JWEL PROJECT NO. 8558-0015

FISH AND FISH HABITAT COMPONENT STUDY TRANS LABRADOR HIGHWAY - PHASE III (HAPPY VALLEY-GOOSE BAY TO CARTWRIGHT JUNCTION)

JANUARY 2003

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SUBMITTED TO

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JANUARY 29, 2003

EXECUTIVE SUMMARY

The Department of Works, Services and Transportation (WST) is proposing to construct a two-lane, gravel surface highway from Cartwright Junction to Happy Valley-Goose Bay. This highway section, approximately 250 km in length, would comprise Trans Labrador Highway - Phase III and will link the existing TLH highway sections to the east and west.

The proposal was registered for provincial environmental assessment in April 2002 and following normal review, the Newfoundland and Labrador Department of Environment (DOE) called for an environmental impact assessment (EIS) that was to include a Fish and Fish Habitat Component Study. The Terms of Reference (TOR) for the Component Study are provided in Appendix 1.

The proposed route will result in 95 stream crossings in five major watersheds; Churchill River, Traverspine River, Kenamu River, Eagle River and Paradise River. The objective of the component study conducted by Jacques Whitford Environment and Innu Environmental Limited Partnership was to review existing information on the distribution of fish species in the study area and conduct field surveys at all of the proposed stream crossing locations. No fish sampling was conducted.

Aerial surveys by helicopter were conducted at all crossing locations and ground surveys were conducted at all ground accessible crossing sites where the upstream area was greater than 2 km², and the habitat was classed as spawning and rearing habitat (Type I and Type II). In total, 35 ground surveys were completed.

The fish habitat was characterized at each crossing location, using standard terminology and classifications. Stream width, water depth, substrate, habitat type, riparian vegetation, and apparent obstructions to fish migration or navigation were recorded for all crossings. The same was recorded in more detail during ground surveys, along with water velocity, stream gradient and selected water quality parameters (temperature, pH, conductivity, dissolved oxygen, turbidity - and a sample to determine total dissolved solids, alkalinity and dissolved metals). Field reports, photographs and water quality data are included in Appendices 2, 3 and 4 respectively.

The results of the field surveys indicated that 50 of the proposed crossing locations are small streams with a width of less than 2 m. The details of several of the crossings could not be determined due to the small size of the stream and the dense overhead canopy of the forest. At least 44 of the crossings comprised productive fish habitat (Type I and II).

Twenty fish species are reported in the five watersheds that the highway will transect. WST is committed to completing detailed fish surveys along the proposed route in 2003.

Water quality data have been compiled for 35 of the proposed stream crossing locations, and these data will enhance the understanding of regional water quality and represent baseline existing conditions for the purpose of assessment and follow-up.

Most of the water quality values are typical for the region. Parameters such as aluminum and iron were found at level above the Canadian Council of Ministers of the Environment (CCME) Guideline for the Protection of Aquatic Life at some locations, a situation that is quite common in Newfoundland and Labrador waterbodies. Other parameters such as cadmium, selenium and silver had values that were either above the CCME guidelines or at levels that could not be compared to the guidelines, due to the level of quantification attained by the analytical laboratory.

KA MAMUSHTAKANT EIMUN

Nete ut Tshishe Utshimat ka ut pempant (Department of work, Services and Transportation WST) meshkanau ka ut nakatuapatakant kie ka atushkatet ntuentamupant tshetshi tutakant meshkanau nete ut Nutapieunant (Cartwright Junction) nuash nete Apipani-Kuspe tshetshi itamuniit. Ume meshkanau miam 250Km tshipa tatupashkuniau, nete ut Napatau Labrador Mishte Meshkanu - Phase III tshipa itamu kie nete Labrador City mak Uapush (Wabush) meshkanau kietamua.

Neme nentuentakant tshetshi tutakant meshkanau mashinateikanipan nete Tshishe Utshimat tshetshi minu nantussentakant kassinu tshekuan eshi innuimikak nete tshe tutakant ne meshkanau. Shiship Pishum 2002 pupun tutakanipan mashineikan, nete Newfounland mak Napatau Labrador tshishe utshimat kanantussentakant kassinu tshekuan eshi inniuimikak assit ntuentakanipan tshetshi tutakant mashineikan (EIS) ishinikateu ne eshi nantussenimant kassinu eshikusht namesh kie eshinakunit nete etat. Ne mashineikan Katutakant (TOR) eshiantussenimant namesh uauitakanu nete Appendix 1 mashineikant katutakant ueshkat.

Ne meshkanau tshe itamutakant 95 shipissa tshika takuna petetat etatinikau shipua, Mishte shipu, Traverspine shipu, Kenamu shipu, Eagle River mak Paradise shipu. Ntshe ka nantussentakau Jacques Whitford Environment kassinu eshi inniumikanit tshekuanu nete assit kie ntshe Innu Environmental Limited tapishkut atushkatamupant nenu enantussentakanit kassinu eshi- inniumikanit tshekuanu nete assit tshe tutakanit meshkananu, nenu muk namesha nete etantshi nantussentamupant kie nete shipissa eitkunetshi. Apu tut utinanikue namesh tshetshi nantusseimakant.

Nete ut ishpimit nantussentakanipan nete tshe itamut meshkanau kauashteitshesht apitshiakanipan kie nete eitakuaki shipissa nuash 2 km tatipashkuniau nete nantussentakant kie ekute etakue namesh (Type i mak Type II) ishinikateu nenu eshi nantussenimakant. Mamu 35 nete tshiashtakantshi enantussentakant tshe itamutakant meshkanau.

Tipan nete tutakanipan ne mashineikan eshi uauinakant namesh eshi nantussenimakant nete eitat Eshkupiat ne shipiss, eshipishat nipi, eshi-takuak neta shipissit, eshinakunit nete ueuaukuut namesh, eshinakunit umitshiim namesh kie nete eshinakuak assi tekuaki nenua shipissa kassinu ne ishi nantussentakanipan nete eitat namesh. Kie nantussentakanipan ne nipi etakaamut, eshinakuak nete tekuak ne nipi (Etakamut kie tshekuan nete eshi tekuak nipi) Eku ume eshi nantussentakanipan akunanakant kie nete mashineikant Appendices 2,3 mak 4 etashtet mashineikant takun ume eshi uauitakant.

Eku nete epamutaenanut enantussentakantshi shipissa 50 km nantussentakanipani, Apu tut tshi nutem minu nantussentakantshi ushamikat apishashua. Muk 44 sentakua etakue namesh (Type 1 mak Type 2, Eshinakusht.

Eku nemeua petetat shipua ka uietetshi uta mashineikant nishunnu eishinakusht namesh eitau nete shipit kie ekute nete ne meshkanau tshe tutakant. Ntshe kanantussentakau WST minuat tshika nantussentamut nete eitantshi namesha patush 2003 pupun tshe atushkatet ne tshe nantussentakant.

Nipi eshinakuak nantussetakanipan 35 tatuiet ishi utnakanipan nete shipissa tekunikau nete meshkanau ua tutakant kie ne eshi nantussentakant tshika setakun eshinakuak nipi kie eukun tshe utshi uitamakuiak eshi meshkakent tshekuan neta nipit.

Pesse ne nipi eshpishat peikutau itentakun nete kutaka nipia tekunikau. Ntshe ka utshimakaniit nenu tshetshi Nantuseentakanit Kassinu Tshekuanu Eshi-inniumikant Nete Assit (CCME) tutamupant mashineikanu tshe ishi nashekanit nenu tshipa ishi nantussentakanu nipi kie kassinu ne aueshish kiemak namesh etat nete nipit, kie eukun eshi tutakant nete Newfoundland mak Napatau Labrador ua nentussentakantshi nipi. Kie nete uet tshetshue nakatuapakant ne eshi nantussentakant nipi apu shuka atapan ishi tutakant ne tshipa ishi nantussentakanu nipi.

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1.0 INTRODUCTION

1.1 Background

The Department of Works, Services and Transportation (WST) is proposing to construct a two-lane, gravel surface highway from Cartwright Junction to Happy Valley-Goose Bay, a distance of approximately 250 km. This highway represents the final link of an all-season ground transportation route between the Labrador Straits, southern Labrador, Upper Lake Melville, western Labrador and Quebec. The proposed alignment for the Trans Labrador Highway - Phase III (TLH - Phase III) will result in 95 stream crossings. The stream crossings are associated with five watersheds; the Churchill River watershed, the Traverspine River watershed, the Kenamu River watershed, the Eagle River watershed and the Paradise River watershed.

In anticipation of requirements for environmental assessment, WST contracted Jacques Whitford Environment Limited (JW) and Innu Environmental Partnership Limited (IELP) to prepare the following fish habitat component study.

1.2 Watersheds

The TLH - Phase III will cross five large watersheds; Paradise River, Eagle River, Kenamu River, Traverspine River (which is a tributary of the Churchill River), and the Churchill River itself. The proposed watercourse crossings vary from small streams to the Churchill River. The nearest communities to the proposed route are Paradise River and Cartwright, approximately 50 and 75 km from Cartwright Junction, respectively, and Happy Valley-Goose Bay at the western end of the route. No permanent residents are located along the route and existing outfitting operations are quite distant from the route.

The physical characteristics of the four basins are provided in Table 1.1. Churchill River, with a basin area of 93,415 km², is not included in the table, as there is only a single crossing proposed near its mouth.

	Paradise River	Eagle River	Kenamu River	Traverspine River					
Drainage Area (sq. km)	5,276	10,824	4,403	728					
Mean width (km)	38	58	32	18					
Axial length (km)	122	139	119	48					
Basin perimeter (km)	359	605	502	148					
Maximum basin relief (m)	485	610 305		518					
Length by meander of main stem (km)	129	135	150	95					
Total length including tributaries (km)	3,373	3,548	613	464					
Number of tributaries	94	81	77	26					
Geological formation	Granitic gneiss	Granitic gneiss	Granite and Granitic gneiss	Gneiss, anorthosite and associated rocks					
Source: Compiled from Anderson (1985)									

Table 1.1 Physical Characteristics of Four Rivers

1.3 Fish and Fish Habitat

Both Paradise River and Eagle River drain in a northeast direction into Sandwich Bay on the coast of Labrador. The TLH - Phase II runs, in part, parallel to Paradise River. The TLH - Phase III will cross the main stem near Paradise Junction and then traverse over 50 km of the watershed in an east-northeast direction. Anadromous Atlantic salmon have access to spawning and rearing habitat up to and 75 km beyond the highway crossing. The lower sections of the river, below the crossing location, are steeper gradient and less suitable as rearing habitat. Anderson (1985) relates reports that Paradise River is not suitable for salmon angling due to the lack of pools. However, subsequent to the construction of TLH - Phase II, the Department of Fisheries and Oceans (DFO) designated Paradise River as a scheduled salmon river. No angling catches had been reported to 1985 but the stock from Paradise River contributed to the, then commercial, salmon fishery of Sandwich Bay.

The Eagle River is one of the largest salmon rivers in North America and up to five years ago was the only scheduled salmon river along the proposed route. There are several outfitting operations that cater to recreational angling on the Eagle River. The proposed highway will cross approximately 125 km of the river basin.

West of the Eagle River, Kenamu River drains north to Hamilton Inlet, which includes Lake Melville and Groswater Bay. The proposed highway will cross approximately 40 km of this watershed at a location approximately 80 km from the river mouth. Most of the length of Kenamu River is suitable rearing habitat

for Atlantic salmon, with only partial barriers presented by rapids on the main stem. However, slow waters in the lower reaches of the river produce poor angling conditions and there is little fishing activity (Anderson 1985).

The Traverspine River also flows in a northerly direction to enter the lower Churchill River, 10 km from the mouth. The proposed highway will traverse the basin at the approximate middle, which is 20 to 25 km wide. The route then runs up the western side of the Traverspine basin to a bridge across the Churchill River. Various potential barriers to salmon migration have been described on the Traverspine River, but again, angling activity is very low due to its remoteness and the presence of poorly suited conditions for angling (Anderson 1985).

The proposed bridge crossing the Churchill River is located approximately 20 km from the mouth of the river. Although there are 20 species of fish reported in Churchill River, only some of these have been reported below Muskrat Falls. The area of the crossing is wide with sandy substrate.

1.4 Objectives

The objective of this component study is to identify the habitat type and quality at each proposed stream crossing location for TLH - Phase III between Happy Valley-Goose Bay and Cartwright Junction. The Terms of Reference (TOR) for this study, included as Appendix 1, provide the details of the required information and indicates the study methodology.

1.5 Study Team

The study team that participated in activities leading to this report is shown in Table 1.2.

Table 1.2Study Team for TLH - Phase III Fish Habitat Component Study

Role	Personnel	Affiliation
Program Management	Bruce Bennett, Fisheries Scientist	JW
Field Surveys/Activities	Barry Wicks, Fisheries Biologist Matt Hynes, Technologist Herman Montague, Field Assistant Peter Jefford, Pilot	JW JW Innu Environmental Limited Partnership Universal Helicopters
Mapping/GPS	David Kearsey	JW

1.6 Study Area

The study area consists of those areas where stream crossing structures will be constructed along the preferred route between Happy Valley-Goose Bay and Cartwright Junction (Refer to Figure 1.1).

1.7 Coordination with Innu Nation

An application for a Research Authorization was submitted to Innu Nation prior to the initiation of the study. The application was developed based on guidelines "Conducting Research in Innu Territory" provided to JW by Innu Nation.



2.0 METHODOLOGY

2.1 Identification of Stream Crossing Sites

WST provided 1:50,000 scale maps with the proposed route marked on them. Ninety-five stream crossing locations were numbered sequentially along the route, beginning with the Churchill River and ending at Cartwright Junction. The maps were accompanied by a preliminary list of crossings that identified the crossing number and location, as well as the size of the upstream drainage basin and the estimated size of the required water transfer structure (culvert or bridge). The study TOR (Appendix 1) required that an aerial survey be conducted of all identified stream crossing locations. A further requirement was that on-ground detailed surveys were to be conducted at all crossings except those that are:

- bog drainage areas;
- areas of obvious Type III (rapids) and Type IV (steadies) habitat; and/or
- crossing sites with an upstream drainage area of less than 2 km².

Upon review of the mapping and topography, it was determined that some crossing locations would not be reasonably accessible (i.e., no safe landing area nearby).

In cases where ground surveys were not conducted, the rationale for omitting the ground survey was documented on field data forms.

2.2 Field Surveys

2.2.1 Aerial Survey

The aerial survey was conducted from 23 to 26 September 2002, flying a Jet Ranger with Universal Helicopters out of Happy Valley-Goose Bay. The survey team was comprised of a fisheries biologist, a field technologist, a field assistant and the pilot. Surveys were conducted according to JW/IELP standard operating procedures. Information was collected following methodology and criteria as outlined in DFO's *Standard Methods Guide for Freshwater Fish and Fish Habitat Surveys in Newfoundland and Labrador* (Sooley et al. 1998).

The 500-m section of stream, extending 250 m upstream and downstream of the crossing location, was classified using Beak salmonid habitat classification (Sooley et al. 1998) as defined in Table 2.1. The Beak habitat classification is based largely on substrate and flow characteristics, as defined in Tables 2.2 and 2.3, respectively, as well as depth. Other information collected during the aerial survey includes an estimate of channel width, bank material composition, back slope, bank vegetation, cover, gradient and the

identification of potential obstructions. Information collected was recorded on field data sheets that are included as Appendix 2.

Habitat	Description							
Туре								
Type I	Good salmonid spawning and rearing habitat; often with some feeding pools for larger age classes							
	Flow: moderate riffles;							
	Current: 0.1 to 0.3 m/s;							
	Dept: relatively shallow, 0.3 to 1 m;							
	Substrate: gravel to small cobble size rocks or boulders; and							
	General habitat types: primarily riffle, pool.							
Type II	Good salmonid rearing habitat with limited spawning, usually only in isolated gravel pockets; Good							
	feeding and holding areas for larger fish in deeper pools, pockets, or backwater eddies:							
	Flows: heavier riffles to light rapids							
	Current: 0.3 to 1 m/s							
	Depth: variable from 0.3 to 1.5 m;							
	Substrate: larger cobble, rubble sized rock to boulders and bedrock, some gravel pockets between larger							
	rocks; and							
	General habitat types: run, riffle, pocketwater, pool.							
Type III	Poor rearing habitat with no spawning capabilities, used for migratory purposes:							
	Flows: very fast, turbulent, heavy rapids, chutes, small waterfalls;							
	Depth : variable, 0.3 to 1.5 m;							
	Substrate: large rock and boulders, bedrock; and							
	General habitat types: run, pocketwater, cascades.							
Type IV	Poor juvenile rearing habitat with no spawning capability, provides shelter and feeding habitat for larger,							
	older salmonids (especially brook trout):							
	Flows: sluggish;							
	Current: 0.15 m/s							
	Depth : variable but often 1 m;							
	Substrate: soft sediment or sand, occasionally large boulders or bedrock, macrophytes present in many							
	locations; and							
	General habitat types: steady, pool, glide.							
Source: Soole	y et al. (1998).							

Table 2.1 Characteristics of the Four Beak Habitat Types

Table 2.2Classification of Substrate

Substrate	Description					
Bedrock (BR)	Continuous solid rock exposed by the scouring forces of the river/stream					
Boulder (Bo)	Boulder sized rocks from 25 cm to greater than 1 m in diameter					
Rubble (R) Large rocks from 14 to 25 cm in diameter						
Cobble (C)	Moderate to small sized rocks from 6 to 13 cm in diameter					
Pebble (P)	Small rocks to stones from 3 to 5 cm in diameter					
Gravel (G)	Small stones from 2 mm to 3 cm in diameter					
Fines (F)	Sand and smaller sized material on margins of streams or between rocks and stones, up to 2 mm in diameter					
Adapted from Sooley et al. (1998). Pebble substrate has been included with cobble as indicated in Bradbury et al. (2001)						

Table 2.3Classification of Flow

Flow Type	Description						
Run	Swiftly flowing water with some surface agitation but no minor flow obstructions, coarser substrate (gravel, cobble boulder)						
Riffle	Shallower section with swiftly flowing, turbulent water with some partially exposed substrate (usually cobble or gravel dominated)						
Pocketwater	Turbulence increased greatly by numerous emergent boulders which create eddies or scour holes (pockets) behind the obstructions						
Steady (or Flat)	Water surface is smooth and substrate is made up of organic matter, sand, mud, and fine gravel. This habitat differs from a pool due to length, associated with low gradient. This habitat type generally has a flat bottom.						
Pool	Deeper area comprising full or partial width of stream, due to depth or width flow velocity is reduced. Pool has rounded surface on bottom.						
Cascade (Rapids)	Area of steeper gradient with irregular and rapids flows, often with turbulent white water. Rapids are primarily associated with larger stream sections and rivers. In larger rivers it is recommended that the survey crew not attempt to conduct cross sections in these types of habitat.						
Glide	Wide, shallow pool flowing smoothly and gently, with low to moderate velocities and little or no surface turbulence. Substrate usually consists of cobble, gravel and sand.						
Source: Sooley et al. (Source: Sooley et al. (1998).						

During the aerial survey, those streams that required ground surveys were verified. Streams were selected for conducting ground surveys based on the criteria outlined above. Where possible (i.e., if a stream was adequately visible), a generalized sketch of the surveyed section was included on the data sheet. All data were recorded on standardized field data sheets (Appendix 2) and field notebooks. Digital photographs were taken of all stream crossings and the area 250 m upstream and downstream of the crossing was videotaped. Photographs of the stream crossings are included in Appendix 3.

2.2.2 Ground Surveys

Ground surveys were conducted at the required locations in accordance with the TOR criteria (Appendix 1), except for those locations that could not be safely accessed due to dense forest, excessive brush and standing dead wood (resulting from past forest fire), or from other factors.

Ground surveys were conducted on 35 streams over the period September 26 to October 1, 2002. In addition to the 500-m section surveyed from the air, a focussed survey was conducted on an approximately 50-m section where the proposed stream crossing is to be located. The determination of this location was based on the information provided by WST and the observed stream conditions. Global Positioning System (GPS) way points for the stream crossing locations are included in Appendix 2.

All stream characteristics collected during the aerial survey for the 500-m section (habitat type, flow type, substrate type, etc.) were again recorded for the stream crossing location. Representative photographs were taken upstream and downstream of the crossing location and a GPS position was recorded. A sketch of the 50-m section outlining key features was recorded on the field data sheets (Appendix 2).

Where visibility was not obstructed, stream gradient was measured over the 50-m section with a clinometer. If visibility was obstructed (e.g., by vegetation cover), the stream gradient over the 50-m section was estimated.

2.2.3 Water Quality and Flow

A Hydrolab Datasonde 4 Water Quality Multiprobe was used to obtain water temperature, pH, conductivity, dissolved oxygen and turbidity measurements. All readings were recorded on data sheets (Appendix 2) and as part of the water quality data results (Appendix 4).

Two water samples were collected at each stream crossing location for the determination of alkalinity, total dissolved solids, and total metals (ICP-MS scan). These samples were kept on ice and shipped to Phillip Analytical Services in Halifax, Nova Scotia, for analysis. The analytical results are included as Appendix 4. Surface velocity measurements were measured with a Gurley flow meter. Where it was safe to do so, the velocity measurements were obtained at mid-stream, as a surface velocity. If this was not possible, surface

velocity was taken closer to the stream bank. In these cases, water depth and distance from the stream bank were recorded along with velocity measurements. The flow data were recorded on the field data sheets (Appendix 2) and as part of the water quality results (Appendix 4).

