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**Interior Watershed Assessment**  
for the  
**IRISH CREEK WATERSHED**  
*(Vernon Forest District)*

**FINAL REPORT**

Prepared for  
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Lavington Division

by  
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**1.0 INTRODUCTION**

At the request of Tolko Industries Ltd. - Lavington Division, an Interior Watershed Assessment Procedure (IWAP) was completed for the Irish Creek community watershed. The purpose of the assessment was to determine the current watershed condition, the effects of previous land-use practices on the watershed and the potential impacts of proposed forest development. The assessment follows the *Interior Watershed Assessment Procedure Guidebook (IWAP) - April 1999*.

**2.0 KEY WATERSHED ASSESSMENT ISSUES**

Based upon discussion between BC Environment, Ministry of Forests and Tolko Industries Ltd. an initial Watershed Advisory Committee (WAC) meeting was not held for this watershed. An initial meeting was not considered necessary since to date there has not been any forest development in the watershed.

The main objective of this watershed assessment process for the Irish Creek watershed was to determine the potential impacts of proposed forest development plans on water quality and water quantity at the point of interest (POI) in the community watershed portion of Irish Creek. Potential impacts associated with recreation and cattle grazing were identified if observed. BC Environment also requested that a review of creek channels below the community watershed boundary be carried out within private land.

The POI for the watershed was at the mouth of the community watershed boundary that is shown in Figure 1. No sub-basins were established within the Irish Creek watershed due to its small size.

### 3.0 BACKGROUND INFORMATION

#### 3.1 Physical Characteristics

The Irish Creek watershed is a tributary to the North Arm of Okanagan Lake and is located east of the Town of Vernon [Figure 1]. The community watershed portion of the watershed is approximately 864.9 ha with elevations ranging from 680 m to 1,380 m. Sixty percent of the watershed is situated above an elevation of 1,140 m (H60 elevation). Biogeoclimatic zones included within the watershed are Interior Douglas-fir (IDF) at lower elevations with Montane Spruce (MS) at higher elevations. Bedrock consists mainly of andesite lava and tuff, argillite, quartzite and limestone of the Cache Creek Group<sup>1</sup>.

The mainstem channel within the community watershed flows east through a deeply entrenched canyon to the POI. Below the POI, Irish Creek flows south through private land and a wide unconfined valley to Okanagan Lake. The gradient of the mainstem channel above the POI ranges between two to fourteen percent. Below the POI the average gradient is one to two percent

The community watershed has a eastern aspect. Irish Creek is a snow-dominated hydrologic system and peak flows occur from late April to mid-June.

Irish Creek has been identified as having a low value for salmonid fish species given its chronically low discharge in the late summer and fall periods as well as its heavily silted and consolidated lower reaches<sup>2</sup>.

#### 3.2 History of Water Use

Irish Creek is utilized by a total of seven water licenses used for irrigation and domestic water supply purposes. No lakes or water storage facilities are present in the watershed.

