tulameen River
- Vuich Creek

Myren Creek / Pike Mountain Watershed Area

- Allison Creek
- Cook Creek
- Gulliford Creek
- Myren Creek
- Otter Creek

500 250 0 500 1,000 1,500 2,000 Meters

1:20,000

N W E S

Source Information

Base Map:	92H
Stream / CBS Information:	Field Inventory
Location Information:	Field, GPS (trimble Nomad / XH rec.)
Feature Information:	Field Inventory
Date of Inventory:	October-November, 2008
Inventory Management:	K. Hawes

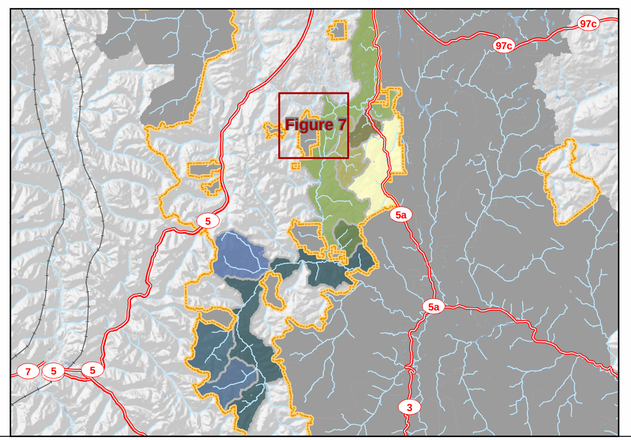


Figure 8

Upper Allison / Gulliford / Upper-Mid Otter

Project:	Tulameen and Myren Creek / Pike Mountain Fish Passage CBS Assessments (Contract 5044001)
Location:	Tolko - Merritt TSA
Project No.:	08-317
Prepared for:	Tolko Industries Ltd.
Prepared by:	Ecoscape Environmental Consultants Ltd.
Drawn by:	Robert Wagner
Checked by:	Kyle Hawes
Projection:	NAD83-UTM Zone 10
Date:	March 16, 2009

Legend

- **Recommended 2010 Passage Mitigation Sites**
- Bridge
- Obstruction
- Crossing Inspections Derived from Planning Phase
- Closed Bottom Structure Field Inspections
- City
- Road
- Railroads
- Watershed Atlas Stream
- Parks and Reserves

Operating Area

- Tolko
- Other

Tulameen Watershed Area

- Britton Creek
- Podunk Creek
- Tulameen River
- Vuich Creek

Myren Creek / Pike Mountain Watershed Area

- Allison Creek
- Cook Creek
- Gulliford Creek
- Myren Creek
- Otter Creek

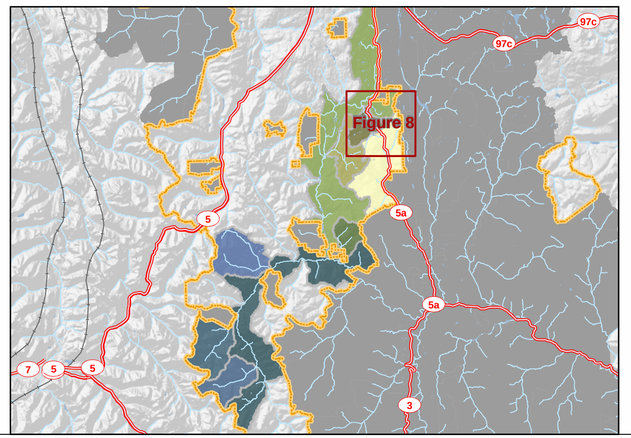
500 250 0 500 1,000 1,500 2,000 Meters

1:20,000

N W E S

Source Information

Base Map:	92H
Stream / CBS Information:	Field Inventory
Location Information:	Field, GPS (trimble Nomad / XH rec.)
Feature Information:	Field Inventory
Date of Inventory:	October-November, 2008
Inventory Management:	K. Hawes



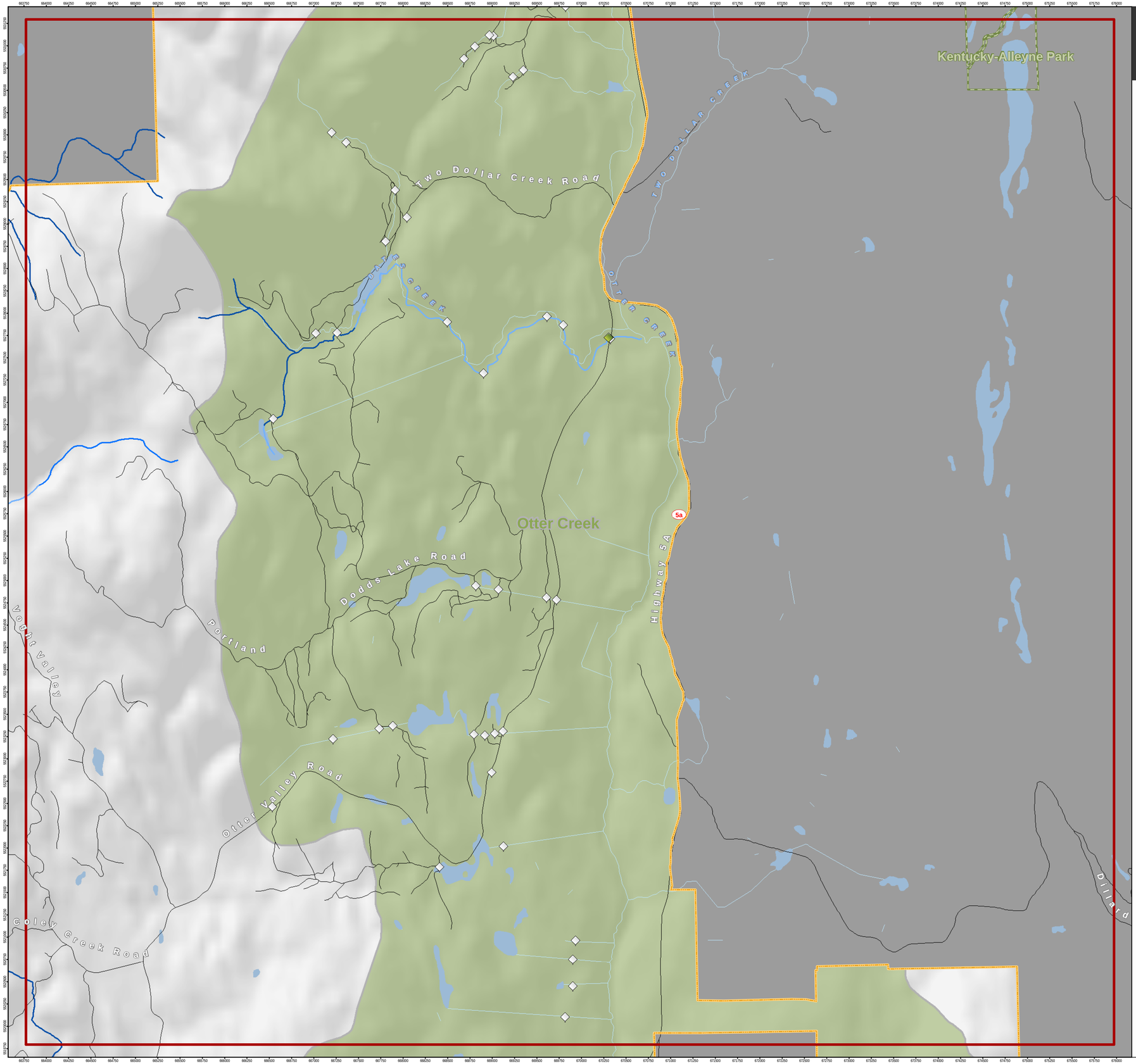


Figure 9

Upper Otter

Project:	Tulameen and Myren Creek / Pike Mountain Fish Passage CBS Assessments (Contract 5044001)
Location:	Tolko - Merritt TSA
Project No.:	08-317
Prepared for:	Tolko Industries Ltd.
Prepared by:	Ecoscape Environmental Consultants Ltd.
Drawn by:	Robert Wagner
Checked by:	Kyle Hawes
Projection:	NAD83-UTM Zone 10
Date:	March 16, 2009

Legend

- **Recommended 2010 Passage Mitigation Sites**
- Bridge
- Obstruction
- Crossing Inspections Derived from Planning Phase
- Closed Bottom Structure Field Inspections
- City
- Road
- Railroads
- Watershed Atlas Stream
- Parks and Reserves

Operating Area

- Tolko
- Other

Tulameen Watershed Area

- Britton Creek
- Podunk Creek
- Tulameen River
- Vuich Creek

Myren Creek / Pike Mountain Watershed Area

- Allison Creek
- Cook Creek
- Gulliford Creek
- Myren Creek
- Otter Creek

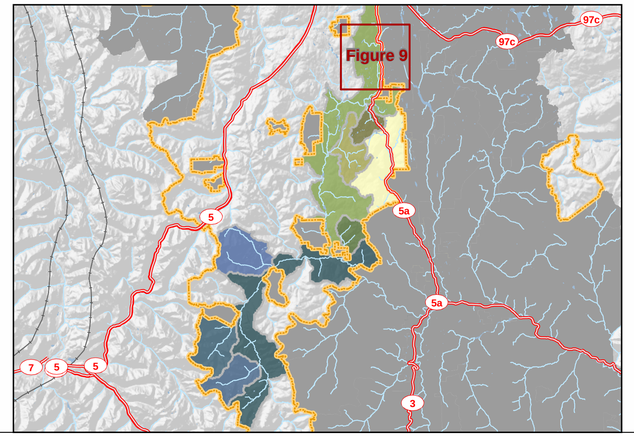
500 250 0 500 1,000 1,500 2,000 Meters

1:20,000

N W E S

Source Information

Base Map:	92H
Stream / CBS Information:	Field Inventory
Location Information:	Field, GPS (trimble Nomad / XH rec.)
Feature Information:	Field Inventory
Date of Inventory:	October-November, 2008
Inventory Management:	K. Hawes



APPENDIX A

Tolko Merritt TSA CBS Database

(*Taken from ESRI shapefile*)

APPENDIX A. Tolko Merritt TSA (Contract 5044001) CBS database file. From GIS field data: CBS_sites.dbf, included in Final_shapefiles subfolder with submission. Planning, data collection, analysis and implementation planning were carried out by Ecoscape Environmental Consulting Ltd. and GauTech Environmental Consulting

Date	Crossing ID	Crew	Coordinate System	Easting	Northing	Stream Name	Road Name	Road KM	MOF Forest District	Crossing Type	Location Comment	MIN30CMOR2	SUB_REL_LE	NAT_CHAN_S
10/13/2008	TUL-001	KH, BG	NAD 83 UTM10N	651021	5469054	Sarah Creek	CP118	61	DCS-Cascades	Round Culvert		No		No
10/13/2008	TUL-002	KH, BG	NAD 83 UTM10N	650962	5469083	Sarah Creek	CP118	60	DCS-Cascades	Round Culvert		No		No
10/13/2008	TUL-003	KH, BG	NAD 83 UTM10N	650930	5469108	Sarah Creek	CP118	60	DCS-Cascades	Round Culvert		No		No
10/13/2008	TUL-004	KH, BG	NAD 83 UTM10N	650264	5469492	Unknown	Tulameen River FSR	58	DCS-Cascades	Round Culvert		No		No
10/13/2008	POD-004	KH, BG	NAD 83 UTM10N	647789	5469590	Podunk Trib 2.0	Tulameen River FSR	55	DCS-Cascades	Round Culvert		Yes		Yes
10/13/2008	POD-002	KH, BG	NAD 83 UTM10N	648340	5469967	Unknown	Tulameen River FSR	56	DCS-Cascades	Round Culvert		No		No
10/13/2008	POD-005	KH, BG	NAD 83 UTM10N	647103	5468588	Podunk Trib 3.0	Tulameen River FSR	54	DCS-Cascades	Round Culvert		No		No
10/13/2008	POD-007	KH, BG	NAD 83 UTM10N	646253	5468269	Podunk Trib 4.0	Tulameen River FSR	53	DCS-Cascades	Round Culvert		No		No
10/13/2008	VUI-001	KH, BG	NAD 83 UTM10N	641913	5473369	WC:3103678006200064700657002 2	Tulameen River FSR	43	DCS-Cascades	Round Culvert		Yes		No
10/13/2008	POD-008	KH, BG	NAD 83 UTM10N	645540	5468094	WC:3103678006200079600409	Tulameen River FSR	52	DCS-Cascades	Round Culvert				
11/14/2008	ALL-001	dd;kh	NAD 83 UTM10N	673845	5509592	unknown	CP193	5	DCS-Cascades	Round Culvert		No	0%	No
11/14/2008	ALL-002	dd;kh	NAD 83 UTM10N	674494	5513088	Ketcham Creek	private road	1	DCS-Cascades	Round Culvert		No	0%	No
11/14/2008	ALL-003	dd;kh	NAD 83 UTM10N	674826	5512863	WC:3103678006090086	private road	2	DCS-Cascades	Round Culvert		No	0%	No
11/14/2008	ALL-005	kh-dd	NAD 83 UTM10N	674998	5514188	Ketcham Creek	private road	4	DCS-Cascades	Round Culvert		No	0%	No
11/14/2008	Bates-1	kh-dd	NAD 83 UTM10N	670304	5527729	Bates Creek	Otter Valley Road	1	DCS-Cascades	Round Culvert		No	0%	No
10/24/2008	OTT-010	kh;bg	NAD 83 UTM10N	666496	5499178	Manning Creek	Pike Mountain Road	22	DCS-Cascades	Round Culvert		No	0%	No
10/24/2008	OTT-011	kh;bg	NAD 83 UTM10N	666391	5499585	Manning Creek	Pike Mountain Road	21	DCS-Cascades	Round Culvert		No	25%	No
10/24/2008	OTT-012	kh;bg	NAD 83 UTM10N	666380	5499883	WC:3103678006200035700193073 8	Pike Mountain Road	20	DCS-Cascades	Round Culvert		No	0%	No
10/24/2008	OTT-013	kh;bg	NAD 83 UTM10N	666315	5499848	Manning Creek	Fremb Creek Road	0	DCS-Cascades	Round Culvert		No	0%	No
10/24/2008	OTT-014	kh;bg	NAD 83 UTM10N	662991	5500524	Manning Creek	402-P28	7	DCS-Cascades	Round Culvert		No	0%	No
10/24/2008	OTT-015	kh;bg	NAD 83 UTM10N	662678	5501423	WC:3103678006200035700193026 9	Manning Station Road	8	DCS-Cascades	Round Culvert		No	0%	No
10/23/2008	OTT-001	kh;bg	NAD 83 UTM10N	660617	5494601	Lockie Creek	Otter Valley Road	43	DCS-Cascades	Round Culvert	Mining road off Otter Valley Road	No	0%	No
10/23/2008	LUK-001	kh;bg	NAD 83 UTM10N	659548	5506966	Luke Creek	Matthew Creek FSR	2	DCS-Cascades	Round Culvert		No	0%	No
10/23/2008	LUK-002	kh;bg	NAD 83 UTM10N	658891	5507243	Luke Creek	191-2	1	DCS-Cascades	Round Culvert		No	0%	No
10/23/2008	LUK-003	kh;bg	NAD 83 UTM10N	657902	5507431	Luke Creek	C-1	2	DCS-Cascades	Round Culvert	Off Luke Creek FSR	No	0%	No
10/23/2008	MAT-001	kh;bg	NAD 83 UTM10N	659723	5508464	Mark Creek	Old Road of Matthew Creek FSR	5	DCS-Cascades	Round Culvert	2km up Old Road off Matthew Cr. FSR (at 3.3km)	No	0%	No
10/23/2008	OTT-006	kh;bg	NAD 83 UTM10N	662928	5516317	Otter Creek	Otter Valley Road	18	DCS-Cascades	Round Culvert		No	0%	No
10/23/2008	OTT-007	kh;bg	NAD 83 UTM10N	663219	5517013	Otter Creek	Otter Valley Road	17	DCS-Cascades	Other		No	0%	No
10/21/2008	MYR-001	kh;bg	NAD 83 UTM10N	667390	5508937	WC:3103678006200035700348054 9	Pike Mountain Road	7	DCS-Cascades	Round Culvert		No	0%	No
10/21/2008	MYR-002	kh;bg	NAD 83 UTM10N	668369	5506729	WC:3103678006200035700348067 5	196-8	3	DCS-Cascades	Round Culvert		No	25%	No
10/21/2008	MYR-003	kh;bg	NAD 83 UTM10N	666613	5506698	Elbow Lake outlet	Pike	11	DCS-Cascades	Round Culvert		No	50%	No
10/21/2008	MYR-004	kh;bg	NAD 83 UTM10N	667292	5506163	WC:3103678006200035700348067 5	P78	12	DCS-Cascades	Round Culvert	Partly damaged	No	0%	No
10/21/2008	MYR-005	kh;bg	NAD 83 UTM10N	667132	5506190	WC:3103678006200035700348067 5	Pike Mountain Road	12	DCS-Cascades	Round Culvert		No	75%	Yes
10/21/2008	MYR-006	kh;bg	NAD 83 UTM10N	665299	5505752	Trib. 2 to Myren Creek	Myren Creek Road	3	DCS-Cascades	Round Culvert		No	0%	No
10/21/2008	MYR-007	kh;bg	NAD 83 UTM10N	665331	5505818	Myren Creek	R07753	3	DCS-Cascades	Pipe Arch		No	100%	Yes
10/21/2008	MYR-008	kh;bg	NAD 83 UTM10N	665316	5506715	Myren Creek	Myren Creek Road	4	DCS-Cascades	Round Culvert		No	0%	No
10/21/2008	MYR-009	kh;bg	NAD 83 UTM10N	665026	5507339	Myren Creek	Myren Creek Road	5	DCS-Cascades	Round Culvert		No	0%	No
10/21/2008	MYR-010	kh;bg	NAD 83 UTM10N	664375	5507419	Biely Creek	Myren Creek Road	5	DCS-Cascades	Round Culvert		No	0%	No
10/17/2008	TUL-102	kh;bg	NAD 83 UTM10N	663782	5489269	WC:31036780062000335	Smart's Road.	6	DCS-Cascades	Round Culvert		No	0%	No
10/17/2008	Manion Creek	kh;bg	NAD 83 UTM10N	660052	5489563	Manion Creek	private road	0	DCS-Cascades	Round Culvert	private road off Smarts Road	No	0%	No
10/17/2008	Highway Crossing	kh;bg	NAD 83 UTM10N	664321	5490002	Cook Creek	Coalmont/Tulameen River Road	0	DCS-Cascades	Round Culvert	Public Road	No	0%	No
10/17/2008	COOK-001	kh;bg	NAD 83 UTM10N	664611	5491065	Cook Creek	Cook Creek FSR	4	DCS-Cascades	Round Culvert		No	0%	No
10/17/2008	COOK-002	kh;bg	NAD 83 UTM10N	664415	5492343	Cook Creek	192-8	6	DCS-Cascades	Embed Round Culve	Embedded with steel notched baffles	Yes	75%	Yes
10/17/2008	COOKTRI-001	kh;bg	NAD 83 UTM10N	665303	5492956	WC:3103678006200034003329 0	192-8	8	DCS-Cascades	Round Culvert		No	0%	No
10/17/2008	COOKRI-002	kh;bg	NAD 83 UTM10N	665892	5493514	WC:3103678006200034003329 0	192-8	9	DCS-Cascades	Round Culvert		No	25%	No
10/17/2008	COOKTRI-003	kh;bg	NAD 83 UTM10N	666259	5493879	WC:3103678006200034003329 0557	192-8	10	DCS-Cascades	Round Culvert		No	0%	No
10/17/2008	COOKTRI-005	kh;bg	NAD 83 UTM10N	666216	5493879	WC:3103678006200034003329 0	192-8	10	DCS-Cascades	Round Culvert		No	0%	No
10/16/2008	BUZCr-001	kh;bg	NAD 83 UTM10N	647457	5482043	Acid Creek	Buzz Creek Road	3	DCS-Cascades	Round Culvert		No	25%	Yes
10/16/2008	TUL-100	kg;bg	NAD 83 UTM10N	648564	5484494	Trib.2A	Tulameen River FSR	24	DCS-Cascades	Round Culvert		No	0%	No
10/16/2008	TUL-101	kh;bg	NAD 83 UTM10N	648543	5484596	WC:31036780062000573	Tulameen FSR	24	DCS-Cascades	Round Culvert	Primary and secondary pipes present	No	0%	No
10/16/2008	BRI-001	kh;bg	NAD 83 UTM10N	648328	5487390	unknown	C4-C5	1	DCS-Cascades	Round Culvert	Up C4-C5 at 20km on the Tulameen	No	0%	No
10/16/2008	BRI-002	kh;bg	NAD 83 UTM10N	648312	5487389	unknown	C4-C5	1	DCS-Cascades	Other	Up C4-C5 at 20km on the Tulameen	No	0%	No
10/16/2008	BRI-005	kh;bg	NAD 83 UTM10N	648530	5487767	unknown	Tulameen River FSR	20	DCS-Cascades	Round Culvert	S5-S6 stream	No	0%	No
10/16/2008	k999	kh;bg	NAD 83 UTM10N	649256	5488914	WC:3103678006200051200125 0076	Tulameen River FSR	17	DCS-Cascades	Round Culvert	Secondary, perched culvert to right (looking downstream)	No	0%	No
10/16/2008	BRIT-006	kh;bg	NAD 83 UTM10N	646264	5493753	unknown	Tulameen River FSR	10	DCS-Cascades	Round Culvert		No	0%	No
10/16/2008	BRIT-007	kh;bg	NAD 83 UTM10N	646239	5493765	unknown	Tulameen River FSR	10	DCS-Cascades	Round Culvert	Debris / landslide above	No	0%	No
10/16/2008	BRIT-008	kh;bg	NAD 83 UTM10N	646350	5493665	unknown	Tulameen River FSR	10	DCS-Cascades	Round Culvert		No	0%	No
10/16/2008	BRIT-010	kh;bg	NAD 83 UTM10N	650582	5489908	WC:3103678006200051200173	Grasshopper spur - Z-2	1	DCS-Cascades	Round Culvert	off Grasshopper at 5km down 250m to crossing	No	0%	No
10/13/2008	POD-0112	KH, BG	NAD 83 UTM10N	643444	5465182	Chan Creek	Jacobsen	3	DCS-Cascades	Wood culvert	Failing structure / rotting and collapsing		100%	Yes

