EXCEL ENERGY INC.

BIRCH OIL SALES PIPELINE

PRE-IMPACT

FISHERIES HABITAT ASSESSMENT

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OCTOBER 1993

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1.0 INTRODUCTION

Excel Energy Inc. plans to construct an oil pipeline in the area of the Birch oil field in northeastern British Columbia. The project involves the construction of approximately 36 kilometres of pipeline for the purpose of transporting crude oil from Excel's Birch Central oil battery, located near Aitken Creek, to the existing oil gathering system near the Alaska Highway (Figure 1).

This pre-impact fisheries habitat assessment was conducted on October 13 and 14, 1993 to identify and evaluate fish habitat along the proposed ROW's associated with this project.

2.0 GENERAL SITE DESCRIPTION

The project is situated within the Blueberry River watershed which is located in the Peace Lowlands ecoregion. Within this ecoregion, the entire proposed ROW lies within the Boreal White and Black Spruce (BWBS) biogeoclimatic zone.

A total of ten drainage courses are encountered along the proposed ROW. Three of these, Blueberry River, Inglis Creek and Aitken Creek, were confirmed to possess fisheries values and a forth, an unnamed tributary of Aitken Creek contains limited, marginal habitat.

The remainder are small, possibly intermittent, feeder streams which were considered to have no fisheries values.

The proposed crossing of the Blueberry River is situated near the south end of the project and is located along an existing Mobil pipeline ROW (Figure 2).

Moving north, the proposed ROW crosses Inglis Creek twice. The first Inglis crossing occurs along an existing pipeline ROW and the second, approximately 5 kilometres upstream, is on a new alignment.

Further north, the Aitken Creek crossing is located immediately adjacent to a newly installed road access and bridge (Figure 3).

The unnamed tributary of Aitken Creek is crossed at the northern extremity of the proposed ROW, approximately 1,000 metres west of the Excel Birch Central battery.

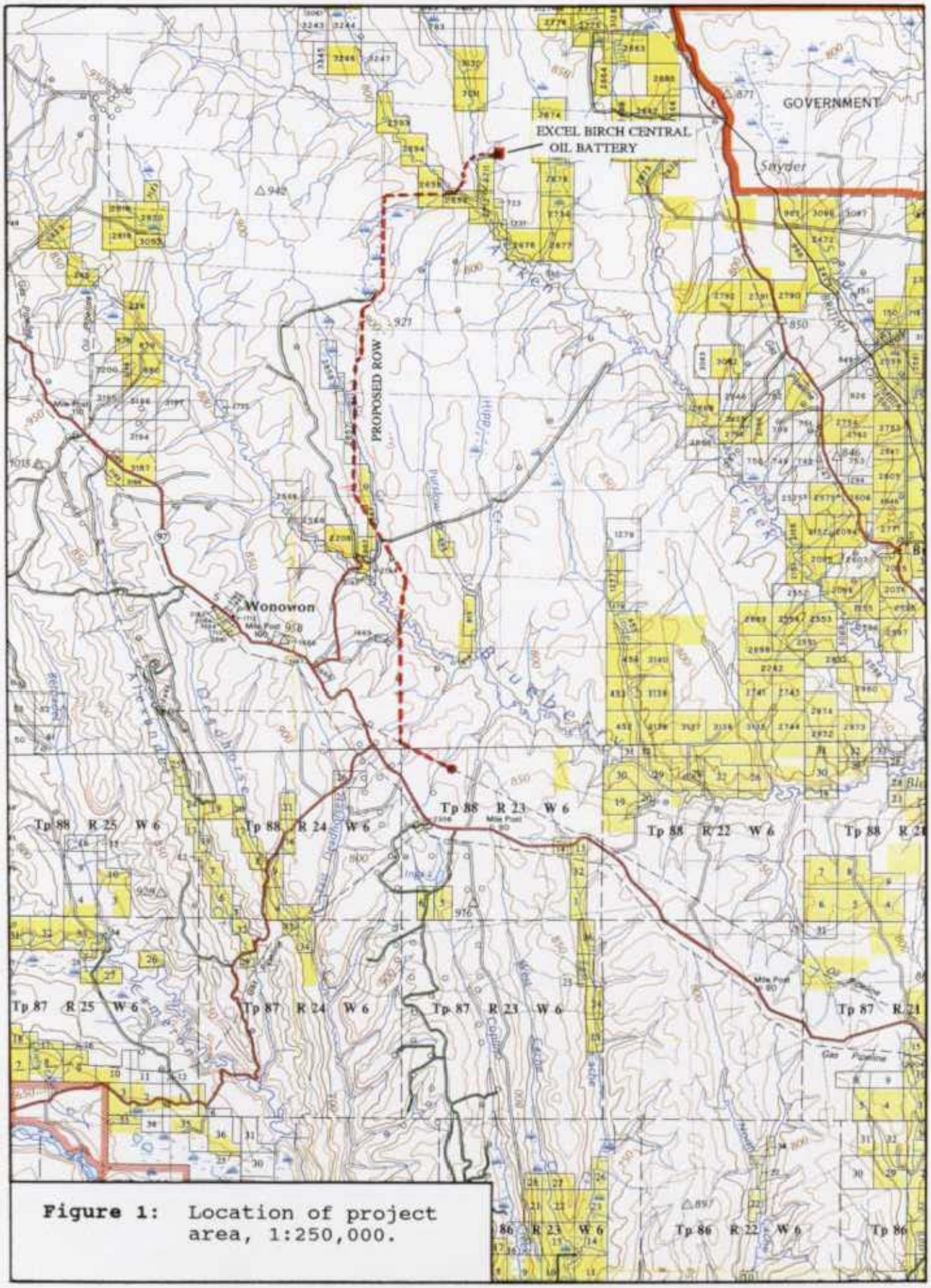


Figure 1: Location of project area, 1:250,000.

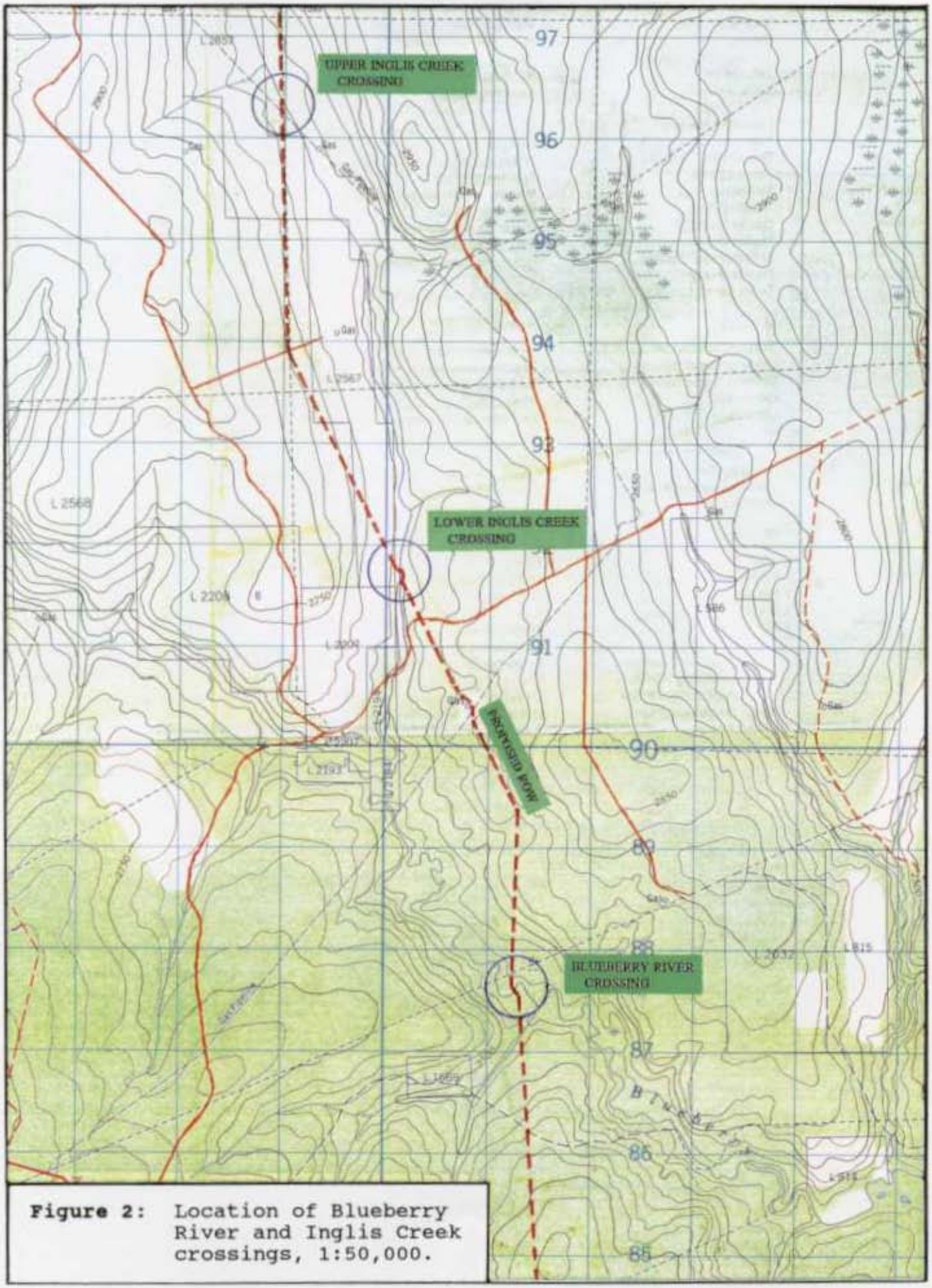


Figure 2: Location of Blueberry River and Inglis Creek crossings, 1:50,000.