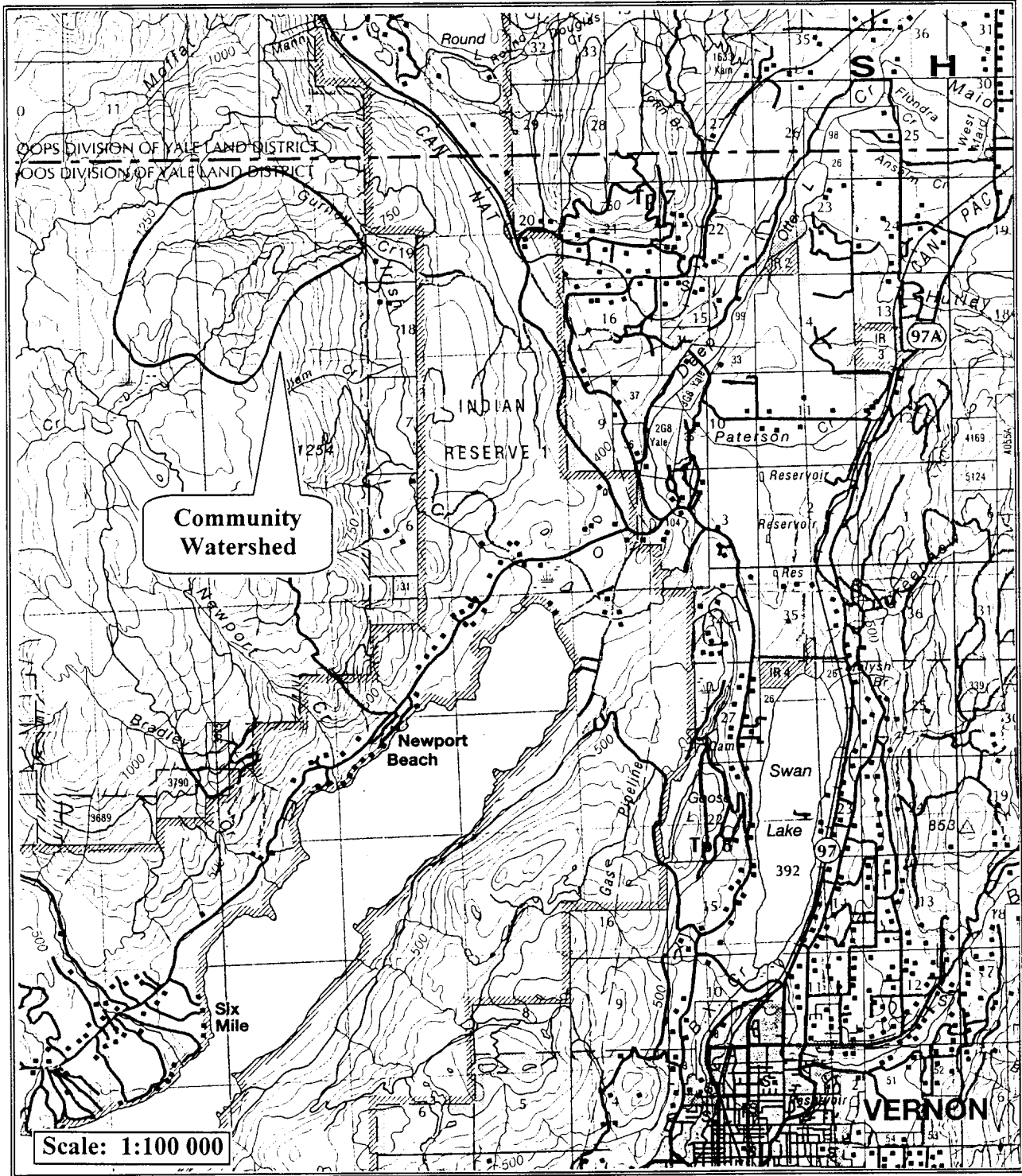
#### 3.3 Past Forest Development

Tolko Industries Ltd., Lavington Division, currently holds the Forest License within the watershed. To date no forest development has taken place in the watershed. Agriculture and rural development is present below the POI.

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<sup>1</sup> Jones, A.G. 1959. Geological Survey of Canada Memoir 296 Vernon Map-Area, British Columbia. Department of Mines and Technical Surveys.

<sup>2</sup> Wightman, J.C. and G.D. Taylor. 1978. Overview and Rating of Production Capabilities and Enhancement Opportunities for Rainbow Trout and Kokanee in Tributaries to Upper Okanagan Basin Lakes. Fish Habitat Improvement Section, Fish and Wildlife Branch, Ministry of Recreation and Conservation, Victoria, B.C. Part A (pp 64-65) and B (pp. 154-155).



**FIGURE 1**  
Location of the Irish Creek Watershed



## 4.0 METHODS

In summary, the assessment process consists of two components: an office assessment and a field assessment. The office assessment consists of the compilation and analysis of data to describe the basic geophysical characteristics of the watershed, along with the extent and location of past forest harvesting activities (the watershed inventory). The field assessment component consists of a reconnaissance overview of the watershed to determine actual hydrologic hazards. The field assessment includes a reconnaissance level sediment source survey and channel assessment to identify sensitive and/or disturbed road segments and channel reaches. The reconnaissance level channel assessment procedure (ReCAP) is based on the *Channel Assessment Procedure Field Guidebook - December 1996*.