Crossing ID	Embeddedness Comment	Form	Material	Diameter (mm)	Length (m)	Width (mm)	Height (mm)	Percent Slope	Outlet Drop (cm)	Primary Comments	Secondary Form	Secondary Material	Secondary Diameter (mm)
TUL-001				1000	16.0	0	0	7.0	6				0
TUL-002				1000	16.0	0	0	18.0	20	Culvert partially collapsed			0
TUL-003				1000	16.0	0	0	27.0	0	Culvert is not passable			0
TUL-004				900	15.0	0	0	19.0	60	Culvert is not passable			0
POD-004	Embedded 300-450mm/ stream bed simulation, armouring rock downstream			2300	23.0	0	0	6.0	30				0
POD-002				600	17.0	0	0	0.0	0	Culvert is not passable			0
POD-005				1200	16.0	0	0	16.0	20	Culvert is not passsable, boulder cascade below, sub-surface 35m downstream from outlet			0
POD-007				800	16.0	0	0	6.0	21	Tributary joins creek downstream at outlet			0
VUI-001				1000	10.0	0	0	6.0	0	Avulsion, agraded downstream and subsurface, flows upstream channelized			600
POD-008				0	0.0	0	0	0.0	0				0
ALL-001		Circular	Corrugated Steel	1000	14.0	0	0	25.0	0				0
ALL-002		Circular	Corrugated Steel	900	12.0	0	0	5.0	68				0
ALL-003		Circular	Corrugated Steel	900	0.0	0	0	3.5	0				0
ALL-005		Circular	Corrugated Steel	750	10.5	0	0	3.5	43				0
Bates-1		Circular	Corrugated Steel	900	20.0	0	0	3.0	8				0
OTT-010		Circular	Corrugated Steel	900	12.0	0	0	3.5	49				0
OTT-011		Circular	Corrugated Steel	900	10.0	0	0	2.0	20		Circular	Corrugated Steel	600
OTT-012		Circular	Corrugated Steel	900	12.0	0	0	2.5	15		Circular	Corrugated Steel	600
OTT-013		Circular	Corrugated Steel	900	10.0	0	0	0.5	23		Circular	Corrugated Steel	600
OTT-014		Circular	Corrugated Steel	600	10.0	0	0	4.0	0				0
OTT-015		Circular	Corrugated Steel	600	10.0	0	0	6.0	30				0
OTT-001		Circular	Corrugated Steel	1200	6.0	0	0	6.0	0	No outlet drop. However, boulder apron just beyond plunges 30cm to lower residual pool.			0
LUK-001		Circular	Corrugated Steel	1600	16.0	0	0	7.0	29	No residual pool / splash on boulder			0
LUK-002		Circular	Corrugated Steel	1400	19.0	0	0	10.0	30	Excavated residual pool - S5-S6 stream			0
LUK-003		Circular	Corrugated Steel	1200	16.0	0	0	8.0	31				0
MAT-001		Circular	Corrugated Steel	900	10.0	0	0	0.7	35	Cattle damage/impacts to riparian			0
OTT-006		Horizontal Ellipse	Corrugated Steel	0	20.7	3400	2000	0.5	15	public road			0
OTT-007		Horizontal Ellipse	Corrugated Steel	0	18.0	3400	2100	3.0	17				0
MYR-001		Circular	Corrugated Steel	900	11.5	0	0	3.5	1				0
MYR-002		Circular	Corrugated Steel	600	10.0	0	0	4.0	0				0
MYR-003	part plugged	Circular	Corrugated Steel	500	10.0	0	0	1.7	0	Plugged/ephemeral flows overtop road			0
MYR-004		Circular	Corrugated Steel	900	10.0	0	0	2.1	33				0
MYR-005	Fines and gravel through 75% - increased grade at upper 25% at inlet	Circular	Corrugated Steel	900	12.0	0	0	3.5	0				0
MYR-006		Circular	Corrugated Steel	1000	10.0	0	0	3.3	0	Ephemeral stream			0
MYR-007	OBS - corrugated steel arch	Arch	Corrugated Steel	0	15.0	1900	1100	0.0	0				0
MYR-008		Circular	Corrugated Steel	800	13.0	0	0	2.5	0	backwatered 75%.			0
MYR-009		Circular	Corrugated Steel	900	15.0	0	0	3.0	0	Outlet drop is 0cm due to outlet control.			0
MYR-010		Circular	Corrugated Steel	900	10.0	0	0	4.0	2				0
TUL-102		Circular	Corrugated Steel	1200	7.0	0	0	6.0	210				0
Manion Creek		Circular	Corrugated Steel	500	9.0	0	0	10.0	18		Circular	Corrugated Steel	400
Highway Crossing	Secondary pipe partly plugged with boulder and gravel.	Circular	Corrugated Steel	1200	12.0	0	0	4.5	25	Rainbow observed in residual pool.	Circular	Corrugated Steel	1200
COOK-001		Circular	Corrugated Steel	1200	10.0	0	0	3.5	10				0
COOK-002	Welded baffles	Circular	Corrugated Steel	1600	16.0	0	0	6.0	0	No outlet drop			0
COOKTRI-001		Circular	Corrugated Steel	2000	20.0	0	0	10.0	0				0
COOKRI-002		Circular	Corrugated Steel	1800	14.0	0	0	10.0	0	No outlet drop			0
COOKTRI-003		Circular	Corrugated Steel	1600	16.0	0	0	11.0	5				0
COOKTRI-005		Circular	Corrugated Steel	1400	10.0	0	0	9.0	0	No outlet drop			0
BUZCr-001	Road fill slope erosion and fines through pipe and downstream	Circular	Corrugated Steel	900	9.0	0	0	1.5	0	Embedded in sand			0
TUL-100		Circular	Corrugated Steel	1000	18.0	0	0	9.0	93				0
TUL-101		Circular	Corrugated Steel	1200	18.0	0	0	6.5	0	No outletdrop on primary pipe. 30cm outlet drop on secondary pipe (dry).	Circular	Corrugated Steel	1000
BRI-001		Circular	Corrugated Steel	1000	10.0	0	0	3.5	0	Boulder/cobble apron at outlet with no residual pool			0
BRI-002	Open bottom rotted structure to be removed	Rectangular	Wood	0	7.0	0	0	5.0	0				0
BRI-005		Circular	Corrugated Steel	800	13.0	0	0	13.0	68				0
k999		Circular	Corrugated Steel	1400	14.0	0	0	5.0	18	Good residual pool - upstream migration barrier	Circular	Corrugated Steel	800
BRIT-006		Circular	Corrugated Steel	1000	15.0	0	0	9.0	3	Not passable to CBS-subsurface flows below CBS-confluence with mainstem flows downstream.			0
BRIT-007		Circular	Corrugated Steel	900	12.0	0	0	5.0	61				0
BRIT-008		Circular	Corrugated Steel	500	9.0	0	0	6.0	0	No residual pool.			0
BRIT-010		Circular	Corrugated Steel	900	12.0	0	0	6.0	10				0
POD-0112	None	Rectangular	Wood	0	10.0	2000	700	0.0	0				0

Crossing ID	Secondary Length (m)	Secondary Width (mm)	Secondary Height	Secondary Percent Slope	Secondary Outlet Drop (cm)	Secondary Comments	Mean D/S Channel Width (m)	Residual Depth (cm)	Downstream Slope (%)	Habitat Rating	Road Fill (cm)	Valley Fill	Beaver Activity	Inlet Drop	Inlet Drop (cm)	Backwater (%)	Fish Sighted
TUL-001	0.0	0	0	0.0	0		1.2	8.0	15	Mod	2000	DF	No	No	0	0	No
TUL-002	0.0	0	0	0.0	0		1.5	15.0	17	Low	3000	DF	No	No	0	0	No
TUL-003	0.0	0	0	0.0	0		1.3	0.0	17	Low	2000	DF	No	No	0	0	No
TUL-004	0.0	0	0	0.0	0		1.2	35.0	13	Low	2500	DF	No	Yes	9	0	No
POD-004	0.0	0	0	0.0	0		1.9	0.0	10	Mod	3500	DF	No	No	0	0	No
POD-002	0.0	0	0	0.0	0		1.0	17.0	16	Low	4000	DF	No	Yes	6	0	No
POD-005	0.0	0	0	0.0	0		1.3	0.0	11	Low	0	DF		Yes	10	0	No
POD-007	0.0	0	0	0.0	0		1.2	4.0	4	Low-Mod	3000	DF	No	No	0	0	No
VUI-001	10.0	0	0	0.0	0	1 primary, 3 secondary pipes	2.9	20.0	3	Low	1500	DF	No	Yes	8	50	No
POD-008	0.0	0	0	0.0	0		0.0	0.0	0		0				0		
ALL-001	0.0	0	0	0.0	0		1.3	3.0	12	Low	400	Deep Fill	No	Yes	30	0%	No
ALL-002	0.0	0	0	0.0	0		1.4	30.0	5	Low	150	Deep Fill	No	No	0	0%	No
ALL-003	0.0	0	0	0.0	0		1.0	8.5	3	Low	2	Deep Fill	Yes	No	0	25%	No
ALL-005	0.0	0	0	0.0	0		0.9	17.0	2	Low	65	Deep Fill	Yes	No	0	0%	No
Bates-1	0.0	0	0	0.0	0		4.2	40.0	2	Low	400	Deep Fill	No	Yes	33	0%	No
OTT-010	0.0	0	0	0.0	0		1.5	39.0	9	Low	35	Deep Fill	No	No	0	0%	No
OTT-011	12.2	0	0	2.2	0	3rd pipe @ 400mm diameter	1.6	32.0	4	Low	38	Deep Fill	No	Yes	22	25%	No
OTT-012	12.0	0	0	7.0	16		1.5	47.0	4	Low	43	Deep Fill	No	Yes	16	0%	No
OTT-013	12.0	0	0	2.5	0		2.8	31.0	4	Low	1	Deep Fill	No	No	0	0%	No
OTT-014	0.0	0	0	0.0	0		2.8	23.0	4	Moderate	35	Deep Fill	No	Yes	4	0%	No
OTT-015	0.0	0	0	0.0	0		1.4	10.0	18	Low	60	Deep Fill	No	Yes	13	0%	No
OTT-001	0.0	0	0	0.0	0		2.7	28.0	7	Moderate	55	Deep Fill	No	Yes	10	0%	No
LUK-001	0.0	0	0	0.0	0		2.6	0.0	8	Low	140	Deep Fill	No	Yes	10	0%	No
LUK-002	0.0	0	0	0.0	0		2.6	35.0	7	Low	200	Deep Fill	No	No	0	0%	No
LUK-003	0.0	0	0	0.0	0		2.8	22.0	5	Low	240	Deep Fill	No	No	0	0%	No
MAT-001	0.0	0	0	0.0	0		1.7	19.0	2	Low	65	Deep Fill	Yes	No	0	0%	No
OTT-006	0.0	0	0	0.0	0		4.3	72.0	2	High	60	Shallow Fill	Yes	No	0	0%	Yes
OTT-007	0.0	0	0	0.0	0		3.7	68.0	2	High	55	Shallow Fill	No	No	0	0%	No
MYR-001	0.0	0	0	0.0	0		1.0	10.0	1	Low	120	Deep Fill	No	No	0	0%	No
MYR-002	0.0	0	0	0.0	0		0.9	2.0	4	Low	40	Deep Fill	No	No	0	25%	No
MYR-003	0.0	0	0	0.0	0		0.8	5.0	2	Low	80	Deep Fill	No	No	0	0%	No
MYR-004	0.0	0	0	0.0	0		0.8	26.0	2	Low	100	Deep Fill	No	No	0	0%	No
MYR-005	0.0	0	0	0.0	0		1.2	3.0	2	Low	120	Deep Fill	No	Yes	4	75%	No
MYR-006	0.0	0	0	0.0	0		0.8	0.0	4	Low	70	Deep Fill	No	No	0	0%	No
MYR-007	0.0	0	0	0.0	0		1.2	0.0	2	Low	90	Deep Fill	No	No	0	0%	No
MYR-008	0.0	0	0	0.0	0		1.2	37.0	1	Low	40	Deep Fill	No	No	0	75%	No
MYR-009	0.0	0	0	0.0	0		1.3	73.0	2	Moderate	4	Deep Fill	No	Yes	18	0%	Yes
MYR-010	0.0	0	0	0.0	0		1.7	9.0	4	Low	200	Deep Fill	No	No	0	0%	No
TUL-102	0.0	0	0	0.0	0		1.6	35.0	7	Moderate	90	Deep Fill	No	Yes	11	0%	No
Manion Creek	9.0	0	0	8.0	35		2.4	33.0	13	Moderate	90	Deep Fill	No	Yes	12	0%	No
Highway Crossing	12.0	0	0	4.0	4	This pipe is accutally postioned lower, however it is blocked and not the primary pipe at this time.	1.0	23.0	2	High	40	Deep Fill	Yes	Yes	7	0%	Yes
COOK-001	0.0	0	0	0.0	0		1.7	25.0	2	Low	60	Deep Fill	No	Yes	15	0%	No
COOK-002	0.0	0	0	0.0	0		2.1	10.0	2	High	200	Deep Fill	No	No	0	25%	Yes
COOKTRI-001	0.0	0	0	0.0	0		1.8	40.0	10	Moderate	275	Deep Fill	No	Yes	15	25%	No
COOKRI-002	0.0	0	0	0.0	0		1.6	15.0	6	Low	140	Deep Fill	No	No	0	50%	No
COOKTRI-003	0.0	0	0	0.0	0		1.7	21.0	12	Low	75	Deep Fill	No	No	0	0%	No
COOKTRI-005	0.0	0	0	0.0	0		1.4	18.0	16	Low	80	Deep Fill	No	No	0	25%	No
BUZCr-001	0.0	0	0	0.0	0		2.2	20.0	2	Low	150	Deep Fill	No	No	0	100%	No
TUL-100	0.0	0	0	0.0	0		0.8	30.0	12	Low	300	Deep Fill	No	Yes	8	0%	No
TUL-101	20.0	0	0	7.0	30	dry	4.1	20.0	16	Low	130	Deep Fill	No	Yes	55	25%	No
BRI-001	0.0	0	0	0.0	0		0.9	0.0	7	Low	120	Deep Fill	No	No	0	0%	No
BRI-002	0.0	0	0	0.0	0		0.9	0.0	7	Low	50	Deep Fill	No	No	0	0%	No
BRI-005	0.0	0	0	0.0	0		1.8	0.0	30	Low	150	Deep Fill	No	Yes	8	0%	No
k999	14.0	0	0	0.0	11	No stream channel / no pool / bermed between primary pipe	2.8	55.0	7	Moderate	75	Deep Fill	No	Yes	8	0%	No
BRIT-006	0.0	0	0	0.0	0		2.0	23.0	6	Low	110	Shallow Fill	No	No	32	0%	No
BRIT-007	0.0	0	0	0.0	0		2.0	0.0	5	Low	80	Shallow Fill	No	Yes	8	0%	No
BRIT-008	0.0	0	0	0.0	0		1.3	0.0	8	Low	100	Shallow Fill	No	Yes	11	0%	No
BRIT-010	0.0	0	0	0.0	0		0.8	22.0	5	Low	120	Deep Fill	No	Yes	5	0%	No
POD-0112	0.0	0	0	0.0	0		0.0	0.0	0	High	0	Deep Fill	No		0		