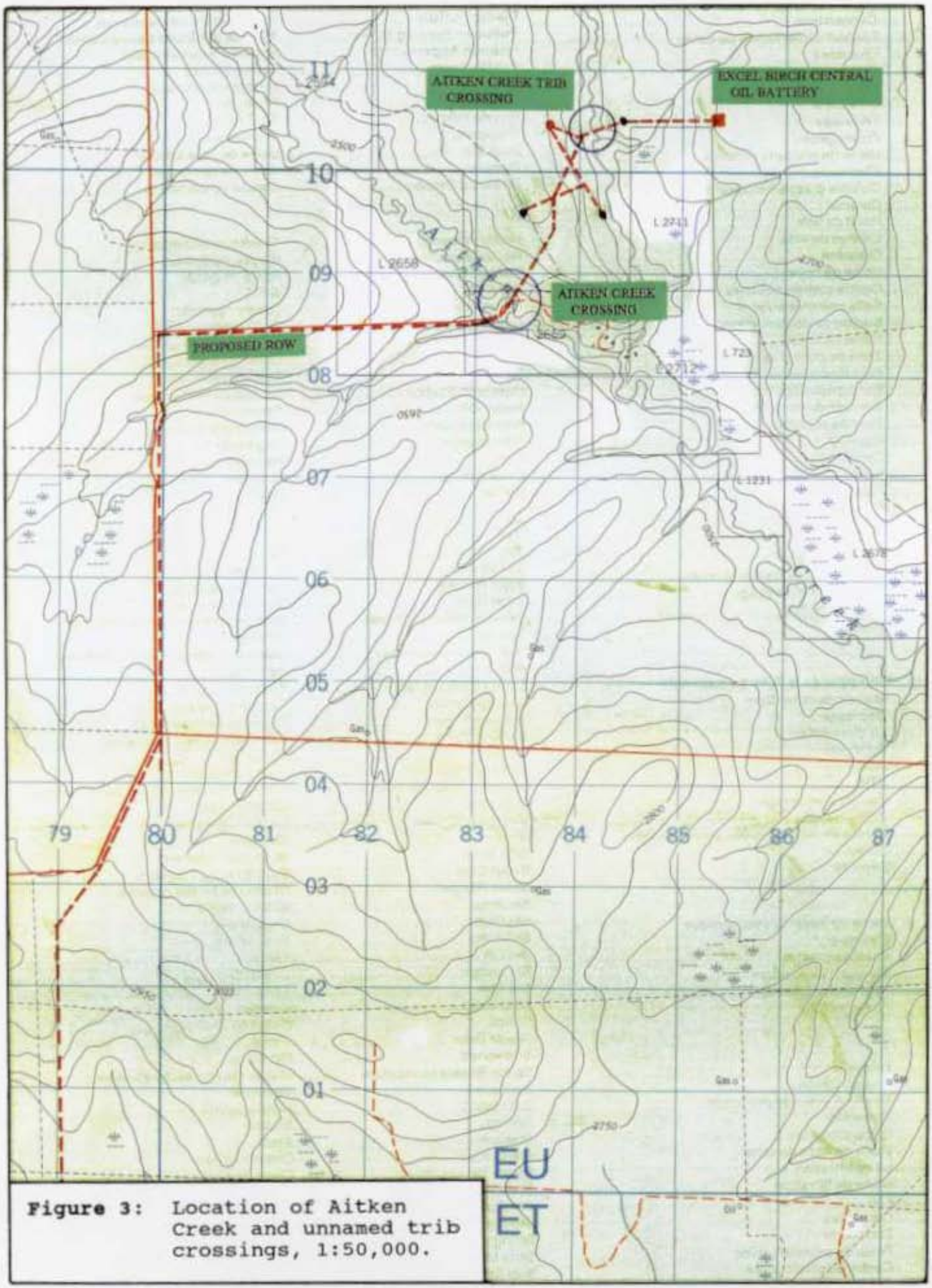


Figure 3: Location of Aitken Creek and unnamed trib crossings, 1:50,000.

3.0 BLUEBERRY RIVER

3.1 METHODS

The Blueberry River was evaluated to determine possible impacts of the proposed pipeline crossing on fish and their habitat. This included an inventory of fish species present and an assessment of fish habitat and related biophysical environment.

Three 100 metre sections of the Blueberry River were evaluated, as per B.C. Environment's *Appendix "A", Pre-Impact Assessment For Small Stream Crossings, Sampling Protocol and Mandatory Reporting* (Appendix I). Site 1 lay immediately upstream of the proposed crossing, site 2 immediately downstream, and site 3 began 500 metres downstream of the proposed crossing.

All fisheries habitat work was conducted to the standards described in the *Fish Habitat Inventory and Information Program* (DFO & BCMOE, 1989). This included a photographic record of the sample sites and riparian area. A fish species inventory was undertaken using a Coffelt gas-generator electro-fisher.

3.2 RESULTS

3.2.1 Biophysical Inventory

The proposed crossing of the Blueberry River is located approximately 70 kilometres upstream of its confluence with the Beatton River.

The river, in the area of the crossing, meanders through a relatively wide valley. Riparian vegetation is dominated by mature white spruce, trembling aspen and balsam poplar. The understory is comprised of willow, rose, grasses, clover, vetch and mosses.

The channel is contained by banks 3 to 4 metres in height. Flood sign was observed up an additional 4 metres above the water surface. At the time of this assessment the flow stage was low.

The river consists of low gradient, pool/riffle habitat, with a relatively low proportion of riffles. The substrate is comprised chiefly of silt and cobble with pockets of gravel throughout (Appendix II).

River banks are relatively unstable and subject to sloughing throughout. Large amounts of silt deposited during past flood conditions were observed. Water turbidity was high as a result of suspended silt, despite low flow conditions and a lack of recent precipitation. Discharge was measured at approximately 0.20 m3/s Water temperature at the time of the assessment was 1.0 degree Celsius.

Extensive beaver activity was evident throughout the area. A well maintained beaver dam was located approximately 250 metres downstream of the proposed crossing. The resulting impoundment extended upstream to the crossing site.

3.2.2 Fish Species Inventory

Four species of fish were electro-fished in the three sample sections on the Blueberry River: 25 lake chub, 7 redside shiner, 3 longnose suckers and 4 trout-perch.

4.0 INGLIS CREEK (LOWER CROSSING)

4.1 METHODS

Inglis Creek was evaluated to determine possible impacts of the proposed pipeline crossing on fish and their habitat. This included an inventory of fish species present and an assessment of fish habitat and related biophysical environment.

Three 100 metre sections of Inglis Creek were evaluated, as per B.C. Environment's *Appendix "A", Pre-Impact Assessment For Small Stream Crossings, Sampling Protocol and Mandatory Reporting* (Appendix I). Site 1 lay immediately upstream of the proposed crossing, site 2 immediately downstream, and site 3 began 500 metres downstream of the proposed crossing.

All fisheries habitat work was conducted to the standards described in the *Fish Habitat Inventory and Information Program* (DFO & BCMOE, 1989). This included a photographic record of the sample sites and riparian area. A fish species inventory was undertaken using a Coffelt gas-generator electro-fisher.

4.2 RESULTS

4.2.1 Biophysical Inventory

The proposed lower crossing of Inglis Creek is located approximately 2.5 kilometres upstream of its confluence with the Blueberry River.

The stream, in the area of the crossing, is narrowly confined by a shallow valley. Riparian vegetation is dominated by bog birch, wiilow and grasses. No overstory exists.

The channel is contained by banks approximately 0.75 metres in height. Flood sign was observed an additional 2.0 metres above the water surface. At the time of this assessment the flow stage was low.

The stream consists of low gradient, pool/riffle habitat, with a roughly even distribution of pools and riffles. The substrate is comprised mainly of boulders and cobble with limited pockets of gravel. The average wetted width of the stream was 1.5 metres. Average maximum pool depth was approximately 65 centimetres.

Streambanks are relatively stable with the exception of some small scale sloughing and exposed soil. Water turbidity was approximately 30 centimetres. Discharge was measured at approximately 0.02 m3/s. Water temperature at the time of the assessment was 3.0 degrees Celsius.

4.2.2 Fish Species Inventory

Five juvenile arctic grayling were electro-fished in the three samples sections at the lower Inglis Creek crossing.

5.0 INGLIS CREEK (UPPER CROSSING)

5.1 METHODS

Because of the proximity to the lower crossing of Inglis Creek, the upper crossing was assessed comparatively by means of a general visual inspection. No specific sample sections were delineated and no fish species inventory was undertaken.

5.2 RESULTS

The proposed upper crossing of Inglis Creek is located approximately 7.5 kilometres upstream of its confluence with the Blueberry River, 5 kilometres above the lower crossing.