3.0 RESULTS

3.1 Background Summary of Surveyed Stream Crossings

The proposed route for TLH - Phase III will result in 95 stream crossings in five watersheds. An overview of the five watersheds is provided in Section 1.3. Stream crossings are numbered sequentially (1 to 95) from the Churchill River near Happy Valley-Goose Bay, to tributaries of the Paradise River near Cartwright Junction, as shown in Tables 3.1 to 3.5 (refer to Figure 1.1 for locations).

The crossings in each watershed are listed by number and distance from the Churchill River (along the proposed highway route) and stream order in Tables 3.1 to 3.5. A headwater stream with no tributary is a first order stream, a second order stream has a first order tributary draining to it, a third order stream has a second order stream draining to it, etc. (Scruton et al. 1992). Any ponds or lakes upstream of each crossing and approximate distance to the crossing are also shown in Tables 3.1 to 3.5, as are lakes or main stem rivers downstream of each crossing and distance to these. This information is relevant in that watercourse features upstream of the crossing may contain spawning and rearing habitat. Downstream features such as steadies and lakes (depositional areas) may represent the downstream extent of the adverse effects of a siltation event. The areas and types of habitat downstream will also determine the potential habitat damage from a accidental release (pollution event).

				U	pstream	Dow	nstream	
Stream Crossing #	Distance from Churchill River (km)	Stream Order	Watershed Area (km ²)	Pond or Lake	Distance to crossing (km)	Lake or Main Stem	Distance to crossing (km)	Comment
1	0	3+	90,000+					Churchill River
2	0.8	1	0.5	Ν	-	М	1	< 2 km ² drainage upstream
3	1.3	1	1	Ν	-	М	1.5	< 2 km ² drainage upstream
4	2	2	2.6	Ν	-	М	4.5	
5	4	1	0.6	Ν	-	М	5	< 2 km ² drainage upstream
6	4.6	1	0.5	Ν	-	М	7	< 2 km ² drainage upstream
7	5.2	1	0.6	Ν	-	М	8	< 2 km ² drainage upstream
8	6.5	2	4	Н	2.3	М	15	
9	6.9	3	3.7	Н	4	М	15	
10	7.4	2	1.8	Ν	-	М	15	< 2 km ² drainage upstream
11	8.3	1	0.7	Ν	-	М	15	< 2 km ² drainage upstream
12	8.7	2	4.7	Ν	-	М	15	
Notes: Upstream of crossings have headwater pond (H), a lake(s) with tributaries (L), or none (N). Downstream of crossings have Lake (L), steady (S), large tributary (T), or the main stem of the river (M).								

Table 3.1 Background Summary of Stream Crossings on Churchill River and Minor Tributaries

					Upstream		nstream	
Stream Crossing #	Distance from Churchill River (km)	Stream Order	Watershe d Area (km²)	Pond or Lake	Distance to crossing (km)	Lake or Main Stem	Distance to crossing (km)	Comment
13	11.6	1	2.4	Ν	-	М	3.0	
14	14.3	1	3.1	Ν	-	М	4.5	
15	16.3	3	26.5	L	3.0	М	6	
16	16.9	3	56.8	L	6.5	М	6.5	
17	18.2	1	1.15	Ν	-	М	7.5	< 2 km ² drainage upstream
18	18.5	1	0.5	Ν	-	М	7.8	< 2 km ² drainage upstream
19	21.4	2	1.7	Ν	-	М	3.0	< 2 km ² drainage upstream
20	22.5	2	2.1	Ν	-	М	2.5	
21	23.3	1	0.7	Ν	-	М	2.5	< 2 km ² drainage upstream
22	24.6	3+	77	L	10	М	2.5	
23	26.7	3+	191	-	-	-	-	Traverspine River
24	27	3	29	L	4	М	0.4	
25	29.5	1	0.4	Ν	-	М	3.0	< 2 km ² drainage upstream
26	30.9	1	0.15	Ν	-	L	3.5	< 2 km ² drainage upstream
27	31.1	1	0.25	Ν	-	L	3.5	$< 2 \text{ km}^2$ drainage upstream
Notes: Upstream of crossings have headwater pond (H), a lake(s) with tributaries (L), or none (N). Downstream of crossings have Lake (L), steady (S), large tributary (T), or the main stem of the river (M).								

Table 3.2 Background Summary of Stream Crossings on Traverspine River and Tributaries

					Upstream		vnstream		
Stream Crossing #	Distance from Churchill River (km)	Stream Order	Watershe d Area (km²)	Pond or Lake	Distance to crossing (km)	Lake or Main Stem	Distance to crossing (km)	Comment	
28	40.2	3+	72.3	L	1.5	L	3		
29	41.3	1	0.78	Ν	-	L	3	$< 2 \text{ km}^2$ drainage upstream	
30	45.6	2	11.9	L	2	L	0.5		
31	48.2	1	2.7	Ν	-	Т	1		
32	49.2	2	6.3	Ν	-	Т	0.5		
33	53.7	1	1.5	Ν	-	М	5	$< 2 \text{ km}^2$ drainage upstream	
34	54.6	1	6.95	Ν	-	М	4		
35	56.7	1	1	Ν	-	М	3	$< 2 \text{ km}^2$ drainage upstream	
36	58.8	3+	2,026	-	-	-	-	Kenamu River	
37	60.9	1	4.75	Ν	-	М	3.5		
38	69.4	3+	41.6	S	0.5	М	11		
39	70.3	1	1.3	Ν	-	М	12	$< 2 \text{ km}^2$ drainage upstream	
40	73.3	3	14.3	Н	3	М	15		
41	78	2	7.8	Ν	-	L	0.3		
42	82.2	1	2.9	L	1	L	4		
Notes: Upstream of crossings have headwater pond (H), a lake(s) with tributaries (L), STEADY (s) or none (N). Downstream of crossings have Lake (L), steady (S), large tributary (T), or the main stem of the river (M).									

Table 3.3 Background Summary of Stream Crossings on Kenamu River and Tributaries

Table 3.4 Background Summary of Stream Crossings on Eagle River and Tributaries

				Upstream		Downstream		
Stream Crossing #	Distance from Churchill River (km)	Stream Order	Watershe d Area (km²)	Pond or Lake	Distance to crossing (km)	Lake or Main Stem	Distance to crossing (km)	Comment
43	85.1	1	0.5	Н	.05	L	0.2	< 2 km ² drainage upstream
44	85.8	-	na	Ν	-	L	1	Crossing is on a pond
45	87.4	2	5	L	.05	L	2.5	
46	90.1	3+	71.8	L	3	L	6	Crossing is on a pond
47	91.8	1	1.75	Ν	-	L	0.4	< 2 km ² drainage upstream
48	94.7	3	36.7	L	0.3	L	3.2	
49	99.3	1	2.6	N	-	L	1	
50	100.2	1	1.6	N	-	L	0.5	< 2 km ² drainage upstream

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				U	pstream	Downstream				
Stream Crossing #	Distance from Churchill River (km)	Stream Order	Watershe d Area (km²)	Pond or Lake	Distance to crossing (km)	Lake or Main Stem	Distance to crossing (km)	Comment		
51	101.3	3	11.8	Ν	0.1	L	0.4			
52	102.9	3+	140	S	0.03	S	2	Crossing is on a steady		
53	106.5	2	2.7	Ν	-	Т	2.5			
54	107.2	1	0.3	Ν	-	Т	3	$< 2 \text{ km}^2$ drainage upstream		
55	109.9	3+	70.8	L	3.5	Т	3.5			
56	111.3	1	2	Ν	-	Т	4			
57	111.6	1	1.5	Ν	-	Т	4	$< 2 \text{ km}^2$ drainage upstream		
58	113.7	1	1	Ν	-	L	1.5	$< 2 \text{ km}^2$ drainage upstream		
59	116.7	2	9.4	L	1.5	L	3.5			
60	117.9	1	1.5	Ν	-	L	3	$< 2 \text{ km}^2$ drainage upstream		
61	118.6	2	13.1	Н	2.5	L	4			
62	125.3	1	1.5	Ν	-	L	5.5	$< 2 \text{ km}^2$ drainage upstream		
63	126.8	1	1	Ν	-	L	4	$< 2 \text{ km}^2$ drainage upstream		
64	127.2	2	3.8	Ν	-	L	3.5			
65	130.8	2	4.1	Н	3	L	0.5			
66	131.1	1	0.7	Н	0.5	L	0.7	$< 2 \text{ km}^2$ drainage upstream		
67	134.5	2	5.6	Ν	-	L	0.05			
68	137.7	1	2.05	Ν	-	L	1			
69	142.9	1	1.725	Ν	-	S	0.6	$< 2 \text{ km}^2$ drainage upstream		
70	148.7	1	4.6	Ν	-	L	2			
71	154.9	3	55.3	S	2.5	Т	3			
72	157.5	1	3.1	Ν	-	L	.15			
73	162.6	3+	3, 644	-		-		Eagle River - South Branch		
74	165.1	1	0.9	Ν	-	М	2.5	$< 2 \text{ km}^2$ drainage upstream		
75	165.4	1	1.9	Ν	-	М	2.5	< 2 km ² drainage upstream		
76	170.6	1	4.2	Ν	-	L	.5			
77	171.2	2	17.3	L	3.5	L	0.1			
78	172.7	1	1.2	Н	0.15	L	3	< 2 km ² drainage upstream		
79	184.8	3+	376	L	2	S	2	Otter Brook		
80	187.6	1	1.2	Ν	-	Т	1	< 2 km ² drainage upstream		
81	187.9	1	1.1	N	-	Т	1.1	< 2 km ² drainage upstream		
82	189.9	3	25	L	3	Т	1.5			
Notes: U	O2 107.7 3 2.3 L 5 1 1.3 Notes: Upstream of crossings have headwater pond (H), a lake(s) with tributaries (L), or none (N). Downstream of crossings have Lake (L), steady (S), large tributary (T), or the main stem of the river (M).									

				$\mathbf{U}_{]}$	pstream	Down	nstream		
Stream Crossing #	Distance from Churchill River (km)	Stream Order	Watershe d Area (km²)	Pond or Lake	Distance to crossing (km)	Lake or Main Stem	Distance to crossing (km)	Comment	
83	206.7	2	11.4	L	0.6	L	0.5		
84	211.9	1	1.9	Ν	-	1	0.5	$< 2 \text{ km}^2$ drainage upstream	
85	213.8	1	0.8	Ν	-	Т	7	< 2 km ² drainage upstream	
86	218.9	3	78	L	1.2	Т	9		
87	221.8	3	24	L	5	L	1		
88	224.8	3+	35	S	0.1	L	0.15		
89	225.3	1	6.55	S	0.3	L	0.1		
90	228.9	1	2.55	Н	1.5	L	2		
91	230.6	2	16.6	L	2	L	1.2		
92	231.7	1	2.5	Н	1.4	L	0.4		
93	235.5	1	2.74	Н	0.7	L	3		
94	241.2	3+	3, 339	-	-	-	-	Paradise River	
95	242.6	1	6.8	Ν	-	М	1.5		
Notes: U	Notes: Upstream of crossings have headwater pond (H), a lake(s) with tributaries (L), or none (N). Downstream of crossings have Lake (L), steady (S), large tributary (T), or the main stem of the river (M).								

 Table 3.5
 Background Summary of Stream Crossings on Paradise River and Tributaries

3.2 Fish Habitat

It is assumed that all stream crossings are potential productive stream habitat and, therefore, the surveys were conducted to collect detailed habitat information at each crossing location either from the air, on the ground or both. The selection of ground survey locations were based on crossings that could be accessed safely, crossings with an upstream basin area greater than 2 km² and crossings with Beak Type I or Type II habitat. If all criteria were met, a detailed habitat assessment of the proposed crossing was conducted on the ground. The number of streams surveyed on the ground, as well as those eliminated from the ground survey and the elimination criteria, are summarized in Table 3.6.

Table 3.6Number of Streams Surveyed from Air and on the Ground

		Streams That Were Not Surveyed on the Ground									
Total Number of	Ground Surveys	Upstream	Type III or IV	Inaccessible for	Other *						
Crossings	Completed	Drainage < 2 km²	Habitat	Landing							
95	35	36	13	8	3						
NOTE:	NOTE:										
* Churchill River w	* Churchill River was not ground surveyed for practical reasons, an osprey prevented approach to one crossing site, and										
one crossing had su	one crossing had sub-surface flow (not stream habitat)										

Thirty-six streams were eliminated from the ground survey requirement, based on drainage area being less than 2 km², as determined by WST from 1:50,000 scale topographic mapping. Of the remaining 59 streams, 13 were eliminated since they were observed to be Type III or Type IV habitat, eight were inaccessible and three were eliminated for other reasons (i.e., Churchill River could not be adequately surveyed on the ground, an aggressive osprey prevented the chopper from landing at stream 31 and stream 92 was intermittent and disappeared under ground). In total, 35 of 95 stream crossings were surveyed on the ground.

A detailed aerial assessment was not possible on 20 watercourse crossings due to the small size of some streams and visual impairment created by an extremely thick tree canopy. The majority (16) of these streams have a drainage area of less than 2 km². The summary information for the 95 stream crossings is shown in Tables 3.7 to 3.11.

Stream		Chann	el Width		Elor: Tuno		
Crossing Number	0-2 m	2-5 m	5-20 m	> 20 m	Flow Type	Beak Habitat Type	Comment
1				Х	riffle	II	Churchill River
2	X				(riffle)	(II)	Upstream Basin area < 2 km ²
3	х				N/A	N/A	Upstream Basin area < 2 km ²
4	х	_			(riffle)	(II)	
5	N/A				N/A	N/A	Upstream Basin area < 2 km ²
6	X				(riffle)	(II)	Upstream Basin area < 2 km ²
7	х				(riffle)	(II)	Upstream Basin area < 2 km ²
- 8 -		х			riffle	II	Fish observed (1)
- 9 -	х				riffle	II	
10	х				N/A	N/A	Upstream Basin area < 2 km ²
11	х				N/A	N/A	Upstream Basin area < 2 km ²
12	х				N/A	N/A	
Crossing num	bers are	sequentia	al and sho	wn in Fig	ure 1.1, see Tab	le 2.3 for flow and Tab	le 2.1 for habitat.

Table 3.7	Summary Information of S	Stream Crossings -	Churchill River and	Minor Tributaries
I uble off	Summary mormation of	ou cam or oppings	Chui chini Iti vei unu	initial instatution

Crossing numbers indicated with hyphens (- # -) are those where ground surveys were conducted.

N/A denotes crossings where the stream was obscured by forest canopy and habitat character could not be determined.

Flow and habitat types in brackets are estimated from partial views or immediately adjacent sections.

Stream		Chann	el Width			Beak Habitat	
Crossing Number	0-2 m	2-5 m	5-20 m	> 20 m	Flow Type Type		Comment
- 13 -		Х			riffle	II	Brook trout observed (1)
14		х			riffle	Ι	
15			х		riffle	Π	
- 16 -			х		riffle/pool	Π	
17	х				N/A	N/A	Upstream Basin area < 2 km ²
18	х				N/A	N/A	Upstream Basin area < 2 km ²
19	х				N/A	N/A	Upstream Basin area < 2 km ²
20		Х			(riffle)	(II)	
21	х				N/A	N/A	Upstream Basin area < 2 km ²
- 22 -				X	rapids	III	
- 23 -			х		riffle	II	Traverspine River
- 24 -			х		rapids	III	
25	Х				N/A	N/A	Upstream Basin area < 2 km ²
26	х				N/A	N/A	Upstream Basin area < 2 km ²
27	х				N/A	N/A	Upstream Basin area < 2 km ²

Table 3.8 Summary Information of Stream Crossings - Traverspine River and Tributaries

Crossing numbers are sequential and shown in Figure 1.1, see Table 2.3 for flow and Table 2.1 for habitat.

Crossing numbers indicated with hyphens (- # -) are those where ground surveys were conducted.

N/A denotes crossings where the stream was obscured by forest canopy and habitat character could not be determined.

Flow and habitat types in brackets are estimated from partial views or immediately adjacent sections.

Stream		Chann	el Width			Beak Habitat	Commont	
Number	0-2 m	2-5 m	5-20 m	> 20 m	Flow Type	Туре	Comment	
- 28 -			х		riffle	II		
29	Х				N/A	N/A	Upstream Basin area < 2 km ²	
30			х		steady	IV		
31	Х				N/A	N/A	Osprey (prevented ground survey)	
32	Х				(riffle)	(II)		
33	Х				(riffle)	(II)	Upstream Basin area < 2 km ²	
34	Х				(riffle)	(II)		
35							No stream was visible at the coordinates	
- 36 -				х	riffle	II	Kenamu River	
- 37 -	Х				steady	IV		
- 38 -			х		riffle	Π		
39	х				N/A	N/A	Upstream Basin area < 2 km ²	
- 40 -		х			riffle	Π		
- 41 -		Х			riffle	Ι		
- 42 -		Х			riffle	II		
Crossing num	bers are	sequentia	al and sho th hyphen	wn in Fig s (- # -) ai	ure 1.1, see Tat	ble 2.3 for flow a	and Table 2.1 for habitat.	

Table 3.9 Summary Information of Stream Crossings on Kenamu River and Tributaries

N/A denotes crossings where the stream was obscured by forest canopy and habitat character could not be determined.

Flow and habitat types in brackets are estimated from partial views or immediately adjacent sections.

Table 3.10	Summary Information of	f Stream Crossings	on Eagle River a	nd Tributaries
	<i></i>			

Stream		Chann	el Width		Elere Trees	Beak Habitat	Commont
Crossing Number	0-2 m	2-5 m	5-20 m	> 20 m	Flow Type	Туре	Comment
43	х				N/A	N/A	Pond ? Upstream Basin area $< 2 \text{ km}^2$
44					N/A	N/A	This crossing is a pond
45				х	riffle	Π	
46		Х			steady	IV	
47	х				steady	IV	Upstream Basin area < 2 km ²
- 48 -		Х			riffle	Π	
49	х				steady	IV	
50	х				(steady)	(IV)	Upstream Basin area < 2 km ²
- 51 -		х			riffle	Π	
- 52 -			х		riffle	II	
- 53 -	Х				riffle	II	

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Stream		Chann	el Width			Beak Habitat		
Crossing Number	0-2 m	2-5 m	5-20 m	> 20 m	Flow Type	Туре	Comment	
54							No stream was visible at the coordinates	
- 55 -			х		riffle	II		
- 56 -	х				riffle	II		
57							No stream was visible at the coordinates	
58	х				steady	IV	Upstream Basin area < 2 km ²	
59	х				riffle	II		
60	х				steady	IV	Upstream Basin area < 2 km ²	
- 61 -		Х			riffle	II		
62	х				steady	IV	Upstream Basin area < 2 km ²	
63	х				steady	IV	Upstream Basin area < 2 km ²	
- 64 -	х				riffle	II		
- 65 -		Х			riffle	II		
66	х				steady	IV	Upstream Basin area < 2 km ²	
- 67 -		Х			riffle	II		
- 68 -	х				riffle	II		
69	х				(riffle/steady)	(II/IV)	Upstream Basin area < 2 km ²	
70	х				steady	IV		
71			х		steady	IV		
72	х				steady	IV		
- 73 -				Х	riffle	II	Eagle River	
74	Х				N/A	N/A	Upstream Basin area < 2 km ²	
75	х				riffle	II	Upstream Basin area < 2 km ²	
76	х				steady	IV		
77				х	steady	IV		
78	х				steady	IV	Upstream Basin area < 2 km ²	
- 79 -				Х	riffle	II		
80	х				steady	IV	Upstream Basin area < 2 km ²	
81	х				steady	IV	Upstream Basin area < 2 km ²	
- 82 -		х			riffle	II		
Crossing num	bers are	sequentia	al and sho	wn in Fig	ure 1.1, see Tab	ble 2.3 for flow a	and Table 2.1 for habitat.	

Crossing numbers indicated with hyphens (- # -) are those where ground surveys were conducted.

N/A denotes crossings where the stream was obscured by forest canopy and habitat character could not be determined. Flow and habitat types in brackets are estimated from partial views or immediately adjacent sections.

Stream		Chann	nel Width			Beak Habitat			
Crossing Number	0-2 m	2-5 m	5-20 m	> 20 m	Flow Type	Туре	Comment		
83		Х			steady	IV			
84		х			steady	IV	Upstream Basin area < 2 km ²		
85							No stream was visible at the coordinates		
86			х		steady	IV			
- 87 -	х				riffle	II			
- 88 -			х		steady	IV			
- 89 -		Х			riffle	II			
- 90 -	х				steady	IV			
- 91 -			х		steady	IV			
92	х				intermittent	nil	Stream appears to go underground		
93		Х			steady	IV			
- 94 -				Х	riffle	II	Paradise River		
- 95 -	х				riffle	II			
Crossing num Crossing num	Crossing numbers are sequential and shown in Figure 1.1, see Table 2.3 for flow and Table 2.1 for habitat. Crossing numbers indicated with hyphens (- # -) are those where ground surveys were conducted.								

Table 3.11 Summary Information of Stream Crossings - Paradise River and Tributaries

N/A denotes crossings where the stream was obscured by forest canopy and habitat character could not be determined. Flow and habitat types in brackets are estimated from partial views or immediately adjacent sections.