Crossing ID	Species	Field Comment	CBS Fix Action	Bridge Span (m)	Substrate Simulation Length	Fix Comment	Outlet Photo	Barrel Photo	Downstream Photo	Inlet Photo
TUL-001			EM	0	0		IMGP0178	IMGP0179	IMGP0180	No Photo
TUL-002		Regular large woody debris, drops, and barriers; Step pool	EM	0	0		IMGP0181	IMGP0182	IMGP0183	IMGP0184
TUL-003		Abundant large woody debris and rock obstructions; Backwatered <1.0m	EM	0	0		IMGP0185	IMGP0186	IMGP0187	IMGP0188
TUL-004			EM	0	0		IMGP0193	IMGP0194	IMGP0195	IMGP0196
POD-004		Upstream gradient barriers 15m upstream from inlet, Rip rap fill barrier downstream 20m from outlet	None	0	0		IMGP0207	IMGP0208	IMGP0209	IMGP0210
POD-002			EM	0	0		IMGP0202	IMGP0203	IMGP0204	IMGP0205
POD-005			EM	0	0		IMGP0219	IMGP0220	IMGP0221	IMGP0222
POD-007	Potential small fish	Higher fish potential and productivity; limited upstream when channels run through wetland area	EM	0	0		IMGP0230	IMGP0231	IMGP0232	IMGP0233
VUI-001		Mod habitat value but not passable upstream to Obs since washout	SS	0	0		IMGP0280	IMGP0281	IMGP0282	IMGP0283
POD-008				0	0		IMGP0239	IMGP0240	IMGP0241	IMGP0242
ALL-001				0	0	No Action	IMGP1278	No Photo	IMGP1279	No Photo
ALL-002		perched inlet		0	0	No Action - S5-S6 stream	IMGP1280	No Photo	IMGP1281	IMGP1283
ALL-003				0	0	No Action under FIA since Low habitat rating and not likley fish bearing.	IMGP1284	No Photo	No Photo	IMGP1286
ALL-005			EM-Sub_Addition	0	0	No Action under FIA - S5-S6 stream	IMGP1292	No Photo	IMGP1291	IMGP1294
Bates-1		ephemeral creek		0	0	No Action under FIA.	IMGP1303	No Photo	IMGP1302	IMGP1300
OTT-010			OBS-Bridge	0	0	OBS or removal. However, this is a low value stream.	IMGP0841	No Photo	IMGP0840	IMGP0839
OTT-011		May backwater during flow periods		0	0	Ephemeral watercourse, however significant spring flows evident by channel scour.	IMGP0846	IMGP0844	IMGP0847	IMGP0842
OTT-012		Likely insufficient flows during summer	OBS-Bridge	0	0	Depending on stream class (likley S5-S6 due to low flows)	IMGP0850	No Photo	IMGP0851	IMGP0848
OTT-013		10cm inlet drop on 2ndary pipe	EM-BW	0	0	Likley S5-S6 stream based on low flows observed during late fall. Install new pipe.	IMGP0854	No Photo	IMGP0855	IMGP0853
OTT-014		No fish observed in otherwise good habitat. Perhaps can't get upstream from Otter Creek.	RM-Removal	0	0	Pipe appears undersized. 200m upstream-downstream investigation identified no barriers.	IMGP0870	No Photo	IMGP0871	IMGP0872
OTT-015		S5-S6 stream.	RM-Removal	0	0	Pipe undersized, road washout has occurred. But S5-S6 stream.	IMGP0876	No Photo	IMGP0875	IMGP0877
OTT-001			RM-Removal	0	0	Check private land/tenure status to see if FIA applies.	IMGP0727	IMGP0727	IMGP0728	IMGP0730
LUK-001		S5 Stream		0	0	No action recommended	IMGP0752	No Photo	IMGP0751	IMGP0750
LUK-002		Recent channel scour/downcutting		0	0	No actions since S5-S6 stream	IMGP0755	IMGP0753	IMGP0754	IMGP0757
LUK-003		S5-S6 stream		0	0	No action recommended	IMGP0762	IMGP0762	IMGP0761	IMGP0759
MAT-001				0	0	No action since S5-S6 stream	IMGP0763	IMGP0765	IMGP0764	IMGP0767
OTT-006	General Fish Observn	Near level grade - some boulder substrates through pipe - dips in center creating shallow pool.		0	0	Public Road - No action recommended through FIA program.	IMGP0809	IMGP0808	IMGP0811	IMGP0806
OTT-007		Pipe installed poorly.		0	0	No action under FIA program since public road	IMGP0821	IMGP0819	IMGP0820	IMGP0815
MYR-001				0	0	No defined channel willow/alder swamp	IMGP0604	No Photo	IMGP0603	IMGP0602
MYR-002		S6 stream. Logged straight through watercourse.		0	0		IMGP0614	IMGP0615	IMGP0616	IMGP0618
MYR-003		S6 Stream	RM-Removal	0	0	Remove pipe and allow natural overflow from lake - although non fish bearing channel.	IMGP0624	IMGP0628	IMGP0625	IMGP0627
MYR-004			RM-Removal	0	0	Low habitat value but fish potential. Road inactive and becoming ingrown with alder. remove pipe	IMGP0631	IMGP0632	IMGP0633	IMGP0635
MYR-005				0	0	Passable but very low value - not likely frequented by fish.	IMGP0637	IMGP0638	IMGP0639	IMGP0640
MYR-006		Ephemeral.		0	0	No action	IMGP0664	IMGP0668	IMGP0665	IMGP0666
MYR-007		Ephemeral stream.		0	0	No Action	No Photo	No Photo	IMGP0671	IMGP0669
MYR-008		Poorly defined channel through alder swamp		0	0	No action.	IMGP0674	IMGP0678	IMGP0675	IMGP0677
MYR-009	General Fish Observn	Trout sp. (EB-RB)- moderate habitate. R-P channel and ocassinal gravel bars.	EM-Sub_Addition	8	0	Undersized pipe.velocity barrier/passable at lower flows-bridge or arch. upstream drops quickly.	IMGP0695	IMGP0696	IMGP0694	IMGP0697
MYR-010		Not passable S5-S6 stream channel - natural debris barrier 6m d/s of outlet		0	0	No action	IMGP0703	No Photo	IMGP0704	IMGP0706
TUL-102			OBS-Bridge	0	0	Install OBS and weirs to step up through structure and prevent unravelling of channel upstream	IMGP0443	IMGP0443	IMGP0444	IMGP0448
Manion Creek		Private property	RM-Removal	0	0	Passage through primary pipe is questionable.	IMGP0449	No Photo	IMGP0453	IMGP0452
Highway Crossing	Rainbow		OBS-Bridge	5	0		IMGP0456	No Photo	IMGP0457	IMGP0459
COOK-001		Subsurface flows through this section.		0	0	No action recommended	IMGP0467	No Photo	IMGP0468	IMGP0465
COOK-002	Rainbow	Two (2) rainbow observed in CBS		0	0	No action. Good pipe and passable	IMGP0469	IMGP0470	IMGP0471	IMGP0473
COOKTRI-001		Moderate to Low value. Debris jam about 3.5 m d/s of outlet increases control elev. and resid. pool	EM-Sub_Addition	0	0	Install baffles and substrates similar to downstream pipe.	IMGP0486	IMGP0485	IMGP0487	IMGP0483
COOKRI-002			EM-Sub_Addition	0	0	Pipe is passable but may still benefit baffles and substrate addition. But low habitat rating.	IMGP0492	IMGP0489	IMGP0493	IMGP0491
COOKTRI-003		Step-pool downstream of pipe. Debris jam influencing deeper residual pool. Low stream value.	EM-Sub_Addition	0	0	Low habitat value since upper watercourse and limitied habitat gained. Perhaps baffles and subs.	IMGP0495	No Photo	IMGP0494	IMGP0497
COOKTRI-005				0	0	No action recommended	IMGP0499	IMGP0500	IMGP0498	IMGP0501
BUZCr-001		S6 Stream trib to Tulameen River. Erosion and sediment control required - lengthen CBS	EM-Sub_Addition	0	0	Pipe is passable however miitigate erosion and sediment issues. Increase length or install bridge.	IMGP0337	IMGP0337	IMGP0338	IMGP0340
TUL-100			OBS-Bridge	0	0	S6 stream. Limited habitat gained. No action recommended since non-fish stream.	IMGP0345	IMGP0345	IMGP0346	IMGP0348
TUL-101		No inlet drop on 2ndary pipe - inlet drop may hinder U/S passage	OBS-Bridge	0	0	u/s slope 18% low habitat value	IMGP0352	IMGP0351	IMGP0350	IMGP0355
BRI-001			RM-Removal	0	0		IMGP0362	IMGP0369	IMGP0361	IMGP0369
BRI-002		Natural barriers to fish through channel - S5-S6 watercourse	RM-Removal	0	0		IMGP0365	No Photo	IMGP0366	IMGP0367
BRI-005		Not passable		0	0		IMGP0374	No Photo	IMGP0375	IMGP0376
k999		IMGP0387 - downstream barrier 3-m height with debris jam barrier 125m downstream.	BW-Backwater	0	0	Low priority due to large impassable debris jam (3-m height) within 200m of crossing.	IMGP0390	IMGP0391	IMGP0386	IMGP0394
BRIT-006		channel splits upstream-upstream gradient=9%		0	0	Pipe recently replaced.	IMGP0407	No Photo	IMGP0409	IMGP0413
BRIT-007		No residual pool		0	0	Upstream channel instability and high bank instability.	IMGP0411	No Photo	IMGP0416	IMGP0415
BRIT-008		Upstream migration barriers SWD/LWD steps 10-m upstream of CBS crossing.	OBS-Bridge	0	0	Sediment and headwall erosion severe. Install longer and bigger pipe.	IMGP0422	No Photo	IMGP0423	IMGP0418
BRIT-010		Low to moderate potential small 1st order watercourse through spruce swamp gully. Stable channel	BW-Backwater	0	0		IMGP0440	No Photo	IMGP0439	IMGP0437
POD-0112		Although not CBS, this old wooden crossing is soon to collapse into the stream.	RM-Removal	0	0	This crossing is near the end of a spur road - collapsing and may become debris jam obstruction	IMGP0270		IMGP0268	

Crossing ID	Upstream Photo	MAX_PDOP	CORR_TYPE	RCVR_TYPE	GPS_DATE	GPS_TIME	DATAFILE	UNFILT_POS	FILT_POS	GPS_HEIGHT	VERT_PREC	HORZ_PREC	SOURCETHM
TUL-001	No Photo	0.0	Postprocessed Code	Pro XH	10/13/2008		TOLKO-1-OCT13.cor	0	0	0.000	0.0	0.0	Cbs_outl.shp
TUL-002	No Photo	0.0	Postprocessed Code	Pro XH	10/13/2008		TOLKO-1-OCT13.cor	0	0	0.000	0.0	0.0	Cbs_outl.shp
TUL-003	IMGP0189	0.0	Postprocessed Code	Pro XH	10/13/2008		TOLKO-1-OCT13.cor	0	0	0.000	0.0	0.0	Cbs_outl.shp
TUL-004	IMGP0197-98	0.0	Postprocessed Code	Pro XH	10/13/2008		TOLKO-1-OCT13.cor	0	0	0.000	0.0	0.0	Cbs_outl.shp
POD-004	IMGP0211-15	0.0	Postprocessed Code	Pro XH	10/13/2008		TOLKO-1-OCT13.cor	0	0	0.000	0.0	0.0	Cbs_outl.shp
POD-002	IMGP0206	0.0	Postprocessed Code	Pro XH	10/13/2008		TOLKO-1-OCT13.cor	0	0	0.000	0.0	0.0	Cbs_outl.shp
POD-005	IMGP0223-26	0.0	Postprocessed Code	Pro XH	10/13/2008		TOLKO-1-OCT13.cor	0	0	0.000	0.0	0.0	Cbs_outl.shp
POD-007	IMGP0234-38	0.0	Postprocessed Code	Pro XH	10/13/2008		TOLKO-1-OCT13.cor	0	0	0.000	0.0	0.0	Cbs_outl.shp
VUI-001	IMGP0284-94	0.0	Postprocessed Code	Pro XH	10/13/2008		TOLKO-1-OCT13.cor	0	0	0.000	0.0	0.0	Cbs_outl.shp
POD-008	No Photo	0.0	Postprocessed Code	Pro XH	10/13/2008		TOLKO-1-OCT13.cor	0	0	0.000	0.0	0.0	Cbs_outl.shp
ALL-001	IMGP1277	6.3	Uncorrected	GeoXM	11/14/2008	12:41:05pm	TOLKO-8-Nov14.cor	132	132	1152.051	3.1	1.8	Cbs_outl.shp
ALL-002	IMGP1282	6.9	Postprocessed Code	GeoXM	11/14/2008	01:10:08pm	TOLKO-8-Nov14.cor	31	31	1207.208	2.3	1.8	Cbs_outl.shp
ALL-003	IMGP1287	19.0	Postprocessed Code	GeoXM	11/14/2008	01:18:59pm	TOLKO-8-Nov14.cor	143	143	1219.469	2.3	2.0	Cbs_outl.shp
ALL-005	IMGP1293	4.6	Postprocessed Code	GeoXM	11/14/2008	01:43:04pm	TOLKO-8-Nov14.cor	295	295	1232.614	1.9	1.4	Cbs_outl.shp
Bates-1	IMGP1301	2.9	Postprocessed Code	GeoXM	11/14/2008	04:20:27pm	TOLKO-8-Nov14.cor	97	97	991.828	1.7	1.3	Cbs_outl.shp
OTT-010	IMGP0838	3.0	Postprocessed Code	Pro XH	10/24/2008	09:14:30am	TOLKO-7-OCT24.cor	49	49	1322.095	0.9	1.1	Cbs_outl.shp
OTT-011	IMGP0843	2.0	Postprocessed Code	Pro XH	10/24/2008	09:22:09am	TOLKO-7-OCT24.cor	101	101	1293.709	0.8	0.5	Cbs_outl.shp
OTT-012	IMGP0849	3.0	Postprocessed Code	Pro XH	10/24/2008	09:33:38am	TOLKO-7-OCT24.cor	208	208	1287.822	0.9	0.6	Cbs_outl.shp
OTT-013	IMGP0852	2.7	Postprocessed Code	Pro XH	10/24/2008	09:42:12am	TOLKO-7-OCT24.cor	2	2	1283.761	1.0	0.6	Cbs_outl.shp
OTT-014	IMGP0873	4.1	Postprocessed Code	Pro XH	10/24/2008	10:55:15am	TOLKO-7-OCT24.cor	67	67	1088.803	1.4	1.2	Cbs_outl.shp
OTT-015	IMGP0878	3.9	Postprocessed Code	Pro XH	10/24/2008	11:24:11am	TOLKO-7-OCT24.cor	130	130	1107.451	1.1	0.9	Cbs_outl.shp
OTT-001	IMGP0729	3.9	Postprocessed Code	Pro XH	10/23/2008	09:04:55am	TOLKO-6-0CT23.cor	65	65	821.212	1.2	1.1	Cbs_outl.shp
LUK-001	IMGP0749	2.7	Postprocessed Code	Pro XH	10/23/2008	10:08:05am	TOLKO-6-0CT23.cor	79	79	1018.101	1.2	0.6	Cbs_outl.shp
LUK-002	IMGP0756	4.9	Postprocessed Code	Pro XH	10/23/2008	10:21:50am	TOLKO-6-0CT23.cor	73	73	1119.896	1.6	1.0	Cbs_outl.shp
LUK-003	IMGP0760	2.9	Postprocessed Code	Pro XH	10/23/2008	10:36:38am	TOLKO-6-0CT23.cor	59	59	1222.668	0.9	0.6	Cbs_outl.shp
MAT-001	IMGP0766	2.2	Postprocessed Code	Pro XH	10/23/2008	10:54:24am	TOLKO-6-0CT23.cor	105	105	1083.652	1.1	0.8	Cbs_outl.shp
OTT-006	IMGP0805	3.3	Postprocessed Code	Pro XH	10/23/2008	02:05:46pm	TOLKO-6-0CT23.cor	98	98	879.190	1.2	0.6	Cbs_outl.shp
OTT-007	IMGP0816	2.9	Postprocessed Code	Pro XH	10/23/2008	02:24:57pm	TOLKO-6-0CT23.cor	132	132	885.789	0.9	0.6	Cbs_outl.shp
MYR-001	IMGP0601	1.9	Postprocessed Code	Pro XH	10/21/2008	07:56:21am	TOLKO-5-OCT21.cor	262	262	1273.553	0.8	0.5	Cbs_outl.shp
MYR-002	IMGP0617	2.3	Postprocessed Code	Pro XH	10/21/2008	08:29:19am	TOLKO-5-OCT21.cor	40	40	1342.668	0.8	0.6	Cbs_outl.shp
MYR-003	IMGP0626	4.9	Postprocessed Code	Pro XH	10/21/2008	09:08:19am	TOLKO-5-OCT21.cor	58	58	1263.038	1.3	0.9	Cbs_outl.shp
MYR-004	IMGP0636	2.1	Postprocessed Code	Pro XH	10/21/2008	09:29:26am	TOLKO-5-OCT21.cor	50	50	1278.583	0.9	0.7	Cbs_outl.shp
MYR-005	IMGP0641	3.7	Postprocessed Code	Pro XH	10/21/2008	09:40:16am	TOLKO-5-OCT21.cor	96	96	1271.318	1.1	0.8	Cbs_outl.shp
MYR-006	IMGP0667	3.1	Postprocessed Code	Pro XH	10/21/2008	10:47:50am	TOLKO-5-OCT21.cor	46	46	1195.013	1.0	0.7	Cbs_outl.shp
MYR-007	IMGP0670	4.0	Postprocessed Code	Pro XH	10/21/2008	10:56:03am	TOLKO-5-OCT21.cor	166	166	1191.274	1.1	0.8	Cbs_outl.shp
MYR-008	IMGP0676	2.3	Postprocessed Code	Pro XH	10/21/2008	11:16:39am	TOLKO-5-OCT21.cor	51	51	1146.778	0.9	0.7	Cbs_outl.shp
MYR-009	IMGP0699	5.5	Uncorrected	Pro XH	10/21/2008	12:18:12pm	TOLKO-5-OCT21.cor	153	153	1131.622	2.5	1.4	Cbs_outl.shp
MYR-010	IMGP0705	5.1	Uncorrected	Pro XH	10/21/2008	12:42:28pm	TOLKO-5-OCT21.cor	119	119	1134.173	2.9	1.3	Cbs_outl.shp
TUL-102	IMGP0446	2.2	Postprocessed Code	Pro XH	10/17/2008	07:53:38am	TOLKO-3-0CT17.cor	80	80	759.053	0.8	0.6	Cbs_outl.shp
Manion Creek	IMGP0451	1.9	Postprocessed Code	Pro XH	10/17/2008	08:30:39am	TOLKO-3-0CT17.cor	120	120	801.182	0.9	0.6	Cbs_outl.shp
Highway Crossing	IMGP0458	3.4	Postprocessed Code	Pro XH	10/17/2008	09:29:06am	TOLKO-3-0CT17.cor	125	125	765.301	1.2	1.0	Cbs_outl.shp
COOK-001	IMGP0466	5.1	Uncorrected	Pro XH	10/17/2008	11:03:43am	TOLKO-3-0CT17.cor	227	227	812.451	1.5	1.5	Cbs_outl.shp
COOK-002	IMGP0472	8.0	Uncorrected	Pro XH	10/17/2008	11:23:09am	TOLKO-3-0CT17.cor	70	70	887.530	1.9	1.8	Cbs_outl.shp
COOKTRI-001	IMGP0484	4.9	Postprocessed Code	Pro XH	10/17/2008	12:26:06pm	TOLKO-3-0CT17.cor	108	108	1070.545	1.4	0.8	Cbs_outl.shp
COOKRI-002	IMGP0488	3.3	Postprocessed Code	Pro XH	10/17/2008	12:42:06pm	TOLKO-3-0CT17.cor	94	94	1148.169	1.4	0.8	Cbs_outl.shp
COOKTRI-003	IMGP0496	4.9	Postprocessed Code	Pro XH	10/17/2008	12:49:40pm	TOLKO-3-0CT17.cor	137	137	1196.267	1.3	0.7	Cbs_outl.shp
COOKTRI-005	IMGP0502	5.2	Postprocessed Code	Pro XH	10/17/2008	01:00:26pm	TOLKO-3-0CT17.cor	192	192	1195.227	1.4	0.7	Cbs_outl.shp
BUZCr-001	IMGP0339	4.6	Postprocessed Code	Pro XH	10/16/2008	09:05:54am	TOLKO-2-0CT-17.cor	210	210	1062.128	1.2	0.8	Cbs_outl.shp
TUL-100	IMGP0349	4.0	Postprocessed Code	Pro XH	10/16/2008	09:50:36am	TOLKO-2-0CT-17.cor	79	79	1044.925	1.7	1.3	Cbs_outl.shp
TUL-101	IMGP0353	2.9	Postprocessed Code	Pro XH	10/16/2008	10:04:50am	TOLKO-2-0CT-17.cor	138	138	1045.851	1.0	0.7	Cbs_outl.shp
BRI-001	IMGP0368	3.5	Postprocessed Code	Pro XH	10/16/2008	10:57:59am	TOLKO-2-0CT-17.cor	67	67	1234.910	1.1	0.7	Cbs_outl.shp
BRI-002	IMGP0368	3.5	Postprocessed Code	Pro XH	10/16/2008	11:11:33am	TOLKO-2-0CT-17.cor	43	43	1234.152	2.2	1.7	Cbs_outl.shp
BRI-005	IMGP0377	2.4	Postprocessed Code	Pro XH	10/16/2008	11:55:04am	TOLKO-2-0CT-17.cor	30	30	1149.965	1.4	1.6	Cbs_outl.shp
k999	IMGP0393	3.3	Postprocessed Code	Pro XH	10/16/2008	01:01:06pm	TOLKO-2-0CT-17.cor	216	216	1149.857	1.3	0.7	Cbs_outl.shp
BRIT-006	IMGP0414	3.4	Postprocessed Code	Pro XH	10/16/2008	02:11:04pm	TOLKO-2-0CT-17.cor	140	140	1267.949	1.2	0.6	Cbs_outl.shp
BRIT-007	No Photo	2.4	Postprocessed Code	Pro XH	10/16/2008	02:28:41pm	TOLKO-2-0CT-17.cor	256	256	1269.852	1.0	0.6	Cbs_outl.shp
BRIT-008	IMGP0419	2.4	Postprocessed Code	Pro XH	10/16/2008	02:36:33pm	TOLKO-2-0CT-17.cor	84	84	1266.344	0.9	0.5	Cbs_outl.shp
BRIT-010	IMGP0438	7.0	Postprocessed Code	Pro XH	10/16/2008	03:32:54pm	TOLKO-2-0CT-17.cor	205	205	1207.934	1.4	0.9	Cbs_outl.shp
POD-0112	IMGP0273	0.0	Postprocessed Code	Pro XH	10/13/2008		TOLKO-1-0CT13.cor	0	0	0.000	0.0	0.0	2010_fia_sites.s