## 5.0 ASSESSMENT

Table 1 presents the current watershed inventory data for the Irish Creek watershed.

**TABLE 1**  
**Watershed Inventory Data for Irish Creek (1998)**

Watershed Inventory Category	Watershed (Data)
Area (ha)	864.9
H60 Elevation (m)	1140
Total Area Harvested (%)	0
Equivalent Clear-cut Area (ECA) (%)	0
ECA Above H60 (%)	0
Road Density (km/km <sup>2</sup> )	0.7
High Sediment Source Roads (km)	0
Landslides (#)	0
Road on Potentially Unstable Slopes (km)	0.2
Stream Crossings (#)	4
Stream Logged to the Bank (km/km)	0
Length of Stream with Non-functional Riparian Forest (km and %)	0.0
Disturbed Channel* (km and %)	0.0

## 5.1 Current Condition of Community Watershed

No forest development has occurred within the Irish Creek watershed therefore, past forest development impacts to watershed functions such as peak flows, channel stability, surface erosion, landslides, and riparian functions are low.

The only development that has occurred in the community watershed is the development of a road that traverses the entire south side of the watershed from east to west and a mine claim. This road appears to have been constructed to access the mine claim. This mine claim appears to have been active in the late seventies to early eighties.

The majority of the road is currently not accessible by vehicle traffic and does not appear to be a surface erosion concern. Portions of the road reviewed during this assessment were vegetated with alder and grass. The mine site is also not considered to be a concern since it is situated away from the mainstem creek channels on the plateau area of the watershed.

Table 2 summarizes the overall condition of the Irish Creek community watershed.

**TABLE 2**  
**Watershed Hazards (1999) for Irish Creek**

Drainage Area	HAZARD CATEGORY					
	Peak Flow	Channel	Surface Erosion	Landslide	Riparian Function	Current ECA (%)
Watershed (POI)	Low	Low	Low	Low	Low	0

## 5.2 Existing Channel Conditions

Irish Creek above the POI (Reach F and G) was characterized as having a partially aggraded step-pool morphology with a boulder, cobble, gravel and sand bed and a gradient of 10 to 15% [refer to Appendix A, Photos 1 and 2]. Large woody debris plays a minor role in defining the channel morphology with the majority of woody debris spanning the channel. Numerous small slumps (<5 m<sup>2</sup>) were identified along the creek associated with the Class V terrain that is adjacent to the creek. The sand component on the bed of the creek appears to be higher than what would be expected for most channels with this gradient. The high sand component is a result of limestone seeps that has cemented the sand on the bed of the channel instead of allowing the sand to be transported downstream. These limestone seeps were observed to enter the creek at numerous locations along Reach F and G. It should be mentioned that the amount of sand within the Reaches F and G is not related to past forest development since no

sediment sources related to past forest development were observed in the community watershed portion of Irish Creek.

Directly below the POI (Reach E) Irish Creek was characterized as having a partially to moderately degraded step-pool morphology with a cobble, gravel and sand bed and gradient of 7% [refer to Appendix A, Photos 3 to 8]. Evidence of bank erosion and scour were present in this reach and are possibly related to the release of water at the water intake pond.

The lower reaches of Irish Creek were assessed at two locations: above Beatrice Road and above Westside Road. Channel conditions above Beatrice Road were characterized as having a moderately to severely aggraded riffle-pool morphology with a sand and silt bed and a 2% gradient [refer to Appendix A, Photos 9 to 12]. Riparian vegetation along this portion channel consisted mainly of birch and cottonwoods approximately sixty years old. Cattle have trampled the banks and bed throughout this area. Below the Beatrice Road crossing the channel is more complex and is less disturbed evidenced by stable banks and a higher frequency of pools.

The channel near the Westside Road is characterized as having a moderately aggraded, riffle-pool morphology with a gravel bed and a 2% gradient [refer to Appendix A, Photos 13 and 14]. A limited amount of large woody debris was present in this channel. Riparian vegetation consisted of large cottonwoods (dbh>30 cm) and shrub species (e.g. dwarf rose, Douglas maple and dogwood). Channel banks appeared to be stable.