Within the Churchill River watershed, there are 12 stream crossings (crossing numbers 1 to 12) associated with the construction of the TLH - Phase III. Seven of these crossings are associated with Type II habitat. The five remaining streams could not be classified for habitat type due to the small size of the streams and visual impairment created by an extremely thick tree canopy. Nine of the twelve stream crossings had a channel width of 0 to 2 m, one crossing was 2 to 5 m wide, one could not be determined and one (Churchill River) was in excess of 20 m. Two ground surveys were completed in this watershed area.

The Traverspine River watershed is associated with 15 stream crossings (13 to 27). Five of the crossings have Type II habitat, two have Type III habitat, one has Type I habitat and seven could not be determined. Seven of the stream crossings are 0 to 2 m wide, three are 2 to 5 m wide, four are 5 to 20 m wide and one is in excess of 20 m wide. Five ground surveys were completed in the Traverspine River watershed.

There are fifteen stream crossings (28 to 42) in the Kenamu River watershed. Eight of the crossings are associated with Type II habitat, two are Type IV habitat, three could not be classified, one is Type I habitat and one stream could not be found at the designated coordinates. Seven of the fifteen crossings are 0 to 2 m, three are 2 to 5 m, three are 5 to 20 m and one (Kenamu River) is in excess of 20 m. Seven ground surveys were conducted in the Kenamu River watershed.

There are 40 stream crossings (43 to 82) associated with the Eagle River watershed. Eighteen of the crossings have Type II habitat, 17 have Type IV habitat, two were not classified due to visual impairment, one was a pond crossing and two had no identifiable streams for the given coordinates. Twenty- three of the forty streams within the Eagle River watershed are 0 to 2 m in width, seven are 2 to 5 m in width, three are 5 to 20 m in width and four are greater than 20 m in width. One crossing is located on a pond and at two crossing locations no stream was visible. Fourteen streams within the Eagle River watershed were surveyed on the ground.

There are 13 stream crossings (83 to 95) in the Paradise River watershed. Seven of the thirteen stream crossings are associated with Type IV habitat, four have Type II habitat, one had no stream for the given coordinates and one stream disappeared underground at the proposed crossing. Four of the thirteen streams in the Paradise River watershed are 0 to 2 m, four are 2 to 5 m, three are 5 to 20 m and one (Paradise River) is in excess of 20 m. Two streams could not be determined.

3.3 Fish Species

The identification and characterization of potential fish habitat has been done without reference to verifying fish presence and use of the habitat. The TOR (Appendix 1) for the component study do not require any fish sampling to be conducted, primarily for two reasons. First, DFO made a preliminary determination that the planned road construction methods are not likely to result in a harmful alteration, disturbance or destruction (HADD) of productive fish habitat, as described under Section 35(2) of the *Fisheries Act*. As such, directed fish sampling would not be required to complete the component study.

Secondly, WST have committed to fish population studies to be completed during the construction phase, when time and access will be more favourable to conducting comprehensive surveys. The protocols to be used have been developed by the Inland Fish and Wildlife Division, who will take the lead in the survey. This will provide extensive new baseline information on fish in the area.

Although fish surveys were not requested by DFO, WST, in consultation with other stakeholders, planned to include qualitative electrofishing surveys in the field studies that were to be conducted. However, due to the late timing of the field surveys, the justification for quantitative or qualitative sampling would be open to challenge. There is risk of harm to spawning fish and their deposited eggs, and the spawning season would bias normal fish distribution in lake and stream habitat. DFO reflected these constraints in the

conditions that they attached to the experimental licence issued for sampling in the fall season and, as a consequence, the surveys were postponed indefinitely.

A brief overview of the species found in the five watersheds is provided in Table 3.12. Fish that were observed during the ground surveys at crossing locations were noted (as indicated in Tables 3.7 to 3.11); however, the lack of observations should not be taken as an indication of fish absence.

Species	Paradise River	Eagle River	Kenamu River	Traverspine River	Churchill River
Atlantic salmon - <i>Salmo salar</i> (S) Ouananiche (R)	√	 ✓ 	1	1	1
Brook trout - Salvelinus fontinalis (S & R)	✓	1	✓	✓	1
Threespine stickleback - Gasterosteus aculeatus		Sus	1		1
Burbot - Lota lota			Rare	✓	1
Lake trout - Salvelinus namaycush					1
Arctic charr - Salvelinus alpinus					1
Lake whitefish - Coregonus clupeaformis			✓		1
Round whitefish - Prosopium cylindraceum		1	✓		1
White sucker - Catastomus commersoni	 ✓ 	✓	✓		1
Longnose sucker - Catostomus catostomus		✓	✓		1
Rainbow smelt - Osmerus mordax (S)		Sus	✓	1	1
Atlantic sturgeon - Acipenser oxyrhynchus (S)			Rare		1
American eel - Anguilla rostrata (S)	1	Sus			1
Ninespine stickleback - Pungitius pungitius	1	Sus			1
Northern pike - Esox lucius	U	✓			1
Lake chub - Couesius plumbeus				U	✓
Mottled sculpin - Cottus bairdi					✓
Slimy sculpin - Cottus cognatus					1
Pearl dace - Semotilus margarita					1
Longnose dace - Rhinichthys cataractae					✓
Legend: (S) sea run, (R) resident, (✓) reported, (S Source: Compiled from Anderson (1985).	us) suspected	l, (U) unc	onfirmed.		

Table 3.12	Summary of Fish Species in the	Watersheds Crossed by	TLH - Phase III

3.4 Water Quality

3.4.1 Field Measurements

A summary of the field measurements relating to water quality at the 35 stream crossing locations that were surveyed on the ground is provided in Table 3.13. Each parameter is listed, as is the method of determination, the units of quantification, the number of locations that measurements were obtained from, summary statistics and Canadian Council of Ministers of the Environment (CCME) Guidelines for the Protection of Aquatic Life (CCME 2000), where guidelines exist. The summary statistics provide the maximum, minimum and median values that were measured, without regard to site location or watershed. If there were measured values for all locations, the mean value is also provided.

				Number of	S				
Parameters	Method	EQL	Units	Stations	Maximum	Minimu m	Median	Mean	CCME Guidelines*
Temperature	Hydrolab		°C	35	11.4	2.82	5.42	5	narrative
рН	Hydrolab		units	35	8.76	5.72	7.59	8	6.5 - 9.0
Conductivity	Hydrolab		µS/cm	35	9.9	2.4	5.7	6	
Dissolved O ₂	Hydrolab		mg/L	35	12.9	8.91	11.11	11	5.5 - 9.5
Turbidity	Hydrolab	0.1	NTU	35	9.7	0.1	2.5	3	narrative
Stream Velocity	Pygmy Gurley		m/s	35	0.59	0.07	0.3	0.3	
Gradient	Inclinometer		degrees	34	6	0.5	< 1		
* CCME Guidelines for Protection of Aquatic Life (CCME 2000).									

 Table 3.13
 Summary of Water Quality Field Measurements

3.4.2 Laboratory Results

Summaries of the laboratory results for water chemistry for 35 stream crossing locations, grouped by watershed, are provided in Tables 3.14 to 3.18. Each parameter is listed, as is the method of determination, the limits of quantification, the units of quantification, the number of locations that quantifiable measurements were obtained from, summary statistics and CCME Guidelines for the Protection of Aquatic Life (CCME 2000), where guidelines exist. The summary statistics provide the maximum, minimum and median values that were measured. If there were measured values for all locations, the mean value is also provided, otherwise there can be no mean that includes unquantified results. Relevant field measurements are also included for the watersheds.

Most of the water quality values are typical for the region. Not surprisingly, many of the metals are at concentrations that are below the Estimated Quantitation Limit (EQL). The EQL is the lowest concentration that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions. The EQL is generally 5 to 10 times the Method Detection Limit.

In comparing the results with the CCME Guidelines for the Protection of Aquatic Life, some parameters must be noted. Aluminum concentrations in water often exceed the guideline in Newfoundland and Labrador waters without apparent consequence. The speciation of aluminum is the key to the actual toxicity and the toxicity may be reduced when aluminum ions are bound to organic or other compounds. Based on the results reported, aluminum exceeds the guideline on almost all of the samples examined in this study.

Although the quantified levels of cadmium are below measurement ($<0.3 \mu g/L$), the guideline is lower still (0.017 $\mu g/L$). One sample from the Eagle River watershed had a concentration of measurable cadmium, which was above the guideline.

The guideline for iron $(300 \,\mu\text{g/L})$ is based on effects to fish and invertebrate development. A total of 28 of the 35 stations had iron levels that exceeded the freshwater guideline, to levels as high as 1,800 and, 2,300 $\mu\text{g/L}$ (in Eagle watershed) and 3,200 $\mu\text{g/L}$ (at a station in the Kenamu watershed).

Selenium and silver each have CCME guideline levels (1.0 mg/L and $0.1 \mu \text{g/L}$, respectively) that are below the normal ELQ provided by the laboratory ($2 \mu \text{g/L}$ and $0.5 \mu \text{g/L}$, respectively); therefore, as with cadmium, the analytical results cannot be determined to guideline limits. However, all results were below the ELQ.

All other parameters that have CCME Guidelines for the Protection of Aquatic Life were determined to be below the guideline levels for all samples (i.e., arsenic, chromium, copper, lead, nickel, thallium and zinc). The guideline levels for these parameters are shown in Tables 3.14 to 3.18.

			Units	Samples with Quantifiable Levels			CCME		
Parameters	Method	EQL			Maximum	Minimu m	Median	Mean	Guidelines *
Temperature	Hydrolab		°C	2	7.83	7.79	7.81	8	narrative
рН	Hydrolab		units	2	8.76	7.99	8.375	8	6.5 - 9.0
Conductivity	Hydrolab		µS/cm	2	9.9	7.1	8.5	9	
Dissolved O ₂	Hydrolab		mg/L	2	10.14	9.28	9.71	10	5.5 - 9.5
Turbidity	Hydrolab	0.1	NTU	2	3.3	0.8	2.05	2	narrative
Alkalinity (as CaCO3)	COBAS	5	mg/L	2	11	8	9.5	10	
Total Dissolved Solids	Grav.	10	mg/L	2	50	40	45	45	
Aluminum	ICP-MS	10	μg/L	2	310	240	275	275	5 - 100
Antimony	ICP-MS	2	μg/L	0	< 2		< 2		
Arsenic	ICP-MS	2	μg/L	0	< 2		< 2		5
Barium	ICP-MS	5	μg/L	2	22	12	17	17	
Beryllium	ICP-MS	5	μg/L	0	< 5		< 5		
Bismuth	ICP-MS	2	μg/L	0	< 2		< 2		
Boron	ICP-MS	5	μg/L	2	11	9	< 5	10	
Cadmium	ICP-MS	0.3	μg/L	0	< 0.3		< 0.3		0.017
Chromium	ICP-MS	2	μg/L	0	< 2		< 2		8.9
Cobalt	ICP-MS	1	μg/L	0	< 1		< 1		
Copper	ICP-MS	2	μg/L	2	5	2	3.5	4	2 - 4
Iron	ICP-MS	20	μg/L	2	890	470	680	680	300
Lead	ICP-MS	0.5	μg/L	1	0.8	0.8	< 0.5		1 - 7
Manganese	ICP-MS	2	μg/L	2	20	12	16	16	
Molybdenum	ICP-MS	2	μg/L	0	< 2		< 2		
Nickel	ICP-MS	2	μg/L	0	< 2		< 2		25 - 150
Selenium	ICP-MS	2	μg/L	0	< 2		< 2		1.0
Silver	ICP-MS	0.5	μg/L	0	< 0.5		< 0.5		0.1
Strontium	ICP-MS	5	μg/L	2	22	14	18	18	
Thallium	ICP-MS	0.1	μg/L	0	< 0.1		< 0.1		0.8
Tin	ICP-MS	2	μg/L	0	< 2		< 2		
Titanium	ICP-MS	2	μg/L	2	8	2	5	5	
Uranium	ICP-MS	0.1	μg/L	1	0.1	0.1	< 0.1		
Vanadium	ICP-MS	2	μg/L	0	< 2		< 2		
Zinc	ICP-MS	2	μg/L	2	6	4	5	5.0	30
* CCME Guidelines for Protection of Aquatic Life (CCME 2000)									

Table 3.14 Water Chemistry Results for Two Samples from Churchill River Tributaries

			Units	Samples with Quantifiable Levels		CCME			
Parameters	Method	EQL			Maximum	Minimum	Median	Mean	Guidelines *
Temperature	Hydrolab		°C	5	5.88	5.39	5.49	6	narrative
pН	Hydrolab		units	5	8.6	7.97	8.5	8	6.5 - 9.0
Conductivity	Hydrolab		µS/cm	5	7	5.4	5.5	6	
Dissolved O ₂	Hydrolab		mg/L	5	12.67	11.04	11.23	12	5.5 - 9.5
Turbidity	Hydrolab	0.1	NTU	5	4.4	1.4	2.4	3	narrative
Alkalinity (as CaCO3)	COBAS	5	mg/L	5	9	6	7	7	
Total Dissolved Solids	Grav.	10	mg/L	5	50	30	40	38	
Aluminum	ICP-MS	10	μg/L	5	220	150	200	194	5 - 100
Antimony	ICP-MS	2	μg/L	0	< 2		< 2		
Arsenic	ICP-MS	2	μg/L	0	< 2		< 2		5
Barium	ICP-MS	5	μg/L	5	14	10	10	11	
Beryllium	ICP-MS	5	μg/L	0	< 5		< 5		
Bismuth	ICP-MS	2	μg/L	0	< 2		< 2		
Boron	ICP-MS	5	μg/L	1	5	5	< 5		
Cadmium	ICP-MS	0.3	μg/L	0	< 0.3		< 0.3		0.017
Chromium	ICP-MS	2	μg/L	0	< 2		< 2		8.9
Cobalt	ICP-MS	1	μg/L	0	< 1		< 1		
Copper	ICP-MS	2	μg/L	5	3	2	2	2	2 - 4
Iron	ICP-MS	20	μg/L	5	940	150	640	622	300
Lead	ICP-MS	0.5	μg/L	1	0.5	0.5	< 0.5		1 - 7
Manganese	ICP-MS	2	μg/L	5	20	2	8	10	
Molybdenum	ICP-MS	2	μg/L	0	< 2		< 2		
Nickel	ICP-MS	2	μg/L	1	2	2	< 2		25 - 150
Selenium	ICP-MS	2	μg/L	0	< 2		< 2		1.0
Silver	ICP-MS	0.5	μg/L	0	< 0.5		< 0.5		0.1
Strontium	ICP-MS	5	μg/L	5	24	16	17	18	
Thallium	ICP-MS	0.1	μg/L	0	< 0.1		< 0.1		0.8
Tin	ICP-MS	2	μg/L	0	< 2		< 2		
Titanium	ICP-MS	2	μg/L	5	4	2	3	3	
Uranium	ICP-MS	0.1	μg/L	1	0.2	0.2	< 0.1		
Vanadium	ICP-MS	2	μg/L	0	< 2		< 2		
Zinc	ICP-MS	2	µg/L	5	5	2	3	3.2	30
* CCME Guidelines for Protection of Aguatic Life (CCME 2000).									

Table 3.15 Water Chemistry Results for Five Samples from Traverspine River and Tributaries

_				Samples with						
Parameters	Method	EQL	Units	Quantifiable Levels	Maximum	Minimum	Median	Mean	CCME Guidelines *	
Temperature	Hydrolab		°C	7	6.95	4.58	6.33	6	narrative	
pН	Hydrolab		units	7	8.6	7.39	7.73	8	6.5 - 9.0	
Conductivity	Hydrolab		µS/cm	7	8.6	4.6	6.1	6		
Dissolved O ₂	Hydrolab		mg/L	7	12.72	8.93	10.86	11	5.5 - 9.5	
Turbidity	Hydrolab	0.1	NTU	7	9.7	0.5	1.1	3	narrative	
Alkalinity (as CaCO3)	COBAS	5	mg/L	7	11	6	8	8		
Total Dissolved Solids	Grav.	10	mg/L	7	30	20	20	24		
Aluminum	ICP-MS	10	μg/L	7	210	80	110	126	5 - 100	
Antimony	ICP-MS	2	μg/L	0	< 2		< 2			
Arsenic	ICP-MS	2	μg/L	0	< 2		< 2		5	
Barium	ICP-MS	5	μg/L	7	19	7	9	10		
Beryllium	ICP-MS	5	μg/L	0	< 5		< 5			
Bismuth	ICP-MS	2	μg/L	0	< 2		< 2			
Boron	ICP-MS	5	μg/L	0	< 5		< 5			
Cadmium	ICP-MS	0.3	μg/L	0	< 0.3		< 0.3		0.017	
Chromium	ICP-MS	2	μg/L	0	< 2		< 2		8.9	
Cobalt	ICP-MS	1	μg/L	1	1	< 1	< 1			
Copper	ICP-MS	2	μg/L	3	2	< 2	< 2		2 - 4	
Iron	ICP-MS	20	μg/L	7	3,200	110	450	787	300	
Lead	ICP-MS	0.5	μg/L	0	< 0.5		< 0.5		1 - 7	
Manganese	ICP-MS	2	μg/L	7	100	3	6	22		
Molybdenum	ICP-MS	2	μg/L	0	< 2		< 2			
Nickel	ICP-MS	2	μg/L	0	< 2		< 2		25 - 150	
Selenium	ICP-MS	2	μg/L	0	< 2		< 2		1.0	
Silver	ICP-MS	0.5	μg/L	0	< 0.5		< 0.5		0.1	
Strontium	ICP-MS	5	μg/L	7	19	11	15	15		
Thallium	ICP-MS	0.1	μg/L	0	< 0.1		< 0.1		0.8	
Tin	ICP-MS	2	μg/L	0	< 2		< 2			
Titanium	ICP-MS	2	μg/L	4	6	2	2			
Uranium	ICP-MS	0.1	μg/L	0	< 0.1		< 0.1			
Vanadium	ICP-MS	2	μg/L	0	< 2		< 2			
Zinc	ICP-MS	2	μg/L	7	4	2	2	2.6	30	
* CCME Guidelines for Protection of Aguatic Life (CCME 2000).										

Table 3.16 Water Chemistry Results for Seven Samples from Kenamu River and Tributaries

_			Units	Samples with Quantifiable Levels					
Parameters	Method	EQL			Maximum	Minimum	Median	Mean	CCME Guidelines *
Temperature	Hydrolab		°C	14	6.09	3.07	4.27	4	narrative
pН	Hydrolab		units	14	7.8	6.49	7.365	7	6.5 - 9.0
Conductivity	Hydrolab		µS/cm	14	9.2	2.4	6.2	6	
Dissolved O ₂	Hydrolab		mg/L	14	12.57	9.61	11.065	11	5.5 - 9.5
Turbidity	Hydrolab	0.1	NTU	14	9.2	1.4	3.15	4	narrative
Alkalinity (as CaCO3)	COBAS	5	mg/L	11	34	< 5	6		
Total Dissolved Solids	Grav.	10	mg/L	14	40	10	30	29	
Aluminum	ICP-MS	10	μg/L	14	170	80	100	111	5 - 100
Antimony	ICP-MS	2	μg/L	0	< 2		< 2		
Arsenic	ICP-MS	2	μg/L	0	< 2		< 2		5
Barium	ICP-MS	5	µg/L	7	8	< 5	5		
Beryllium	ICP-MS	5	μg/L	0	< 5		< 5		
Bismuth	ICP-MS	2	μg/L	0	< 2		< 2		
Boron	ICP-MS	5	μg/L	1	6	< 5	< 5		
Cadmium	ICP-MS	0.3	μg/L	1	0.3	< 0.3	< 0.3		0.017
Chromium	ICP-MS	2	µg/L	0	< 2		< 2		8.9
Cobalt	ICP-MS	1	μg/L	0	< 1		< 1		
Copper	ICP-MS	2	μg/L	5	37,348	< 2	< 2		2-4
Iron	ICP-MS	20	µg/L	14	2300	150	520	736	300
Lead	ICP-MS	0.5	μg/L	0	< 0.5		< 0.5		1 - 7
Manganese	ICP-MS	2	µg/L	14	71	6	10.5	16	
Molybdenum	ICP-MS	2	µg/L	0	< 2		< 2		
Nickel	ICP-MS	2	μg/L	0	< 2		< 2		25 - 150
Selenium	ICP-MS	2	μg/L	0	< 2		< 2		1.0
Silver	ICP-MS	0.5	μg/L	0	< 0.5		< 0.5		0.1
Strontium	ICP-MS	5	μg/L	14	18	7	12	12	
Thallium	ICP-MS	0.1	μg/L	0	< 0.1		< 0.1		0.8
Tin	ICP-MS	2	μg/L	0	< 2		< 2		
Titanium	ICP-MS	2	µg/L	3	3	< 2	< 2		
Uranium	ICP-MS	0.1	μg/L	0	< 0.1		< 0.1		
Vanadium	ICP-MS	2	μg/L	0	< 2		< 2		
Zinc	ICP-MS	2	μg/L	14	8	2	2.5	3.4	30
* CCME Guidelines for Protection of Aguatic Life (CCME 2000).									