The stream in this area is less confined, as the shallow valley is slightly wider. Riparian vegetation is dominated by dwarf birch, willow, lodgepole pine seedlings and grasses. No overstory exists.

The channel is contained by banks approximately 1.0 metre in height. Flood sign was observed up an additional 1.5 metres above the water surface. At the time of this assessment the flow stage was low.

This portion of the stream consists of low gradient, pool/riffle habitat, with a roughly even distribution of pools and riffles. The substrate is comprised mainly of cobble and large gravel.

Streambanks are composed of sod and fine materials and show evidence of erosion from high flows but are generally quite stable. Water turbidity was approximately 30 centimetres. Discharge was estimated to be comparable to the lower crossing, approximately 0.02 m3/s.

6.0 AITKEN CREEK

6.1 METHODS

Aitken Creek was evaluated to determine possible impacts of the proposed pipeline crossing on fish and their habitat. This included an inventory of fish species present and an assessment of fish habitat and related biophysical environment.

Two 100 metre sections of Aitken Creek were evaluated, as per B.C. Environment's *Appendix "A", Pre-Impact Assessment For Small Stream Crossings, Sampling Protocol and Mandatory Reporting* (Appendix I). Site 1 was omitted due to active bridge construction on the upstream side of the proposed crossing. Site 2 lay immediately downstream of the proposed crossing and site 3 began 500 metres downstream.

All fisheries habitat work was conducted to the standards described in the *Fish Habitat Inventory and Information Program* (DFO & BCMOE, 1989). This included a photographic record of the sample sites and riparian area. A fish species inventory was undertaken using a Coffelt gas-generator electro-fisher.

6.2 RESULTS

6.2.1 Biophysical Inventory

The proposed crossing of Aitken Creek is located approximately 43 kilometres upstream of its confluence with the Blueberry River.

The stream, in the area of the crossing, winds relatively unconfined in a wide, shallow valley. Riparian vegetation is predominantly willow, bog birch, rose and grasses with scattered aspen and spruce. No overstory exists.

The channel is contained by banks up to 4 metres in height. Flood sign was observed an additional 3 to 4 metres above the water surface. At the time of this assessment the flow stage was low.

The stream consists of low gradient, pool/riffle habitat, with a very low proportion of riffles. The substrate is comprised mainly of silt and fines with gravel and small cobble occupying less than 30% of the streambed. The average wetted width of the stream was 4.0 metres.

Streambanks are composed of silt and fine materials and subject to sloughing throughout. The water was moderately turbid due to suspended silt and organic stain. Discharge was measured at approximately 0.10 m3/s. Water temperature at the time of the assessment was 3.0 degrees Celsius.

6.2.2 Fish Species Inventory

Six fish, representing two species, were captured in the two sample sections on Aitken Creek: five lake chub and one longnose sucker.

7.0 UNNAMED AITKEN CREEK TRIBUTARY

This stream is crossed by the proposed ROW at the north end of the project approximately one kilometre west of Excel's Birch Central battery. It is the largest unnamed stream on the ROW. The proposed crossing of this tributary is located approximately three kilometres upstream of its confluence with Aitken Creek.

After a general visual inspection, the stream was deemed to possess only marginal, seasonal fisheries values. Because of the formation of surface ice, electro-fishing was not attempted.

Flow rates were comparable to those in Inglis Creek, however, habitat quality was much lower. Silt and fines comprised a large proportion of the streambed material. Turbidity was relatively high and natural instream cover was lacking. In addition, habitat of similarly low quality is present in Aitken Creek adjacent to the mouth of the tributary.

8.0 DISCUSSION, GENERAL CONCERNS AND RECOMMENDATIONS

8.1 BLUEBERRY RIVER

The Blueberry River system supports a variety of non-sport fish species, and possibly restricted populations of arctic grayling in headwaters areas.

The proposed Excel crossing is located on relatively stable ground at the site of an existing Mobil pipeline crossing. Much of the substrate immediately below the crossing is composed of sand and silt. The beaver dam, located 250 metres below the site, and the resulting impoundment creates an effective silt trap and should allow disturbance-induced silt to slowly settle out before being carried downstream.

Large granular substrate at the crossing site should be replaced when trench backfilling is complete.

8.2 INGLIS CREEK

Inglis Creek was found to contain high quality rearing habitat for juvenile arctic grayling. Clean cobble and boulder substrate, moderately low turbidity and low silt content encourage production the aquatic invertebrate food sources. Deep pools and overhanging banks provide suitable cover.

Arctic grayling are a high priority species throughout the region and are known to be extremely sensitive to habitat degradation. There are probably relatively few streams in the Blueberry system suitable for this species.

Juvenile grayling utilizing small tributaries as rearing habitat normally move to lower reaches as flow rates and water temperatures decrease in the fall. Deep pools and the presence of grayling in October may indicate overwintering capabilities in Inglis Creek.

Block and pump procedures may be required during trenching operations at both proposed Inglis Creek crossings.

The lower crossing occurs adjacent to an existing pipeline ROW. The proposed Excel ROW is currently being re-aligned or kinked at the crossing site to allow a right angle crossing of the stream.

The proposed upper crossing is located on new cut and is presently being adjusted or kinked at the crossing site to avoid straddling a small intermittent drainage channel on the east bank of the stream. This modification was made to address concerns about ROW erosion during run-off periods and resulting siltation into Inglis Creek.

8.3 AITKEN CREEK

No high quality fish habitat exists in the area of the Aitken Creek crossing. The streambanks and streambed are composed primarily of silt and fines. Clean granular substrate is limited.

The crossing and downstream stretch are located on private property. A high degree of in-stream disturbance is evident and ongoing. Sloughing of abandoned bridge abutments, heavy equipment fords and intensive use of the stream by livestock may have further reduced its suitability for all but the most tolerant of non-sport species.

The proposed ROW follows the edge of an existing road allowance and crosses the stream adjacent to a newly installed bridge.

8.4 UNNAMED AITKEN CREEK TRIBUTARY

No high quality fish habitat exists in the area of the crossing of the unnamed Aitken Creek tributary.

Appendix I:
Appendix "A"
Pre-impact Assessment For Small Stream Crossings
Sampling Protocol and Manadatory Reporting
B.C. Environment

APPENDIX 'A'

PRE-IMPACT ASSESSMENT FOR SMALL STREAM CROSSINGS.
SAMPLING PROTOCOL AND MANDATORY REPORTING.

All fisheries habitat survey work must be conducted to the standards described in the "Fish Habitat Inventory & Information Program" (D.F.O. & B.C.M.O.E., 1989). Copies of the guide and the appropriate forms to be used are available c/o the MOE Fisheries Branch, Inventory and Data Systems Unit, 780 Blanshard St., Victoria B.C., V8V 1X5.

For proposed stream crossings requiring a pre-impact assessment, a habitat survey will be conducted for at least 100m upstream and 100m downstream of the proposed crossing site. An additional 100m section of river will be surveyed approximately 500m downstream the proposed crossing site. Fish presence and abundance will be assessed for each of the sections of river surveyed using appropriate techniques (usually some combination of electrofishing, seining and angling).

Every effort should be made to maintain captured fish alive and in good condition so that they can be released back into the waters from which they were captured. All fish captured should be identified to species and the total number of each species captured will be recorded. All indivduals of sport species should be measured (fork length) to the nearest mm and a non-lethal aging structure should be collected (scales from all species other than Percids from which dorsal spines should be collected). Anaesthetics may be used to quiet fish prior to sampling but fish should be fully recovered before being released into the wild. The following information will be recorded for individuals that die incidentally during capture or handling: weight; sex; maturity; stomach contents; parisites or other lesions. Otoliths should be removed and saved from any char that die. If fish ages are not specifically required for the study in question then aging structures will be included with all the relevant data as part of the final report.

For non-sport species the total number captured and the range of fork lengths for each species will be recorded. A representative sample of each non-sports species (up to 20 individuals representing the full size range captured with the exception that suckers and squawfish longer than 15 cm need not be kept) should be fixed in 10% formalin and delivered to the Regional Fisheries Biologist in Fort St. John.

The final report must include the following information as a minimum:
-a map (1:50,000 scale or less) showing the precise location of all sampling sites;
-a completed Stream Survey Card for each sample location;
-a photographic record with at least one upstream and one downstream shot at each sample location;
-all fish data collected, summarized in tabular form;
-techniques, effort (eg. electroshocking seconds), and area sampled (square meters) for each sample location;
-problems encountered that might influence the results;
-a summary of the major habitat components and the fisheries potential for the stream surveyed, comments indicating how typical the surveyed area was relative to the stream as a whole;
-an assessment of the probable impacts as a result of the planned in-stream activities.