## 6.0 RISKS OF FUTURE FOREST DEVELOPMENT

A total of four blocks are proposed by Tolko Industries Ltd. to be harvested in the watershed by 2005 [refer to Appendix E, Map]. Approximately 35% of the development (CP 342-2) is proposed to be harvested using partial retention (60 to 80% basal area removal) with clearcut harvesting proposed on the remaining blocks. Tolko Industries Ltd. proposes 2.9 km of new road to be constructed between 1999 and 2005.

### 6.1 Peak Flow Hazards

The ECA in the Irish Creek watershed is presently 0%. Tolko Industries Ltd.'s proposed development for the Forest Development Planning period of 2000 to 2005, the ECA will increase to a maximum of 6.2% and the ECA above the H60 line will be a maximum of 5.4%. Potential peak flow impacts as a result of the increased ECA is a low concern for the entire watershed and should not increase potential peak flow or channel impacts.

## **6.2 Surface Erosion**

Future surface erosion concerns will continue to be low in the Irish Creek community watershed. Proposed road construction should have a limited impact on sediment production provided that the natural drainage patterns are maintained and sediment control measures are implemented. Following harvest, roads should either be maintained or promptly deactivated to a level consistent with future access management requirements. It should be noted that areas immediately adjacent to streams tend to have moderate or high erosion potential based on the Level C terrain mapping. Consequently, close attention (e.g. silt fence, prompt grass seeding, etc..) should be taken to reduce potential surface erosion within or adjacent to stream channels.

## **6.3 Landslides**

Terrain stability mapping (Level C) has been completed for the community watershed portion. Potential impacts from increased landslides associated with the proposed forest development is a low concern since there is limited harvesting or road construction proposed on Class IV and V terrain. Particular attention should be given to reviewing the north boundary of CP 342-4, since this block is situated above Class IV or V terrain.

## **6.4 Riparian Functions**

Potential impacts to riparian functions associated with the proposed forest development is a low concern provided that appropriate riparian management practices as required under the Forest Practices Code are carried out to maintain stream-bank stability and water quality. It should be noted that only limited (~300 m) forest development is proposed along the mainstem channels of Irish Creek.

## **7.0 CONCLUSIONS**

### **7.1 Watershed Assessment Results (Existing Conditions)**

No forest development has occurred within the Irish Creek watershed therefore, past forest development impacts to watershed functions such as peak flows, channel stability, surface erosion, landslides, and riparian functions are low.

### **7.2 Proposed Forest Development**

Based on the results of the watershed assessment and provided that the current Forest Practices Code requirements are implemented, the development of the proposed access roads and cutting permits associated with Tolko Industries Ltd. have a low likelihood of impacting water quantity or water quality at the POI.

## 8.0 RECOMMENDATIONS

### 8.1 Forest Development Plan Recommendations

- Ensure that all existing road crossings in the Crown land portion of the watershed have been reviewed and are either upgraded or deactivated depending upon access requirements.
- Ensure that appropriate measures (e.g. silt fence, prompt grass seeding, maintenance of natural drainage patterns, etc.) are carried out on the proposed stream crossings to avoid or minimize the delivery of sediment into stream channels.

### 8.2 Other Recommendations

- BC Environment and the private land owners should give consideration to completing a channel assessment on Irish Creek that flows through private land. The purpose of this work would be to identify rehabilitation works to improve channel conditions, riparian functions and ultimately water quality.

RS/cm

**APPENDICES**

**APPENDIX A**

**Field Photographs**



**PHOTO 1.** Irish Creek, approximately 60m above point of interest (POI).



**PHOTO 2.** Channel bed of Irish Creek approximately 60m above POI. Note: mixture of cobbles, gravel & sand on bed of channel.