Table 3.17 Water Chemistry Results for 14 Samples from Eagle River and Tributaries
_				Samples with	Summary Statistics				
Parameters	Method	EQL	Units	Quantifiable Levels	Maximum	Minimum	Median	Mean	CCME Guidelines *
Temperature	Hydrolab		°C	7	11.4	2.82	5.78	6	narrative
pН	Hydrolab		units	7	8.09	5.72	6.41	7	6.5 - 9.0
Conductivity	Hydrolab		µS/cm	7	8.1	4.1	4.8	5	
Dissolved O ₂	Hydrolab		mg/L	7	12.9	8.91	11.51	11	5.5 - 9.5
Turbidity	Hydrolab	0.1	NTU	7	6.7	0.1	3.4	3	narrative
Alkalinity (as CaCO3)	COBAS	5	mg/L	1	7	< 5	< 5		
Total Dissolved Solids	Grav.	10	mg/L	7	50	30	40	39	
Aluminum	ICP-MS	10	μg/L	7	370	130	280	261	5 - 100
Antimony	ICP-MS	2	μg/L	0	< 2		< 2		
Arsenic	ICP-MS	2	μg/L	0	< 2		< 2		5
Barium	ICP-MS	5	μg/L	7	11	6	9	9	
Beryllium	ICP-MS	5	μg/L	0	< 5		< 5		
Bismuth	ICP-MS	2	μg/L	0	< 2		< 2		
Boron	ICP-MS	5	μg/L	0	< 5		< 5		
Cadmium	ICP-MS	0.3	μg/L	0	< 0.3		< 0.3		0.017
Chromium	ICP-MS	2	μg/L	0	< 2		< 2		8.9
Cobalt	ICP-MS	1	μg/L	0	< 1		< 1		
Copper	ICP-MS	2	μg/L	3	2	< 2	< 2		2-4
Iron	ICP-MS	20	μg/L	7	940	420	650	640	300
Lead	ICP-MS	0.5	μg/L	0	< 0.5		< 0.5		1 - 7
Manganese	ICP-MS	2	μg/L	7	15	5	9	10	
Molybdenum	ICP-MS	2	μg/L	0	< 2		< 2		
Nickel	ICP-MS	2	μg/L	0	< 2		< 2		25 - 150
Selenium	ICP-MS	2	μg/L	0	< 2		< 2		1.0
Silver	ICP-MS	0.5	μg/L	0	< 0.5		< 0.5		0.1
Strontium	ICP-MS	5	μg/L	7	16	9	12	12	
Thallium	ICP-MS	0.1	μg/L	0	< 0.1		< 0.1		0.8
Tin	ICP-MS	2	μg/L	0	< 2		< 2		
Titanium	ICP-MS	2	μg/L	7	5	2	3	3	
Uranium	ICP-MS	0.1	μg/L	1	0.1		< 0.1		
Vanadium	ICP-MS	2	μg/L	0	< 2		< 2		
Zinc	ICP-MS	2	μg/L	7	8	3	4	4.3	30
* CCME Guidelines for Protection of Aguatic Life (CCME 2000).									

Table 3.18 Water Chemistry Results for Seven Samples from Paradise River and Tributaries

4.0 **REFERENCES**

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APPENDIX 1

FISH HABITAT FIELD STUDY TERMS OF REFERENCE

APPENDIX 1 TERMS OF REFERENCE Fish and Fish Habitat Component Study PHASE III TRANS LABRADOR HIGHWAY GOOSE BAY TO CARTWRIGHT JUNCTION

INTRODUCTION

The Department of Works, Services and Transportation has been required through the Provincial Environmental Assessment Process to prepare an Environmental Impact Statement for the Phase III of the Trans Labrador Highway between Happy Valley-Goose Bay and Cartwright Junction.

Potential effects of the construction of stream crossings on fish and fish habitat have been identified by DFO and the Innu Nation. In order to effectively determine these potential impacts and identify appropriate mitigative measures, it is necessary to gather the important site specific habitat information at each crossing.

RATIONALE / OBJECTIVES

To identify the habitat type and quality and to assess mitigation requirements (i.e., based on erodible soils, slopes) at each proposed stream crossing location for Phase Ill Trans Labrador Highway between Happy Valley-Goose Bay and Cartwright Junction.

STUDY AREA

The study area will consist of those locations where streams crossing structures will be constructed along the preferred route between Happy Valley-Goose Bay and Cartwright Junction.

STUDY METHODOLOGY OUTPUTS

A. FISH HABITAT SURVEYS

The consultant must produce a report providing the information required at each of the stream crossings as outlined in the Fish Habitat Survey section of DFO's Standard Methods Guide For Freshwater Fish and Fish Habitat Surveys In Newfoundland and Labrador: Rivers and Streams.

An aerial survey of all crossings is to be conducted following the Standard Methods Guide methodology and criteria. Digital Photographs are to be taken of all watercourse crossings and the area 250 m upstream and downstream of each crossing should be videotaped. This report must also include a sketch of each crossing including GPS coordinates. All data is to be recorded on standardized field data sheets.

Ground surveys are to be performed on all stream crossings except:

- 1) Bog drainage areas.
- 2) Areas of obvious type III and IV habitat.
- 3) Watercourses with a drainage area of less than 2 km^2 .

There are approximately **58** stream crossings requiring survey information. These streams have been identified using a 1:50,000 map as potential fish habitat (i.e. they are not simple drainage from a bog or hill). From preliminary examinations it appears that approximately 43 of the 58 stream crossings will require ground surveys based on the 2 km² drainage area factor. However, this number may vary once they are examined in the field due to other factors.

In these cases where there is no ground survey conducted, the rationale for not doing so should be welldocumented.

Specific information requirements of each crossing include but is not limited to;

- 1) Section Characteristics
 - section length and width (m)
 - water level (Low, Moderate, High)
 - water Temp (°C)
 - surface Velocity (m/s)
 - gradient (%)

Additional Information requirements would include:

Key watershed characteristics: should be provided including drainage area upstream, number of waterbodies upstream, distance to next watercourse downstream etc. These may have special importance in decision making.

Water quality measurements: will be gathered, including turbidity, conductivity, total dissolved solids, alkalinity, pH, dissolved oxygen.

2) Habitat Characteristics

This includes a quantification of each meso-habitat by estimating the proportion of various habitat types including pools, riffles, steadies, rapids and other types identified in the Standards Methods Guide.

3) Substrate

This includes an estimate of the portion (%) of the substrate types including bedrock, large boulders, small boulders, cobble/rubble, gravel/pebble, fines, and siltation as defined by the standard methods guide.

4) Cover

This includes the relative portion (%) of cover contained in the survey section and identified as one of three types, Overhanging, Instream (logs, substrate, debris, etc), or Instream vegetation, as defined by the standards methods guide.

5) Riparian Vegetation

This includes the identification, quantification and qualification of the vegetation growing on or near the banks of the stream crossing as defined by the standard methods guide.

6) Obstructions

This includes the identification and qualification of any obstructions located in the stream directly upstream or downstream of the crossing as described in the standard methods guide. A photograph is to be included with the description of the obstruction.

7) Sketch

A sketch outlining and identifying key features must also be completed at each crossing as described in the standard methods guide.

8) Habitat Classification

Each stream crossing must be classified under the Beak method as described in the standard methods guide.

The consultant must also provide a listing of all fish species present in each watershed area. This is to be completed through literature and background research, no original field research will be necessary.

The stream survey data generated from these surveys will be provided in a digital form on a CD-ROM in a format suitable for incorporation in a Geographic Information System (GIS). As a minimum, the information will consist of sufficient number of geographic coordinates of point locations, line locations and/or spatial extent, as appropriate of the features at the selected map scale. The information must be organized and labelled such that each unique feature is distinguishable from all other. Appropriate descriptive parameters of each data set such as projection, UTM Zone, datum and data collection method (e.g., GPS, aerial survey, etc.) must also be included. The format should, as a minimum, be in ASCII tabular format or in a spreadsheet or database format such as Lotus 1-2-3, or Excel.

B. FISH SURVEYS

Electrofishing surveys will be conducted at select stream crossings within the Paradise River, Eagle River, Kenamu River, and Traverspine River Watersheds. These surveys are to be conducted in accordance with the Fish Surveys section of DFO Standard Methods Guide For Freshwater Fish and Fish Habitat Surveys In Newfoundland and Labrador: Rivers and Streams.

These electrofishing surveys are to be completed on selected representative secondary and tertiary streams, Exact areas must be located within the 250 m upstream and 250 m downstream area surrounding the proposed stream crossing as outlined in the Fish Habitat Survey Section.

Location, methods (electrofishing, minnow traps, gillnets, etc.) and timing for surveys should be determined by the consultant in consultation with DFO, Innu Nation and other agencies/individuals as appropriate to maximize the value of the information collected. Two methods should be deployed in each sampling location.

APPENDIX 2

FISH HABITAT STUDY GPS WAY POINTS FOR STREAM CROSSINGS AND FIELD DATA SHEETS

	TRANS-LAB	RADOR HIC	GHWAY STREA	M CROSSING	G INFORMATI	ON: CARTWRIGHT JUNCTIO	N TO GOOSE BAY
	Stream No.	[1]	Sketch of the	area	Legue
	ate	[Ser7+ 23/0	7		;	
•	Surveyed by	Ī	3m/mH/HM	195		(1
	Watershed		Church	int ·			= /
	GPS Co-erd.		See List			2 800 m	/
	Aerial Photo 4	# .					
	Map Number		13F18			No was 1/)
	Photo Numbe	ers	#35			Florent	1
	Video		Ves		-	1 10-	1
	Area Surveye	d	500 m	~			
	Water Sample	es	NO'				
	-				·····	_	Comments
	Depth	0 - 1 m	1 - 2 m	>2 m	Unknown		
	Channel Width	0 - 2 m	2 - 5 m	5 - 20 m	>20 m		
ş) Jow Type	Steady	Riffle	<u>Ra</u> pids	Pools		
۰. ۱	Substrate			<u>Co</u> bble/			
	Type Beak	Eines	<u> </u>	<u>Ru</u> bble] <u>Bo</u> ulder[] <u>Bed</u> rock <u>Un</u> known]	
	Habitat	Type I	Type II	Type III	Type IV		
	Bank Matorial	Eines	<u>G</u> ravel/	<u>Co</u> bble/]		
	IVLATELIAI		<u>People</u>	Deen	Boulder	Begrock Unknown	
	Backslope	Gully	Gully	Gully	Stream	Plain Bog/Fen	
.~	Bank Vegetation	Bog	Grasses 5	Shrubs 25	Trees 70		
14	Cover 21%	Instream	Overhang lov.	Canopy	None]	
	Potential Obstruction	Falls	Rapids	Chute	Cascade		
-	Est.				-]	
	Gradient	0 - 1 %	1 - 3 %	3 - 5 %	>5 %	j	
r	Substrate fines le gravel 2: pebble 3 cobble 6	ess than 2 mm mm - 3 cm - 5 cm -13 cm 4-25 cm	Backslope Shallow gully Meduim gully Deep gully Forest stream	1 m 2-3 m $\geq 4 \text{ m}$ see over	Cover Instream Overhang Canopy	submergent/emergent vegetation grasses/shrubs within 1 m of wate trees > 1m above water can be expressed as % cover	r
	boulder 2	6 cm and up	Bog/Fen	see over			rage number

Ground Survey	
Ground survey completed	Ground Survey not Completed NO
Temperature	Crossing less than 2 km ² (on DWST list)
pH	Bog drainage
Conductivity	Type IV (steady) flow
Dissolved Oxygen	Type III (cascade/rapids) flow
Turbidity	No accessible by helicopter
Surface velocity	Other: No ground Survey required
Water Samples collected	for churchin River
Gradient (inclinometer)	

Sketch & Measurements of Surveyed Section(s)

LEGENDS / NOTES

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Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

Stream No.	[2		Sketch of the a	rea		·
`e	[Sept23/02	2	Cluse	infication	he low buy	ed or
Surveyed by	[Bw/mH/Hn	-105	big	able to	see streen	- at
Watershed	[Church: 1		3 lo	iations		
GPS Co-ord.	. [See list					
Aerial Photo	# [
Map Number	r [13 F/ 8					
Photo Numb	ers [36					
Video	[100					
Area Survey	ed [500m a	evial .				,
Water Samp	les [NO.					
							Comments
Depth	0 - 1 m	1.2	>2 m	Unknown			
Depen .			· · · · · · · · · · · · · · · · · · ·		1		
Channel							
Width	0 - 2 m[2 - 5 m	5 - 20 m	>20 m			·····
1	ſ			ا	1		
w Type	<u>St</u> eady	Riffle	<u>Ra</u> pids	Pools			· · · · · · · · · · · · · · · · · · ·
astrate	<u> </u>					רק ר	· · · ·
Туре	Fines	Gravel	Rubble ~	Boulder	Bedrock	Unknown	
nt-	5						
Beak							
Haditat	I ype I						
Bank 💡	ſ	<u>G</u> ravel/	<u>Co</u> bble/				
Material	Fines	Pebble	<u>Ru</u> bble	<u>Bo</u> ulder	Bedrock	Unknown	·
	Shallow[Medium[Deep	Forest	Flood		
Backslope	Gully	Gully	Gully	Stream	Plain	Bog/Fen	
Bank	ſ	I]	-	
Vegetation	Bog	Grasses 5	Shrubs 35	Trees 60			
	. r]		
Cover 91	lo Instream	Overhang 50	Capony 50	None			
Rotontial]] [-) 	
Obstruction	Ealla	n:					
	<u>ra</u> ns[<u>]m</u> ternititent[·
Est.							
Gradient	0 - 1 %[1-3%	3 - 5 %	>5 %	·		
Substrate		Backslope		Cover		·····	·····
fines	less than 2 n	nm Shallow gully	lm	Instream	submergent/em	ergent vegetation	
gravel	2mm - 3 cm	Meduim gully	2-3 m	Overhang	grasses/shrubs v	within 1 m of water	
pebble	3 - 5 cm	Deep gully	<u>></u> 4 m	Canopy	trees > 1m abov	e water	
cobble	6-13 cm	Forest stream	see over	. •	can be expresse	d as % cover	
rubble	14-25 cm	Flood plain	see over				Page number
ooulder	∠o cm and u	p Bog/Fen	see over				

.

TRANS-LABRADOR HIGHWAY STREAM CROSSI	NG INFORMATION: CARTWRIGHT JUNCTION TO GOOSE BAY
Ground Survey 并必	
Ground survey completed	Ground Survey not Completed NO
Temperature	Crossing less than 2 km ² (on DWST list)
pH	Bog drainage
Conductivity	Type IV (steady) flow
Dissolved Oxygen	Type III (cascade/rapids) flow
Turbidity	No accessible by helicopter
Surface velocity	Other:
Water Samples collected	
Gradient (inclinometer)	
Sketch & Measurements of Surveyed Section(s)	
	· (

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Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

Stream No.	3	Sketch of the area	
ate	Sept 23/02	Could not see stream	
Surveyed by	Bu/mH/Hm/PT		
Watershed	Churchill		
GPS Co-ord.	See list		
Aerial Photo #			
Map Number	13 F B		
Photo Numbers	37	•	
Video	Yeg .		· · · · ·
Area Surveyed	500 m		
Water Samples	NO		<u></u>
·····			Comments
Depth 0-1 m	1 - 2 m >2 m	Unknown	
Channel			
Width 02 m	2 - 5 m 5 - 20 m	>20 m	
Now Type Steady	Riffle Ravids	Pools	
Substrate			
Type <u>Fines</u>	<u>G</u> ravel <u>Ru</u> bble	<u>Bo</u> ulder <u>Bed</u> rock <u>Unknown</u>	
Beak			
Habitat Type I	Type II	Type IV	
Bank	<u>G</u> ravel/ <u>Co</u> bble/		
Material Fines	Pebble <u>Ru</u> bble	Boulder Bedrock Unknown	
Backslope Gully	Gully Gully	Stream Plain Bog/Fen	
Bank			
Vegetation <u>Bog</u>	<u>Gras</u> ses <u>Sh</u> rubs	Trees	
Cover 100° 3	Overhang 20 Canopy 80	None	
Potential			
Obstruction <u>Falls</u>	<u>Rapids</u> <u>Ch</u> ute	<u>Cascade</u> <u>Intermittent</u> None	
Est. Gradient 0 - 1 %	1 - 3 % 3 - 5 %	>5 %	
Substrate fines less than 2 gravel 2mm - 3 cm pebble 3 - 5 cm cobble 6-13 cm rubble 14-25 cm	Backslope mm Shallow gully 1 m n Meduim gully 2-3 m Deep gully ≥4 m Forest stream see over Flood plain see over	Cover Instream submergent/emergent vegetation Overhang grasses/shrubs within 1 m of water Canopy trees > 1m above water can be expressed as % cover	Page number
boulder 26 cm and	up Bog/Fen see over		

TRANS-LABRADOR HIGHWAY STREAM CROSSIN	G INFORMATION: CARTWRIGHT JUNCTION TO GOOSE BAY
Ground Survey Completed	Ground Survey not Completed NO
Temperature	Crossing less than 2 km ² (on DWST list)
pH Conductivity	Bog drainage Type IV (steady) flow
Dissolved Oxygen	Type III (cascade/rapids) flow No accessible by helicopter
Surface velocity	Other:
Water Samples collected	
Sketch & Measurements of Surveyed Section(s)	

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Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

Stream No.		4		Sketch of the	area	
Jate		Sep+23/02	-			1
Surveyed by	y	BW/mH/HI	NPJ	C (45=	to view stream	briefly in
Watershed	ĺ	Churc	hill	4	discrete location	
GPS Co-orc	ı.	See list		1 7		
Aerial Phot	o #					
Map Numbe	er	137/1		· · ·		
Photo Numi	bers	38				
Video	[Yes				
Area Survey	ved [500 m aer	al.			
Water Samp	oles	No				
<u>_</u>			<u> </u>	- <u></u>		Comments
Depth	0 - 1 m	1 - 2 m	>2 m	Unknown		
Channel	[-	······································
Width	0 - 2 m	∠ 2 - 5 m	5 - 20 m	>20 m		
]]low Type	<u>St</u> eady	Riffle	<u>Ra</u> pids	Pools]	
Substrate	Γ		<u>Cobble/</u>			
Type	<u>F</u> ines		Rubble	<u>Bo</u> ulder	<u>Bed</u> rock <u>Un</u> known	
Habitat	Type I	Type II	Type III	Type IV		
Bank	ſ	Gravel/	<u>Cobble</u> /			
Material	Fines	<u>P</u> ebble	<u>Ru</u> bble	<u>Bo</u> ulder	Bedrock Unknown	
Backslope	Shallow Gully	· Medium	Deep	Forest	Flood	
Bank	jany r			Stream] Plain Bog/Fen	
Vegetation	Bog	Grasses	Shrubs 20	Trees 80		
Cover 980	Instream	Overhang 50	Canopy 50	None		
Potential	r r		, (1		┘ ┐ ┍──┐ ┍─	_
Obstruction	Falls	Rapids	<u>Ch</u> ute	<u>Ca</u> scade	Intermittent None	
Est.	Γ		[]	[1	
Gradient	0 - 1 %	1 - 3 %	3 - 5 %	>5 %		
Substrate fines gravel pebble cobble rubble boulder	less than 2 m 2mm - 3 cm 3 - 5 cm 6-13 cm 14-25 cm 26 cm and m	Backslope Im Shallow gully Meduim gully Deep gully Forest stream Flood plain	1 m 2-3 m 2-4 m see over see over	Cover Instream Overhang Canopy	submergent/emergent vegetation grasses/shrubs within 1 m of w trees > 1m above water can be expressed as % cover	n ater Page number
		- Dogron				

TRANS-LABRADOR HIGHWAY STREAM	CROSSING	INFORM	ATION: CARTW	VRIGHT Л	JNCTION '	TO GOOSE BAY
Cround Survey	#4			Car	it la	di
Ground survey completed	G	Ground Sur	vey not Complete	ON		
) Temperature	\exists		Crossing less than	$n 2 \text{ km}^2$ (on)	DWST list)	
pH			Bog drainage			
Conductivity			Type IV (steady)	flow		
Dissolved Oxygen			Type III (cascade	/rapids) flow	,	
Turbidity			No accessible by	helicopter		
Surface velocity			Other:	•		······································
Water Samples collected]					
Gradient (inclinometer)						
Sketch & Measurements of Surveyed Section	(s)					
				upt	887	Xing
						<u> </u>
		-				
) }						

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Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

Stream No.		5			Sketch of the	area			
ite		Sept231	02		Carit Se stream at all.				
Surveyed by		Bu/m+	1 Hm PT						
Watershed		<u> </u>	vchill		took photos and Video of				
GPS Co-ord	. [See	115+		tuh	me Atrea	~ (5 50	posed	
Aerial Photo	#]		5e locatod	•		
Map Numbe	r	13F/	·····]	spru	ie and 5	hrubs	at	
Photo Numb	ers	Ŧ3°	1]	-the	adate of 2	bogs	•	
Video		Ye4	-						
Area Survey	ed	50	om :				,		
Water Samp	les	Ň	0						
r			· · · · · · · · · · · · · · · · · · ·			· · · · · · · · · · · · · · · · · · ·		Comments	
Denth	0 - 1 m	1-2 п	>2	"	Linknown	7			
Channel		^		"L] 0	ן ר			
Width	0 - 2 m	2 - 5 n	ы <u>5~20</u> п		>20 m				
	U] 20[]			
Jow Type	<u>St</u> eady	<u>Ri</u> ffle	Rapic	ls	Pools				
Substrate]		Cobbl	e/[] [ריין ר			
Туре	<u>F</u> ines	<u> </u>	l <u>Ru</u> bb	le	<u>Bo</u> ulder	Bedrock Un	known		
Beak	ſ]]			
Habitat	Type I	Туре I	I Type I	II	Type IV	J			
Bank	[Gravel	<u>Co</u> bbl	e/] [
Material	Eines	Pebble	e <u>Ru</u> bb	le	<u>Bo</u> ulder	Bedrock Unk	cnown		
	Shallow	Mediun	n Dee	p	Forest	Flood			
Backslope	Gully	Gull	y Guli	у	Stream	Plain B	og/Fen		
Bank	_ [
Vegetation	<u>Bog</u>	<u>Gras</u> ses	s <u>Sh</u> rut	s[<u> </u>				
Cover	Instream	Overhand	Салол	v	None				
Potential	1.101.01.11			<u></u> ر		י קייד נ			
Obstruction	<u>Fa</u> lls	Rapid	s <u>Chu</u>	e	Cascade	Intermittent	None		
Est.]			[]			
Gradient	0 - 1 %	1 - 3 %	3-59	6	>5 %				
Substrate fines gravel pebble cobble rubble boulder	less than 2 r 2mm - 3 cm 3 - 5 cm 6-13 cm 14-25 cm 26 cm and u	Backslope nm Shallow g Meduim g Deep g Vorest stre Flood p p Bog	ally 1 m ally 2-3 m ally \geq 4 m cam see over lain see over /Fen see over		Cover Instream Overhang Canopy	submergent/emergent grasses/shrubs within trees > 1m above wat can be expressed as %	vegetation 1 m of water er 6 cover	Page number	