Appendix II:
Blueberry River
Stream Survey Forms,
Site Photographs and
Fish Data Sheets

DFO / MOE
STREAM SURVEY FORM

Stream Name (gaz.)	BLUEBERRY R	(local)				Access	V4	Method	
Watershed Code	2 3 3 2 6 1 3			Reach No.		Length(km)			
Location	FROM PROPOSED ROW, UPSTREAM FOR 100 M.	Map#	94A / 13	Site No.	1	Lth surv(m)	100	HC	
		U.T.M.	10 5812 62876	Fish Card	Y (N)	C	Field ☐	Hist ☐	
Date Y M D	9 3 1 0 1 3	Time	0930	Agency	DFO	Crew	BC / DC	Photos	Air Photos

C	PARAMETER	VALUE	METH.	SPECIFIC DATA
	Ave. Chan. Width (m)	15.0	HC	
	Ave. Wet Width (m)	9.0	HC	
	Ave. Max. Riffle Depth (cm)	20	T	
	Ave. Max. Pool Depth (cm)	60	T	
	Gradient %	1.0	CL	
	% Pool 80 Riffle 20 Run ☐ Other ☐		GE	
	Side Chan. % 0 (X) 0-10 ☐ 10-40 ☐ >40 ☐		GE	
	Debris Area % 05 0 ☐ 0-5 (X) 5-15 ☐ >15 ☐		GE	
	Debris Stable %	50	GE	
1	COVER: Total %	60	GE	

Comp sum 100%	Dp Pool	L.O.D.	Boulder	Ov. Veg	Over Veg	Cutbank
	70	10	10	0	0	10

Crown Closure % 0 C ☐ Aspect SE

C	BED MATERIAL		%	
2	Fines	clay, silt, sand (<2mm)	30	30
	Gravels	small (2 - 16mm)	30	15
		large (16 - 64mm)		15
	Larges	sm. cobble (64 - 128mm)	40	20
		lge. cobble (128 - 256mm)		10
		boulder (>256mm)		10
	Bedrock (R)		0	0

D_{50} (cm) 30 C ☐ Compaction L M (H)

C	BANKS		
	Height (m)	3	% Unstable 20
	Texture	(F) G L R	

Confinement	EN	CO	FC	OC	(UC)	N/A
Valley Channel Ratio	0-2	2-5	5-10	(>10)		N/A
Stage	Dry	(L)	M	H	Flood	
Flood Signs Ht (m)	4	Braided	Y (N)			
Bars (%)	25	pH		O2 (ppm)		
Water Temp (°C)	+1	Turb. (cm)	30	Cond. (25°C)		

OBSTRUCTIONS

C.	Ht (m)	Type	Loc'n

DISCHARGE

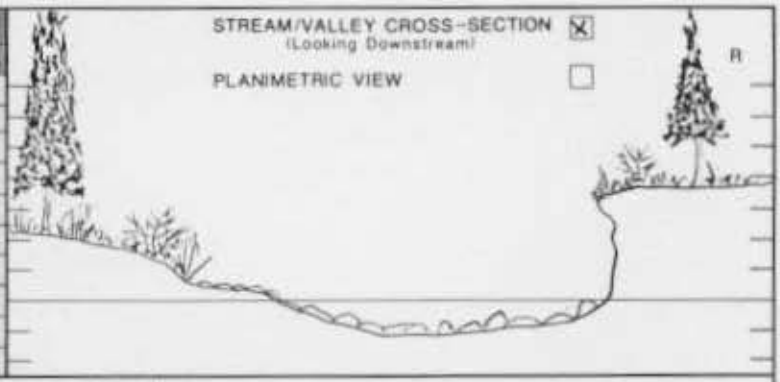
Parameter	Value	Method	Specific Data
Wetted Width (m)	1.9	T	
Mean Depth (m)	.28	T	
Mean Velocity (m/s)	0.5	F	
Discharge (m^3/s)	2.0		

REACH SYMBOL
(Fish)
(Width, Valley Channel, Slope) (Bed Material)

FISH SUMMARY

C	Species	No.	Size Range (mm)	Life Phase	Use	Method/Ref.
3	LKC	11	46-119			EL
	LWS	1	85			
	RSC	2	65-84			

STREAM/VALLEY CROSS-SECTION (X) (Looking Downstream)
PLANIMETRIC VIEW ☐



COMMENTS

Channel Stability ☐ Debris ☐ Management Concerns ☐ Obstructions ☐ Riparian Zone (4) Valley Wall Processes ☐ Etc.

1 HIGH DEGREE OF SUSPENDED SILT IN WATER INCREASES COVER

2 FINES COMPRISED CHIEFLY OF SAND

3 LAKE CHUB AVERAGE: 71MM, ELECTROSHOCKING SECONDS: 515

4 RIPARIAN VEGETATION: SPRUCE, BALSAM POPLAR, ROSE, WILLOW, MOSSES, CLOVER, AMERICAN VETCH, GRASSES.

Edited by: DC
Date Y M D: 931015

Stream Survey Form; Blueberry River - Site 1, the uppermost site.

Blueberry River site 1, above proposed crossing: View downstream; 50 m up from bottom of site.

Blueberry River site 1, above proposed crossing: View downstream; from top of site.

STREAM NAME Blueberry River

LOCATION Upstream of proposed crossing

DATE Oct. 13 / 93 SITE NO. 1 UTM 10.5812.62876

ELECTROSHOCKING SECONDS 515 AREA SAMPLED 900 m2

NO	SP	LENGTH (mm)	COMMENTS	NO	SP	LENGTH (mm)	COMMENTS
1	LKC	119	PRESERVED	26			
2	LKC	71	PRESERVED	27			
3	LKC	75	PRESERVED	28			
4	LKC	90	PRESERVED	29			
5	LKC	48	RELEASED	30			
6	LKC	65	RELEASED	31			
7	LKC	81	PRESERVED	32			
8	LKC	62	RELEASED	33			
9	LKC	64	RELEASED	34			
10	LKC	46	RELEASED	35			
11	LKC	59	RELEASED	36			
12	LNS	85	PRESERVED	37			
13	RSC	84	PRESERVED	38			
14	RSC	65	PRESERVED	39			
15				40			
16				41			
17				42			
18				43			
19				44			
20				45			
21				46			
22				47			
23				48			
24				49			
25				50			
					LKC	AV = 71	

DFO / MOE
STREAM SURVEY FORM

Stream Name (gaz.)	BLUEBERRY R (local)	Access	V4
Watershed Code	2 3 3 2 6 1 3	Reach No.	
Location	FROM PROPOSED ROW, DOWNSTREAM FOR 100 M	Map #	94 A/13
U.T.M.	10.5813.62877	Site No.	2
Length (km)		Lth.surv (m)	100 HC
Fish Card	Y (N) circled	Field	X
Hist.		Photos	
Air Photos			
Date Y M D	93 01 3	Time	1020
Agency	DES	Crew	BC / DC /

C	PARAMETER	VALUE	METH.
	Ave.Chan.Width (m)	25.0	HC
	Ave.Wet.Width (m)	20.0	HC
	Ave.Max.Riffle Depth (cm)	0	-
	Ave.Max.Pool Depth (cm)	150.0	GE
	Gradient %	0.5	CL
3	% Pool / Riffle / Run / Other		GE
	Side Chan.%	0 (0 ☒, 0-10 ☐, 10-40 ☐, >40 ☐)	GE
	Debris Area%	0 (0 ☒, 0-5 ☐, 5-15 ☐, >15 ☐)	GE
	Debris Stable %		
1	COVER: Total %	80	GE
	Crown Closure %	0	
	Aspect	SE	

Comp. sum 100%	Dp Pool	L.O.D.	Boulder	In Veg	Over Veg	Cutbank
	90	0	0	0	0	10

SPECIFIC DATA

OBSTRUCTIONS

C	Ht(m)	Type	Loc'n

C	BED MATERIAL		%	
2	Fines	clay, silt, sand (<2mm)	70	70
	Gravels	small (2-16mm)	10	5
		large (16-64mm)		5
	Larges	sm.cobble (64-128mm)	20	10
		lge cobble (128-256mm)		5
		boulder (>256mm)		5
	Bedrock (R)		0	0
	D_{90} (cm)	6	Compaction	L (M) H

BANKS			
Height (m)	1	% Unstable	50
Texture	(F) G L R		
Confinement	EN CO FC OC (UC) N/A		
Valley: Channel Ratio	0-2 2-5 5-10 (10+) N/A		
Stage	Dry (L) M H Flood		
Flood Signs Ht(m)	4	Braided	Y (N)
Bars (%)	5	pH	
O_2 (ppm)		Water Temp (°C)	* 1
Turb. (cm)	30	Cond. (25°C)	

DISCHARGE

Parameter	Value	Method	Specific Data
Wetted Width (m)			
Mean Depth (m)			
Mean Velocity (m/s)			
Discharge (m^3/s)			

REACH SYMBOL (Fish)

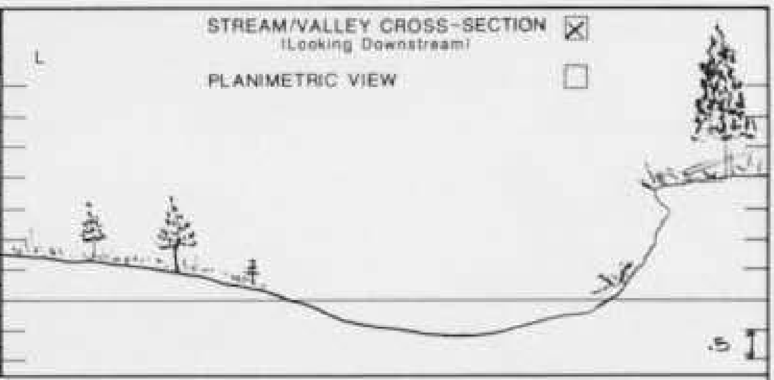
(Width, Valley:Channel, Slope) (Bed Material)

FISH SUMMARY

C	Species	No.	Size Range (mm)	Life Phase	Use	Method/Ref.
6	LKC	13	39-75			EL
	RSC	4	60-75			

STREAM/VALLEY CROSS-SECTION ☒ (Looking Downstream)

PLANIMETRIC VIEW ☐



COMMENTS

Channel Stability ☐, Debris ☐, Management Concerns ☐, Obstructions ☐, Riparian Zone ☑, Valley Wall Processes ☐, Etc.