0.0

APPENDIX B

Photo Plates of Potential Passage Mitigation Sites

LOCATION AND OVERVIEW INFORMATION

Date Surveyed	Crossing ID No.	Crew Name	UTM/GPS (Incl. Grid Number)	Stream Name	Road Name and km	Ministry of Forest District
10/13/2008	POD-0112	KH/BG	UTM10N 643444E 5465182N	Chan Creek	Jacobsen, 3 km	DCS- Cascade

Crossing Type	Embedded (Yes/No; % of culvert length; like natural streambed)	Culvert Dimensions		Culvert Slope (%)	Downstream Width (nearest 0.1m)
		Diameter (nearest 1000mm)	Length (m)		
Round Culvert	Yes / 100% / Natural Streambed	width –200 mm height –700 mm	10	0	3.5

FIELD MEASUREMENTS

Outlet Drop (cm)	Outlet Residual Pool Depth (cm)	D/S Slope(%)	Habitat Value (Low/Mod/ High)	Depth of Fill (m)	Valley Fill (DF/SF/BR)	Beaver Activity
0	0	0	High	0	Deep Fill	No

Inlet Drop (cm)	Backwatered?	Fish Sighted?	Culvert Fix
0	No / 0%	No	Removal

PHOTO DOCUMENTATION

Outlet Photo	Barrel Photo	Downstream Photo	Inlet Photo	Upstream Photo
IMGP0270		IMGP0268		IMGP0273

FIELD COMMENTS

Failing structure—rotting, collapsing. Although not a CBS, this old wooden crossing is likely to collapse into stream.







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LOCATION AND OVERVIEW INFORMATION

Date Surveyed	Crossing ID No.	Crew Name	UTM/GPS (Incl. Grid Number)	Stream Name	Road Name and km	Ministry of Forest District
10/21/2008	MYR-009	KH/BG	UTM10N 665027E 5507339N	Myren Creek	Myren Creek FSR; 5 km	DCS- Cascade

Crossing Type	Embedded (Yes/No; % of culvert length; like natural streambed)	Culvert Dimensions		Culvert Slope (%)	Downstream Width (nearest 0.1m)
		Diameter (nearest 1000mm)	Length (m)		
Round Culvert	No / 0% / No	900	15	3	1.2 / 1.3 / 1.3

FIELD MEASUREMENTS

Outlet Drop (cm)	Outlet Residual Pool Depth (cm)	D/S Slope(%)	Habitat Value (Low/Mod/ High)	Depth of Fill (m)	Valley Fill (DF/SF/BR)	Beaver Activity
Outlet drop is 0 cm due to outlet control	73	2	Moderate	3.5	Deep Fill	No

Inlet Drop (cm)	Backwatered?	Fish Sighted?	Culvert Fix
18	No / 0%	Yes—EB or RB	EM—Substrate addition

PHOTO DOCUMENTATION

Outlet Photo	Barrel Photo	Downstream Photo	Inlet Photo	Upstream Photo
IMGP0695	IMGP0696	IMGP0694	IMGP0697	IMGP0699

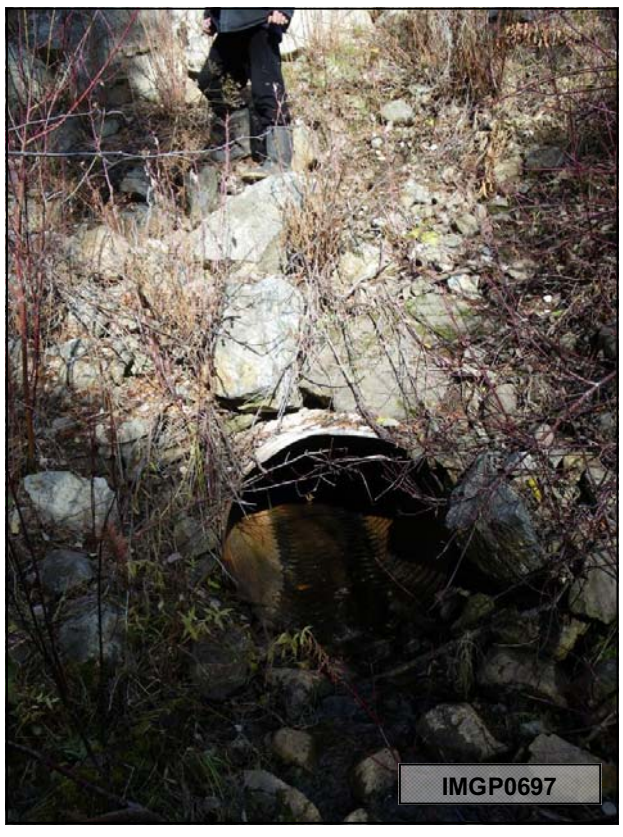
FIELD COMMENTS

Trout species (EB or RB) — moderate habitat value. Riffle-pool channel and occasional gravel bars.


IMGP0695


IMGP0696


IMGP0694


IMGP0697


IMGP0699

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LOCATION AND OVERVIEW INFORMATION

Date Surveyed	Crossing ID No.	Crew Name	UTM/GPS (Incl. Grid Number)	Stream Name	Road Name and km	Ministry of Forest District
10/17/2008	TUL-102	KH/BG	UTM10N 663783E 5489269N	WC:31036780062000335	Smarts Road / 0 km	DCS- Cascade

Crossing Type	Embedded (Yes/No; % of culvert length; like natural streambed)	Culvert Dimensions		Culvert Slope (%)	Downstream Width (nearest 0.1m)
		Diameter (nearest 1000mm)	Length (m)		
Round Culvert	No / 0% / No	1200	7	6	1.5 / 1.6 / 1.7

FIELD MEASUREMENTS

Outlet Drop (cm)	Outlet Residual Pool Depth (cm)	D/S Slope(%)	Habitat Value (Low/Mod/ High)	Depth of Fill (m)	Valley Fill (DF/SF/BR)	Beaver Activity
210	35	7	Low	0.9	Deep Fill	No

Inlet Drop (cm)	Backwatered?	Fish Sighted?	Culvert Fix
11	No / 0%	No	OBS—Bridge

PHOTO DOCUMENTATION

Outlet Photo	Barrel Photo	Downstream Photo	Inlet Photo	Upstream Photo
IMGP0443	IMGP0443	IMGP0444	IMGP0448	IMGP0446

FIELD COMMENTS

Bridge; check land tenure (confirmed public lands).


IMGP0443


IMGP0444


IMGP0448


IMGP0446

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LOCATION AND OVERVIEW INFORMATION

Date Surveyed	Crossing ID No.	Crew Name	UTM/GPS (Incl. Grid Number)	Stream Name	Road Name and km	Ministry of Forest District
16/10/2008	k999	KH, BG	UTM10N 649256E 5488914N	WC:310367800620005120 01250076	Tulameen River FSR, 17km	DCS-Cascades

Crossing Type	Embedded (Yes/No; % of culvert length; like natural streambed)	Culvert Dimensions		Culvert Slope (%)	Downstream Width (nearest 0.1m)
		Diameter (nearest 1000mm)	Length (m)		
Round Culvert	No;0%;No	1400	14	5.0	2.5 / 2.9 / 2.8

FIELD MEASUREMENTS

Outlet Drop (cm)	Outlet Residual Pool Depth (cm)	D/S Slope(%)	Habitat Value (Low/Mod/ High)	Depth of Fill (m)	Valley Fill (DF/SF/BR)	Beaver Activity
18	55	7	Moderate	0.75	DF	**No**

Inlet Drop (cm)	Backwatered?	Fish Sighted?	Culvert Fix
8	No	No	OBS

PHOTO DOCUMENTATION

Outlet Photo	Barrel Photo	Downstream Photo	Inlet Photo	Upstream Photo
IMGP0390	IMGP0391	IMGP0386	IMGP0394	IMGP0393

FIELD COMMENTS

Good residual pool - Debris jam barrier 125m (Photo IMGP0387) downstream of crossing. Therefore this site is not recommended for passage mitigation at this time.













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LOCATION AND OVERVIEW INFORMATION

Date Surveyed	Crossing ID No.	Crew Name	UTM/GPS (Incl. Grid Number)	Stream Name	Road Name and km	Ministry of Forest District
10/17/2008	TUL-001	KH/BG	UTM10N 651022E 5469054N	Sarah Creek	CP118, 61km (up Tulameen FSR)	DCS- Cascade

Crossing Type	Embedded (Yes/No; % of culvert length; like natural streambed)	Culvert Dimensions		Culvert Slope (%)	Downstream Width (nearest 0.1m)
		Diameter (nearest 1000mm)	Length (m)		
Round Culvert	No / 0% / No	1000	16	7	1.1 / 1.2 / 1.2

FIELD MEASUREMENTS

Outlet Drop (cm)	Outlet Residual Pool Depth (cm)	D/S Slope(%)	Habitat Value (Low/Mod/ High)	Depth of Fill (m)	Valley Fill (DF/SF/BR)	Beaver Activity
6	8	15	Moderate	2	Deep Fill	No

Inlet Drop (cm)	Backwatered?	Fish Sighted?	Culvert Fix
0	0	No	EM or OBS

PHOTO DOCUMENTATION

Outlet Photo	Barrel Photo	Downstream Photo	Inlet Photo	Upstream Photo
IMGP0178	IMGP0179	IMGP0180		

FIELD COMMENTS

Embed pipe or open bottom structure


IMGP0178


IMGP0179


IMGP0180

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LOCATION AND OVERVIEW INFORMATION

Date Surveyed	Crossing ID No.	Crew Name	UTM/GPS (Incl. Grid Number)	Stream Name	Road Name and km	Ministry of Forest District
10/17/2008	POD-007	KH/BG	UTM10N 646254E 5468270N	Trib 4.0	Tulameen River FSR; 53 km	DCS- Cascade

Crossing Type	Embedded (Yes/No; % of culvert length; like natural streambed)	Culvert Dimensions		Culvert Slope (%)	Downstream Width (nearest 0.1m)
		Diameter (nearest 1000mm)	Length (m)		
Round Culvert	No / 0% / No	800	16	6	1.1 / 1.2 / 1.2

FIELD MEASUREMENTS

Outlet Drop (cm)	Outlet Residual Pool Depth (cm)	D/S Slope(%)	Habitat Value (Low/Mod/ High)	Depth of Fill (m)	Valley Fill (DF/SF/BR)	Beaver Activity
21	4	4	Low	3.0	Deep Fill	No

Inlet Drop (cm)	Backwatered?	Fish Sighted?	Culvert Fix
0	No / 0%	No	Backwater

PHOTO DOCUMENTATION

Outlet Photo	Barrel Photo	Downstream Photo	Inlet Photo	Upstream Photo
IMGP0234	IMGP0235	IMGP0236	IMGP0231	IMGP0234-38

FIELD COMMENTS

Potential small fish; higher fish potential and productivity; limited upstream when channel runs through wetland area, Based on small size and channel stability, probably cost effective to backwater.


IMGP0234


IMGP0235


IMGP0236


IMGP0238


IMGP0231

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LOCATION AND OVERVIEW INFORMATION

Date Surveyed	Crossing ID No.	Crew Name	UTM/GPS (Incl. Grid Number)	Stream Name	Road Name and km	Ministry of Forest District
10/21/2008	MTR-004	KH/BG	UTM10N 667292E 5506164N	WC:310367800620003570 03480675	Pike Spur - P78, 12km	DCS- Cascade

Crossing Type	Embedded (Yes/No; % of culvert length; like natural streambed)	Culvert Dimensions		Culvert Slope (%)	Downstream Width (nearest 0.1m)
		Diameter (nearest 1000mm)	Length (m)		
Round Culvert	No / 0% / No	900	10	2	0.8 / 0.8 / 0.9

FIELD MEASUREMENTS

Outlet Drop (cm)	Outlet Residual Pool Depth (cm)	D/S Slope(%)	Habitat Value (Low/Mod/ High)	Depth of Fill (m)	Valley Fill (DF/SF/BR)	Beaver Activity
33	26	2	Low	1.0	Deep Fill	No

Inlet Drop (cm)	Backwatered?	Fish Sighted?	Culvert Fix
0	No / 0%	No	Removal

PHOTO DOCUMENTATION

Outlet Photo	Barrel Photo	Downstream Photo	Inlet Photo	Upstream Photo
IMGP0631	IMGP0632	IMGP0633	IMGP0635	IMGP0636

FIELD COMMENTS

Low habitat value, but fish potential. Road inactive and becoming ingrown with alder.