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TRANS-LABRADOR HIGHWAY STREAM CROSSIN	G INFORMATION: CARTWRIGHT JUNCTION TO GOOSE BAY
Ground Survey completed	Ground Survey not Completed ND
Temperature	Crossing less than 2 km ² (on DWST list)
pH	Bog drainage
Conductivity	Type IV (steady) flow
Dissolved Oxygen	Type III (cascade/rapids) flow
Turbidity	No accessible by helicopter
Surface velocity	Other: Not ON List'
Water Samples collected	
Gradient (inclinometer)	

Sketch & Measurements of Surveyed Section(s)

LEGENDS / NOTES

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Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

Stream No.	#6.	Sketch of the area	
Jate	Sep+23/02	could see work little 5	stream
Surveyed by	BW/mH/HM/PT		have
Watershed	Churchi II	Cluckitication buside or	briefly
GPS Co-ord.	See)15+	able to discrete área	a .> "
Aerial Photo #			
Map Number	137/1		
Photo Numbers	40		
Video	Yes.		
Area Surveyed	570 m		
Water Samples	N/O		
	· · · · · · · · · · · · · · · · · · ·		Comments
Depth 0-1m			
Channel			
Width 0.2 m	V 2.5m 5.20m	>20 m	
l Jlow Type <u>St</u> eady	<u>Riffle</u> <u>Ra</u> pids	Pools	
Substrate	<u>Cobble/</u>		
Type <u>Fines</u>	<u>G</u> ravel <u>Ru</u> bble	<u>Bo</u> ulder <u>Bed</u> rock <u>Un</u> known	
Beak Habitat Type I			
Bank			
Material <u>Fines</u>	Pebble Rubble	Boulder Bedrock Unknown	
Shallow	Medium Deep	Forest Flood	
Backstope Gully		Stream Plain Bog/Fen	
Vegetation <u>Bog</u>	Grasses Shrubs 50	Trees 50	
- pl - *			
Cover Qala Instream	Overhang 50 Canopy 50	None	
Potential			
Obstruction Falls	<u>Ra</u> pids <u>Ch</u> ute	<u>Ca</u> scade <u>Int</u> ermittent None	
Est.			
Gradient 0 - 1 %	1-3% 3-5%	>5 %	
Substrate	Packglone	Cover	[]
fines less than 2	num Shallow gully 1 m	Instream submergent/emergent vegetation	
gravel 2mm - 3 cm	n Meduim gully 2-3 m	Overhang grasses/shrubs within 1 m of water	
pebble 3 - 5 cm	Deep gully ≥ 4 m	Canopy trees > 1m above water	
cobble 6-13 cm	Forest stream see over	can be expressed as % cover	
boulder 26 cm and	riooa piain see over		Page number

TRANS-LABRADOR HIGHWAY STREAM CROSSI	NG INFORMATION: CARTWRIGHT JUNCTION TO GOOSE BAY
Ground Survey #6.	
Ground survey completed	Ground Survey not Completed No
Temperature	Crossing less than 2 km ² (on DWST list)
pH	Bog drainage
Conductivity	Type IV (steady) flow
Dissolved Oxygen	Type III (cascade/rapids) flow
Turbidity	No accessible by helicopter
Surface velocity	Other: Not on List
Water Samples collected	
Gradient (inclinometer)	

Sketch & Measurements of Surveyed Section(s)

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Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

Stream No.	#7	Sketch of the area	
Date	Sept 23/02		
Surveyed by	Bw/mH/Hm/pJ	Limited amount of stree	W DISIBLE
Watershed	Churchill	1 1- 2.50	m
GPS Co-ord.	Sex list	TYPEIT	
Aerial Photo #		RIFFLE	
Map Number	13 F/1	$f_{10}\omega$ $-f_{-}$ $-f_{+}\omega$	
Photo Numbers	41	r' II vittle	
Video	125	TV Steady	
Area Surveyed	500 m aerial.		1 ma
Water Samples	No ·		
[Comments
Depth 0 - 1	m 1 - 2 m >2 m	Unknown	
Channel			
Width 0 - 2	2 m 2 - 5 m 5 - 20 m	>20 m	
Jow Type <u>St</u> ea	$\operatorname{ady}^{4\circ}$ $\operatorname{Riffle}^{6\circ}$ Rapids	Pools	
Substrate	<u>Co</u> bble/		
Type <u>F</u> ii	nes <u>G</u> ravel <u>Rubble</u>	<u>Bo</u> ulder <u>Bed</u> rock <u>Unknown</u>	
Beak Habitat Tum		Type IV	
Bank	Gravel/ Cobble/		
Material <u>F</u> in	nes Pebble Rubble	Boulder Bedrock Unknown	
Shall	low Medium Deep	Forest Flood	
Backslope Gu	illy Gully Gully	Stream Plain Bog/Fen	
Bank			
Vegetation <u>B</u>	<u>sog</u> <u>Gras</u> ses <u>Sh</u> rubs	<u>Ir</u> ecs	
Cover aslo Instrea	am Overhang 50 Canopy 5	o None	
Potential			
Obstruction Fa	alls <u>Rapids</u> <u>Chute</u>	<u>Cascade</u> <u>Intermittent</u> None	
Est. Gradient 0.1	94 1 3 11/ 2 5 11/	>5 0/	
Substrate fines less than gravel 2mm - 3 pebble 3 - 5 cm cobble 6-13 cm rubble 14-25 cr	Backslope 2 mm Shallow guily 1 m 3 cm Meduim gully $2-3 \text{ m}$ 4 m Deep gully $\geq 4 \text{ m}$ 4 Forest stream see over 1 m Flood plain	Cover Instream submergent/emergent vegetation Overhang grasses/shrubs within 1 m of water Canopy trees > 1m above water can be expressed as % cover	Page number
boulder 26 cm ar	nd up Bog/Fen see over		ge lipshoot

TRANS-LABRADOR HIGHWAY STREAM CROSSING	G INFORMATION: CARTWRIGHT JUNCTION TO GOOSE BAY
Ground Survey completed	Ground Survey not Completed NO
f Temperature	Crossing less than 2 km ² (on DWST list)
pH	Bog drainage
Conductivity	Type IV (steady) flow
Dissolved Oxygen	Type III (cascade/rapids) flow
Turbidity	No accessible by helicopter
Surface velocity	Other: (
Water Samples collected	
Gradient (inclinometer)	

Sketch & Measurements of Surveyed Section(s)

LEGENDS / NOTES

Backslope

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B # Stream No. Sketch of the area Jate 02 2+23888 chopper. Landing. (ouid not view stream enough to classify. Surveyed by mH/Hm/p-Watershed hurchill See 1154 GPS Co-ord. L Aerial Photo # Refer to Ground Survey for 38 Map Number Xing Info. # 42 Photo Numbers Video Jes Area Surveyed 500 m Perial 50m dra Yes Water Samples Comments 0 - 1 m >2 m Unknown Depth 1 - 2 m Channel Width 0 - 2 m 5 - 20 m >20 m 2 - 5 m Riffle low Type **Rapids** Steady Pools Substrate Cobble/ Unknown Туре Fines Gravel Rubble Boulder Bedrock Beak Habitat Type IV Type I Type II Type III Bank Gravel/ Cobble/ Material Fines Pebble Unknown <u>Rubble</u> Boulder Bedrock Shallow Medium Deep Flood Forest Backslope Gully Gully Gullv Stream Plain Bog/Fen Bank Trees 40 Shrubs 60 Vegetation Bog Grasses Cover \oolo Instream Canopy 40 Overhang None Potential Obstruction Falls **Rapids** <u>Ch</u>ute Cascade Intermittent None Est. Gradient 0 - 1 % 1 - 3 % 3 - 5 % >5 % Substrate Backslope Cover fines less than 2 mm Shallow gully 1 m Instream submergent/emergent vegetation gravel 2mm - 3 cm Meduim gully 2-3 m Overhang grasses/shrubs within 1 m of water pebble 3 - 5 cm Deep gully $\geq 4 \text{ m}$ Canopy trees > 1m above water cobble 6-13 cm Forest stream see over can be expressed as % cover rubble .14-25 cm Flood plain see over Page number boulder 26 cm and up Bog/Fen see over . چې



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Backslope

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Stream No.			#9		Sketch of the	area	. <u> </u>				
ate			Sept 2	3/02	Stre	could no	+ 6+ 5	ee n			
Surveyed by			Bu/mH/	Hm/pJ	clea	r enough t	o class	ify from			
Watershed			Church	.: IN	+40						
GPS Co-ord			See 11	5+	The curr.						
Aerial Photo	#				Refe	r to Gra	and Si	arrey			
Map Numbe	r		13F/1		Lor	Crussing	deser	ption			
Photo Numb	ers		43		U.	\mathcal{I}					
Video			Ves								
Area Survey	ed	500	in aerial.	5 om of vour							
Water Samp	les		yes.								
								Comments			
Depth	0 - 1 m		1 - 2 m	>2 m		7					
Channel			· · ····	,]			·			
Width	0 - 2 m	\checkmark	2 - 5 m	5 - 20 m	>20 m						
						- 					
w Type	<u>St</u> eady		<u>Ri</u> ffle	<u>Ra</u> pids	Pools						
Substrate			[<u>Co</u> bble/							
Туре	<u>F</u> ines		<u>G</u> ravel	<u>Ru</u> bble	<u>Bo</u> ulder	Bedrock Un	known				
Beak]					
Habitat	Туре І		Type II[Type III] Type I∨[
Bank	F ·		<u>G</u> ravel/	<u>Co</u> bble/							
INTALCITAL	Challes				Boulder						
Backslope	Gully		Gully	Gully	Stream	Plain B	og/Fen				
Bank	j] 0]]					
Vegetation	Bog		<u>Gras</u> ses	Shrubs 40	Trees 60						
Cover 109	• Instream			Canopy 60	None]					
Potential] [
Obstruction	<u>Fa</u> lls		<u>Ra</u> pids	<u>Ch</u> ute	<u>Ca</u> scade] <u>Int</u> ermittent	None				
Est.	0 1 94		1.2.0/]					
	0-1%		1 - 3 %	J 3-3%							
Substrate	1		Backslope		Cover						
Tines	less than 2	mm	Shallow gully Moduine and		Instream	submergent/emergent	vegetation				
pebble	3 - 5 cm	۰.	Deen oully	2-5 m >4 m	Canony	grasses/smuos within trees > im above wat	inn oi water er				
, cobble	6-13 cm		Forest stream	see over	Sanopy	can be expressed as 9	6.COVCT				
) rubble	14-25 cm		Flood plain	see over				Page number			
boulder	26 cm and i	ıp	Bog/Fen	see over							

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TRANS-LABRADOR HIGHWAY S	TREAM CROSSIN	G INFORMATION: CA	ARTWRIGHT JUN	CTION TO GOOSE BAY
Ground Survey Ground Survey completed Temperatu P Conductivi Dissolved Oxyge Turbidi Surface veloci Water Samples collector	TREAM CROSSIN 479. 767.83 18.76 19.76 19.76 19.76 19.76 19.76 19.76 10.00 10.0	Ground Survey not Con Ground Survey not Con Crossing les Bog drainag Type IV (st Type III (ca No accessib Other:	ARTWRIGHT JUN npleted ss than 2 km ² (on DW ge eady) flow uscade/rapids) flow ole by helicopter	CTION TO GOOSE BAY Landing Spot 420m VST list) brow cv-ssing
Sketch & Measurements of Surveyed Sapt 27/02 UDJ 50% THE THES 45 Alder D= 5 Moss/anacs Concer 160% Concer 160% Concer 160% Concer 160% Concer 160%	$\frac{1}{1} \text{ Section(s)}$	-pt 891 5 892 c Can 20-114 brom 59 photof type II but Riffle Flow '50 m mes Sand/mud	tvean cross chopper hand Access an inpetrean intent ow throughout Flow Swptz	nom brom sat crossing

Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

Stream No.			10		Sketch of the a	irea		
ate	ĺ		Son+ 23/	02	Strea	m court	not be i	haman
Surveyed by			Bw/mH/Hn	PJ PJ	Clean	enough	to classi	E¥
Watershed			Church	; <u>))</u>		-		
GPS Co-ord	. [See lis	*				
Aerial Photo	#							
Map Numbe	r		13 F/	1				
Photo Numb	ers		44 4	45				
Video			Yes					
Area Survey	ed		500m .					
Water Samp	les		NO.		[
						··		Comments
Depth	0 - 1 m		1 - 2 m	>2 m	Unknown			
Channel) <u></u>]		
Width	0 - 2 m	ν	2 - 5 m	5 - 20 m	>20 m]		
bw Type	Steady		P. ffla	Renide	Reals			
Substrate	<u>Gi</u> cauy			Cobble/] FOOIS[)]		
Туре	Fines		<u>G</u> ravel	<u>Ru</u> bble	<u>Bo</u> ulder	Bedrock	<u>Un</u> known	
Beak]		
Habitat	Type I			Type III]	_	
Bank Material	Fines		<u>G</u> ravel/ Pebble	<u>Co</u> bble/ Rubble	Boulder	Bedrock	Unknown	
	Shallow	لـــــ ز	Medium	Deep[Forest	Flood		
Backslope	Gully		Gully	Gully	Stream] Plain	Bog/Fen	
Bank Vogetation	Deed	$\overline{\mathbf{V}}$				1		
vegetation	<u>ן פסמ</u> ו		<u>Gras</u> ses	<u>Sh</u> rubs[<u></u>	J I		
Cover 100	lo _{Instream}]	Overhang P	Canopy 50	None]		
Potential	r-11.]		
Est	<u>1-a</u> 115			<u>Ch</u> ute	<u>Ca</u> scade	<u>jintermittent</u>	None	
Gradient	0 - 1 %		1 - 3 %	3 - 5 %	>5 %			
Substrate			Backslope		Cover			
fines	less than 2 r	nm	Shallow gully – Meduim multy	1 m 2 3 m	Instream	submergent/eme	rgent vegetation	
pebble	3 - 5 cm	L	Deep gully	≥-2 m ≥.4 m	Canopy	trees > 1m above	e water	
cobble	6-13 cm		Forest stream	see over	F- J	can be expressed	l as % cover	
rubble boulder	14-25 cm 26 cm and v	תו	Flood plain Bow/liep	see over				Page number
5561661		·Ρ	DORVER	add Uvel				· · · · · · · · · · · · · · · · · · ·

TRANS-LABRADOR HIGHWAY STREAM CROSSING INFORMATION: CARTWRIGHT JUNCTION TO GOOSE BAY #10 Ground Survey Ground survey completed Ground Survey not Completed Crossing less than 2 km² (on DWST list) Temperature pН Bog drainage Conductivity Type IV (steady) flow Dissolved Oxygen Type III (cascade/rapids) flow Turbidity No accessible by helicopter Surface velocity Other: Water Samples collected

Sketch & Measurements of Surveyed Section(s)

Gradient (inclinometer)

LEGENDS / NOTES

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Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

Stream No.	11	Sketch of the area	
Date	Sept 23/02	see very little of stre	Ame
Surveyed by	BW/mH/Hm/PJ		he mensed
Watershed	Churchill	Streem Could not	at as ()
GPS Co-ord.	See list.	Well enough to	Classif 7
Aerial Photo #		j j	
Map Number	13 F/1		
Photo Numbers	#46.		
Video	yes		
Area Surveyed	500m Aerul		
Water Samples	No ·		
ſ			Comments
Depth 0-1 m	✓ 1 - 2 m >2 m	Unknown	
Channel			
Width 0-2 m	2 - 5 m 5 - 20 m	>20 m	
Jlow Type <u>St</u> eady	<u>Ri</u> ffle <u>Ra</u> pids	Pools	
Substrate	<u>Cobble/</u>		
Type <u>Fines</u>	<u>G</u> ravel <u>Ru</u> bble	<u>Bo</u> ulder <u>Bed</u> rock <u>Un</u> known	·
Beak			
Habitat Type I	Type II Type III	Type IV	
Bank	<u>Gravel</u> <u>Co</u> bble/		
Material <u>Fines</u>	PebbleRubble	Boulder Bedrock Unknown	
Shallow	Medium Deep	Forest Flood	
Backslope Gully	Gully Gully	Stream Plain Bog/Fen	
Bank			
Vegetation <u>Bog</u>	Grasses Shrubs 50	<u> Trees</u> 50	
olo.			
Cover Vo Instream	Overhang U Canopy	0 None	
Potential			
Obstruction Falls	<u>Rapids</u> <u>Ch</u> ute	<u>Ca</u> scade <u>Int</u> ermittent None	
Est.			
Gradient 0 - 1 %	1 - 3 % 3 - 5 %	>5 %	
Substrate	Backslone	Cover	L
fines less than 2	mm Shallow gully 1 m	Instream submergent/emergent vegetation	
gravel 2mm - 3 cr	n Meduim gully 2-3 m	Overhang grasses/shrubs within 1 m of water	
pebble 3 - 5 cm	Deep gully ≥ 4 m	Canopy trees > 1m above water	
rubble 14-25 cm	Forest stream see over Flood plain see over	can be expressed as % cover	Page number
boulder 26 cm and	up Bog/Fen see over		

TRANS-LABRADOR HIGHWAY STREAM CROSSI	NG INFORMATION: CARTWRIGHT JUNCTION TO GOOSE BAY
Ground survey completed	Ground Survey not Completed
Temperature	Crossing less than 2 km^2 (on DWST list)
pH	Bog drainage
Conductivity	Type IV (steady) flow
Dissolved Oxygen	Type III (cascade/rapids) flow
Turbidity	No accessible by helicopter
Surface velocity	Other:
Water Samples collected	
Gradient (inclinometer)	
Sketch & Measurements of Surveyed Section(s)	
()	

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Backslope

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Stream No.	[12		Sketch of the	area	· · · · · · · · · · · · · · · · · · ·
ate	. [Sept 23/02		Stream	~ could not be seen	clear
Surveyed by	[Bu/mH/Hm	1 PJ	enou	gh to clussify.	
Watershed	[Churchi	11			
GPS Co-ord.	[See lis	;+			
Aerial Photo #	¥ [·····				
Map Number	[13 F/1				
Photo Numbe	rs [# 47				
Video	[yes.				
Area Surveye	d [500m A	certal			
Water Sample	es	NO.				
1						Comments
Depth	0 - 1 m	1 - 2 m	>2 m	Unknown		
Channel	[
Width	0 - 2 m	X 2 - 5 m	5 - 20 m	>20 m		
Now Type	Steady	Riffle	Rapids	Pools		
Substrate	<u>] (</u> 000 <u>70</u>		Cobble/			
Туре	Fines	<u>G</u> ravel	Rubble	Boulder	Bedrock Unknown	
Beak]]	
Habitat	Type I	Type II	Type III	Type IV]	
Bank	Finad	Gravel/	Cobble/	Douldar	Bedroek Unknown	
	<u>Entes</u>		Deep	<u> </u>		
Backslope	Gully	Gully	Gully	Stream	Plain Bog/Fen	
Bank	ĺ				- <u></u>	
Vegetation	Bog	Grasses	Shrubs 40	Trees b	Ż	
Cover 100%	Instream	Overhang 30	Canopy 70	None		
Potential	[\neg \Box				
Obstruction	<u>Fa</u> lls	Rapids	<u>Ch</u> ute	<u>Ca</u> scade	Intermittent None	
Est.	0 1 0/		2 5 0/	>5.0/		
Gradient	U-1%		3-2%	>> %]	<u> </u>
Substrate fines 1	ess than 2 r	Backslope		Cover	submergent/emergent vegetation	
gravel 2	lmm - 3 cm	Meduim gully 2	2-3 m	Overhang	grasses/shrubs within 1 m of water	
pebble 3	- 5 cm	Deep gully	<u>></u> 4 m	Canopy	trees > 1m above water	
) cobble 6	-13 cm 4-25 cm	Forest stream s	ee over		can be expressed as % cover	Page number
boulder 2	6 cm and u	p Bog/Fen s	ee over			
						1 1