1 HIGH DEGREE OF SUSPENDED SILT IN WATER INCREASES COVER.
2 FINES COMPRISED CHIEFLY OF SAND. FINES SETTLED OUT DUE TO DOWNSTREAM BEAVER DAM
3 100% POOL DUE TO BEAVER DAM DOWNSTREAM
4 BANKS GENERALLY 3-4 M, LOWER 20 M OF SITE WIDENS AND LEFT BANK REDUCED TO 1 M AT INSIDE BEND
5 BEAVER DAM APPROX. 150 M DOWNSTREAM OF SITE. OBSTRUCTION TO MIGRATING FISH AT CURRENT WATER LEVEL
6 ELECTROSHOCKING SECONDS - 320. CHUB AVERAGE - 52 mm
7 RIPARIAN VEGETATION - SPRUCE, ASPEN, BALSAM POPLAR ROSE, WILLOW AND GRASS UNDERSTORY

Edited by: DC
Date Y M D: 931015

Stream Survey Form; Blueberry River - Site 2, the middle site.

Blueberry River site 2, below proposed crossing: View downstream; from top of site.

Blueberry River site 2, below proposed crossing: View downstream; from 50 m down from top of site.

STREAM NAME Blueberry River

LOCATION Downstream of proposed crossing

DATE Oct. 13 / 93 SITE NO. 2 UTM 10.5813.62877

ELECTROSHOCKING SECONDS 320 AREA SAMPLED 2000 m2

NO	SP	LENGTH (mm)	COMMENTS	NO	SP	LENGTH (mm)	COMMENTS
1	LKC	56	RELEASED	26			
2	LKC	70	RELEASED	27			
3	LKC	75	RELEASED	28			
4	LKC	68	RELEASED	29			
5	LKC	44	RELEASED	30			
6	LKC	52	RELEASED	31			
7	LKC	50	RELEASED	32			
8	LKC	45	RELEASED	33			
9	LKC	45	RELEASED	34			
10	LKC	47	RELEASED	35			
11	LKC	46	RELEASED	36			
12	LKC	42	RELEASED	37			
13	LKC	39	RELEASED	38			
14	RSC	60	RELEASED	39			
15	RSC	75	RELEASED	40			
16	RSC	72	RELEASED	41			
17	RSC	66	RELEASED	42			
18				43			
19				44			
20				45			
21				46			
22				47			
23				48			
24				49			
25				50			
	LKC	AV = 52			RSC	AV = 68	

DFO / MOE
STREAM SURVEY FORM

Stream Name (gaz.)	BLUEBERRY R	(local)	
Access	V4	Method	
Watershed Code	233261 3	Reach No.	
Length(km)			
Location	FROM 300 M BELOW CROSSING, DOWNSTREAM FOR 100 M	Map #	94 A/13
Site No.	3	Lth surv(m)	100 HC
U.T.M.	10.5814.62876	Fish Card	Y (N)
C		Field	[X]
Hist.	[ ]		
Date Y.M.D.	93 10 13	Time	1110
Agency	DES	Crew	BC DC
Photos		Air Photos	

C	PARAMETER	VALUE	METH.	SPECIFIC DATA
	Ave.Chan.Width (m)	20.0	HC	
	Ave.Wet.Width (m)	15.0	HC	
	Ave.Max.Riffle Depth (cm)	15	T	
	Ave.Max.Pool Depth (cm)	50	T	
	Gradient %	1.0	CL	
	% Pool 90 Riffle 10 Run Other		GE	
	Side Chan.% 0 [ ] 0-10 [X] 10-40 [ ] >40 [ ]	0	GE	
	Debris Area% 0 [ ] 0-5 [X] 5-15 [ ] >15 [ ]	5	GE	
	Debris Stable %	90	GE	
	COVER: Total %	60	GE	
	Comp. sum 100%: Dp Pool 70, L.O.D. 0, Boulder 10, In Veg 0, Over Veg 0, Cutbank 20			
	Crown Closure %	0		
C	Aspect	SE		

OBSTRUCTIONS

C	Ht(m)	Type	Loc'n

BED MATERIAL

C	BED MATERIAL		%	
	Fines	clay, silt, sand (<2mm)	60	60
	Gravels	small (2-16mm)	30	20
	Gravels	large (16-64mm)		10
	Larges	sm. cobble (64-128mm)	10	5
	Larges	lg. cobble (128-256mm)		5
	Larges	boulder (>256mm)		0
	Bedrock (R)		0	0
	D_{90}(cm)	12		
C	Compaction	L (M) H		

BANKS

C				
	Height(m)	2	%Unstable	20
	Texture	(F) G L R		
	Confinement	EN CO FC OC (UC) N/A		
	Valley: Channel Ratio	0-2 2-5 5-10 (10+) N/A		
	Stage	Dry (L) M H Flood		
	Flood Signs Ht(m)	3	Braided	Y (N)
	Bars (%)	20	pH	
	O_2(ppm)			
	Water Temp (°C)	+1	Turb.(cm)	30
	Cond.(25°C)			

DISCHARGE

Parameter	Value	Method	Specific Data
Wetted Width (m)			
Mean Depth (m)			
Mean Velocity (m/s)			
Discharge (m^3/s)			

REACH SYMBOL (Fish)

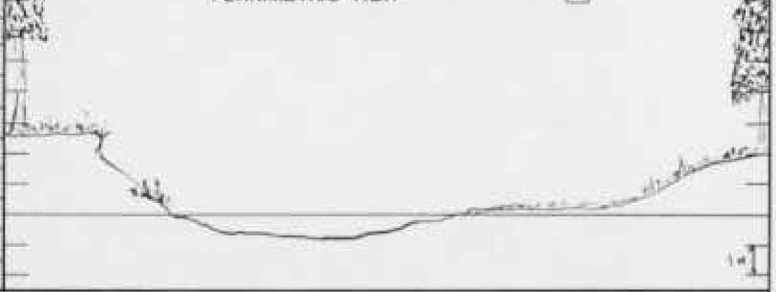
(Width,Valley:Channel,Slope) (Bed Material)

FISH SUMMARY

C	Species	No.	Size Range(mm)	Life Phase	Use	Method/Ref.
3	LSU	1	115			EL
	RSC	1	68			
	TP	4	62-70			
	LKC	7	43-99			

STREAM/VALLEY CROSS-SECTION [X]
(Looking Downstream)

PLANIMETRIC VIEW [ ]



COMMENTS

Channel Stability [ ] Debris [ ] Management Concerns [ ] Obstructions [ ] Riparian Zone [+] Valley Wall Processes [ ] Etc.

1 HIGH DEGREE OF SUSPENDED SILT IN WATER INCREASES COVER
2 FINES COMPRISED CHIEFLY OF SAND
3 ELECTROSHOCKING SECONDS - 530. LAKE CHUB AVERAGE - 68 MM
4 RIPARIAN VEGETATION - SPRUCE, ASPEN, BALSAM POPLAR, ROSE, WILLOW WITH GRASS UNDERSTORY

Edited by: DC
Date Y.M.D. 931015

Stream Survey Form; Blueberry River - Site 3, the lowermost site.

Blueberry River site 3, 300 m below proposed crossing: View downstream; from top of site.

Blueberry River site 3, 300 m below proposed crossing: View upstream; from bottom of site.