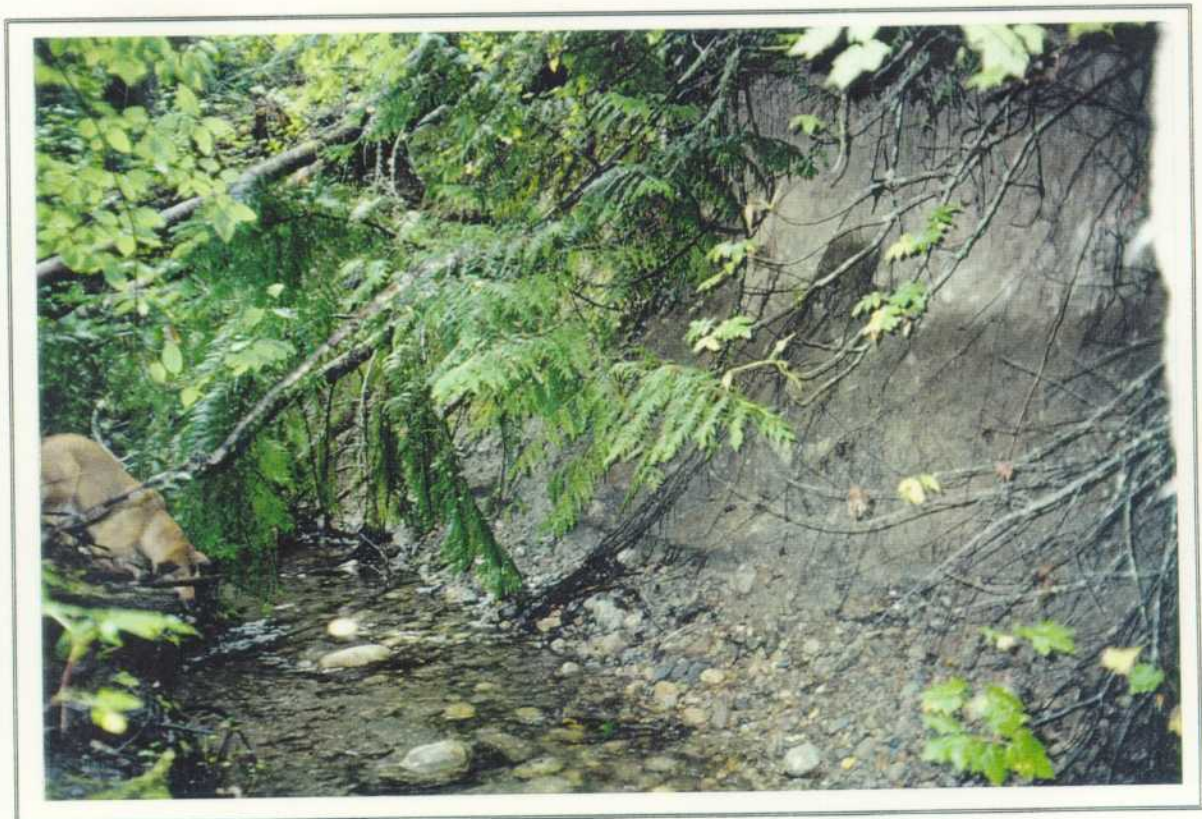
PHOTO 3. Water intake at POI.



PHOTO 4. Looking upstream toward water intake at POI.