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LOCATION AND OVERVIEW INFORMATION

Date Surveyed	Crossing ID No.	Crew Name	UTM/GPS (Incl. Grid Number)	Stream Name	Road Name and km	Ministry of Forest District
10/13/2008	COOKTRI-001	KH/BG	UTM10N 665303E 5492956N	WC:310367800620003400 03290	192-8, 8km	DCS- Cascade

Crossing Type	Embedded (Yes/No; % of culvert length; like natural streambed)	Culvert Dimensions		Culvert Slope (%)	Downstream Width (nearest 0.1m)
		Diameter (nearest 1000mm)	Length (m)		
Round Culvert	No / 0% / No	2000	20	10	1.7 / 1.8 / 1.8

FIELD MEASUREMENTS

Outlet Drop (cm)	Outlet Residual Pool Depth (cm)	D/S Slope(%)	Habitat Value (Low/Mod/ High)	Depth of Fill (m)	Valley Fill (DF/SF/BR)	Beaver Activity
0	40	10	Moderate	2.75	Deep Fill	No

Inlet Drop (cm)	Backwatered?	Fish Sighted?	Culvert Fix
15	Yes / 25%	No	EM or substrate addition

PHOTO DOCUMENTATION

Outlet Photo	Barrel Photo	Downstream Photo	Inlet Photo	Upstream Photo
IMGP0486	IMGP0485	IMGP0487	IMGP0483	IMGP0484

FIELD COMMENTS

Install baffles and substrates similar to downstream pipe. Moderate to low value. Debris jam about 3.5 m downstream of outlet increases control elevation and residual pool.


IMGP0486


IMGP0485


IMGP0487


IMGP0484


IMGP0483

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LOCATION AND OVERVIEW INFORMATION

Date Surveyed	Crossing ID No.	Crew Name	UTM/GPS (Incl. Grid Number)	Stream Name	Road Name and km	Ministry of Forest District
10/16/2008	BUZZCr-001	KH/BG	UTM10N 647458E 5482043N	Acid Creek	Buzz Creek Road, 3 km	DCS- Cascade

Crossing Type	Embedded (Yes/No; % of culvert length; like natural streambed)	Culvert Dimensions		Culvert Slope (%)	Downstream Width (nearest 0.1m)
		Diameter (nearest 1000mm)	Length (m)		
Round Culvert	No / 25% / Yes	900	9	1.5	2.1 / 2.2 / 2.2

FIELD MEASUREMENTS

Outlet Drop (cm)	Outlet Residual Pool Depth (cm)	D/S Slope(%)	Habitat Value (Low/Mod/ High)	Depth of Fill (m)	Valley Fill (DF/SF/BR)	Beaver Activity
0	20	2	Moderate	1.5	Deep Fill	No

Inlet Drop (cm)	Backwatered?	Fish Sighted?	Culvert Fix
0	Yes / 100%	No	OBS—Bridge

PHOTO DOCUMENTATION

Outlet Photo	Barrel Photo	Downstream Photo	Inlet Photo	Upstream Photo
IMGP0337	IMGP0337	IMGP0338	IMGP0340	IMGP0399

FIELD COMMENTS

Road fill, slope erosion and fines through pipe and downstream. CBS is passable; however, erosion and sediment control required. Increase length of pipe or install bridge. Tributary to Tulameen River.









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APPENDIX C

Cost Estimates for Proposed Passage Mitigation Works

SITE: POD - 0112 - Does not qualify as FIA fundable (Not a closed bottom structure). However, this feature is beginning to collapse into the creek.

Existing Structure	Wood Culvert	**Average channel Width (m)**	-
Length (m)	10.0	**Average channel depth (m)**	-
Diameter mm)	-	**Ac-Cross-sectional area m^2**	-
Fill depth to barrel (m)	1	**Q100 (m^3/s) based on A_c**	-
Downstream slope (%)	-	**Potential remedies**	Remove wood culvert

Option 1 - Remove Wood Culvert,
consider deactivaion prescriptions beyond

Remove existing structure	**Units**	**Cost/Unit**	**Cost**
Mob/demob	8	$90.00	$720.00
Excvator EX200	4	$135.00	$540.00
Construct crossing			
Excavator	8	$135.00	$1,080.00
labourer	12	$40.00	$480.00
Rock armour	4	$600.00	$2,400.00
Total			**$4,500.00**

Estimated costs for Options 1 and 2 do not include site survey, design, fish salvage, de-watering, and ESC costs.





SITE: MYR - 009

Existing Structure	Round Culvert	**Average channel Width (m)**	1.3
Barrel Length (m)	15.0	**Average channel depth (m)**	0.73
Diameter mm)	900 CSP	**Ac-Cross-sectional area m^2**	2.847
Fill depth to barrel (m)	4.0	**Q100 (m^3/s) based on A_c**	3.5-5.0
Downstream slope (%)	2.0	**Potential remedies**	Install Bridge or Open bottom culvert

Based on the Ac and Forest Practices Code, Community Watershed Guidebook - Table 8, the existing 900mm cmp appears significantly undersizd

Option 1 - Open Bottom Arch Culvert (1828mm Span x 914mm Rise)
** Aluminum footings designed for 200KPa Bearing capacity

Remove existing structure	**Units**	**Cost/Unit**	**Cost**
Mob/demob	8	90	$720.00
Excvator EX200	8	$135.00	$1,080.00
Open Bottom Culvert with Aluminum footings*			
assembled (m)	18	$900.00	$16,200.00
delivered (hrs)	6	$90.00	$540.00
Prepare base install culvert			
Excavator	12	$135.00	$1,620.00
hand operated compactor	2	$105.00	$210.00
labourer	20	$40.00	$800.00
Imported base material (pads/rip-rap armou	4	$600.00	$2,400.00
Supplies/disbursements	1	$1,000.00	$1,000.00
Total			**$22,850.00**

Option 2 -Bridge (composite, 15m span)

Remove existing structure	**Units**	**Cost/Unit**	**Cost**
Mob/demob	8	90	$720.00
Excvator EX200	8	$135.00	$1,080.00
Pre-cast concrete span, abutmentand wing wall			
Bridge components	1	$54,000.00	$54,000.00
delivered	1	$9,000.00	$9,000.00
Prepare base, install abutments, span and wingwalls			
Excavator	20	$135.00	$2,700.00
hand operated compactor	3	$105.00	$315.00
labourer	56	$40.00	$2,240.00
Supplies/disbursements	1	$1,200.00	$1,200.00
Total			**$70,535.00**

Estimated costs for Options 1 and 2 do not include site survey, design, fish salvage, de-watering, and ESC costs.
Bridge estimate for complete bridge, slab and sub-structure based on L75 loading


IMGP0695


IMGP0699

SITE: TUL - 102

Existing Structure	Round Culvert	**Average channel Width (m)**	1.6
Barrel Length (m)	7.0	**Average channel depth (m)**	0.35
Diameter mm)	1200 CSP	**Ac-Cross-sectional area m^2**	1.68
Fill depth to barrel (m)	0.9	**Q100 (m^3/s) based on A_c**	3.5
Downstream slope (%)	7.0	**Potential remedies**	OBS-Bridge

Based on the Ac and Forest Practices Code, Community Watershed Guidebook - Table 8, the existing 1200mm csp appears undersized, calculations identify 1600mm circular culvert

Option 1 - Open Bottom Arch Culvert (2438mm Span x 1219mm Rise)

** Aluminum footings designed for 200KPa Bearing capacity

Remove existing structure	**Units**	**Cost/Unit**	**Cost**
Mob/demob	8	90	$720.00
Excvator EX200	8	$135.00	$1,080.00
Open Bottom Culvert with Aluminum footings*			
assembled (m)	10	$1,200.00	$12,000.00
delivered (hrs)	8	$90.00	$720.00
Prepare base install culvert			
Excavator	16	$135.00	$2,160.00
hand operated compactor	2	$105.00	$210.00
labourer	26	$40.00	$1,040.00
Imported base material (pads)	2	$600.00	$1,200.00
Re-grade stream channel (rock weirs)	6	$600.00	$3,600.00
Total			**$22,730.00**

Option 2 -Bridge (L100 composite, 15m span)

Remove existing structure	**Units**	**Cost/Unit**	**Cost**
Mob/demob	8	90	$720.00
Excvator EX200	8	$135.00	$1,080.00
Pre-cast concrete span, abutmentand wing wall			
Bridge components	1	$54,000.00	$54,000.00
delivered (hrs)	1	$9,000.00	$9,000.00
Prepare base, install abutments, span and wingwalls			
Excavator	26	$135.00	$3,510.00
hand operated compactor	3	$105.00	$315.00
labourer	68	$40.00	$2,720.00
Re-grade stream (weirs)	6	$600.00	$3,600.00
Supplies/disbursements/rip-rap	3	$1,200.00	$3,600.00
Total			**$78,545.00**

Estimated costs for Options 1 and 2 do not include site survey, design, fish salvage, de-watering, and ESC costs.
Bridge estimate for complete bridge, slab and sub-structure based on L75 loading



IMGP0443

SITE: TUL - 001

Existing Structure	Round Culvert	**Average channel Width (m)**	1.2
Barrel Length (m)	16.0	**Average channel depth (m)**	0.08
Diameter mm)	1000	**Ac-Cross-sectional area m^2**	0.288
Fill depth to barrel (m)	2	**Q100 (m^3/s) based on A_c**	0.65
Downstream slope (%)	15	**Potential remedies**	Embed new pipe or OBS

Based on the Ac and Forest Practices Code, Community Watershed Guidebook - Table 8, the existing 1000mm cmp appears appropriately sized but may be restricting flow

Option 1 - Open Bottom Arch Culvert (1828mm Span x 914mm Rise)
** Aluminum footings designed for 200KPa Bearing capacity

Remove existing structure	**Units**	**Cost/Unit**	**Cost**
Mob/demob	8	90	$720.00
Excvator EX200	4	$135.00	$540.00
Open Bottom Culvert with Aluminum footings*			
assembled (m)	18	$900.00	$16,200.00
delivered (hrs)	8	$90.00	$720.00
Prepare base install culvert			
Excavator	8	$135.00	$1,080.00
hand operated compactor	2	$105.00	$210.00
labourer	12	$40.00	$480.00
Imported base material (pads)	2	$600.00	$1,200.00
Supplies/disbursements	1	$750.00	$750.00
Total			**$20,430.00**

Option 2 - Embedded Pipe Arch (1390mm span x 970mm Rise)

Remove existing structure	**Units**	**Cost/Unit**	**Cost**
Mob/demob	8	90	$720.00
Excvator EX200	4	$135.00	$540.00
Open Bottom Culvert with Aluminum footings*			
assembled (m)	16	$1,200.00	$19,200.00
delivered (hrs)	8	$90.00	$720.00
Prepare base install culvert			
Excavator	12	$135.00	$1,620.00
hand operated compactor	2	$105.00	$210.00
labourer	16	$40.00	$640.00
Imported base material	2	$600.00	$1,200.00
Supplies/disbursements	1	$750.00	$750.00
Total			**$24,130.00**

Estimated costs for Options 1 and 2 do not include site survey, design, fish salvage, de-watering, and ESC costs.



IMGP0178



IMGP0180

SITE: POD - 007

Existing Structure	Round culvert	**Average channel Width (m)**	1.2
Barrel Length (m)	16.0	**Average channel depth (m)**	0.04
Diameter mm)	800	**Ac-Cross-sectional area m^2**	0.144
Fill depth to barrel (m)	3	**Q100 (m^3/s) based on A_c**	0.2
Downstream slope (%)	4	**Potential remedies**	Backwater or Open Bottom Arch

Based on the Ac and Forest Practices Code, Community Watershed Guidebook - Table 8, the existing 800mm cmp appears appropriately sized

Option 1 - Backwater with rip-rap

	Units	Cost/Unit	Cost
Bring in 1.0 m3 of Rip-rap	1	$600.00	$600.00
Prepare base install culvert			
Install rock back-water sructure	16	$85.00	$1,360.00
Supplies/disbursements	1	$250.00	$250.00
Total			**$2,210.00**

Option 2 - Open Bottom Arch Culvert (1220mm Span x 610mm Rise)

* Aluminum footings designed for 200KPa Bearing capacity

Remove existing structure	Units	Cost/Unit	Cost
Mob/demob	8	90	$720.00
Excvator EX200	4	$135.00	$540.00
Open Bottom Culvert with Aluminum footings*			
assembled (m)	16	$700.00	$11,200.00
delivered (hrs)	8	$90.00	$720.00
Prepare base install culvert			
Excavator	6	$135.00	$810.00
hand operated compactor	2	$105.00	$210.00
labourer	20	$40.00	$800.00
Imported base material (pads)	2	$600.00	$1,200.00
Supplies/disbursements	1	$500.00	$500.00
Total			**$15,480.00**

Estimated costs for Options 1 and 2 do not include site survey, design, fish salvage, de-watering, and ESC costs.



IMGP0234



IMGP0236

SITE: MYR - 004

Existing Structure	Round culvert	**Average channel Width (m)**	0.8
Barrel Length (m)	10.0	**Average channel depth (m)**	0.26
Diameter mm)	900 CSP	**Ac-Cross-sectional area m^2**	0.624
Fill depth to barrel (m)	1.0	**Q100 (m^3/s) based on A_c**	0.9
Downstream slope (%)	2	**Potential remedies**	Remove structure or install open bottom culvert

Based on the Ac and Forest Practices Code, Community Watershed Guidebook - Table 8, the existing 900mm cmp appears near the minimum size for ths site

Option 1 - Remove corrugated steel pipe
consider deactivaion prescriptions beyond

Remove existing structure	**Units**	**Cost/Unit**	**Cost**
Mob/demob	8	$90.00	$720.00
Excvator EX200	4	$135.00	$540.00
Construct crossing			
Excavator	8	$135.00	$1,080.00
labourer	12	$40.00	$480.00
Rock armour	4	$600.00	$2,400.00
Supplies/disbursements	1	$250.00	$250.00
Total			**$4,500.00**

Option 2 - Open Bottom Arch Culvert (1220mm Span x 610mm Rise)
* Aluminum footings designed for 200KPa Bearing capacity

Remove existing structure	**Units**	**Cost/Unit**	**Cost**
Mob/demob	8	90	$720.00
Excvator EX200	4	$135.00	$540.00
Open Bottom Culvert with Aluminum footings*			
assembled (m)	10	$700.00	$7,000.00
delivered (hrs)	8	$90.00	$720.00
Prepare base install culvert			
Excavator	6	$135.00	$810.00
hand operated compactor	2	$105.00	$210.00
labourer	20	$40.00	$800.00
Imported base material (pads)	2	$600.00	$1,200.00
Supplies/disbursements	1	$500.00	$500.00
Total			**$11,280.00**

Estimated costs for Options 1 and 2 do not include site survey, design, fish salvage, de-watering, and ESC costs.

COOKTRI - 001

Existing Structure	Round Culvert	**Average channel Width (m)**	1.8
Barrel Length (m)	20.0	**Average channel depth (m)**	0.40
Diameter mm)	2000	**Ac-Cross-sectional area m^2**	2.16
Fill depth to barrel (m)	3	**Q100 (m^3/s) based on A_c**	3.5 - 5.0
Downstream slope (%)	10	**Potential remedies**	Install baffles and substrates similar to downstream pipe, or, Open Bottom Arch

Based on the Ac and Forest Practices Code, Community Watershed Guidebook - Table 8, the existing 2000mm cmp appears appropriately sized

Option 1 - Install baffles and substrate

Install baffles	**Units**	**Cost/Unit**	**Cost**
Mobile welder	12	$90.00	$1,080.00
Materials	1	$500.00	$500.00
Faller	4	$175.00	$700.00
Labourers	12	$40.00	$480.00
Total			**$2,280.00**

Option 2 - Open Bottom Arch Culvert (2438mm Span x 1219mm Rise)

** Aluminum footings designed for 200KPa Bearing capacity

Remove existing structure	**Units**	**Cost/Unit**	**Cost**
Mob/demob	8	90	$720.00
Excvator EX200	4	$135.00	$540.00
Open Bottom Culvert with Aluminum footings*			
assembled (m)	20	$1,200.00	$24,000.00
delivered (hrs)	8	$90.00	$720.00
Prepare base install culvert			
Excavator	10	$135.00	$1,350.00
hand operated compactor	2	$105.00	$210.00
labourer	14	$40.00	$560.00
Imported base material (pads)	2	$600.00	$1,200.00
Supplies/disbursements	1	$1,200.00	$1,200.00
Total			**$29,300.00**

Estimated costs for Options 1 and 2 do not include site survey, design, fish salvage, de-watering, and ESC costs.



IMGP0486

SITE: BUZCr - 001- Does not qualify as FIA fundable since passable to fish.