STREAM NAME Blueberry River

LOCATION 300 m downstream of proposed crossing

DATE Oct. 13 / 93 SITE NO. 3 UTM 10.5814.62876

ELECTROSHOCKING SECONDS 530 AREA SAMPLED 1500 m2

NO	SP	LENGTH (mm)	COMMENTS	NO	SP	LENGTH (mm)	COMMENTS
1	LKC	99	PRESERVED	26			
2	LKC	74	RELEASED	27			
3	LKC	73	RELEASED	28			
4	LKC	59	RELEASED	29			
5	LKC	67	RELEASED	30			
6	LKC	62	RELEASED	31			
7	LKC	43	RELEASED	32			
8	LNS	115	PRESERVED	33			
9	RSC	68	RELEASED	34			
10	TP	70	PRESERVED	35			
11	TP	67	PRESERVED	36			
12	TP	62	PRESERVED	37			
13	TP	67	RELEASED	38			
14				39			
15				40			
16				41			
17				42			
18				43			
19				44			
20				45			
21				46			
22				47			
23				48			
24				49			
25				50			
	LKC	AV = 68			TP	AV = 67	

Appendix III:
Inglis Creek
Stream Survey Forms,
Site Photographs and
Fish Data Sheets

DFO / MOE
STREAM SURVEY FORM

Stream Name (gaz.) INGLIS CREEK	(local)		Access	V4	Method
Watershed Code 233261 3727		Reach No.		Length(km)	
Location SURVEYED FROM PROPOSED PIPELINE CROSSING TO 100 M UPSTREAM	Map# 94 A/13	Site No. 1		Lthsurv(m) 100	HC
	U.T.M. 10.5801.6291B	Fish Card	Y (N)	C	Field [X] Hist [ ]
Date Y.M.D. 931013 Time 1600 Agency DES Crew BC/DC	Photos	Air Photos			

C	PARAMETER	VALUE	METH.	SPECIFIC DATA
	Ave.Chan.Width (m)	2.0	GE	
	Ave.Wet.Width (m)	1.5	GE	
	Ave.Max.Riffle Depth (cm)	15	T	
	Ave.Max.Pool Depth (cm)	65	T	
	Gradient %	0.5	CL	
	% Pool 70 Riffle 30 Run Other		GE	
	Side Chan.% 0 [X]0-10 [ ]10-40 [ ]>40		GE	
	Debris Area% 0 [X]0-5 [ ]5-15 [ ]>15		GE	
	Debris Stable %			
	COVER: Total %	30	GE	
	Comp. sum 100%: Dp Pool 80, L.O.D. 0, Boulder 10, In Veg 0, Ovr Veg 0, Cutbank 10			
	Crown Closure % 0	C	Aspect S	

C	BED MATERIAL		%	
	Fines	clay,silt,sand (<2mm)	10	10
	Gravels	small (2-16mm)	30	10
	Gravels	large (16-64mm)		20
	Larges	sm.cobble (64-128mm)	60	15
	Larges	lge.cobble (128-256mm)		20
	Larges	boulder (>256mm)		25
	Bedrock (R)		0	0
	D_{90}(cm) 25	C	Compaction L M (H)	

C	BANKS	
	Height(m) .75	%Unstable 20
	Texture (F) G L R	
	Confinement	EN (CO) FC OC UC N/A
	Valley: Channel Ratio	(0-2) 2-5 5-10 10+ N/A
	Stage	Dry (L) M H Flood
	Flood Signs Ht(m) 1.5	Braided Y (N)
	Bars (%) 0	pH	O_2(ppm)
	Water Temp.(°C) 3	Turb.(cm) 30	Cond.(25°C)

OBSTRUCTIONS: C | Ht(m) | Type | Loc'n

DISCHARGE

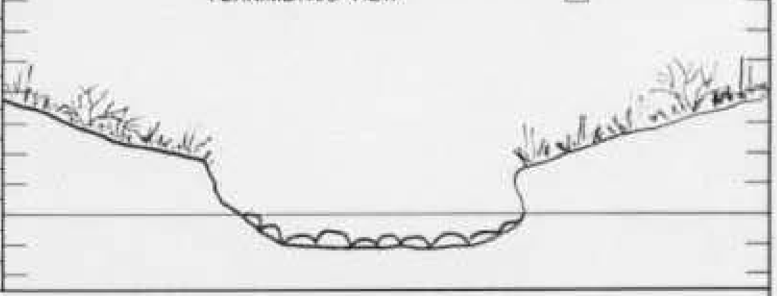
Parameter	Value	Method	Specific Data
Wetted Width (m)	1.1	T	
Mean Depth (m)	0.11	T	
Mean Velocity (m/s)	0.24	F	
Discharge (m^3/s)	0.02		

REACH SYMBOL (Fish)
(Width,Valley:Channel,Slope) (Bed Material)

FISH SUMMARY

C	Species	No.	Size Range(mm)	Life Phase	Use	Method/Ref.
2	AG	3	79-82	J	R	EL

STREAM/VALLEY CROSS-SECTION [X] (Looking Downstream)
PLANIMETRIC VIEW [ ]



COMMENTS

Channel Stability [ ] Debris [ ] Management Concerns [ ] Obstructions [ ] Riparian Zone [X] Valley Wall Processes [ ] Etc.

1 RIPARIAN VEGETATION: WILLOW, BOG BIRCH, GRASSES, SEDGES, STRAWBERRY, PALMATE COLTSFOOT, YARROW, MOSSES; MATURE SPRUCE AND ASPEN IN CREEK VALLEY.

2 ELECTROSHOCKING SECONDS 529, FISH SIZES ARE 79, 82, 82 mm.

Edited by: DC/KN
Date Y.M.D. 921015

Stream Survey Form; Inglis Creek - Site 1, the uppermost site.

Inglis Creek site 1, above proposed crossing: View downstream; from top of site.

Inglis Creek site 1, above proposed crossing: View upstream; from proposed crossing at bottom of site.

STREAM NAME Inglis Creek

LOCATION From proposed crossing upstream for 100 m

DATE Oct. 13 / 93 SITE NO. 1 UTM 10.5801.62918

ELECTROSHOCKING SECONDS 529 AREA SAMPLED 150 m2

NO	SP	LENGTH (mm)	COMMENTS	NO	SP	LENGTH (mm)	COMMENTS
1	AG	82	RELEASED	26			
2	AG	82	RELEASED	27			
3	AG	79	RELEASED	28			
4				29			
5				30			
6				31			
7				32			
8				33			
9				34			
10				35			
11				36			
12				37			
13				38			
14				39			
15				40			
16				41			
17				42			
18				43			
19				44			
20				45			
21				46			
22				47			
23				48			
24				49			
25				50			

DFO / MOE
STREAM SURVEY FORM

Stream Name (gaz.)	INGLIS C	(local)		Access	V4
Watershed Code	2 3 3 2 6 1 3 7 2 7		Reach No.		Length(km)	Method
Location	LINE CROSSING TO 100M DOWNSTREAM	Map# 94G/13	Site No. 2	Lth.surv(m) 100	HC
		U.T.M. 10.5801.62916	Fish Card	Y (N)	C	Field [X] Hist. [ ]
Date Y.M.D. 9 3 1 0 1 3	Time 1640	Agency DES	Crew BC / DC /	Photos	Air Photos

C	PARAMETER	VALUE	METH.	SPECIFIC DATA
	Ave.Chan.Width (m)	2.5	GE	
	Ave.Wet.Width (m)	2.0	GE	
	Ave.Max.Riffle Depth (cm)	15	T	
	Ave.Max.Pool Depth (cm)	65	T	
	Gradient %	0.5	CL	
	% Pool 70 Riffle 30 Run Other		GE	
	Side Chan.%	0 [0 X] [0-10] [10-40] [>40]	GE	
	Debris Area%	0 [0 X] [0-5] [5-15] [>15]	GE	
	Debris Stable %			
	COVER: Total %	40	GE	
	Comp. sum 100%: Dp Pool 60, L.O.D. 0, Boulder 15, In Veg 0, Over Veg 10, Cutbank 15			
	Crown Closure %	ø	C Aspect	S

OBSTRUCTIONS

C	Ht(m)	Type	Loc'n

C	BED MATERIAL		%	
	Fines	clay, silt, sand (<2mm)	10	10
	Gravels	small (2-16mm)	30	10
		large (16-64mm)		20
	Larges	sm.cobble (64-128mm)	60	15
		lge.cobble (128-256mm)		15
		boulder (>256mm)		30
	Bedrock (R)		0	0
	D_{90}(cm) 30	C	Compaction L M (H)	

C	BANKS			
	Height(m) 1.0	%Unstable 30		
	Texture	(F) G L R		
	Confinement	EN (CO) FC OC UC N/A		
	Valley: Channel Ratio	(0-2) 2-5 5-10 10+ N/A		
	Stage	Dry (L) M H Flood		
	Flood Signs Ht(m) 2	Braided Y (N)		
/	Bars (%) 0	pH	O_2(ppm)	
	Water Temp.(°C) 3	Turb.(cm) 30	Cond.(25°C)	

DISCHARGE

	Parameter	Value	Method	Specific Data
	Wetted Width (m)			
	Mean Depth (m)			
	Mean Velocity (m/s)			
	Discharge (m³/s)			

REACH SYMBOL (Fish)

(Width, Valley:Channel, Slope) (Bed Material)

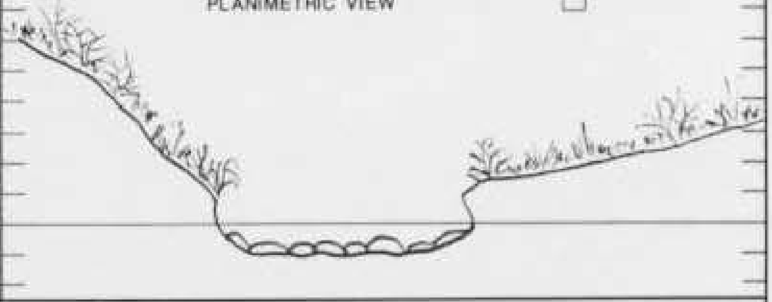
FISH SUMMARY

C	Species	No.	Size Range(mm)	Life Phase	Use	Method/Ref.
3		ø				

STREAM/VALLEY CROSS-SECTION [X] (Looking Downstream)

PLANIMETRIC VIEW [ ]

L R



COMMENTS

Channel Stability [ ] Debris [ ] Management Concerns [ ] Obstructions [ ] Riparian Zone [2] Valley Wall Processes [ ] Etc.