**PHOTO 5.** Blowdown along creek below POI.



**PHOTO 6.** Bank failure along Irish Creek approximately 100m below POI.



**PHOTO 7.** Evidence of channel bank erosion and scour below POI at lower road crossing location.



**PHOTO 8.** Characteristic channel condition below POI within Reach E.



**PHOTO 9.** Channel conditions approximately 300m above Beatrice Rd. Note: silt banks trampled by cattle.



**PHOTO 10.** Cattle crossing location above Beatrice Road.



**PHOTO 11.** Culvert inlet at Beatrice Road crossing.



**PHOTO 12.** Irish Creek directly below Beatrice Road crossing.



**PHOTO 13.** Irish Creek directly above Westside Road.



**PHOTO 14.** Irish Creek directly below Westside Road.

**APPENDIX B**

**Watershed Inventory Information**

## *Pre 2000-2005\* FDP Watershed Report Card for Irish Creek*

<i>Basin</i>	<i>Gross Area (ha)</i>	<i>Total Harvested Area (ha/%)</i>	<i>ECA (ha/%)</i>	<i>ECA Below H60 (ha/%)</i>	<i>ECA Above H60 (ha/%)</i>	<i>Total Rd Density (sqkm)</i>	<i>Total Rd Length (km)</i>	<i>Permanent Deactivation (km)</i>	<i>Semi-Perminant Deactivation (km)</i>	<i>High/Moderate Sediment Source Roads (km)</i>	<i>Landslides Entering Streams</i>	<i>Road