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TRANS-LABRADOR HIGHWAY STREA	M CROSSIN	G INFORMA	TION: CARTW	VRIGHT	TUNCTION T	TO GOOSE BAY	
Ground Survey Ground survey completed	12.	Ground Surv	ey not Completed	ما، سم s ه	por by	50 mai	gai
Temperature			Crossing less than	$n 2 \text{ km}^2$ (or	n DWST list)	SPY	ue
pH		[] I	Bog drainage			alla	2.40.4
Conductivity]	Type IV (steady)	flow			
Dissolved Oxygen			Type III (cascade	/rapids) flo	ow	-	
Turbidity	· ·		No accessible by I	helicopter		~	
Surface velocity			Other:				I.
Water Samples collected							
Gradient (inclinometer)							
Sketch & Measurements of Surveyed Sectio	on(s)		, upt	<u> </u>	storean	orossing	
		•					
				· · ·			
,)							
• •							
			•				
· · ·							

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Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

Stream No.	Į		13		Sketch of the a	rea	
Date		(Sept23	102		t	1-250m
Surveyed by	[-9	w/mn/1	Im/pJ		RIFFIC.	
Watershed	Į	_	Traverspi	ne		Flow	
GPS Co-ord.	(See 119	54			
Aerial Photo	#						
Map Number	- [13 F	71			- X (00)
Photo Numbe	ers		48			I	
Video			Yes			KIFFIe.	/
Area Surveye	ed	560	maerial,	50m ground			
Water Sampl	les		Yes.]	[- 250 m
ſ			·····				
Depth	0-1 m	~	1 - 2 m	>2 m	Unknown		-
Channel					l L]	
Width	0 - 2 m		2 - 5 m	5 - 20 m	>20 m]	
1				i î		1	
pw Type	<u>St</u> eady		Riffle	<u>Ra</u> pids	Pools		
Substrate	[<u>Cobble</u>	A DO		
Туре	Fines		<u>G</u> ravel	<u>Ru</u> bble	<u>Boulder</u>	Bedrock Unknown	
Beak				ł			
Habitat	Type I		Type II	Type III	Type IV]	
Bank			<u>G</u> ravel/	<u>Co</u> bble/] [
Material	<u>F</u> ines		Pebble	<u>Ru</u> bble	Boulder	Bedrock Unknown	
	Shallow	·	Medium	Deep	Forest	Flood	
Backslope	Gully		Gully	Gully	Stream] Plain Bog/Fen	
Bank			[
Vegetation	Bog		Grasses	Shrubs 40	<u><u>Tr</u>ees</u>]	
Cover on	o Instream		Overhang 30	Canopy 10	None		
Potential		[]	Γ] [] [
Obstruction	<u>Fa</u> lls		<u>Ra</u> pids	<u>Ch</u> ute	<u>Ca</u> scade	Intermittent None	
Est.			[} [—	ן ר]	l i
Gradient	0 - 1 %		1 - 3 %	3 - 5 %	>5 %		
Substrate fines gravel pebble cobble / rubble boulder	less than 2 r 2mm - 3 cn 3 - 5 cm 6-13 cm 14-25 cm 26 cm and r	mm 1	Backslope Shallow gully Meduim gully Deep gully Forest stream Flood plain Bog/Fen	1 m 2-3 m ≥4 m see over see over see over	Cover Instream Overhang Canopy	submergent/emergent vegetation grasses/shrubs within 1 m of wate trees > 1m above water can be expressed as % cover	r Page number

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Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

Stream No.			14		Sketch of the	area					
Date		Se	p + 23	102			0) 2	50 m .	onfreed
Surveyed by		Bul	mH/r	Im/pJ		ļ	KIF	Fler	Boul	der more pro	
Watershed		Tre	mersp	ine				-		Flow	
GPS Co-ord.			See 1	15+	Averals a	pper	<u> </u>		- 100	~	
Aerial Photo	#				move pr	onsunced	([±] /:	I			
Map Number	r		13 F/		loom abou	e -	- π/	Ĩ	- x		
Photo Numb	ers		49		T period o	0)		100	m '	
Video			4.05				L I	-	Rou	Her more	
Area Survey	ed	5001	r aer.	al			(Rif	Fle-	0.0	pronounc	
Water Sampl	les		No.				1		2	.50 m	
										Comments	_
Depth	0-1m		- 2 m	>2 m	Unknown		·				
Channel				 [i [- -					
Width	0 - 2 m	2	- 5 m 🗹	5 - 20 m	>20 m						
w Type	<u>St</u> eady		Riffle	Rapids	Pools]					
Joubstrate]			Cobble/	i[]			[]		
Туре	<u> </u>		Gravel 30	Rubble 30	Boulder 30	<u>Bed</u> ro	ck 1	<u>Un</u> know	n		
Beak	ſ					-	```			•	-
Habitat	Type I	Т	ype II	Type III	Type IV]					
Bank Material	<u>F</u> ines		gravel/ Pebble	<u>Co</u> bble/ <u>Ru</u> bble	Boulder	Bedro	ck []	<u>Jn</u> knowr			
	Shallow	М	edium	Deep	Forest	- Flo	od				
Backslope	Gully		Gully	Gully	Stream] Pla	ain	Bog/Fe	n		_
Bank Vegetation	Bog	<u> </u>	rasses 0	Shrubs 🕫	<u>Tr</u> ees 40]					
Cover 40ºlo	Instream	ည္ _{Ove}	rhang 💋	Canopy 30	None]					
Potential Obstruction	Falls	Б	apids	Chute	Cascade	Intermitte		Non	\square		
Est.	[]	···· []	140m	- <u>[]</u>		
Gradient	0 - 1 %	1	- 3 %	3 - 5 %	>5 %						j
Substrate fines 1 gravel 2 pebble 3 cobble 6	ess than 2 m 2mm - 3 cm 3 - 5 cm	Back um Shall Medu Do	slope ow gully im gully 2 cep gully 2	l n) 2-3 m ≥4 m	Cover Instream Overhang Canopy	submerge grasses/sh trees > 1n	nt/emerge trubs with n above w	ent vege hin 1 m (vater	tation of water	I	
) rubble 1	4-25 cm	Flo	od plain s	iee over		can be exj	pressed as	5 70 COVê	t.	Page number	
boulder 2	6 cm and u	p	Bog/Fen s	ee over						50 //4/1001	

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TRANS-LABRADOR HIGHWAY STR	EAM CROSSING INFORMATION: CARTWRIGHT JUNCTION TO GOOSE BAY
Ground Summer	Retented land 500 m through
Ground survey completed	Ground Survey not Completed winds/-fider
	Control and a 21-2 (DWOTH) (thick)
	Crossing less than 2 km ⁻ (on DWS1 list)
PH_	Bog drainage
Conductivity	Type IV (steady) flow
Dissolved Oxygen	Type III (cascade/rapids) flow
Turbidity	No accessible by helicopter
Surface velocity	Other:
Water Samples collected	
Gradient (inclinometer)]
Sketch & Measurements of Surveyed Se	ection(s)
	landing Site South
	brown crossing check later
	. 0
	l. I

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Backslope

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Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

) Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting
Stream No.	Г	15		Sketch of the	area			
ıte	Г	Sept 23/0	2		<u> </u>	- Flow		7
Surveyed by	, Ē	BWINHIHM	JOT					
Watershed		Traverso	ine l	(P)∉ (i	HE ER	3		
GPS Co-ore	, Ľ		< <u></u>		K	pool)		
Aerial Phot	··	,						
Man Numb		17 5	·		J			
		<u>13 F</u>	12			-{ m }	Alter How TYREE	elett.
Photo Num	bers	50			Í	$\int \pi \int 7$	with pools and Kiri	
Video		Yes			104	50 / L	Stews Less	
Area Surve	yed	500m Aeri	<u>. t</u>		¥ ⁽⁰	' \	· ·	-
Water Sam	oles	<u> </u>					<u>}</u>	
	······] [<u> </u>	<u>ר ר</u>	<u> </u>	Comments	7
Depth	0 - 1 m 8	ک ا 1 - 2 m	>2 m	Unknown				4
Channel Width	0 - 2 m	2 - 5 m	5 - 20 m	>20 m				
	L L							1
w Type	<u>St</u> eady		<u>Ra</u> pids	Pools IS				-
Type	<u>F</u> ines	<u>Gravel</u> 5	<u>Cobble/</u> <u>Rubble</u>	Boulder BC	Bedrock	Unknown		
Beak]			1
Habitat	Type I		Type III	Type IV			· · · · · · · · · · · · · · · · · · ·	1
Bank Material	Fines	<u>G</u> ravel/ Pebble	Cobble/	Boulder 80	Bedrock			-
	Shallow	 Medium	Deep	Forest	Flood			
Backslope	Gully	Gully	Gully	Stream	Plain	Bog/Fen		
Bank Vegetation,	Bog	Grasses	Shrubs 40	Trees 60				
]			-
Cover 20°	lo Instream 2	Overhang S	Canopy 30	None			·····	
Potential Obstruction	<u>Fa</u> lls	Rapids	Chute	Cascade	Intermittent	None		
Est.]]			
Gradient	0 - 1 %	1 - 3 %	3 - 5 %	>5 %				
Substrate	less then 2	Backslope		Cover				•.
gravel	2mm - 3 cm	Meduim oully	1 m 2-3 m	Instream Overbang	submergent/eme	rgent vegetation		
pebble	3 - 5 cm	Deep gully	≥_4 m	Canopy	trees > 1m above	e water		
cobble	6-13 cm	Forest stream	see over	···	can be expressed	l as % cover		
boulder	14-25 cm 26 cm and up	Flood plain Bog/Fen	see over see over				Page number	
		Dobrion	300 0101					

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TRANS-LABRADOR HIGHWAY STRE	EAM CROSSING INFORM	1ATION: CARTWRIGHT JUNCTION TO GOOSE BAY
Ground Survey	15	Cannot Land
Ground survey completed	Ground Su	rvey not Completed No
Temperature		Crossing less than 2 km ² (on DWST list)
pH		Bog drainage
Conductivity		Type IV (steady) flow
Dissolved Oxygen		Type III (cascade/rapids) flow
Turbidity		No accessible by helicopter
Surface velocity		Other:
Water Samples collected		
Gradient (inclinometer)		

Sketch & Measurements of Surveyed Section(s)

LEGENDS / NOTES

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Backslope

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Stream No. Sketch of the area RIFFIE 250m .∴e Sep+23 02 mostly (white H 11 RIFFLE Surveyed by MHI Hm 07 Watershed roverspine ٥b FIDW See GPS Co-ord. Riffle list 11 6 Aerial Photo # Rapids/ concerde R. FFle 3 FI Map Number 2 RIFFE H 51 Photo Numbers Ves Video RIFFIC Area Surveyed 500 in Herricely 9 50 m q 250 0 Water Samples yes Comments 0 - 1 m Depth 1 - 2 m >2 m Unknown Channel Width 0 - 2 m 2 - 5 m 5 - 20 m >20 m Riffle 80 10 10 w Type Steady Rapids Pools Substrate Cobble/ Boulder 80 Туре Fines Gravel Rubble DBedrock <u>Un</u>known Beak Habitat Type I Type III 5 Type II Type IV Bank Gravel/ Cobble/ Material Fines Pebble Rubble Boulder **Bedrock** Unknown Shallow Medium Deep Forest Flood Backslope Gully Gully Gully Bog/Fen Stream Plain Bank Trees 50 Shrubs 50 Vegetation Bog <u>Gras</u>ses for the 10% Overhang 40 Cover Instream 3 Ù Canopy 30 None Potential Obstruction Falls Rapids Chute Cascade Intermittent None Est. Gradient 0 - 1 % 1-3% 3 - 5 % >5 % Substrate Backslope Cover fines less than 2 mm Shallow gully 1 m Instream submergent/emergent vegetation gravel 2mm - 3 cm Meduim gully 2-3 m Overhang grasses/shrubs within 1 m of water pebble 3 - 5 cm Deep gully $\geq 4 \text{ m}$ Canopy trees > 1m above water cobble 6-13 cm Forest stream see over can be expressed as % cover rubble 14-25 cm Flood plain see over Page number boulder 26 cm and up Bog/Fen see over

TRANS-LABRADOR HIGHWAY STREAM CROSSING INFORMATION: CARTWRIGHT JUNCTION TO GOOSE BAY
Ground Survey #16 350m - Crossing ib
Ground survey completed Ves Ground Survey not Completed 1.3 Grom
Temperature 5.42 Crossing less than 2 km ² (on DWST list)
pH 8.50 Bog drainage
Conductivity 5 , 4 Type IV (steady) flow
Dissolved Oxygen 11.56 Type III (cascade/rapids) flow
Turbidity 4.1 No accessible by helicopter
Surface velocity 105 Revision 33 cm Other:
Will be of stream. Water Samples collected Yes
Gradient (inclinometer) 2%
Sept 29/02
Cover 15% Oble Att Cover 10%
overhand 40 und Arder 30% Flow. 80% Riffle
Training (D) 40 Trees 60% The T Greb 10 port
Cancer 20% II 5% 10° concider fapid'
O Contin DO DO DA
Substrate 2 port. 2 width
Toolo B Dunixe D D A Porox
20% R
ET 5 00 C 2022 0) (est.).
5%.6
R
wp+902 R+ Bank Bank material
Depth mostly < 1m Boulder 20% Sarol 10% Pools maybe > 1m. Rubble 210
Lot of hain yesterday. Difficult to see (turbidity)
Backslone

Backstope

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Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

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Stream No.	[[1]				Sketch of the area					
.te		Sep+23/02				Could not view stream well					
Surveyed by	[B	sw/mH/1	+m/pJ							
Watershed	[T	Towerspi	ne		e how	ng L	70			
GPS Co-ord			See 1	15+.							
Aerial Photo	#		······	· · · ·							
Map Numbe	r [13 F/	2-							
Photo Numb	ers		51								
Video	[yer.								
Area Survey	ed [5	os n K	Aerial.							
Water Samp	les		NO								
										Comments	
Depth	0 - 1 m		1 - 2 m	>2 m		Unknown].				
Channel	1			י. ג ו			-				
Width	0 - 2 m	M.	2 - 5 m	5 - 20 m		>20 m					
). بر ج			J-20m[- 20 m					
w Type	<u>St</u> eady		<u>Ri</u> ffle	<u>Ra</u> pids		Pools					
Substrate	T			<u>Co</u> bble/] _	, , 🗍		ſ	
I ype Beak	<u>F</u> ines[<u>G</u> ravel			Boulder	ן <u>א</u> נ ר	edrock	<u>Un</u> known		
Habitat	Type I		Type II	Type III		Type IV	J		v	-	
Bank]		<u>G</u> ravel/	<u>Co</u> bble/	· · · ·		7		[;] []		
Material	<u>F</u> ines		Pebble	<u>Ru</u> bble		<u>Bo</u> ulder	Be	edrock	<u>Un</u> known		
Deslet	Shallow		Medium	Deep	7	Forest]	Flood			
Dackstope	Guiry		Guily	Guiy		Stream]		Bog/Fen		
Bank Vegetation	Bog		<u>Gras</u> ses	<u>Sh</u> rubs	50	Trees 50	2				
a and	0		20		10]			· · ·	
Cover	Instream	<u> </u>	Overnang 7	Canopy	1-	None]				
Potential	F 11	ł									
Obstruction	Falls		<u>Rapids</u>	<u>Ch</u> ute		Cascade	<u>]Int</u> err	nittent	None		
Est.											
Gradient	0-1%		1 - 3 %	3 - 5 %		>5 %					
Substrate		В	ackslope		(Cover		r			
fines	less than 2 r	nm S	hallow gully	1 m		Instream	subm	ergent/emer	gent vegetation		
gravel	2nm - 3 cm	M	leduim gully	2-3 m		Overhang	grass	es/shrubs wi	thin 1 m of water		
pebble	3 - 5 cm	T	Deep gully	<u>></u> 4 m		Canopy	trees	> 1m above	water		
mbble	14-25 cm	r	Flood plain	See Over			can b	e expressed	as % cover	Page number	
boulder	26 cm and u	p	Bog/Fen	see over						r age numoer	
	•	-									

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TRANS-LABRADOR HIGHWAY STREAM CROSSI	NG INFORMATION: CARTWRIGHT JUNCTION TO GOOSE BAY
Ground Survey completed	Ground Survey not Completed ND
Temperature pH Conductivity Dissolved Oxygen Turbidity Surface velocity Water Samples collected Gradient (inclinometer)	Crossing less than 2 km² (on DWST list) Bog drainage Type IV (steady) flow Type III (cascade/rapids) flow No accessible by helicopter Other:
Sketch & Measurements of Surveyed Section(s)	

LEGENDS / NOTES

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Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

Stream No.			18		Sketch of the	area		
. <i>t</i> e		5	opt23/02	<u> </u>	Con	1 mut	See Stree	m
Surveyed by		B	~/mH/HV	~pJ	clea	- one	t to c	lassify.
Watershed		$\overline{}$	vaners pi	ne				
GPS Co-ord.	.		Seel	ist.				
Aerial Photo	#							
Map Numbe	r		13 F/	2				
Photo Numb	ers		53					
Video			yas					
Area Survey	ed	5	oon Aer	rial				
Water Samp	les		No ·					
ſ							<u></u>	Comments
Depth	0 - 1 m		1 - 2 m	>2 m	Unknown	$\frac{1}{2}$		
Channel		_			í —	ן ר		
Width	0 - 2 m	\checkmark	2 - 5 m	5 - 20 m	>20 m			
					/	ן ר		
w Type	<u>St</u> eady		<u>Ri</u> ffle	<u>Ra</u> pids	Pools			
Substrate	Finar		Crewel	Cobble/	Devider	Dedroels		
Beak	Luce							
Habitat	Туре І		Type II	Type III	Type IV			· · · · · · · · · · · · · · · · · · ·
Bank Material	Fines		<u>G</u> ravel/ Pebble	<u>Co</u> bble/ Rubble	Boulder	Bedrock	Unknown	
	Shallow		Medium	Deep	Forest	Flood		
Backslope	Gully		Guliy	Gully	Stream	Plain	Bog/Fen	
Vegetation	<u>Bog</u>		<u>Gras</u> ses	Shrubs 40	Trees Co	•		
Cover 0	0 Unstream		Overhang 40	در کر Canopy	None]		
Potential Obstruction	Falls		Rapids	Chute	Cascade	Intermittent	None	
Est.	[]		
Gradient	0 - 1 %		1 - 3 %	3 - 5 %	>5 %]		
Substrate fines gravel pebble cobble	less than 2 n 2mm - 3 cm 3 - 5 cm 6-13 cm	nm :	Backslope Shallow gully Meduim gully Deep gully Forest stream	1 m 2-3 m 2-4 m see over	Cover Instream Overhang Canopy	submergent/em grasses/shrubs trees > 1m abov can be expresse	ergent vegetation within 1 m of water ve water d as % cover	•• , ; - === , ; - === , , , , ,
rubble	14-25 cm		Flood plain	see over				Page number
boulder	26 cm and u	ъ	Bog/Fen	see over				

TRANS-LABRADOR HIGHWAY STREAM CROSSI	NG INFORMATION: CARTWRIGHT JUNCTION TO GOOSE BAY
Ground Survey 7+	18
Ground survey completed	Ground Survey not Completed NO
Temperature	Crossing less than 2 km^2 (on DWST list)
pH	Bog drainage
Conductivity	Type IV (steady) flow
Dissolved Oxygen	Type III (cascade/rapids) flow
Turbidity	No accessible by helicopter
Surface velocity	Other:
Water Samples collected	
Gradient (inclinometer)	
Sketch & Measurements of Surveyed Section(s)	
	-
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Υ.	
LEGENDS / NOTES	
Backslope	
Gullies are typically well defined steep sided cf depending on bank material	nannels which contain spordic flooding but may suffer bank erosion

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

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Stream No.	19	Sketch of the area	
ate	Sept 23/02.	Could not see Stream	~ well
Surveyed by	BW/mH/Hm/pJ	enough to classify.	
Watershed	Traverspine		
GPS Co-ord.			
Aerial Photo #			
Map Number			
Photo Numbers	54		
Video	yes		
Area Surveyed	500 m Aerial		
Water Samples	NO		Commente
r <u> </u>	· · · · · · · · · · · · · · · · · · ·		Comments
Depth 0-1 m	1 - 2 m >2 m	Unknown	
Channel			
Width 0.2 m	2 - 5 m 5 - 20 m	>20 m	
J Jow Type <u>St</u> eady	<u>Riffle</u> <u>Rapids</u>	Pools	
Substrate	<u>Co</u> bble/		
Type <u>Fines</u>	<u>G</u> ravel <u>Ru</u> bble	Boulder Bedrock Unknown	
Beak			
Habitat Type I	Type II / Type III	Type IV	
Bank	Gravel/ Cobble/		
Material Eines	<u>Pebble</u> <u>Rubble</u>	Boulder Bedrock Unknown	
Shallow	Medium Deep	Forest Flood	
Backslope Gully	Gully Gully	Stream Plain Bog/Fen	
Bank			
Vegetation Bog	Grasses 7 Shrubs 4	Trees 15	
Cover Instream		None None	
Potential			
Obstruction <u>Falls</u>	<u>Rapids</u> <u>Chute</u>	<u>Cascade</u> Intermittent None	
Est.			
Gradient 0 - 1 %	<u> </u>	>5 %	
Substrate	Backslope	Cover	
fines less than 2	mm Shallow gully 1 m	Instream submergent/emergent vegetation	
gravel 2mm - 3 ci	m Meduim gully 2-3 m	Overhang grasses/shrubs within 1 m of water	
pebble 3 - 5 cm	Deep gully ≥ 4 m	Canopy trees $> 1m$ above water	
rubble 14-25 cm	Flood plain see over	can be expressed as 70 tover	Page number
boulder 26 cm and	up Bog/Fen see over		Ť,
•			