1 SMALL GRAVEL BAR (MAN-MADE) FROM PREVIOUS PIPELINE CROSSING

2 RIPARIAN VEGETATION: WILLOW, BOG BIRCH, GRASSES + SEDGES, MOSSES; MATURE WHITE SPRUCE AND ASPEN IN VALLEY.

3 ELECTROSHOCKING SECONDS - 562, NO FISH CAUGHT.

Edited by DC / KN

Date Y M D 931015

Stream Survey Form; Inglis Creek - Site 2, the middle site.

Inglis Creek site 2, below proposed crossing: View downstream; from proposed crossing at top of site.

Inglis Creek site 2, below proposed crossing: View upstream; from bottom of site.

STREAM NAME Inglis Creek

LOCATION From proposed crossing downstream for 100 m

DATE Oct. 13 / 93 SITE NO. 2 UTM 10.5801.62916

ELECTROSHOCKING SECONDS 562 AREA SAMPLED 200 m2

NO	SP	LENGTH (mm)	COMMENTS	NO	SP	LENGTH (mm)	COMMENTS
1			NO FISH	26			
2				27			
3				28			
4				29			
5				30			
6				31			
7				32			
8				33			
9				34			
10				35			
11				36			
12				37			
13				38			
14				39			
15				40			
16				41			
17				42			
18				43			
19				44			
20				45			
21				46			
22				47			
23				48			
24				49			
25				50			

DFO / MOE
STREAM SURVEY FORM

Stream Name (gaz.)	INGLIS CREEK	(local)				Access	V4	Method	
Watershed Code	233261372700000			Reach No.		Length (km)			
Location	FROM 500M BELOW CROSSING, DOWNSTREAM FOR 100M	Map #	94 A/13	Site No.	3	Lithsurv (m)	100	HC	
		UTM	10 580 629 13	Fish Card	Y (N)	C	Field [X]	Hist [ ]	
Date YMD	93 10 13	Time	1730	Agency	DFS	Crew	BC DC /	Photos	Air Photos

C	PARAMETER	VALUE	METH
	Ave. Chan. Width (m)	3.0	GE
	Ave. Wet. Width (m)	2.0	GE
	Ave. Max. Riffle Depth (cm)	10	T
	Ave. Max. Pool Depth (cm)	50	T
	Gradient %	1.0	CL
	% Pool 40 Riffle 60 Run Other		GE
	Side Chan % 0 (0) [X] (0-10) [ ] (10-40) [ ] (>40) [ ]		GE
	Debris Area % 0 (0) [X] (0-3) [ ] (3-15) [ ] (>15) [ ] Stable %		GE
	COVER: Total %	40	GE
	Comp sum 100% — Dp Pool 50; L.O.D. 0; Boulder 35; Lv Veg 0; Over Veg 0; Cutbank 15		
	Crown Closure % 0 (C) Aspect S		

C	BED MATERIAL		%	
	Fines	clay, silt, sand (<2mm)	10	10
	Gravels	small (2-16mm)	20	10
		large (16-64mm)		10
	Larges	sm. cobble (64-128mm)	70	10
		lge. cobble (128-256mm)		20
		boulder (>256mm)		40
	Bedrock (R)		0	0
	D_{50} (cm) 40 (C) Compaction L M (H)			

C	BANKS					
	Height (m) 1.0	% Unstable 40				
	Texture (F) G L R					
	Confinement	EN (CO)	FC	OC	UC	N/A
	Valley Channel Ratio	(1-2)	2-5	5-10	10+	N/A
	Stage	Dry (L)	M	H	Flood	
	Flood Signs Ht (m) 2	Braided	Y (N)			
	Bars (%) 20	pH		Oxy (ppm)		
	Water Temp (°C) 13	Turb. (NTU) 30	Cond. (25°C)			

OBSTRUCTIONS			
C	Ht (m)	Type	Loc'n

DISCHARGE

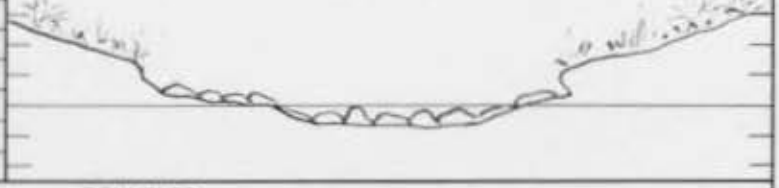
Parameter	Value	Method	Specific Data
Wetted Width (m)			
Mean Depth (m)			
Mean Velocity (m/s)			
Discharge (m^3/s)			

REACH SYMBOL (Fish)
(Width, Valley Channel, Slope) (Bed Material)

FISH SUMMARY

C	Species	No.	Size Range (mm)	Life Phase	Use	Method / Ref.
2	AG	2	78-80	J	R	EL

STREAM/VALLEY CROSS-SECTION [X] (Looking Downstream)
PLANIMETRIC VIEW [ ]



COMMENTS

Channel Stability [ ] Debris [ ] Management Concerns [ ] Obstructions [ ] Riparian Zone [1] Valley Wall Processes [ ] Etc.

1 RIPARIAN VEGETATION: WILLOW, BOG BIRCH, KINNIKINNICK, MOSSES, YARROW GRASSES, SEDGES, STRAWBERRY, WHITE SPRUCE, LODGEPOLE PINE AND ASPEN IN ADJACENT VALLEY.

2 ELECTROSHOCKING SECONDS: 540. FISH SIZES ARE: 78 80 MM.

Edited by DC / KN
Date YMD 93 10 15

Stream Survey Form; Inglis Creek - Site 3, the lowermost site.

Inglis Creek site 3, 500 m below proposed crossing: View downstream; from top of site.

Inglis Creek site 3, 500 m below proposed crossing: View upstream; from bottom of site.

STREAM NAME Inglis Creek

LOCATION Downstream of the proposed crossing 250 m

DATE Oct. 13 / 93 SITE NO. 3 UTM 10.5801.62913

ELECTROSHOCKING SECONDS 540 AREA SAMPLED 200 m2

NO	SP	LENGTH (mm)	COMMENTS	NO	SP	LENGTH (mm)	COMMENTS
1	AG	78	RELEASED	26			
2	AG	80	RELEASED	27			
3				28			
4				29			
5				30			
6				31			
7				32			
8				33			
9				34			
10				35			
11				36			
12				37			
13				38			
14				39			
15				40			
16				41			
17				42			
18				43			
19				44			
20				45			
21				46			
22				47			
23				48			
24				49			
25				50			

Appendix IV:
Aitken Creek
Stream Survey Forms,
Site Photographs and
Fish Data Sheets

DFO / MOE
STREAM SURVEY FORM

Stream Name (gaz.)	AITKEN C.	(local)		Access	√2
Watershed Code	233-26-13356	Reach No.		Length(km)	
Location	FROM CROSSING SITE, 100M DOWNSTREAM	Map#	94 A/12	Site No.	1
		UTM	10.583463087	Fish Card	Y (N)
Lthaul(m)	200 HC	Field [x]	Hist. [ ]		
Date YMD	93 10 13	Time	1330	Agency	DES
Crew	BC/DC/	Photos		Air Photos	

C	PARAMETER	VALUE	METH.	SPECIFIC DATA
	Ave Chan Width (m)	8.0	HC	
	Ave Wet Width (m)	4.0	HC	
	Ave Max Riffle Depth (cm)	15.0	T	
	Ave Max Pool Depth (cm)	60.0	T	
	Gradient %	2.0	CL	
	% Pool 90 Riffle 10 Run Other		GE	
	Side Chan % 0 [0-10 x]		GE	
	Debris Area % D [0-5 x]		GE	
	Debris Stable %			
2	COVER: Total %	20	GE	
	Comp sum 100%: Dp Pool 95; L.O.D. Ø; Boulder 5; In Veg Ø; Over Veg Ø; Cutbank Ø			
	Crown Closure %	Ø		Aspect SE

C	BED MATERIAL		%	
5	Fines	clay, silt, sand (<2mm)	60	60
	Gravels	small (2-16mm)	20	10
		large (16-64mm)		10
		sm. cobble (64-128mm)		10
	Larges	lge cobble (128-256mm)	20	5
		boulder (>256mm)		5
	Bedrock (R)		Ø	Ø
	D_{90}(cm) 12	Compaction (L) M H		

C	BANKS			
	Height(m)	1	%Unstable	10
	Texture	(F) G L R		
	Confinement	EN CO FC OC (UC) N/A		
	Valley: Channel Ratio	0-2 2-5 5-10 (10+) N/A		
	Stage	Dry (L) M H Flood		
	Flood Signs Ht(m)	4	Braided	Y (N)
	Bars (%)	50	pH	O_2(ppm)
	Water Temp (°C)	+3	Turb.(cm) 30	Cond.(25°C)

OBSTRUCTIONS: C | Ht(m) | Type | Loc'n

DISCHARGE

Parameter	Value	Method	Specific Data
Wetted Width (m)	2.1	T	
Mean Depth (m)	.18	T	
Mean Velocity (m/s)	.37	F	
Discharge (m^3/s)	.10		

REACH SYMBOL (Fish)

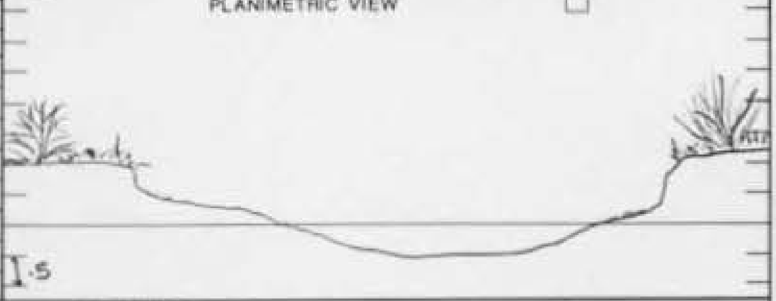
(Width, Valley:Channel, Slope) (Bed Material)

FISH SUMMARY

C	Species	No.	Size Range (mm)	Life Phase	Use	Method/Ref.
3	LSU	1	87			EL
	LKC	1	72			EL

STREAM/VALLEY CROSS-SECTION [x] (Looking Downstream)

PLANIMETRIC VIEW [ ]



COMMENTS

Channel Stability [ ] Debris [ ] Management Concerns [✓] Obstructions [ ] Riparian Zone [✓] Valley Wall Processes [ ] Etc.