Existing Structure	Round Culvert	**Average channel Width (m)**	2.2
Barrel Length (m)	9.0	**Average channel depth (m)**	0.20
Diameter mm)	900 CSP	**Ac-Cross-sectional area m^2**	1.32
Fill depth to barrel (m)	1.5	**Q100 (m^3/s) based on A_c**	2.6
Downstream slope (%)	2.0	**Potential remedies**	OBS-Bridge

Based on the Ac and Forest Practices Code, Community Watershed Guidebook - Table 8, the existing 900mm cmp appears undersized, calculations identify a minmum of a 1400mm csp

Option 1 - Open Bottom Arch Culvert (2438mm Span x 1219mm Rise)

** Aluminum footings designed for 200KPa Bearing capacity

Remove existing structure	**Units**	**Cost/Unit**	**Cost**
Mob/demob	8	90	$720.00
Excvator EX200	8	$135.00	$1,080.00
Open Bottom Culvert with Aluminum footings*			
assembled (m)	12	$1,200.00	$14,400.00
delivered (hrs)	8	$90.00	$720.00
Prepare base install culvert			
Excavator	12	$135.00	$1,620.00
hand operated compactor	3	$105.00	$315.00
labourer	18	$40.00	$720.00
Imported base material (pads/rip-rap)	4	$600.00	$2,400.00
Supplies/disbursements	1	$1,000.00	$1,000.00
Total			**$21,975.00**

Option 2 -Bridge (composite - 12m span)

Remove existing structure	**Units**	**Cost/Unit**	**Cost**
Mob/demob	8	90	$720.00
Excvator EX200	8	$135.00	$1,080.00
Pre-cast concrete span, abutmentand wing wall			
Bridge components	1	$53,000.00	$53,000.00
delivered (hrs)	1	$9,000.00	$9,000.00
Prepare base, install abutments, span and wingwalls			
Excavator	22	$135.00	$2,970.00
hand operated compactor	3	$105.00	$315.00
labourer	60	$40.00	$2,400.00
Supplies/disbursements	1	$1,200.00	$1,200.00
Total			**$69,485.00**

Estimated costs for Options 1 and 2 do not include site survey, design, fish salvage, de-watering, and ESC costs.
Bridge estimate for complete bridge, slab and sub-structure based on L75 loading

APPENDIX D
Field Data Submission Form

Field Assessment for Fish Passage Determination of Closed Bottomed Structures (CBS)

Field Data Submission Form for the 2008 Field Season: Myren Creek / Pike Mountain and Tulameen Watershed Areas

Location and Overview Information										Field Observations and Measurements															
Date of Inspection	Crossing ID No.	Crew Name	UTM/GPS Co-ordinates Grid	Easting	Northing	Stream Name	Road Name	Road km mark	MoFR District	Crossing Type RC PA EC EA Other	Culvert Dimensions Diameter	Length	Embedded? Yes / No	If NO, to what % is it embeded?	Resemble Channel? Yes / No	Backwatered? Percentage	Depth of Fill (cm)	Outlet Drop (cm)	Culvert Slope (%)	Inlet drop Yes / No	Outlet residual Pool depth (cm)	Downstream Channel Width (nearest 0.1m)	Downstream Stream Slope (%)	Valley Fill DF SF BR	Beaver Activity Yes / No	Habitat Value Low / Mod./ High.
10/13/2008	**TUL-001**	**Ecoscape-KH,BG**	**NAD83 UTM10N**	**651021E**	**5469054N**	**Sarah Creek**	**CP118**	**61**	**DCS-Cascades**	**RC**	**1000**	**16.0**	**No**	**0%**	**No**	**0**	**2000**	**6**	**7.0**	**No**	**8.0**	**1.2**	**15**	**DF**	**No**	**Mod**
10/13/2008	TUL-002	Ecoscape-KH,BG	NAD83 UTM10N	650962E	5469083N	Sarah Creek	CP118	60	DCS-Cascades	RC	1000	16.0	No	0%	No	0	3000	20	18.0	No	15.0	1.5	17	DF	No	Low
10/13/2008	TUL-003	Ecoscape-KH,BG	NAD83 UTM10N	650930E	5469108N	Sarah Creek	CP118	60	DCS-Cascades	RC	1000	16.0	No	0%	No	0	2000	0	27.0	No	0.0	1.3	17	DF	No	Low
10/13/2008	TUL-004	Ecoscape-KH,BG	NAD83 UTM10N	650264E	5469492N	Unknown	Tulameen River FSR	58	DCS-Cascades	RC	900	15.0	No	0%	No	0	2500	60	19.0	Yes	35.0	1.2	13	DF	No	Low
10/13/2008	POD-004	Ecoscape-KH,BG	NAD83 UTM10N	647789E	5469590N	Podunk Trib 2.0	Tulameen River FSR	55	DCS-Cascades	RC	2300	23.0	Yes	0%	Yes	0	3500	30	6.0	No	0.0	1.9	10	DF	No	Mod
10/13/2008	POD-002	Ecoscape-KH,BG	NAD83 UTM10N	648340E	5469967N	Unknown	Tulameen River FSR	56	DCS-Cascades	RC	600	17.0	No	0%	No	0	4000	0	0.0	Yes	17.0	1.0	16	DF	No	Low
10/13/2008	POD-005	Ecoscape-KH,BG	NAD83 UTM10N	647103E	5468588N	Podunk Trib 3.0	Tulameen River FSR	54	DCS-Cascades	RC	1200	16.0	No	0%	No	0	0	20	16.0	Yes	0.0	1.3	11	DF		Low
10/13/2008	**POD-007**	**Ecoscape-KH,BG**	**NAD83 UTM10N**	**646253E**	**5468269N**	**Podunk Trib 4.0**	**Tulameen River FSR**	**53**	**DCS-Cascades**	**RC**	**800**	**16.0**	**No**	0%	**No**	**0**	**3000**	**21**	**6.0**	**No**	**4.0**	**1.2**	**4**	**DF**	**No**	**Low-Mod**
10/13/2008	VUI-001	Ecoscape-KH,BG	NAD83 UTM10N	641913E	5473369N	WC:3103678006200064706570022	Tulameen River FSR	43	DCS-Cascades	RC	1000	10.0	Yes	0%	No	50	1500	0	6.0	Yes	20.0	2.9	3	DF	No	Low
10/13/2008	POD-008	Ecoscape-KH,BG	NAD83 UTM10N	645540E	5468094N	WC:3103678006200079600409	Tulameen River FSR	52	DCS-Cascades	RC	0	0.0		0%			0	0	0.0		0.0	0.0	0			
11/14/2008	ALL-001	Ecoscape-KH,DD	NAD83 UTM10N	673845E	5509592N	unknown	CP193	5	DCS-Cascades	RC	1000	14.0	No	0%	No	0%	400	0	25.0	Yes	3.0	1.3	12	Deep Fill	No	Low
11/14/2008	ALL-002	Ecoscape-KH,DD	NAD83 UTM10N	674494E	5513088N	Ketcham Creek	private road	1	DCS-Cascades	RC	900	12.0	No	0%	No	0%	150	68	5.0	No	30.0	1.4	5	Deep Fill	No	Low
11/14/2008	ALL-003	Ecoscape-KH,DD	NAD83 UTM10N	674826E	5512863N	WC:3103678006090086	private road	2	DCS-Cascades	RC	900	0.0	No	0%	No	25%	2	0	3.5	No	8.5	1.0	3	Deep Fill	Yes	Low
11/14/2008	ALL-005	Ecoscape-KH,DD	NAD83 UTM10N	674998E	5514188N	Ketcham Creek	private road	4	DCS-Cascades	RC	750	10.5	No	0%	No	0%	65	43	3.5	No	17.0	0.9	2	Deep Fill	Yes	Low
11/14/2008	Bates-1	Ecoscape-KH,DD	NAD83 UTM10N	670304E	5527729N	Bates Creek	Otter Valley Road	1	DCS-Cascades	RC	900	20.0	No	0%	No	0%	400	8	3.0	Yes	40.0	4.2	2	Deep Fill	No	Low
10/24/2008	OTT-010	Ecoscape-KH,BG	NAD83 UTM10N	666496E	5499178N	Manning Creek	Pike Mountain Road	22	DCS-Cascades	RC	900	12.0	No	0%	No	0%	35	49	3.5	No	39.0	1.5	9	Deep Fill	No	Low
10/24/2008	OTT-011	Ecoscape-KH,BG	NAD83 UTM10N	666391E	5499585N	Manning Creek	Pike Mountain Road	21	DCS-Cascades	RC	900	10.0	No	25%	No	25%	38	20	2.0	Yes	32.0	1.6	4	Deep Fill	No	Low
10/24/2008	OTT-012	Ecoscape-KH,BG	NAD83 UTM10N	666380E	5499883N	WC:3103678006200035701930738	Pike Mountain Road	20	DCS-Cascades	RC	900	12.0	No	0%	No	0%	43	15	2.5	Yes	47.0	1.5	4	Deep Fill	No	Low
10/24/2008	OTT-013	Ecoscape-KH,BG	NAD83 UTM10N	666315E	5499848N	Manning Creek	Fremb Creek Road	0	DCS-Cascades	RC	900	10.0	No	0%	No	0%	1	23	0.5	No	31.0	2.8	4	Deep Fill	No	Low
10/24/2008	OTT-014	Ecoscape-KH,BG	NAD83 UTM10N	662991E	5500524N	Manning Creek	402-P28	7	DCS-Cascades	RC	600	10.0	No	0%	No	0%	35	0	4.0	Yes	23.0	2.8	4	Deep Fill	No	Moderate
10/24/2008	OTT-015	Ecoscape-KH,BG	NAD83 UTM10N	662678E	5501423N	WC:3103678006200035701930269	Manning Station Road	8	DCS-Cascades	RC	600	10.0	No	0%	No	0%	60	30	6.0	Yes	10.0	1.4	18	Deep Fill	No	Low
10/23/2008	OTT-001	Ecoscape-KH,BG	NAD83 UTM10N	660617E	5494601N	Lockie Creek	Otter Valley Road	43	DCS-Cascades	RC	1200	6.0	No	0%	No	0%	55	0	6.0	Yes	28.0	2.7	7	Deep Fill	No	Moderate
10/23/2008	LUK-001	Ecoscape-KH,BG	NAD83 UTM10N	659548E	5506966N	Luke Creek	Matthew Creek FSR	2	DCS-Cascades	RC	1600	16.0	No	0%	No	0%	140	29	7.0	Yes	0.0	2.6	8	Deep Fill	No	Low
10/23/2008	LUK-002	Ecoscape-KH,BG	NAD83 UTM10N	658891E	5507243N	Luke Creek	191-2	1	DCS-Cascades	RC	1400	19.0	No	0%	No	0%	200	30	10.0	No	35.0	2.6	7	Deep Fill	No	Low
10/23/2008	LUK-003	Ecoscape-KH,BG	NAD83 UTM10N	657902E	5507431N	Luke Creek	C-1	2	DCS-Cascades	RC	1200	16.0	No	0%	No	0%	240	31	8.0	No	22.0	2.8	5	Deep Fill	No	Low
10/23/2008	MAT-001	Ecoscape-KH,BG	NAD83 UTM10N	659723E	5508464N	Mark Creek	Old Road of Matthew Creek FSR	5	DCS-Cascades	RC	900	10.0	No	0%	No	0%	65	35	0.7	No	19.0	1.7	2	Deep Fill	Yes	Low
10/23/2008	OTT-006	Ecoscape-KH,BG	NAD83 UTM10N	662928E	5516317N	Otter Creek	Otter Valley Road	18	DCS-Cascades	RC	0	20.7	No	0%	No	0%	60	15	0.5	No	72.0	4.3	2	Shallow Fill	Yes	High
10/23/2008	OTT-007	Ecoscape-KH,BG	NAD83 UTM10N	663219E	5517013N	Otter Creek	Otter Valley Road	17	DCS-Cascades	Other	0	18.0	No	0%	No	0%	55	17	3.0	No	68.0	3.7	2	Shallow Fill	No	High
10/21/2008	MYR-001	Ecoscape-KH,BG	NAD83 UTM10N	667390E	5508937N	WC:3103678006200035700348054 9	Pike Mountain Road	7	DCS-Cascades	RC	900	11.5	No	0%	No	0%	120	1	3.5	No	10.0	1.0	1	Deep Fill	No	Low
10/21/2008	MYR-002	Ecoscape-KH,BG	NAD83 UTM10N	668369E	5506729N	WC:3103678006200035700348067 5	196-8	3	DCS-Cascades	RC	600	10.0	No	25%	No	25%	40	0	4.0	No	2.0	0.9	4	Deep Fill	No	Low
10/21/2008	MYR-003	Ecoscape-KH,BG	NAD83 UTM10N	666613E	5506698N	Elbow Lake outlet	Pike	11	DCS-Cascades	RC	500	10.0	No	50%	No	0%	80	0	1.7	No	5.0	0.8	2	Deep Fill	No	Low
10/21/2008	**MYR-004**	**Ecoscape-KH,BG**	**NAD83 UTM10N**	**667292E**	**5506163N**	**WC:3103678006200035700348067 5**	**P78**	**12**	**DCS-Cascades**	**RC**	**900**	**10.0**	**No**	**0%**	**No**	**0%**	**100**	**33**	**2.1**	**No**	**26.0**	**0.8**	**2**	**Deep Fill**	**No**	**Low**
10/21/2008	MYR-005	Ecoscape-KH,BG	NAD83 UTM10N	667132E	5506190N	WC:3103678006200035700348067 5	Pike Mountain Road	12	DCS-Cascades	RC	900	12.0	No	75%	Yes	75%	120	0	3.5	Yes	3.0	1.2	2	Deep Fill	No	Low
10/21/2008	MYR-006	Ecoscape-KH,BG	NAD83 UTM10N	665299E	5505752N	Trib. 2 to Myren Creek	Myren Creek Road	3	DCS-Cascades	RC	1000	10.0	No	0%	No	0%	70	0	3.3	No	0.0	0.8	4	Deep Fill	No	Low
10/21/2008	MYR-007	Ecoscape-KH,BG	NAD83 UTM10N	665331E	5505818N	Myren Creek	R07753	3	DCS-Cascades	PA	0	15.0	No	100%	Yes	0%	90	0	0.0	No	0.0	1.2	2	Deep Fill	No	Low
10/21/2008	MYR-008	Ecoscape-KH,BG	NAD83 UTM10N	665316E	5506715N	Myren Creek	Myren Creek Road	4	DCS-Cascades	RC	800	13.0	No	0%	No	75%	40	0	2.5	No	37.0	1.2	1	Deep Fill	No	Low
10/21/2008	**MYR-009**	**Ecoscape-KH,BG**	**NAD83 UTM10N**	**665026E**	**5507339N**	**Myren Creek**	**Myren Creek Road**	**5**	**DCS-Cascades**	**RC**	**900**	**15.0**	**No**	**0%**	**No**	**0%**	**4**	**0**	**3.0**	**Yes**	**73.0**	**1.3**	**2**	**Deep Fill**	**No**	**Moderate**
10/21/2008	MYR-010	Ecoscape-KH,BG	NAD83 UTM10N	664375E	5507419N	Biely Creek	Myren Creek Road	5	DCS-Cascades	RC	900	10.0	No	0%	No	0%	200	2	4.0	No	9.0	1.7	4	Deep Fill	No	Low
10/17/2008	**TUL-102**	**Ecoscape-KH,BG**	**NAD83 UTM10N**	**663782E**	**5489269N**	**WC:3103678006200035**	**Smart's Road.**	**6**	**DCS-Cascades**	**RC**	**1200**	**7.0**	**No**	**0%**	**No**	**0%**	**90**	**210**	**6.0**	**Yes**	**35.0**	**1.6**	**7**	**Deep Fill**	**No**	**Moderate**
10/17/2008	Manion Creek	Ecoscape-KH,BG	NAD83 UTM10N	660052E	5489563N	Manion Creek	private road	0	DCS-Cascades	RC	500	9.0	No	0%	No	0%	90	18	10.0	Yes	33.0	2.4	13	Deep Fill	No	Moderate
10/17/2008	Highway Crossing	Ecoscape-KH,BG	NAD83 UTM10N	664321E	5490002N	Cook Creek	Coalmont/Tulameen River Road	0	DCS-Cascades	RC	1200	12.0	No	0%	No	0%	40	25	4.5	Yes	23.0	1.0	2	Deep Fill	Yes	High
10/17/2008	COOK-001	Ecoscape-KH,BG	NAD83 UTM10N	664611E	5491065N	Cook Creek	Cook Creek FSR	4	DCS-Cascades	RC	1200	10.0	No	0%	No	0%	60	10	3.5	Yes	25.0	1.7	2	Deep Fill	No	Low
10/17/2008	COOK-002	Ecoscape-KH,BG	NAD83 UTM10N	664415E	5492343N	Cook Creek	192-8	6	DCS-Cascades	EC	1600	16.0	Yes	75%	Yes	25%	200	0	6.0	No	10.0	2.1	2	Deep Fill	No	High
10/17/2008	**COOKTRI-001**	**Ecoscape-KH,BG**	**NAD83 UTM10N**	**665303E**	**5492956N**	**WC:3103678006200034003290**	**192-8**	**8**	**DCS-Cascades**	**RC**	**2000**	**20.0**	**No**	**0%**	**No**	**25%**	**275**	**0**	**10.0**	**Yes**	**40.0**	**1.8**	**10**	**Deep Fill**	**No**	**Moderate**
10/17/2008	COOKRI-002	Ecoscape-KH,BG	NAD83 UTM10N	665892E	5493514N	WC:3103678006200034003290	192-8	9	DCS-Cascades	RC	1800	14.0	No	25%	No	50%	140	0	10.0	No	15.0	1.6	6	Deep Fill	No	Low
10/17/2008	COOKTRI-003	Ecoscape-KH,BG	NAD83 UTM10N	666259E	5493879N	WC:3103678006200034003290557	192-8	10	DCS-Cascades	RC	1600	16.0	No	0%	No	0%	75	5	11.0	No	21.0	1.7	12	Deep Fill	No	Low
10/17/2008	COOKTRI-005	Ecoscape-KH,BG	NAD83 UTM10N	666216E	5493879N	WC:3103678006200034003290	192-8	10	DCS-Cascades	RC	1400	10.0	No	0%	No	25%	80	0	9.0	No	18.0	1.4	16	Deep Fill	No	Low
10/16/2008	**BUZCr-001**	**Ecoscape-KH,BG**	**NAD83 UTM10N**	**647457E**	**5482043N**	**Acid Creek**	**Buzz Creek Road**	**3**	**DCS-Cascades**	**RC**	**900**	**9.0**	**No**	**25%**	**Yes**	**100%**	**150**	**0**	**1.5**	**No**	**20.0**	**2.2**	**2**	**Deep Fill**	**No**	**Low**
10/16/2008	TUL-100	Ecoscape-KH,BG	NAD83 UTM10N	648564E	5484494N	Trib.2A	Tulameen River FSR	24	DCS-Cascades	RC	1000	18.0	No	0%	No	0%	300	93	9.0	Yes	30.0	0.8	12	Deep Fill	No	Low
10/16/2008	TUL-101	Ecoscape-KH,BG	NAD83 UTM10N	648543E	5484596N	WC:31036780062000573	Tulameen FSR	24	DCS-Cascades	RC	1200	18.0	No	0%	No	25%	130	0	6.5	Yes	20.0	4.1	16	Deep Fill	No	Low
10/16/2008	BRI-001	Ecoscape-KH,BG	NAD83 UTM10N	648328E	5487390N	unknown	C4-C5	1	DCS-Cascades	RC	1000	10.0	No	0%	No	0%	120	0	3.5	No	0.0	0.9	7	Deep Fill	No	Low
10/16/2008	BRI-002	Ecoscape-KH,BG	NAD83 UTM10N	648312E	5487389N	unknown	C4-C5	1	DCS-Cascades	Other	0	7.0	No	0%	No	0%	50	0	5.0	No	0.0	0.9	7	Deep Fill	No	Low
10/16/2008	BRI-005	Ecoscape-KH,BG	NAD83 UTM10N	648530E	5487767N	unknown	Tulameen River FSR	20	DCS-Cascades	RC	800	13.0	No	0%	No	0%	150	68	13.0	Yes	0.0	1.8	30	Deep Fill	No	Low
10/16/2008	k999	Ecoscape-KH,BG	NAD83 UTM10N	649256E	5488914N	WC:3103678006200051200125 0076	Tulameen River FSR	17	DCS-Cascades	RC	1400	14.0	No	0%	No	0%	75	18	5.0	Yes	55.0	2.8	7	Deep Fill	No	Moderate
10/16/2008	BRIT-006	Ecoscape-KH,BG	NAD83 UTM10N	646264E	5493753N	unknown	Tulameen River FSR	10	DCS-Cascades	RC	1000	15.0	No	0%	No	0%	110	3	9.0	No	23.0	2.0	6	Shallow Fill	No	Low
10/16/2008	BRIT-007	Ecoscape-KH,BG	NAD83 UTM10N	646239E	5493765N	unknown	Tulameen River FSR	10	DCS-Cascades	RC	900	12.0	No	0%	No	0%	80	61	5.0	Yes	0.0	2.0	5	Shallow Fill	No	Low
10/16/2008	BRIT-008	Ecoscape-KH,BG	NAD83 UTM10N	646350E	5493665N	unknown	Tulameen River FSR	10	DCS-Cascades	RC	500	9.0	No	0%	No	0%	100	0	6.0	Yes	0.0	1.3	8	Shallow Fill	No	Low
10/16/2008	BRIT-010	Ecoscape-KH,BG	NAD83 UTM10N	650582E	5489908N	WC:3103678006200051200173	Grasshopper spur - Z-2	1	DCS-Cascades	RC	900	12.0	No	0%	No	0%	120	10	6.0	Yes	22.0	0.8	5	Deep Fill	No	Low