on Class IV or V Terrain (km)</i>	<i>Stream Crossings #</i>	<i>Streams LTB km</i>	<i>Length of Mainstem Channel with Non-Functional RMA (km)</i>	<i>Length of Disturbed Mainstem Channel (km)</i>
Irish Creek	864.9	0.0 / 0.0	0.0 / 0.0	0.0 / 0.0	0.0 / 0.0	0.7	5.6	0.0	0.0	0.0	0	0.0	4	0.0	0.0	0.0

\* Includes all blocks cut or projected to be cut in 1999

March 16, 2000



## *Post 2000-2005\* FDP Watershed Report Card for Irish Creek*

<i>Basin</i>	<i>Gross Area (ha)</i>	<i>Total Harvested Area (ha/%)</i>	<i>ECA (ha/%)</i>	<i>ECA below H60 (ha/%)</i>	<i>ECA above H60 (ha/%)</i>	<i>Total Rd Density (sqkm)</i>	<i>Total Rd Length (km)</i>	<i>Permanent Deactivation (km)</i>	<i>Semi-Perminant Deactivation (km)</i>	<i>High/Moderate Sediment Source Roads (km)</i>	<i>Landslides Entering Streams</i>	<i>Road on Class IV or V Terrain (km)</i>	<i>Stream Crossings #</i>	<i>Streams LTB km</i>	<i>Length of Mainstem Channel with Non-Functional RMA (km/%)</i>	<i>Length of Disturbed Mainstem Channel (km / %)</i>
Irish	864.9	53.5	53.5	6.6	46.8	1.0	8.5	0.0	0.0	0.0	0	0.0	6	0.0	0.0	0.0
		6.2	6.2	0.8	5.4											

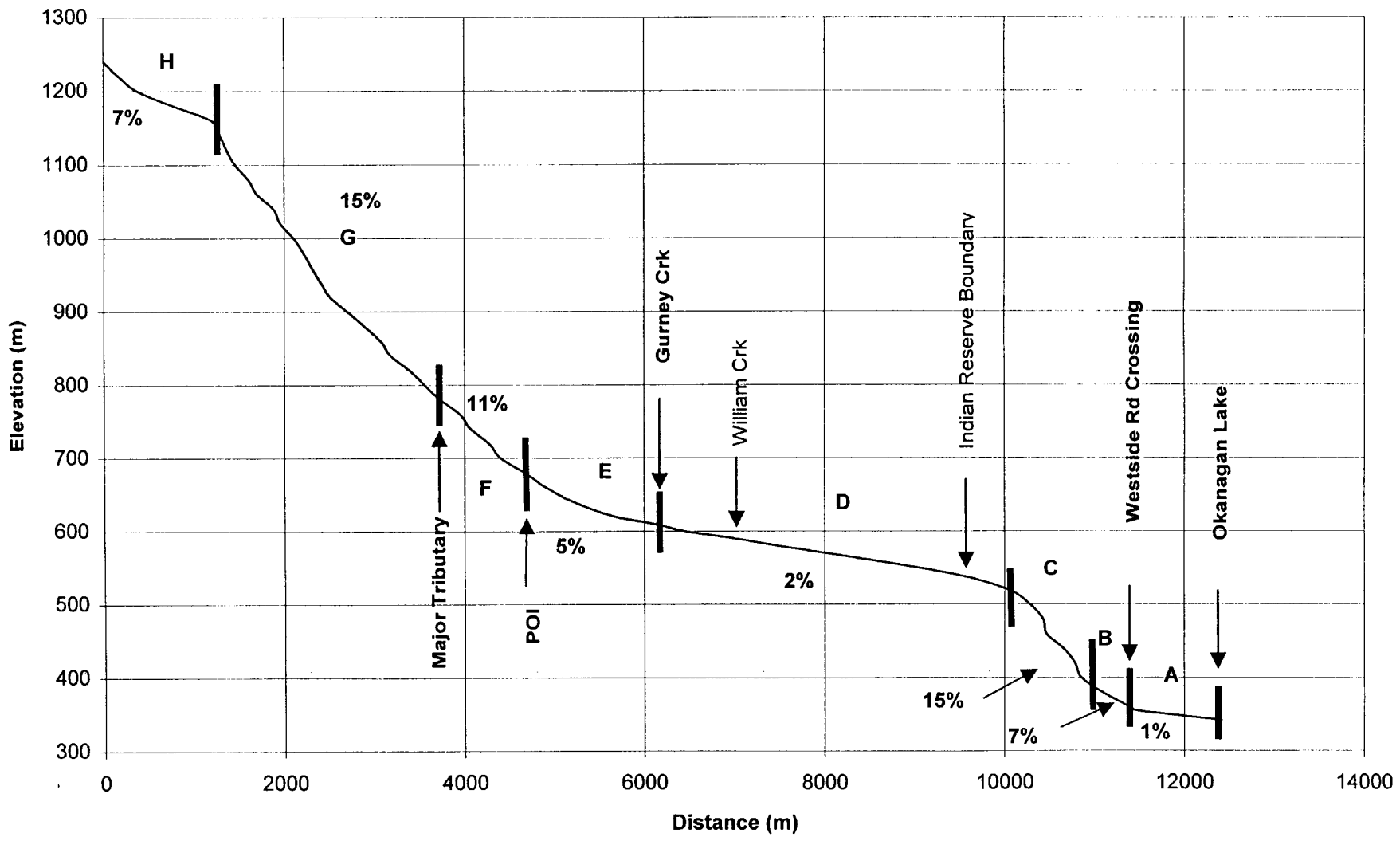
*\* Includes all blocks projected to be cut in 2005*