1 HIGH DEGREE OF DISTURBANCE BOTH UPSTREAM + DOWNSTREAM OF PROPOSED CROSSING SITE: (A) LIVESTOCK ACCESS TO CREEK (B) NEW BRIDGE CURRENTLY BEING INSTALLED IMMEDIATELY UPSTREAM OF PROPOSED CROSSING (C) OLD BRIDGE APPROXIMATELY 50M DOWNSTREAM (D) BULLDOZER CROSSING OF CREEK APPROXIMATELY 75 M DOWNSTREAM. STREAM SURVEY MODIFIED TO AVOID HEAVY EQUIPMENT ZONE

2 SILT LOAD, COMBINED WITH SLIGHTLY TANNIC WATER, INCREASED COVER IN POOLS.

3 ELECTROSHOCKING SECONDS: 425 ; 2 FISH CAUGHT.

4 RIPARIAN VEGETATION: BOG BIRCH, WILLOW, ROSE, WHITE SPRUCE, ASPEN DANDELION, AMERICAN VETCH, WILD STRAWBERRY, GRASSES

5 RIP-RAP UNDER OLD BRIDGE DECK CLASSIFIED AS BOULDERS.

Edited by: DC/KN
Date YMD 93 10 15

Stream Survey Form; Aitken Creek - Site 1, below the bridge.

Aitken Creek site 1 below proposed crossing: View upstream; from middle of site.

Aitken Creek site 1, below proposed crossing: View upstream; from bottom of site.

STREAM NAME Aitken Creek

LOCATION From crossing site, 100 metres downstream

DATE Oct. 13 / 93 SITE NO. 1 UTM 10.5834.63087

ELECTROSHOCKING SECONDS 425 AREA SAMPLED 400 m2

NO	SP	LENGTH (mm)	COMMENTS	NO	SP	LENGTH (mm)	COMMENTS
1	LSU	87	PRESERVED	26			
2	LKC	72	PRESERVED	27			
3				28			
4				29			
5				30			
6				31			
7				32			
8				33			
9				34			
10				35			
11				36			
12				37			
13				38			
14				39			
15				40			
16				41			
17				42			
18				43			
19				44			
20				45			
21				46			
22				47			
23				48			
24				49			
25				50			

DFO / MOE
STREAM SURVEY FORM

Stream Name (gaz.)	AITKEN C.	(local)	
Access	V2	Method	
Watershed Code	233-26-13356	Reach No.	
Length(km)			
Location	500 M DOWNSTREAM OF PROPOSED CROSSING	Map#	94 A/12
Site No.	2	Lthaurs(m)	100 HC
U.T.M.	10 583463085	Fish Card	Y (N)
Field	X	Hist.	
Date Y M D	93 10 13	Time	1420
Agency	DES	Crew	DC / BC
Photos		Air Photos	

C	PARAMETER	VALUE	METH	SPECIFIC DATA
	Ave.Chan.Width (m)	10.0	HC	
	Ave.Wet.Width (m)	6.0	HC	
	Ave.Max.Riffle Depth (cm)	15.0	T	
	Ave.Max.Pool Depth (cm)	60.0	T	
	Gradient %	1.0	CL	
	% Pool 80 Riffle 20 Run Other		GE	
	Side Chan.% 0 [0 ☒ 0-10 ☐ 10-40 ☐ >40 ☐]		GE	
	Debris Area% 5 [0 ☐ 0-5 ☒ 5-15 ☐ >15 ☐]		GE	
	Debris Stable %	50	GE	
1	COVER: Total %	25	GE	
	Crown Closure %	Ø		Aspect GE

Comp. sum 100%	Dp. Pool	L.O.D.	Boulder	In. Veg	Over Veg	Cutbank
	85	5	Ø	Ø	5	5

C	BED MATERIAL		%	
	Fines	clay, silt, sand (<2mm)	70	70
	Gravels	small (2-16mm)	20	10
		large (16-64mm)		10
	Larges	sm. cobble (64-128mm)	10	5
		lge. cobble (128-256mm)		5
		boulder (>256mm)		Ø
	Bedrock (R)		Ø	Ø
	D_{90}(cm) 12		Compaction (L) M H	

C	BANKS			
	Height(m)	.25	%Unstable	30
	Texture	(F) G L R		
	Confinement	EN CO FC OC (UC) N/A		
	Valley: Channel Ratio	0-2 2-5 5-10 (10+) N/A		
	Stage	Dry (L) M H Flood		
	Flood Signs Ht(m)	4	Braided	Y (N)
	Bars (%)	40	pH	O_2(ppm)
	Water temp (°C)	+3	Turb(cm) 30	Cond.(25°C)

OBSTRUCTIONS			
C	Ht(m)	Type	Loc'n

DISCHARGE

Parameter	Value	Method	Specific Data
Wetted Width (m)			
Mean Depth (m)			
Mean Velocity (m/s)			
Discharge (m^3/s)			

REACH SYMBOL (Fish)

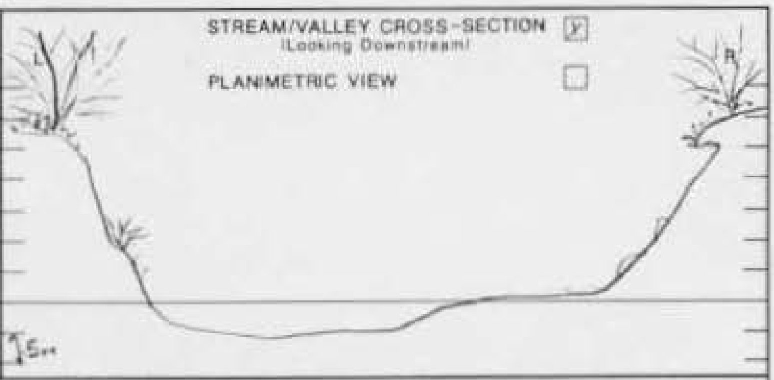
Width.Valley:Channel,Slope/ (Bed Material)

FISH SUMMARY

C	Species	No.	Size Range(mm)	Life Phase	Use	Method/Ref.
2	LKC	4	39-86			EL

STREAM/VALLEY CROSS-SECTION ☒ (Looking Downstream)

PLANIMETRIC VIEW ☐



COMMENTS

Channel Stability ☐ Debris ☐ Management Concerns 4 Obstructions ☐ Riparian Zone 3 Valley Wall Processes ☐ Etc.

1 SILT LOAD, COMBINED WITH SLIGHTLY TANNIC WATER, INCREASED COVER IN POOLS.
2 ELECTRO-SHOCKING SECONDS 379; LAKE CHUB SIZES: 39, 40, 42, 86 mm.
3 RIPARIAN VEGETATION: BOG BIRCH, WILLOW, ROSE, ASPEN, WHITE SPRUCE, GRASSES, AMERICAN VETCH, WILD STRAWBERRY, DANDELION
4 LIVESTOCK ACCESS TO CREEK.

Edited by DC/KN
Date Y M D 931015

Stream Survey Form; Aitken Creek - Site 2, the lowermost site.

Aitken Creek site 2, 500 m below proposed crossing: View upstream; from bottom of site.

Aitken Creek site 2, 500 m below proposed crossing: View downstream; from middle of site.

STREAM NAME Aitken Creek

LOCATION 500 metres downstream of proposed crossing

DATE Oct. 13 / 93 SITE NO. 2 UTM 10.5834.63085

ELECTROSHOCKING SECONDS 379 AREA SAMPLED 600 m2

NO	SP	LENGTH (mm)	COMMENTS	NO	SP	LENGTH (mm)	COMMENTS
1	LKC	39	PRESERVED	26			
2	LKC	40	PRESERVED	27			
3	LKC	42	PRESERVED	28			
4	LKC	86	PRESERVED	29			
5				30			
6				31			
7				32			
8				33			
9				34			
10				35			
11				36			
12				37			
13				38			
14				39			
15				40			
16				41			
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19				44			
20				45			
21				46			
22				47			
23				48			
24				49			
25				50			