TRANS-LABRADOR HIGHWAY STREAM CROSSI	NG INFORMATION: CARTWRIGHT JUNCTION TO GOOSE BAY
Ground Survey #19	
Ground survey completed	Ground Survey not Completed NO
Temperature	Crossing less than 2 km ² (on DWST list)
pH	Bog drainage
Conductivity	Type IV (steady) flow
Dissolved Oxygen	Type III (cascade/rapids) flow
Turbidity	No accessible by helicopter
Surface velocity	Other:
Water Samples collected	
Gradient (inclinometer)	

Sketch & Measurements of Surveyed Section(s)

LEGENDS / NOTES

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Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

Stream No.	. [#20	, •	Sketch of the	area	· _ · _ · _ · _ · _ · _ · _ · _	
Ate	[Son+231	02				- 250 .
Surveyed by	Г	BW/mH/	HMPJ		Le (RIFFLE	
Watershed	.[Travers	pine	how a	3.10	FION)
GPS Co-ord.	[See	115+ .	Substra	48)	λ	
Aerial Photo	#			ی معمالیں ا	tream	V	00
Map Number	r [13 F	12	Could h	$f_{1}^{e} = f_{1}^{e}$	-	
Photo Numb	ers [55		Ulawa		RIFFIE	
Video		Yes					
Area Survey	ed	5000	Aerial)		
Water Sampi	les	NO			1		- 250
<u>-</u>							Comments
Depth	0 - 1 m	1 - 2 m	>2 m	Unknown			
Channel	. [і Г]		
Width	0 - 2 m[2 - 5 m	5 - 20 m	>20 m			
Jw Type	<u>St</u> eady	Riffle	Rapids	Pools			
Substrate	Finad		<u>Co</u> bble/	Douldar	Badraal		
I ype Reak	<u>r</u> ines] <u>Bo</u> nger] <u>Bed</u> rock		
Habitat	Type I	Type II	Type III	Type IV			
Bank	Γ	<u>G</u> ravel/	<u>Co</u> bble/] [
Material	<u>F</u> ines	Pebble	<u>Ru</u> bble	<u>Bo</u> ulder	Bedrock	Unknown	
Dostralass	Shallow	Medium	Deep	Forest	Flood		
Bank	Guny] Stream		Bog/Fen	
Vegetation	Bog	Grasses	5 Shrubs 44	Trees 51	D		
Cover 90	L Instream	Querbang	10 Canon 9	Nona]		
Potential	Insucanit_]		
Obstruction	<u>Fa</u> lls	<u>Ra</u> pids	<u>Ch</u> ute	<u>Ca</u> scade	Intermittent	None	
Est.	ſ		<u> </u>]]		
Gradient	0 - 1 %	1 - 3 %	3 - 5 %	>5 %			
Substrate fines gravel pebble cobble rubble boulder	less than 2 m 2mm - 3 cm 3 - 5 cm 6-13 cm 14-25 cm 26 cm and w	Backslope Im Shallow gull Meduim gull Deep gull Forest strear Flood plai	y 1 m y 2-3 m y \geq 4 m n see over n see over en see over	Cover Instream Overhang Canopy	submergent/en grasses/shrubs trees > 1m abo can be express	nergent vegetation within 1 m of water ve water ed as % cover	Page number
ocuraci		r Dog/r					

Ground Survey					え	4 50 1	\sim to	
Ground survey completed	20	Ground Sur	rvey not Complet	ed NO		(ual	k + 0	
Temperature			Crossing less the	an 2 km² (o	n DWST	list)	105 Sing-	L
pH			Bog drainage			(our	450	
Conductivity	[Type IV (steady) flow		ar	-, ,	
Dissolved Oxygen			Type III (cascad	le/rapids) fle	w			1
Turbidity		\checkmark	No accessible by	y helicopter			Λ	
Surface velocity			Other:	50 v	γ (may.	/maybe	Ł
Water Samples collected						/	(
Gradient (inclinometer)				÷				

Sketch & Measurements of Surveyed Section(s)

LEGENDS / NOTES

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Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

Stream No.		2	1	Sketch of the :	irea					
.te		Sept23	02	Could	See ver	y little	H20.			
Surveyed by		BW/mH	Hm/pJ							
Watershed		Travers	pine	Con	id not u	en uren -				
GPS Co-ord.		Sea	list.	40	classif	·				
Aerial Photo	#									
Map Number	. 1	13	F/2							
Photo Numbe	ers	56								
Video		yes								
Area Surveye	ed .	5000	Aericl							
Water Sampl	es	NO	•				Companya			
ſ	<u></u>		<u> </u>		 }					
Depth	0 - 1 m	1 - 2 m	>2 m	Unknown]					
Channel] []					
Width	0 - 2 m	2 - 5 m	5 - 20 m	>20 m						
w Type	Steady	Riffle	Rapids	Pools						
Substrate			Cobble/		, , – – – –					
Туре	<u>F</u> ines	<u>G</u> ravel	Rubble	<u>Bo</u> ulder	Bedrock	<u>Un</u> known				
Beak Habitat	Tume I] .					
Rank	Type I				」 」					
Material	<u>F</u> ines	<u>P</u> ebble	<u>Ru</u> bble	Boulder	Bedrock	Unknown				
Backslope	Shallow Gully	Medium	Deep	Forest	Flood Plain	Bog/Fen				
Bank]					
Vegetation	<u>Bog</u>	Grasses	5 <u>Sh</u> rubs Z	ت _{Trees}	8					
Cover	Instream	Overhang	Canopy	None						
Potential					j	[]				
Obstruction	<u>Fa</u> lls	<u>Ra</u> pids	<u></u> <u>Ch</u> ute	<u>Ca</u> scade	Intermittent	None	ļ			
Est.]					
Gradient	0 - 1 %	1 - 3 %	3 - 5 %	>5 %	}					
Substrate		Backslope		Сочег						
fines l	less than 2	mm Shallow gu	ly 1 m	Instream	submergent/emer	igent vegetation				
pebble 3	211111 - 3 Cft 3 - 5 cm	Deen gu	1y 2 - 5 m 1y > 4 m	Canopy	grasses/snrubs w trees > 1m above	water				
cobble (6-13 cm	Forest strea	m see over	Canopy	can be expressed	as % cover				
rubble	14-25 cm	Flood pla	in see over				Page number			
boulder 2	20 cm and 1	up Bog/	ren see over							

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TRANS-LABRADOR HIGHWAY STREAM CRO	OSSING INFORMATION: CARTWRIGHT JUNCTION TO GOOSE BAY
Ground Survey #21	
Ground survey completed	Ground Survey not Completed NO
Temperature	Crossing less than 2 km^2 (on DWST list)
pH	Bog drainage
Conductivity	Type IV (steady) flow
Dissolved Oxygen	Type III (cascade/rapids) flow
Turbidity	No accessible by helicopter
Surface velocity	Other:
Water Samples collected	
Gradient (inclinometer)	
Sketch & Measurements of Surveyed Section(s)	

LEGENDS / NOTES

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Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

Stream No.		22		Sketch of the	area	1 om	
te	i	Sept 23	102			25	
Surveyed b	у	Bw/mH	1Hm/pJ		Fortfile	THE A	
Watershed		Trovers	spine				h.)
GPS Co-ore	d.	See	list	J) /v	OO F.	115/canceste
Aerial Phot	o #			Flo		III/I XXX V	_00 (IIL
Map Numb	er	13	F/I		1-1		
Photo Num	bers	57		Part	oik/chute'	U IHI	
Video	[Yes		F-1		- I de	-
Area Surve	yed [500 m Ae	rial 50 gram	4		Fast RIFF	, , , ,
Water Sam	ples	Yes			1 (e -	250
	··]	1		Comments
Depth	0 - 1 m	<u>1 - 2 m</u>	20 >2 m	Unknown]		
Channel Width	0 - 2 m	2 - 5 m	5 - 20 m] >20 m	}		
w Type	<u>St</u> eady	Riffle	SO Rapids 40	Pools 10]		· ·
Substrate	Finan						
Beak	<u>r</u> mes[<u>G</u> ravel		Boulder 60] <u>Bed</u> rock	<u>Un</u> known	
Habitat	Type I	Type II	50 Type III 50	Type IV			
Bank Material	Finas	<u>G</u> ravel/	Cobble/				
	Shallow	<u></u>		Boulder	Bedrock CO	<u>Un</u> known	
Backslope	Gully	Gully	Gully 50	Stream	Plain	Bog/Fen	
Bank	_ [
vegetation	Bog[<u>Gras</u> ses	> <u>Sh</u> rubs 35	<u>Trees</u>			
Cover Do	d Instream	20 Overhang (Canopy 20	None			
Potential	ſ						
Obstruction	<u>Fa</u> lls	Rapids	<u>Ch</u> ute	<u>Ca</u> scade	Intermittent	None	
Gradient	0 - 1 %	1 - 3 %	3 - 5 %	>5 %			
Substrate fines gravel pebble cobble rubble boulder	less than 2 m 2mm - 3 cm 3 - 5 cm 6-13 cm 14-25 cm 26 cm and up	Backslope Im Shallow gully Meduim gully Deep gully Forest stream Flood plain D Bog/Fe	y 1 m y 2-3 m y \geq 4 m h see over h see over en see over	Cover Instream Overhang Canopy	submergent/emer grasses/shrubs w trees > 1m above can be expressed	rgent vegetation ithin 1 m of water water as % cover	Page number



LEGENDS / NOTES

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Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

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Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

Stream No.		2	-3		Sketch of the	area	\leq	• • • •	
e		Sep+2	23/02			```		· ·	
Surveyed b	У	Bwlr	nH/Hn	IPT			γ		
Watershed		Tran	evspin	<u>+</u>					
GPS Co-or	d.	5	Seel	15+			- ANSI		
Aerial Phot	o #		· · ·			<i>Υ</i>	X	0-0	•. •
Map Numb	er	1	3 F/ I			V		•	
Photo Num	bers		58				we want of the second		
Video		500	Yes		· ·	×"	(x X X X X K mej.	v water Fall	
Area Surve	yed	500 m (acrist "	50 m grow	ł	ρσ	d.	tox Call ,	
Water Sam	ples	У	les.			$\setminus 6$	T XXX Z WA	2502	
								Comments	
Depth	0 - 1 m	90 1-	2 m 10	>2 m	Unknown] `			
Channel	ן ן								-
WIT: JAL			_		t.				
width	0 - 2 mj	2 -	· 5 m	5 - 20 m 🕶	>20 m 🕑	<u>'</u>			
w Type	<u>St</u> eady	R	Liffle 30	Rapids 60	Pools	,			
JouDstrate	ſ	<u> </u>		Cobble/					\neg
Туре	Fines	G	ravel 5	Bubble 15	Boulder	Pedrock 2			
Beak		<u>~</u> ~							_
Habitat	Type I	Туј	pe II 40	Type III 60	Type IV				
Bank	Γ	<u> </u>	avel/	Cobble		<u>ا</u> ر			
Material	Fines	Pe	bble 10	Rubble	Boulder 6	Bedrock	Unknown	•	
1	Shallow			Deer	 Forect				\neg
Backslope	Gully			Cult 40	Character	Flood			
Pank		`` ~~~~			Sucam		Bog/ren		_
Vegetation,	Bog	Gra	10	Shrubs & O	Trees 50				
100	Ն_ [an		[]]			
Cover 10	Instream	0verł	$\operatorname{nang}\mathcal{W}$	Canopy	None				
Potential	Г					ا	יים ד <u>י</u>		
Obstruction	<u>Fa</u> lls	<u>Ra</u>	pids 🗸	Chute	Cascade	Intermittent	None		
Est.	Г					<u></u>		· · · ·	
Gradient	0 - 1 %	1 -	3 %	3 - 5 %	>5 %				
Substrate		Backsle	0pe		Cover	<u> </u>	·	J	
fines	less than 2 m	um Shallov	w gully 1	m	Instream	submergent/em	ergent vegetation		
gravel	2mm - 3 cm	Meduir	n gully 2.	-3 m	Overhang	grasses/shrubs	within 1 m of water		
pebble	3 - 5 cm	Dee	p gully \geq	4 m	Canopy	trees > 1m abov	ve water		
cobble	6-13 cm	Forest	stream se	e over	- 5 3	can be expresse	ed as % cover		
rubble	14-25 cm	Floo	d plain se	e over		£		Page number	٦
Doulder	26 cm and up	p I	Bog/Fen se	e over					
	•							1	1

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LEGENDS / NOTES

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Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

Stream No.	[24		Sketch of the	area 1		
2	[Sort 23/	02	V cascade/ 1	Lepith LIFFle.	250 0	-
Surveyed by	v [BW/MH/1	+m/pJ	O pools	· [
Watershed	[Trouersp	ine		TH WI	f. Cascon	le / pools / Some RIFFLE
GPS Co-ord	ı. [See 1	15+-		THE OU		
Aerial Photo	o # [3	TTI- W W	K- 00 cascade	pods/ some RIFFLE
Map Numbe	er [13 F/		<u><u></u><u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u></u></u>		,	
Photo Numl	bers [59		√	TI cosade/		
Video		Yes	····		Repids		
Area Survey	ved [500m acria	sonGround			- u	Jater Falls , .
Water Samp	oles	yas.			*****	250 m	
							Comments
Depth	0 - 1 m	1 - 2 m	>2 m	Unknown			
Channel	Г		ר []		
Width	0 - 2 m	2-5m30	5-20m 70	>20 m			
	Г			i —	_ ר		
v Type	Steady	<u>Riffle</u> 3u	Rapids 50	Pools 2			
Suðstrate			Cobble/				
Туре	Fines	<u>G</u> ravel	<u>Rubble</u>	<u>Bo</u> ulder	Bedrock Unkr	nown	
Beak]		
Habitat	Type I	Type II	Type III 50	Type IV			· · · · · · · · · · · · · · · · · · ·
Bank	Γ	<u>G</u> ravel/	<u>Cobble/</u>				
Material	<u>F</u> ines	<u>P</u> ebble	<u>Rubble</u>	Boulder &	<u>Bed</u> rock <u>Un</u> kn	own	
	Shallow	Medium	Deep	Forest	Flood		
Backslope	Gully	Gully	Gully	Stream	Plain Bog	g/Fen	
Bank	F	[1		
Vegetation,	Bog	Grasses	Shrubs 20	Trees 🐼]		
Cover 2.1	ه _{Instream}	overhang	Canopy 30	None			
Potential	Γ					· ·	
Obstruction	<u>Fa</u> lls	<u>Ra</u> pids	<u>Ch</u> ute	<u>Ca</u> scade	Intermittent 1	None	
Est.	Г]		
Gradient	0 - 1 %	1 - 3 %	3 - 5 %	>5 %			
Substrate fines gravel pebble cobble i nubble	less than 2 m 2mm - 3 cm 3 - 5 cm 6-13 cm 14-25 cm 26 cm and m	Backslope Im Shallow gully Meduim gully Deep gully Forest stream Flood plain	1 m 2-3 m $\ge 4 \text{ m}$ see over see over	Cover Instream Overhang Canopy	submergent/emergent v grasses/shrubs within 1 trees > 1m above water can be expressed as % o	regetation m of water cover	Page number
Jourdet	Lo chi and up	ь Бод/гег	i see over] [

TRANS-LABRADOR HIGHWAY STREAM CROSSING INFORMATION: CARTWRIGHT JUNCTION TO GOOSE BAY
Frank Fight Dephicult Wools
Ground survey completed Up Ground Survey not Completed
Temperature 5.88 Crossing less than 2 km^2 (on DWST list) $\alpha + 23$
nH 197 Bog drainage
Conductivity 5 , 9 Type IV (steady) flow
Dissolved Oxygen 11.73 Type III (cascade/rapids) flow
Turbidity Z.4 No accessible by helicopter
Surface velocity 58 Rev./min Other: Behived Baulden /2 meters from shore (46 cm) Water Samples collected Yes
Gradient (inclinometer) 4 %
Sketch & Measurements of Surveyed Section(s)
Sept 29/02. Helicopter @ wpt 23
cover (2)) nedum Gulley
a % overhang I a budenten Dewestream
100 IS Large where Trib enters Traverspine
30 - C
white pool on of Flow Flow Chute. white of pool on of the Flow Flow Flow Chute of the chute of the
T. 5 10 13 35 40
wpt 900 sunstrate,
Qual 141 Dooking 90% LB 70% TYPE III
D'S from Frog 9 ALC 30% TYPE II
LEGENDS/NOTES Bankmaterial Same as Substrate.
Backslope Found Another Stream Bth 2:3 224 enters timerspine at water Fails Brief Charocterization on Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion Boek depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

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Stream No.		25		Sketch of the :	area		
)ate		Sept 23	102	could	hut s.	ee Stream	ا مرب
Surveyed by		BW/mH/H	IM/PT	enou	gh to	classify.	
Watershed	l	Traverspin	e	-			
GPS Co-ord.	· [see li	s+				
Aerial Photo	#						
Map Number	r	13 F/	1				
Photo Numb	ers	60.					
Video	ĺ	yes.					
Area Survey	ed	500m annul	, 50 m grow	4.			
Water Samp	les	No ·					
· · · · · · · · · · · · · · · · · · ·							Comments
Depth	0 - 1 m	1 - 2 m	>2 m	Unknown	7		
Channel] v	· · - ···[) <u></u>		ן ר		
Width	0 - 2 m	2.5m	5 - 20 m	>20 m			
	- 2 mj] 5-20m[] ~20 m[ן ר		
pw Type	<u>St</u> eady	Riffle	<u>Ra</u> pids	Pools			
Joubstrate]		<u>Co</u> bble/] [] [
Туре	<u>F</u> ines	<u>G</u> ravel	<u>Ru</u> bble	<u>Bo</u> ulder	Bedrock	<u>Un</u> known	
Beak]]	1]		
Habitat	Type I	Type II	Type III	Type IV			
Bank	-	Gravel/	Cobble/		- 		
Material	Fines	Pebble	<u>Ru</u> bble	<u>Bo</u> ulder	Bedrock	Unknown	
	Shallow] Deep	Forest	Flood		
Backslope	Gully	Gully	Gully	Stream	Plain	Bog/Fen	
Bank]		<u></u>] <u> </u>]		
Vegetation	Bog	30 Grasses 10	Shrubs 30	<u>Trees</u> 30			
കരീ	10 [] [] <u> </u>]		
Cover	Instream	Overhang 💞	Canopy	None	J		
Potential	ł] [] [
Obstruction	<u>Fa</u> lls	<u>Ra</u> pids	<u>Ch</u> ute	<u>Ca</u> scade	<u>Intermitten</u> (None	
Est.	[[] [] []		
Gradient	0 - 1 %	1 - 3 %	3 - 5 %	>5 %	}		
Substrate		Backslope		Cover	······	·	·
fines	less than 2 r	nm Shallow gully	l m	Instream	submergent/em	ergent vegetation	
gravel	2mm - 3 cm	Meduim gully	2-3 m	Overhang	grasses/shrubs	within 1 m of water	
pebble .	3 - 5 cm	Deep gully	<u>></u> 4 m	Canopy	trees > 1m abov	ve water	
rubble	0-15 cm 14-25 cm	rorest stream Flood plain	See over		can be expresse	as % cover	Page number
boulder	26 cm and u	ip Bog/Fen	see over				
	•						

TRANS-LABRADOR HIGHWAY STR	EAM CROSSING	G INFORMATION: CARTWRIGHT JUNCTION TO GOOSE BAY
Cround Survey #	25	
Ground survey completed [Ground Survey not Completed NO
Temperature		Crossing less than 2 km ² (on DWST list)
pH[Bog drainage
Conductivity		Type IV (steady) flow
Dissolved Oxygen		Type III (cascade/rapids) flow
Turbidity[No accessible by helicopter
Surface velocity		Other:
Water Samples collected		
Gradient (inclinometer)		
Sketch & Measurements of Surveyed Se	ection(s)	
)		
· ·		

LEGENDS / NOTES

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Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

Stream No.	[21	0	Sketch of the	area	
ate		Sept 24	102	Con	id not see Stree	m well
Surveyed by		BW/mH,	175		well to classif	y •
Watershed		Travers	oine	an	55	, .
GPS Co-ord	. [See	115+			
Aerial Photo	#					
Map Numbe	r [13 F	/1.			
Photo Numb	ers	(01				
Video	[Ver	•			
Area Survey	ed	500 m	Aeria			
Water Samp	les	NO				
- -				·	······································	Comments
Depth	0 - 1 m	1 - 2 m	>2 m		1	
Channel	[7	
Width	0 - 2 m	2 - 5 m	5 - 20 m	>20 m		
Jow Type	Steady	Riffle	Banide	Pools	7	
ISubstrate	<u>5</u> 70003[Cobble/			
Туре	Fines	<u>G</u> ravel	<u>Ru</u> bble	Boulder	Bedrock Unknown	
Beak]]	
Habitat	Type I	Type II	Type III	Type IV		
Bank		<u>G</u> ravel/	<u>Co</u> bble/] [-		
Material	Eines		<u>Rubble</u>	Boulder	Bedrock Unknown	
Backslope	Shallow Gully	Medium Gully	Deep	Forest	Flood Plain Bog/Fen	
Bank](
Vegetation	Bog	Grasses	Shrubs 30	Trees To		
Cover 100	W Instream	Overhang	,o Canopy 10	None		
Potential Obstruction	<u>Fa</u> lls	<u>Ra</u> pids	<u>Ch</u> ute	<u>Ca</u> scade	Intermittent None	
Est.	[]	
Gradient	0 - 1 %	1 - 3 %	3-5%	>5 %		
Substrate fines gravel pebble cobble rubble boulder	less than 2 m 2mm - 3 cm 3 - 5 cm 6-13 cm 14-25 cm 26 cm and u	Backslope nm Shallow gull Meduim gull Deep gull Forest strear Flood plai	y 1 m y 2-3 m y \geq 4 m n see over n see over en see over	Cover Instream Overhang Canopy	submergent/emergent vegetation grasses/shrubs within 1 m of water trees > 1m above water can be expressed as % cover	Page number
	•					4 1