Field Assessment for Fish Passage Determination of Closed Bottomed Structures (CBS)

Field Data Submission Form for the 2008 Field Season: Myren Creek / Pike Mountain and Tulameen Watershed Areas

Fish Sighted?	Culvert Fix	Length and/or	Comments	Fix Comments
Yes / No / FPC	RM OBS SS EM BW	span? (m)		
No	**EM**	**0**		
No	EM	0	Culvert partially collapsed. Regular large woody debris, drops, and barriers; Step pool	
No	EM	0	Culvert is not passable. Abundant large woody debris and rock obstructions; Backwatered <1.0m	
No	EM	0	Culvert is not passable	
No	None	0	Embedded 300-450mm/ stream bed simulation, armouring rock downstream. Upstream gradient barriers 15m upstream from inlet, Rip rap fill barrier downstream 20m from outlet	
No	EM	0	Culvert is not passable	
No	EM	0	Culvert is not passsable, boulder cascade below, sub-surface 35m downstream from outlet	
No	**EM**	**0**	**Tributary joins creek downstream at outlet. Higher fish potential and productivity; limited upstream when channels run through wetland area**	
No	SS	0	Avulsion, agraded downstream and subsurface, flows upstream channelized. 1 primary, 3 secondary pipes	
		0		
No		0		No Action
No		0	Perched inlet	No Action - S5-S6 stream
No		0		No Action under FIA since Low habitat rating and not likley fish bearing.
No	EM-Sub_Addition	0		No Action under FIA - S5-S6 stream
No		0	Ephemeral creek	No Action under FIA.
No	OBS-Bridge	0		OBS or removal. However, this is a low value stream.
No		0	3rd pipe @ 400mm diameter. May backwater during flow periods	Ephemeral watercourse, however significant spring flows evident by channel scour.
No	OBS-Bridge	0	Likely insufficient flows during summer	Depending on stream class (likley S5-S6 due to low flows)
No	EM-BW	0	10cm inlet drop on 2ndary pipe	Likley S5-S6 stream based on low flows observed during late fall. Install new pipe.
No	RM-Removal	0	No fish observed in otherwise good habitat. Perhaps can't get upstream from Otter Creek.	Pipe appears undersized. 200m upstream-downstream investigation identified no barriers.
No	RM-Removal	0	S5-S6 stream.	Pipe undersized, road washout has occurred. But S5-S6 stream
No	RM-Removal	0	No outlet drop. However, boulder apron just beyond plunges 30cm to lower residual pool.	Check private land/tenure status to see if FIA applies.
No		0	No residual pool / splash on boulder	No action recommended
No		0	Excavated residual pool - S5-S6 stream. Recent channel scour/downcutting	No actions since S5-S6 stream
No		0	S5-S6 stream	No action recommended
No		0	Cattle damage/impacts to riparian	No action since S5-S6 stream
Yes		0	public road. Near level grade - some boulder substrates through pipe - dips in center creating shallow pool.	Public Road - No action recommended through FIA program.
No		0	Pipe installed poorly.	No action under FIA program since public road
No		0		No defined channel willow/alder swamp
No		0	S6 stream. Logged straight through watercourse.	
No	RM-Removal	0	Plugged/ephemeral flows overtop road. S6 Stream	Remove pipe and allow natural overflow from lake - although not fish bearing channel.
No	**RM-Removal**	**0**		**Low habitat value but fish potential. Road inactive and becoming ingrown with alder. remove pipe**
No		0	Fines and gravel through 75% - increased grade at upper 25% at inlet	Passable but very low value - not likely frequented by fish.
No		0	Ephemeral stream	No action
No		0	OBS - corrugated steel arch. Ephemeral stream.	No Action
No		0	backwatered 75%. Poorly defined channel through alder swamp	No action.
Yes	**EM-Sub_Addition**	**8**	**Outlet drop is 0cm due to outlet control. Trout sp. (EB-RB)-moderate habitate. R-P channel and ocassinal gravel bars.**	**Undersized pipe.velocity barrier/passable at lower flows-bridge or arch. upstream drops quickly.**
No		0	Not passable S5-S6 stream channel - natural debris barrier 6m d/s of outlet	No action
No	**OBS-Bridge**	**15**		**Install OBS and weirs to step up through structure and prevent unravelling of channel upstream**
No	RM-Removal	0	Private property	Passage through primary pipe is questionable.
Yes	OBS-Bridge	5	Secondary pipe partly plugged with boulder and gravel. Rainbow observed in residual pool.	
No		0	Subsurface flows through this section.	No action recommended
Yes		0	Welded baffles. No outlet drop. Two (2) rainbow observed in CBS	No action. Good pipe and passable
No	**EM-Sub_Addition**	**0**	**Moderate to Low value. Debris jam about 3.5 m d/s of outlet increases control elev. and resid. pool**	**Install baffles and substrates similar to downstream pipe.**
No	EM-Sub_Addition	0	No outlet drop	Pipe is passable but may still benefit baffles and substrate addition. But low habitat rating.
No	EM-Sub_Addition	0	Step-pool downstream of pipe. Debris jam influencing deeper residual pool. Low stream value.	Low habitat value since upper watercourse and limitied habitat gained. Perhaps baffles and subs.
No		0	No outlet drop	No action recommended
No	**EM-Sub_Addition**	**0**	**Road fill slope erosion and fines through pipe and downstream. S6 Stream trib to Tulameen River. Erosion and sediment control required - lengthen CBS**	**Pipe is passable however mitigate erosion and sediment issues. Increase length or install bridge.**
No	OBS-Bridge	0		S6 stream. Limited habitat gained. No action recommended since non-fish stream.
No	OBS-Bridge	0	No outletdrop on primary pipe. 30cm outlet drop on secondary pipe (dry).	u/s slope 18% low habitat value
No	RM-Removal	0	Boulder/cobble apron at outlet with no residual pool	
No	RM-Removal	0	Open bottom rotted structure to be removed. Natural barriers to fish through channel - S5-S6 watercourse	
No		0	Not passable	
No	BW-Backwater	0	Good residual pool - IMGP0387 - barrier 3-m height with debris jam barrier 125m (Photo IMGP0387) downstream of crossing.	Low priority due to large impassable debris jam (3-m height) within 200m of crossing.
No		0	Not passable to CBS-subsurface flows below CBS-confluence with mainstem flows downstream. channel splits upstream-upstream gradient=9%	Pipe recently replaced.
No		0	No residual pool	Upstream channel instability and high bank instability.
No	OBS-Bridge	0	No residual pool. Upstream migration barriers SWD/LWD steps 10-m upstream of CBS crossing.	Sediment and headwall erosion severe. Install longer and bigger pipe.
No	BW-Backwater	0	Low to moderate potential small 1st order watercourse through spruce swamp gully. Stable channel	

APPENDIX E

Schedule A: Certificate of Completion

Schedule "A"

Recipient: Tolko Industries Ltd.

Project #: 5044001 Fish Passage

Investment Schedule #: SOTSA185044

Technical:

I, KYLE HAWES, in my capacity as

NATURAL RESOURCE BIOLOGIST of ECOSCAPE ENVIRONMENTAL CONSULTANTS Ltd.

do hereby certify that the following matters are true and correct to the best of my knowledge, information and belief, as of the date of this Certificate:

1. I have personal knowledge of the matters set out in this Certificate.

2. The Project has been completed in accordance with the objectives and standards as agreed to with the applicable Ministry and as set out in the Project.

3. The Outputs and findings documented in the Project Completion Summary are true, accurate and fair.

4. All data and deliverables required to be delivered to the Ministry or to other applicable governmental agencies pursuant to their respective rules, regulations, standards and specifications have been delivered to the appropriate agencies in the appropriate format.

DATED as of MARCH 16, 2009

(signed)

KYLE HAWES, FISH & AQUATIC BIOLOGIST

(print name and title)

R.P.Bio # 1598

(professional designation)

PDF and E-mail the completed Schedule A to your Investment Manager with a "cc" to fiaa@ca.pwc.com

or

Fax to: 604-484-7025

Note: This document cannot be altered without the prior written consent of PricewaterhouseCoopers

APPENDIX F

Working Plan Field Maps

(*Submitted during Planning Phase*)

Figure 1.

Tulameen and Myren / Pike Mtn. Study Area
Fish Passage Culvert Assessments
(Contract 5044001)

Project:	Tulameen and Myren Creek / Pike Mtn. Fish Passage CBS Assessments (Contract 5044001)
Project No.:	08-317
Location:	Tolko - Merritt TSA
Prepared for:	Tolko Industries Ltd.
Prepared by:	Ecoscape Environmental Consultants Ltd.
Drawn by:	KH
Date:	Octber 10, 2008
Projection:	NAD 83 UTM Zone 10N

LEGEND

Tulameen Watershed
- Britton Creek
- Podunk Creek
- Tulameen River
- Vuich Creek

Myren - Pike Mountain Watershed
- Allison Creek
- Cook Creek
- Gulliford Creek
- Myren Creek
- Otter Creek

- Tolko Operating Area
- Parks
- Highways
- TRIM Roads
- Lakes
- Streams

N
W E
S

3000 0 3000 6000 9000 12000
Meters
1:90000

SOURCE INFORMATION

Base Map:	92H
Stream / CBS Information:	Field Inventory
Location Information:	Field, GPS (trimble Nomad / XH rec.)
Feature Information:	Field Inventory
Date of Inventory:	October-November, 2008
Inventory Management:	K. Hawes



TOLKO INDUSTRIES LTD.

ECOSCAPE Environmental Consultants Ltd.

Figure 2a.

Tulameen (East Section) Watershed Area
Fish Passage Culvert Assessments
(Contract 5044001) - WORKING PLAN

Project:	Tulameen and Myren Creek / Pike Mtn. Fish Passage CBS Assessments (Contract 5044001)
Project No.:	08-317
Location:	Tolko - Merritt TSA
Prepared for:	Tolko Industries Ltd.
Prepared by:	Ecoscape Environmental Consultants Ltd.
Drawn by:	KH
Date:	Octber 10, 2008
Projection:	NAD 83 UTM Zone 10N

LEGEND

- CBS ASSESSMENT SITES - WORKING PLAN
- Roads
- Fish Sample
- Site assessment - non fish bearing
- Obstruction

FISH STREAM CLASS. REACHES
- S1-S4 Unconfirmed
- S1-S4 Confirmed
- S5-S6 Unconfirmed and other
- S5-S6 Confirmed
- Watercourses - undefined
- Waterbodies

Tulameen Watershed Area
- BRITTON CREEK
- PODUNK CREEK
- TULAMEEN RIVER
- VUICH CREEK

Myren Creek / Pike Mtn. Watershed Area
- ALLISON CREEK
- COOK CREEK
- GULLIFORD CREEK
- MYREN CREEK
- OTTER CREEK

- Parks and Reserves

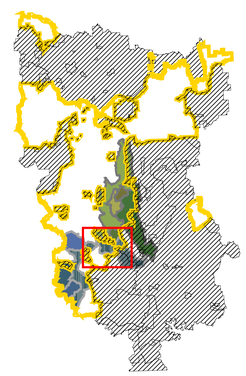
OPERATING AREA
- Other
- Tolko
- 20 m contour interval

N W E S

1:20000

SOURCE INFORMATION

Base Map:	92H
Stream / CBS Information:	Field Inventory
Location Information:	Field, GPS (trimble Nomad / XH rec.)
Feature Information:	Field Inventory
Date of Inventory:	October-November, 2008
Inventory Management:	K. Hawes



TOLKO INDUSTRIES LTD.

ECOSCAPE Environmental Consultants Ltd

Figure 2b.

Tulameen (West Section) Watershed Area
Fish Passage Culvert Assessments
(Contract 5044001) - WORKING PLAN

Project:	Tulameen and Myren Creek / Pike Mtn. Fish Passage CBS Assessments (Contract 5044001)
Project No.:	08-317
Location:	Tolko - Merritt TSA
Prepared for:	Tolko Industries Ltd.
Prepared by:	Ecoscape Environmental Consultants Ltd.
Drawn by:	KH
Date:	Octber 10, 2008
Projection:	NAD 83 UTM Zone 10N

LEGEND

- CBS ASSESSMENT SITES - WORKING PLAN
- Roads
- Fish Sample
- Site assessment - non fish bearing
- Obstruction

FISH STREAM CLASS. REACHES
- S1-S4 Unconfirmed
- S1-S4 Confirmed
- S5-S6 Unconfirmed and other
- S5-S6 Confirmed
- Watercourses - undefined
- Waterbodies

Tulameen Watershed Area
- BRITTON CREEK
- PODUNK CREEK
- TULAMEEN RIVER
- VUICH CREEK

Myren Creek / Pike Mtn. Watershed Area
- ALLISON CREEK
- COOK CREEK
- GULLIFORD CREEK
- MYREN CREEK
- OTTER CREEK

- Parks and Reserves

OPERATING AREA
- Other
- Tolko

20 m contour interval

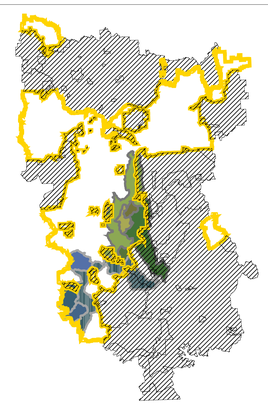
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SOURCE INFORMATION

Base Map:	92H
Stream / CBS Information:	Field Inventory
Location Information:	Field, GPS (trimble Nomad / XH rec.)
Feature Information:	Field Inventory
Date of Inventory:	October-November, 2008
Inventory Management:	K. Hawes



TOLKO INDUSTRIES LTD.

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Figure 3.

Britton Creek Watershed Area
Fish Passage Culvert Assessments
(Contract 5044001) - WORKING MAP

Project:	Tulameen and Myren Creek / Pike Mtn. Fish Passage CBS Assessments (Contract 5044001)
Project No.:	08-317
Location:	Tolko - Merritt TSA
Prepared for:	Tolko Industries Ltd.
Prepared by:	Ecoscape Environmental Consultants Ltd.
Drawn by:	KH
Date:	Octber 10, 2008
Projection:	NAD 83 UTM Zone 10N

LEGEND

- CBS ASSESSMENT SITES - WORKING PLAN
- Roads
- Fish Sample
- Site assessment - non fish bearing
- Obstruction

FISH STREAM CLASS. REACHES
- S1-S4 Unconfirmed
- S1-S4 Confirmed
- S5-S6 Unconfirmed and other
- S5-S6 Confirmed
- Watercourses - undefined
- Waterbodies

Tulameen Watershed Area
- BRITTON CREEK
- PODUNK CREEK
- TULAMEEN RIVER
- VUICH CREEK

Myren Creek / Pike Mtn. Watershed Area
- ALLISON CREEK
- COOK CREEK
- GULLIFORD CREEK
- MYREN CREEK
- OTTER CREEK

- Parks and Reserves

OPERATING AREA
- Other
- Tolko
- 20 m contour interval

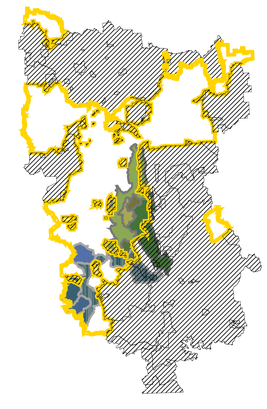
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SOURCE INFORMATION

Base Map:	92H
Stream / CBS Information:	Field Inventory
Location Information:	Field, GPS (Trimble Nomad / XH rec.)
Feature Information:	Field Inventory
Date of Inventory:	October-November, 2008
Inventory Management:	K. Hawes



TOLKO INDUSTRIES LTD.

ECOSCAPE Environmental Consultants Ltd.

Figure 4.