*March 16, 2000*

**APPENDIX C**

**Longitudinal Profile**

### Irish Creek Longitudinal Profile



**APPENDIX D**

**ReCAP Results**

# Irish Creek Channel Assessment - Field Form 1

Watershed: Irish Creek

Crew: Scherer/Smith

Date: 10/5-15/99

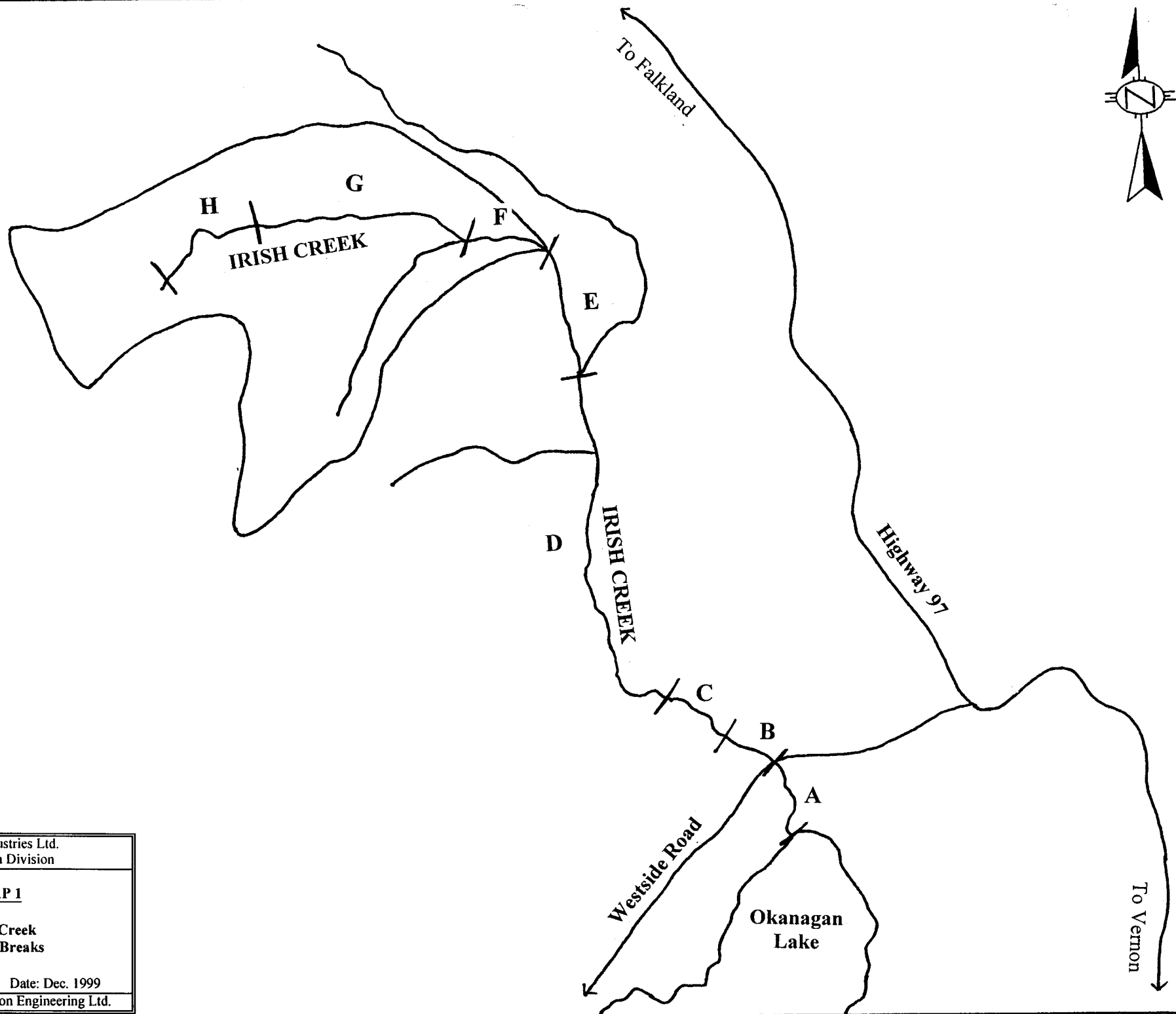
Weather: mostly cloudy and raining

Reach ID	Wb (m)	d (m)	S (%)	D (cm)	Channel Type	Bank Type	Disturbance Indicators	Comments
A	2.6	0.1	2	<5	RPg:A2	A 2/3	S1, C2	No large woody debris, moderately aggraded channel
B	2.6	0.1	2	<5	RPg:A2	A 2/3	S1, C2	
C	Not Assessed							
D	2.6-3.4	0.15	2	<5	RPg:A2 to A3	A 1/2	B2, C2, S1	Banks trampled by cattle Limited frequency of pools Silty homogeneous bed texture Deciduous riparian veg.
E	2.0	0.4	7	20	SPc:D1 to D2	A 2/3/4	B2	Eroded banks below POI (water intake)
F	1.9	0.25	7	15	SPc:A1	A 3/4	B2	Numerous slumps along channel Eroded banks LWD scattered and spanning channel Cemented sand and gravel on channel bed (limestone)
G	2.0	0.25	15	15	SPc:A1	A 3/4	B2	Similar to Reach F
H	Not Assessed							

S1 Homogenous bed texture	C1 Extensive riffles or cascades	B1 Abandoned channels
S2 Sediment fingers	C2 Minimal pool area	B2 Eroding banks
S3 Sediment wedges	C3 Elevated mid-channel bars	B3 Avulsions
S4 Extensive bars	C4 Multiple channels or braids	D1 Small woody debris
S5 Extensive scoured zones	C5 Disturbed stone lines	D2 LWD function
		D3 Recently formed LWD jams
Bank Type:		
A (Erodible Banks): 1=Silt, 2=Sand, 3=Gravel, 4=Cobble, 5=Boulder		
N (Non-erodible Banks): 1=Till, 2=Colluvium, 3=Bedrock		

**APPENDIX E**

**Map**



Tolko Industries Ltd.  
Lavington Division

**MAP 1**

**Irish Creek  
Reach Breaks**

Scale: 1:50 000      Date: Dec. 1999

Prepared By: Dobson Engineering Ltd.