Podunk Creek Watershed Area
Fish Passage Culvert Assessments
(Contract 5044001) - WORKING MAP

Project:	Tulameen and Myren Creek / Pike Mtn. Fish Passage CBS Assessments (Contract 5044001)
Project No.:	08-317
Location:	Tolko - Merritt TSA
Prepared for:	Tolko Industries Ltd.
Prepared by:	Ecoscape Environmental Consultants Ltd.
Drawn by:	KH
Date:	Octber 10, 2008
Projection:	NAD 83 UTM Zone 10N

LEGEND

- CBS ASSESSMENT SITES - WORKING PLAN
- Roads
- Fish Sample
- Site assessment - non fish bearing
- Obstruction

FISH STREAM CLASS. REACHES
- S1-S4 Unconfirmed
- S1-S4 Confirmed
- S5-S6 Unconfirmed and other
- S5-S6 Confirmed
- Watercourses - undefined
- Waterbodies

Tulameen Watershed Area
- BRITTON CREEK
- PODUNK CREEK
- TULAMEEN RIVER
- VUICH CREEK

Myren Creek / Pike Mtn. Watershed Area
- ALLISON CREEK
- COOK CREEK
- GULLIFORD CREEK
- MYREN CREEK
- OTTER CREEK

- Parks and Reserves

OPERATING AREA
- Other
- Tolko

- 20 m contour interval

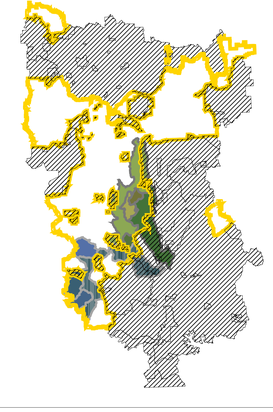
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SOURCE INFORMATION

Base Map:	92H
Stream / CBS Information:	Field Inventory
Location Information:	Field, GPS (trimble Nomad / XH rec.)
Feature Information:	Field Inventory
Date of Inventory:	October-November, 2008
Inventory Management:	K. Hawes



TOLKO INDUSTRIES LTD.

ECOSCAPE Environmental Consultants Ltd.

Figure 5.

Vuich Creek Watershed Area
Fish Passage Culvert Assessments
(Contract 5044001) - WORKING MAP

Project:	Tulameen and Myren Creek / Pike Mtn. Fish Passage CBS Assessments (Contract 5044001)
Project No.:	08-317
Location:	Tolko - Merritt TSA
Prepared for:	Tolko Industries Ltd.
Prepared by:	Ecoscape Environmental Consultants Ltd.
Drawn by:	KH
Date:	Octber 10, 2008
Projection:	NAD 83 UTM Zone 10N

LEGEND

- CBS ASSESSMENT SITES - WORKING PLAN
- Roads
- Fish Sample
- Site assessment - non fish bearing
- Obstruction

FISH STREAM CLASS. REACHES
- S1-S4 Unconfirmed
- S1-S4 Confirmed
- S5-S6 Unconfirmed and other
- S5-S6 Confirmed
- Watercourses - undefined
- Waterbodies

Tulameen Watershed Area
- BRITTON CREEK
- PODUNK CREEK
- TULAMEEN RIVER
- VUICH CREEK

Myren Creek / Pike Mtn. Watershed Area
- ALLISON CREEK
- COOK CREEK
- GULLIFORD CREEK
- MYREN CREEK
- OTTER CREEK

- Parks and Reserves

OPERATING AREA
- Other
- Tolko

- 20 m contour interval

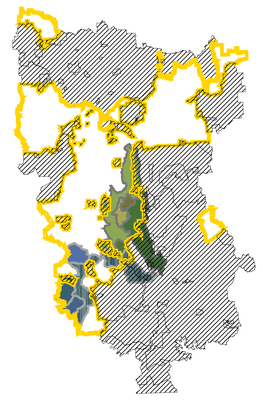
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SOURCE INFORMATION

Base Map:	92H
Stream / CBS Information:	Field Inventory
Location Information:	Field, GPS (trimble Nomad / XH rec.)
Feature Information:	Field Inventory
Date of Inventory:	October-November, 2008
Inventory Management:	K. Hawes



TOLKO INDUSTRIES LTD.

ECOSCAPE Environmental Consultants Ltd.

Figure 6.

Cook Creek Watershed Area
Fish Passage Culvert Assessments
(Contract 5044001)

Project:	Tulameen and Myren Creek / Pike Mtn. Fish Passage CBS Assessments (Contract 5044001)
Project No.:	08-317
Location:	Tolko - Merritt TSA
Prepared for:	Tolko Industries Ltd.
Prepared by:	Ecoscape Environmental Consultants Ltd.
Drawn by:	KH
Date:	Octber 10, 2008
Projection:	NAD 83 UTM Zone 10N

LEGEND

- CBS ASSESSMENT SITES - WORKING PLAN
- Roads
- Fish Sample
- Site assessment - non fish bearing
- Obstruction

FISH STREAM CLASS. REACHES

- S1-S4 Unconfirmed
- S1-S4 Confirmed
- S5-S6 Unconfirmed and other
- S5-S6 Confirmed
- Watercourses - undefined
- Waterbodies

Tulameen Watershed Area

- BRITTON CREEK
- PODUNK CREEK
- TULAMEEN RIVER
- VUICH CREEK

Myren Creek / Pike Mtn. Watershed Area

- ALLISON CREEK
- COOK CREEK
- GULLIFORD CREEK
- MYREN CREEK
- OTTER CREEK

- Parks and Reserves

OPERATING AREA

- Other
- Tolko
- 20 m contour interval

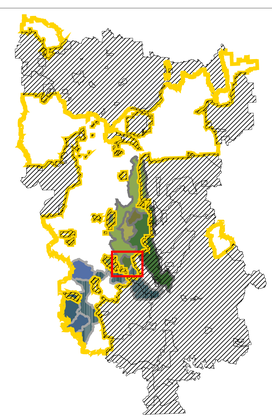
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SOURCE INFORMATION

Base Map:	92H
Stream / CBS Information:	Field Inventory
Location Information:	Field, GPS (trimble Nomad / XH rec.)
Feature Information:	Field Inventory
Date of Inventory:	October-November, 2008
Inventory Management:	K. Hawes



TOLKO INDUSTRIES LTD.

ECOSCAPE Environmental Consultants Ltd.

Figure 7.

Gulliford Creek Watershed Area
Fish Passage Culvert Assessments
(Contract 5044001)

Project:	Tulameen and Myren Creek / Pike Mtn. Fish Passage CBS Assessments (Contract 5044001)
Project No.:	08-317
Location:	Tolko - Merritt TSA
Prepared for:	Tolko Industries Ltd.
Prepared by:	Ecoscape Environmental Consultants Ltd.
Drawn by:	KH
Date:	Octber 10, 2008
Projection:	NAD 83 UTM Zone 10N

LEGEND

- CBS ASSESSMENT SITES - WORKING PLAN
- Roads
- Fish Sample
- Site assessment - non fish bearing
- Obstruction

FISH STREAM CLASS. REACHES
- S1-S4 Unconfirmed
- S1-S4 Confirmed
- S5-S6 Unconfirmed and other
- S5-S6 Confirmed
- Watercourses - undefined
- Waterbodies

Tulameen Watershed Area
- BRITTON CREEK
- PODUNK CREEK
- TULAMEEN RIVER
- VUICH CREEK

Myren Creek / Pike Mtn. Watershed Area
- ALLISON CREEK
- COOK CREEK
- GULLIFORD CREEK
- MYREN CREEK
- OTTER CREEK

- Parks and Reserves

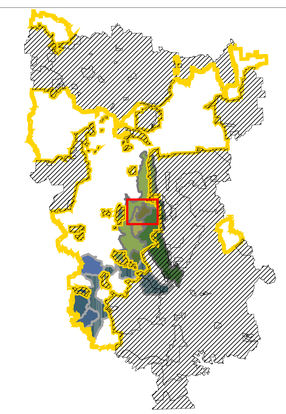
OPERATING AREA
- Other
- Tolko
- 20 m contour interval

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SOURCE INFORMATION

Base Map:	92H
Stream / CBS Information:	Field Inventory
Location Information:	Field, GPS (trimble Nomad / XH rec.)
Feature Information:	Field Inventory
Date of Inventory:	October-November, 2008
Inventory Management:	K. Hawes



TOLKO INDUSTRIES LTD.

ECOSCAPE Environmental Consultants Ltd.

Figure 8.

Myren Creek Watershed Area
Fish Passage Culvert Assessments
(Contract 5044001)

Project:	Tulameen and Myren Creek / Pike Mtn. Fish Passage CBS Assessments (Contract 5044001)
Project No.:	08-317
Location:	Tolko - Merritt TSA
Prepared for:	Tolko Industries Ltd.
Prepared by:	Ecoscape Environmental Consultants Ltd.
Drawn by:	KH
Date:	Octber 10, 2008
Projection:	NAD 83 UTM Zone 10N

LEGEND

- CBS ASSESSMENT SITES - WORKING PLAN
- Roads
- Fish Sample
- Site assessment - non fish bearing
- Obstruction

FISH STREAM CLASS. REACHES

- S1-S4 Unconfirmed
- S1-S4 Confirmed
- S5-S6 Unconfirmed and other
- S5-S6 Confirmed
- Watercourses - undefined
- Waterbodies

Tulameen Watershed Area

- BRITTON CREEK
- PODUNK CREEK
- TULAMEEN RIVER
- VUICH CREEK

Myren Creek / Pike Mtn. Watershed Area

- ALLISON CREEK
- COOK CREEK
- GULLIFORD CREEK
- MYREN CREEK
- OTTER CREEK

- Parks and Reserves

OPERATING AREA

- Other
- Tolko
- 20 m contour interval

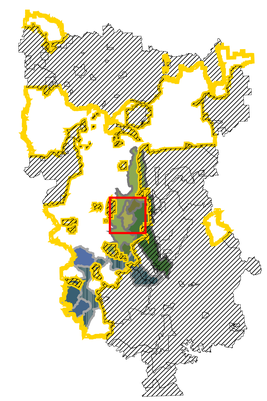
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SOURCE INFORMATION

Base Map:	92H
Stream / CBS Information:	Field Inventory
Location Information:	Field, GPS (trimble Nomad / XH rec.)
Feature Information:	Field Inventory
Date of Inventory:	October-November, 2008
Inventory Management:	K. Hawes



TOLKO INDUSTRIES LTD.

ECOSCAPE
Environmental Consultants Ltd.

Figure 9a.

Otter Creek Watershed Area (North Section)
Fish Passage Culvert Assessments
(Contract 5044001)

Project:	Tulameen and Myren Creek / Pike Mtn. Fish Passage CBS Assessments (Contract 5044001)
Project No.:	08-317
Location:	Tolko - Merritt TSA
Prepared for:	Tolko Industries Ltd.
Prepared by:	Ecoscape Environmental Consultants Ltd.
Drawn by:	KH
Date:	Octber 10, 2008
Projection:	NAD 83 UTM Zone 10N

LEGEND

- CBS ASSESSMENT SITES - WORKING PLAN
- Roads
- Fish Sample
- Site assessment - non fish bearing
- Obstruction

FISH STREAM CLASS. REACHES

- S1-S4 Unconfirmed
- S1-S4 Confirmed
- S5-S6 Unconfirmed and other
- S5-S6 Confirmed
- Watercourses - undefined
- Waterbodies

Tulameen Watershed Area

- BRITTON CREEK
- PODUNK CREEK
- TULAMEEN RIVER
- VUICH CREEK

Myren Creek / Pike Mtn. Watershed Area

- ALLISON CREEK
- COOK CREEK
- GULLIFORD CREEK
- MYREN CREEK
- OTTER CREEK

- Parks and Reserves

OPERATING AREA

- Other
- Tolko
- 20 m contour interval

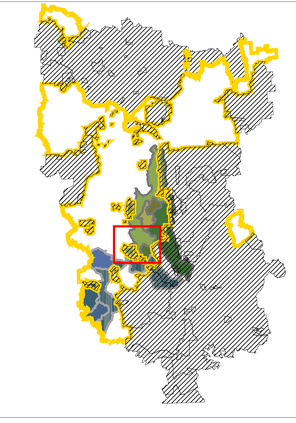
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SOURCE INFORMATION

Base Map:	92H
Stream / CBS Information:	Field Inventory
Location Information:	Field, GPS (trimble Nomad / XH rec.)
Feature Information:	Field Inventory
Date of Inventory:	October-November, 2008
Inventory Management:	K. Hawes



TOLKO INDUSTRIES LTD.

ECOSCAPE Environmental Consultants Ltd.

Figure 9b.

Otter Creek Watershed Area (Middle Section)
Fish Passage Culvert Assessments
(Contract 5044001)

Project:	Tulameen and Myren Creek / Pike Mtn. Fish Passage CBS Assessments (Contract 5044001)
Project No.:	08-317
Location:	Tolko - Merritt TSA
Prepared for:	Tolko Industries Ltd.
Prepared by:	Ecoscape Environmental Consultants Ltd.
Drawn by:	KH
Date:	October 10, 2008
Projection:	NAD 83 UTM Zone 10N

LEGEND

- CBS ASSESSMENT SITES - WORKING PLAN
- Roads
- Fish Sample
- Site assessment - non fish bearing
- Obstruction

FISH STREAM CLASS. REACHES

- S1-S4 Unconfirmed
- S1-S4 Confirmed
- S5-S6 Unconfirmed and other
- S5-S6 Confirmed
- Watercourses - undefined
- Waterbodies

Tulameen Watershed Area

- BRITTON CREEK
- PODUNK CREEK
- TULAMEEN RIVER
- VUICH CREEK

Myren Creek / Pike Mtn. Watershed Area

- ALLISON CREEK
- COOK CREEK
- GULLIFORD CREEK
- MYREN CREEK
- OTTER CREEK

- Parks and Reserves

OPERATING AREA

- Other
- Tolko
- 20 m contour interval

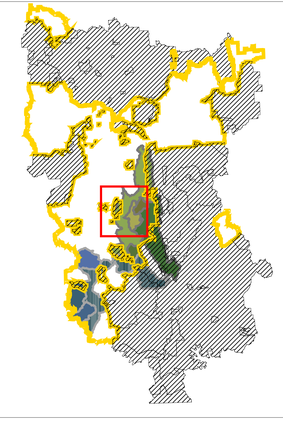
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SOURCE INFORMATION

Base Map:	92H
Stream / CBS Information:	Field Inventory
Location Information:	Field, GPS (trimble Nomad / XH rec.)
Feature Information:	Field Inventory
Date of Inventory:	October-November, 2008
Inventory Management:	K. Hawes



TOLKO INDUSTRIES LTD.

ECOSCAPE Environmental Consultants Ltd.

Figure 9c.

Otter Creek Watershed Area (South Section)
Fish Passage Culvert Assessments
(Contract 5044001)

Project:	Tulameen and Myren Creek / Pike Mtn. Fish Passage CBS Assessments (Contract 5044001)
Project No.:	08-317
Location:	Tolko - Merritt TSA
Prepared for:	Tolko Industries Ltd.
Prepared by:	Ecoscape Environmental Consultants Ltd.
Drawn by:	KH
Date:	October 10, 2008
Projection:	NAD 83 UTM Zone 10N

LEGEND

- CBS ASSESSMENT SITES - WORKING PLAN
- Roads
- Fish Sample
- Site assessment - non fish bearing
- Obstruction

FISH STREAM CLASS. REACHES

- S1-S4 Unconfirmed
- S1-S4 Confirmed
- S5-S6 Unconfirmed and other
- S5-S6 Confirmed
- Watercourses - undefined
- Waterbodies

Tulameen Watershed Area

- BRITTON CREEK
- PODUNK CREEK
- TULAMEEN RIVER
- VUICH CREEK

Myren Creek / Pike Mtn. Watershed Area

- ALLISON CREEK
- COOK CREEK
- GULLIFORD CREEK
- MYREN CREEK
- OTTER CREEK

- Parks and Reserves

OPERATING AREA

- Other
- Tolko
- 20 m contour interval

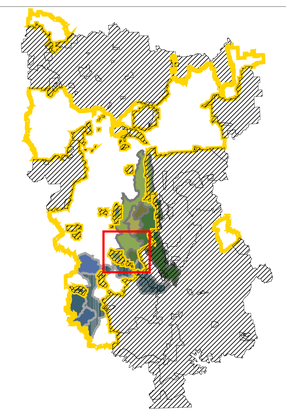
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SOURCE INFORMATION

Base Map:	92H
Stream / CBS Information:	Field Inventory
Location Information:	Field, GPS (trimble Nomad / XH rec.)
Feature Information:	Field Inventory
Date of Inventory:	October-November, 2008
Inventory Management:	K. Hawes



TOLKO INDUSTRIES LTD.

ECOSCAPE Environmental Consultants Ltd.

Figure 10.

Allison Creek Watershed Area
Fish Passage Culvert Assessments
(Contract 5044001)

Project:	Tulameen and Myren Creek / Pike Mtn. Fish Passage CBS Assessments (Contract 5044001)
Project No.:	08-317
Location:	Tolko - Merritt TSA
Prepared for:	Tolko Industries Ltd.
Prepared by:	Ecoscape Environmental Consultants Ltd.
Drawn by:	KH
Date:	October 10, 2008
Projection:	NAD 83 UTM Zone 10N

LEGEND

- CBS ASSESSMENT SITES - WORKING PLAN
- Roads
- Fish Sample
- Site assessment - non fish bearing
- Obstruction

FISH STREAM CLASS. REACHES

- S1-S4 Unconfirmed
- S1-S4 Confirmed
- S5-S6 Unconfirmed and other
- S5-S6 Confirmed
- Watercourses - undefined
- Waterbodies

Tulameen Watershed Area

- BRITTON CREEK
- PODUNK CREEK
- TULAMEEN RIVER
- VUICH CREEK

Myren Creek / Pike Mtn. Watershed Area

- ALLISON CREEK
- COOK CREEK
- GULLIFORD CREEK
- MYREN CREEK
- OTTER CREEK

- Parks and Reserves

OPERATING AREA

- Other
- Tolko
- 20 m contour interval

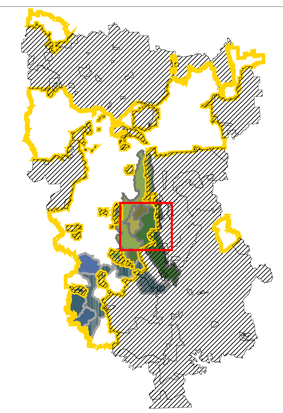
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SOURCE INFORMATION

Base Map:	92H
Stream / CBS Information:	Field Inventory
Location Information:	Field, GPS (trimble Nomad / XH rec.)
Feature Information:	Field Inventory
Date of Inventory:	October-November, 2008
Inventory Management:	K. Hawes



TOLKO INDUSTRIES LTD.

ECOSCAPE Environmental Consultants Ltd.