TRANS-LABRADOR HIGHWAY STREAM CROSSING INFORMATION: CARTWRIGHT JUNCTION TO GOOSE BAY 26. **Ground Survey** Ground Survey not Completed N D Ground survey completed Crossing less than 2 km² (on DWST list) Temperature Bog drainage pН Conductivity Type IV (steady) flow Dissolved Oxygen Type III (cascade/rapids) flow Turbidity No accessible by helicopter Surface velocity Other: Water Samples collected Gradient (inclinometer)

Sketch & Measurements of Surveyed Section(s)

LEGENDS / NOTES

Backslope

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Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

Stream No.			27_		Sketch of the a	rea		
(e		Sup+24/02_			Could not see stream well			
Surveyed by		B	w/mH/RI	TIDT	eno			
Watershed		7	raverspi	ne			. '	
GPS Co-ord.			See 1	s+		•		
Aerial Photo	#							
Map Numbe	r		13 F/	1				
Photo Numb	ers		62					
Video			Ver.					
Area Survey	ed	5	ov m Ae	mali				
Water Samn	100		NO					
	103						Comments	
] []		
Depth	0 - 1 m		1 - 2 m	>2 m	Unknown			
Channel								
Width	0 - 2 m		2 - 5 m	5 - 20 m] >20 m[
))w Type	<u>St</u> eady		Riffle	<u>Ra</u> pids	Pools			
Substrate	•			<u>Co</u> bble/				
Туре	<u>F</u> ines		<u>G</u> ravel	<u>Ru</u> bble	<u>Bo</u> ulder	Bedrock Unknown	·	
Beak				[] []		
Habitat	Туре І		Type II	Type III	Type IV			
Bank			Gravel/	<u>Co</u> bble/] [
Material	<u>F</u> ines		Pebble	<u>Ru</u> bble	<u>Bo</u> ulder	Bedrock Unknown		
Paaluslama	Shallow		Medium	Deep	Forest	Flood Plain Bog/Fen		
Dackslope	Gully	[] ["""""						
Vegetation	Bog		<u>Gras</u> ses	Shrubs 50	Trees 46			
Cover 100	l Instream		Overhang 🕼	Canopy 40	None]		
Potential Obstruction	<u>Fa</u> lls		<u>Ra</u> pids	<u>Ch</u> ute	<u>Ca</u> scade	Intermittent None		
Est.								
Gradient	0 - 1 %	۱	1 - 3 %	J 3-5%	<u>>5-%</u>]		
Substrate fines gravel pebble cobble	less than 2 2mm - 3 cr 3 - 5 cm 6-13 cm 14-25 cm	mm n	Backslope Shallow gully Meduim gully Deep gully Forest stream	i m 2-3 m $\geq 4 m$ see over	Cover Instream Overhang Canopy	submergent/emergent vegetation grasses/shrubs within 1 m of water trees > 1m above water can be expressed as % cover	Page number	
boulder	26 cm and	up	Bog/Fen	see over				

TRANS-LABRADOR HIGHWAY STREAM CROSSING INFOR	MATION: CARTWRIGHT JUNCTION TO GOOSE BAY
Ground Survey #27.	
Ground survey completed Ground	Survey not Completed NO
Temperature	Crossing less than 2 km ² (on DWST list)
pH	Bog drainage
Conductivity	Type IV (steady) flow
Dissolved Oxygen	Type III (cascade/rapids) flow
Turbidity	No accessible by helicopter
Surface velocity	Other:
Water Samples collected	
Gradient (inclinometer)	

Sketch & Measurements of Surveyed Section(s)

LEGENDS / NOTES

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Backslope

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Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

Stream No.			28		Sketch of the	area	/	•
te		5	ep+ 241	62			TT stars	250 .
Surveyed by	,	Ĺ	BW/MH/	PT			Run	
Watershed		ļ	Lenami	~		π	(Port)	
GPS Co-ord	. .		Sec 119	5 + .		-	RIFFIC	
Aerial Photo	o #						F. RIFFLY	
Map Numbe	r		13 L	116			RIFFIR X 00	
Photo Numb	pers	[63				RIFFIE	
Video			Ves			II /	Fnet	•
Area Survey	red	500.	m avrial z	50 m ground			Risfle. Risfle.	,
Water Samp	les		yes.				2.50	
		<u></u>						Comments
Depth	0 - 1 m	90	1 - 2 m 10	>2 m	Unknown]		
Channel]]		
Width	0 - 2 m		2 - 5 m	5 - 20 m סר	>20 m 30			
J w Type	<u>St</u> eady	5	Riffle 85	<u>Ra</u> pids	Pools 10			
Substrate	ſ		[.]	Cobble/) r		
Туре	<u>F</u> ines		Gravel	<u>Ru</u> bble 40	<u>Bo</u> ulder 50	Bedrock	<u>Un</u> known	
Beak	Type I		THE	т., тт				
Ronk	Tybe T							
Material	Fines	10	<u>G</u> ravel/ Pebble	Rubble/	Boulder 40	Bedrock	Unknow	
	- L Shallow	_	Medium	Deen	Forest	Elocd		·
Backslope	Gully	40	Gully 60	Gully	Stream	Plain	Bog/Fen	
Bank	Γ					i —		
Vegetation,	Bog		Grasses 5	Shrubs 35	Trees 60			
Cover 15°le	Instream	<u>3</u> 0 c	verhang 40	Canopy 30	None			
Potential	Γ					· · · ·		
Obstruction	<u>Fa</u> lls		<u>Ra</u> pids	<u>Ch</u> ute	<u>Ca</u> scade	<u>Int</u> ermittent	None	
Est.	0 1 0 1							
	0-1%]	1 - 3 %	3 - 5 %	>5 %			
Substrate fines 1 gravel 2 pebble 3 cobble 6	ess than 2 m 2mm - 3 cm 3 - 5 cm 5-13 cm	Ba um Sh Me Fo	ckslope allow gully 1 cduim gully 2 Deep gully \geq prest stream s	. m 2-3 m ≥4 m ee over	Cover Instream Overhang Canopy	submergent/eme grasses/shrubs w trees > 1m above can be expressed	ergent vegetation within 1 m of water e water d as % cover]
boulder 2	$\frac{1}{2}$ cm and $\frac{1}{10}$	י כ	Bog/Fen s	ee over ee over				Page number
								1



Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

Stream No.	Ľ.	29.		Sketch of the a	rea		·	
Date		Sept 24	102	Coul	d hot s	See Stream	- well	
Surveyed by	Ľ	BWIMH	1PT	enough to classify.				
Watershed		Kenami	~		/			
GPS Co-ord.		See hi	5+					
Aerial Photo #								
Map Number	Ľ	130/1	6					
Photo Numbers		64						
Video		Yes						
Area Surveyed		500m 0	erial_					
Water Samples	[NO				<u></u>]	
F		······						
Depth	0 - 1 m	1 - 2 m	>2 m	Unknown				
Channel	Ē]			
Width	0 - 2 m	2-5m	5 - 20 m	>20 m				
	Stand J]			
ow Type	<u>Steady</u>		Cobble/	Pools)] —	-1 []		
Туре	Fines	Gravel	Rubble	<u>Bo</u> ulder	Bedrock	Unknown		
Beak Habitat	Type I			Type IV				
Rank	·,//~ /		Cobble/		,			
Material	Fines	<u>Pebble</u>	<u>Ru</u> bble	Boulder	Bedrock	<u>Un</u> known		
Backslone	Shallow Gully	· Medium	Deep	Forest	Flood	Bog/Fen		
Bank] (0)] · /=···(
Vegetation	Bog	Grasses	Shrubs 40	Trees 60	•			
Cover 1000 lo	nstream	Overhang 60	Canopy 40	None]			
Potential Obstruction	Falls	<u>Ra</u> pids		<u>Ca</u> scade	Intermittent	None		
Est. Gradient	0 - 1 %	1 - 3 %	3 - 5 %	>5 %]			
Substrate fines less gravel 2nu pebble 3 - cobble 6-11 rubble 14-2 boulder 26 of	than 2 m m - 3 cm 5 cm 3 cm 25 cm cm and up	Backslope m Shallow gully Meduim gully Deep gully Forest stream Flood plain Bog/Fen	1 m 2-3 m $\ge 4 \text{ m}$ see over see over see over	Cover Instream Overhang Canopy	subinergent/en grasses/shrubs trees > 1m abo can be expresse	nergent vegetation within 1 m of water ve water ed as % cover	Page number	
							L	

Sketch & Measurements of Surveyed Section(s)

LEGENDS / NOTES

Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

Stream No.		Sketch of the area	~
Jate	Sept 24/02		14
Surveyed by	BW/MH/ PJ	TE	$\widetilde{\langle \cdot 7 \rangle}$
Watershed	Kenamu	1 12 the	
GPS Co-ord.			
Aerial Photo #	, .	- 00	
Map Number	13 (16		- 15
Photo Numbers	65	1 - 250 +	ype II
Video	Ves	TIN T	
Area Surveyed	500m Aerial	Brennan	
Water Samples	· · · · ·	1 LAKe /	
			Comments
Depth 0 - 1	1 - 2 m >2 m	Unknown	
Channel			
Width 0-2	2 m 2 - 5 m 5 - 20 m	>20 m	
] }low Type <u>St</u> e:	ady 100 Riffle Rapids	Pools	
Substrate			
Type Ei	nes <u>G</u> ravel <u>Ru</u> bble	Boulder Bedrock Unknown	
Beak Habitat Typ	De I Type II Type III	Type IV	
Bank	<u>Gravel</u> <u>Cobble</u>		
Material <u>F</u> i	nes <u>Pebble</u> <u>Rubble</u>	Boulder Bedrock Unknown	· · ·
Backslope G	ully Gully Gully	Stream Plain Bog/Fen	
Bank Voortetier		59	
vegetation <u>r</u>			·····
Cover 5 Instre	am Overhang 🜮 Canopy	None	
Potential Obstruction F	alls Banids Chute		
Est.			
Gradient 0 - 1	1 % 1 - 3 % 3 - 5 %	>5 %	
Substrate	Backslope	Cover	
tines less that	n 2 mm Shallow gully i m	Instream submergent/emergent vegetation	
pebble 3 - 5 cm	$\frac{1}{2} Deep gully > 4 m$	Canopy trees > 1m above water	
cobble 6-13 cn	Forest stream see over	can be expressed as % cover	
rubble 14-25 c	m Flood plain see over		Page number
boulder 26 cm a	nd up Bog/Fen see over		

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TRANS-LABRADOR HIGHWAY STREAM CROSS	ING INFORMATION: CARTWRIGHT JUNCTION TO GOOSE BAY
Ground Survey	
	Ground Survey not Completed 100
Temperature	Crossing less than 2 km ² (on DWST list)
pH	Bog drainage
Conductivity	Type IV (steady) flow
Dissolved Oxygen	Type III (cascade/rapids) flow
Turbidity	No accessible by helicopter
Surface velocity	Other:
Water Samples collected	
Gradient (inclinometer)	
Sketch & Measurements of Surveyed Section(s)	

LEGENDS / NOTES

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Backslope

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Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

Stream No.		31		Sketch of the	area		
ate		Sep+24	02		- Server		CV OF
Surveyed by		BW/mH/	1.107		N LOU	X	and the second sec
Watershed		Kenan	nu	f_{γ}	they beg	5	A
GPS Co-ord		See	115+		out" Jar7	~ 10m . 3	2
Aerial Photo	#				frent -	Va co	
Map Numbe	r	130	16		V (SD	Y x av	
Photo Ňumb	ers	66	200 - 200 200 - 200 200 - 200		10.5	' 2	
Video		Ves			(Y		
Area Survey	ed			2	ospreys,	1 very	aggressive '
Water Samp	les						
·		·····			_		Comments
Depth *	0 - 1 m	I - 2 m	>2 m	Unknown			
Çhannel			- -	i —	7		
Width	0 - 2 m	2 - 5 m	5 - 20 m	>20 m]		
)ow Type	<u>St</u> eady	<u>Ri</u> ffle		Pools			
Substrate	Fines	Gravel	Cobble/	Bouldar	Bodrook		
Baak	Tures] <u>Do</u> uidei [
Habitat	Type I	Type II	Type III	Type IV			
Bank	ſ		<u>Co</u> bble/				
Material	Fines	Pebble	<u>Ru</u> bble	Boulder	Bedrock U	nknown	
	Shallow	Medium	Deep	Forest	Flood		
Backslope	Gully	Gully	Gully	Stream 🗸	Plain	Bog/Fen	
Bank							
vegetation	Bog	<u>Gras</u> ses	<u>Sh</u> rubs		1		
Cover 90	Instream	Overhang 6	Canopy 90	None			
Potential	ſ			, <u> </u>	י ריין י	[]	
Obstruction	<u>Fa</u> lls	<u>Ra</u> pids	<u>Ch</u> ute	<u>Ca</u> scade	Intermittent	None	
Est.			-] []		
Gradient	0 - 1 %	1 - 3 %	3 - 5 %	>5 %			
Substrate		Backslope		Cover	· · · · · · · · · · · · · · · · · · ·		
fines	less than 2π	nm Shallow gully	l m	Instream	submergent/emerge	nt vegetation	
gravei pebble	21000 - 3 cm 3 - 5 cm	Deen gully	2-3 m > 4 m	Overhang	grasses/shrubs with: trees > Im above w	in 1 m of water	
) cobble	6-13 cm	Forest stream	see over	Cauchy	can be expressed as	% cover	
rubble boulder	14-25 cm 26 cm and u	Flood plain p Bog/Fei	see over 1 see over				Page number
							ŧ

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TRANS-LABRADOR HIGHWAY STR	EAM CROSSING INFORMATION: CARTWRIGHT JUN	CTION TO GOOSE BAY
Ground Survey	#31	Can land
Ground survey completed	Ground Survey not Completed	easily.
Temperature	Crossing less than 2 km ² (on DV	VST list)
pH	Bog drainage	
Conductivity	Type IV (steady) flow	Sprey very
Dissolved Oxygen	Type III (cascade/rapids) flow	A 9 VISSIUL
Turbidity	No accessible by helicopter	
Surface velocity	Other:	
Water Samples collected		
Gradient (inclinometer)		
Sketch & Measurements of Surveyed Se	tion(s)	
	osprey agressive. Cannot Survey this although Accessibility is G	Site ood.)
[

LEGENDS / NOTES

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Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

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Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

32. Stream No. Sketch of the area ⊿te 0724107 Surveyed by MH Watershed .0 See 115+ GPS Co-ord. Aerial Photo # 13 C Map Number 16 ممحار 6 Photo Numbers looked VISILLE Video Ver your - certion INCE I WITL Area Surveyed 500 m Aeria builder present NO Water Samples Comments 0 - 1 m >2 m Depth 1 - 2 m Unknown Channel Width 5 - 20 m 0 - 2 m 2 - 5 m>20 m)ow Type <u>Riffle</u> <u>Rapids</u> Steady Pools Substrate Cobble/ Туре Fines <u>G</u>ravel <u>Ru</u>bble Boulder Bedrock Unknown Beak Habitat Type IV Type I Type I Type III Bank Gravel/ Cobble/ Material <u>Bo</u>ulder <u>Bed</u>rock Fines Pebble <u>Ru</u>bble Unknown Shallow Deep Medium Forest Flood Backslope Bog/Fer Gully Stream Plain Gully Gully Bank Vegetation 50 Shrubs Bog Grasses Trees 50 100% Cover Instream Overhang & Canopy 40 None Potential Obstruction <u>Ra</u>pids Falls Chute <u>Ca</u>scade Intermittent None Est. Gradient 0 - 1 % 1 - 3 % 3 - 5 % >5 % Substrate Backslope Cover fines less than 2 mm Shallow gully 1 m Instream submergent/emergent vegetation gravel 2mm - 3 cm Meduim guily 2-3 m grasses/shrubs within 1 m of water Overhang pebble 3 - 5 cm Deep gully $\geq 4 \text{ m}$ Canopy trees > 1m above water cobble 6-13 cm Forest stream see over can be expressed as % cover rubble 14-25 cm Flood plain see over Page number boulder 26 cm and up Bog/Fen see over

Ground Survey	11-	
Ground survey completed		Ground Survey not Completed 🛛 🕇 🖉
Temperature		Crossing less than 2 km ² (on DWST list)
pH		Bog drainage
Conductivity		Type IV (steady) flow
Dissolved Oxygen		Type III (cascade/rapids) flow
Turbidity	· · ·	No accessible by helicopter
Surface velocity		Other:
Water Samples collected		
Gradient (inclinometer)		

Sketch & Measurements of Surveyed Section(s)

LEGENDS / NOTES

Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

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Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting
Stream No.			33		Sketch of the a	area		
late			Sept 24	102		250-	1	ic here
Surveyed by		ſ	BulmH/F	ν Γ		150 K	FI	owing.
Watershed			Kenami	~			CIR	Substrate
GPS Co-ord			See	15+-				
Aerial Photo	#					60× /		
Map Numbe	r .		136/	16				·
Photo Numb	ers		68.					
Video			Ver					
Area Survey	eđ		500 m 1	Aerial		ςυ <u>_</u>		
Water Samp	les		NO					
						<u> </u>		Comments
Denth	0 - 1 m		1 - 2 m	>2 m	Unknown]		
	• • •					ע. ר		
Channel	<u> </u>			5 00	. 20			
Width	0 - 2 m		2 - 5 m	5 - 20 m [>20 m	Ţ		· · · · · · · · · · · · · · · · · · ·
l Now Type	<u>St</u> eady		Riffle	Rapids	Pools			
ISubstrate				Cobble/Z		- -		
Туре	<u>F</u> ines		<u>G</u> ravel	Rubble	Boulder	Bedrock	<u>Un</u> known	
Beak			P		- ۲	٦		
Habitat	Type I		Type II	Type III	Type IV			
Bank			Gravel/	Cobble/		-	[]	
Material	Fines		Pebble	Rubble	Boulder	Bedrock	Unknown	
	Shallow		Modium					
Backslope	Gully		Gully	Gully	Stream	Plain	Bog/Fen	
Bank	,			(min)				
Vegetation	Bog		<u>Gras</u> ses	<u>Sh</u> rubs 9	o <u>Tr</u> ees 20			
1	olo					7		
Cover	Instream		Overhang	Canopy	None			
Potential					7			
Obstruction	- <u>Fa</u> lls		<u>Ra</u> pids	<u>Ch</u> ute	<u>Ca</u> scade	<u>Int</u> ermittent	None	
Est.						7		
Gradient	0 - 1 %		1 - 3 %	3 - 5 %	>5 %	_		
Substrate			Backslope		Cover			
fines	less than 2	mm	Shallow gully	1 m	Instream	submergent/emer	gent vegetation	
gravel	2mm - 3 cr	n	Meduim gully	2-3 m	Overhang	grasses/shrubs wi	ithin 1 m of water	
pebble	3 - 5 cm		Deep gully	<u>></u> 4 m	Canopy	trees > 1m above	water	
cobble	6-13 cm		Forest stream	see over		can be expressed	as % cover	
rubble	14-25 cm		Flood plain	see over				Page number
boulder	26 cm ạnd	up	Bog/Fen	see over				

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TRANS-LABRADOR HIGHWAY STREAM CROSSING INFORMATION: CARTWRIGHT JUNCTION TO GOOSE BAY #23 **Ground Survey** Ground survey completed Ground Survey not Completed Crossing less than 2 km² (on DWST list) Temperature pН Bog drainage Conductivity Type IV (steady) flow Dissolved Oxygen Type III (cascade/rapids) flow Turbidity No accessible by helicopter Surface velocity Other: Water Samples collected Gradient (inclinometer)

Sketch & Measurements of Surveyed Section(s)

LEGENDS / NOTES

Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

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Stream No.	34	Sketch of the area	
/ate	Sapt 24/02		
Surveyed by	Bu/mH/pJ	Flow	
Watershed	Kenamu	2 places/ 250	
GPS Co-ord.	See list	FUR Same	
Aerial Photo #		11	
Map Number	13 C/16	Sand 60m	
Photo Numbers	69		
Video	yes	Sand at Ri	FFIC
Area Surveyed	500 m Aerial.	this and	
Water Samples	0 V	·	
			Comments
Depth 0 - 1 m	1 - 2 m >2 m	Unknown	
Channel			
Width 0-2 m	2-5m 5-20m	>20 m	
Now Type Steeds	Piffa 10 Panida		
tow Type <u>Steady</u>			
Substrate	80 Groupi 10 Bubble 10	Pouldar Podrock Unknown	
iPash			· · · · · · · · · · · · · · · · · · ·
Habitat Type	Type II	Type IV	
Bank	Gravel/ Cobble/		
Material <u>F</u> ine	<u>P</u> ebble <u>Ru</u> bble	Boulder Bedrock Unknown	
Shallov	Medium Deep	Forest Flood	
Backslope Gull	Gully Gully	Stream Plain Bog/Fen	
Bank			
Vegetation Bog	Grasses C Shrubs	Trees	
Cover 98 Instream	Overhang 20 Canopy 10	None	
Potential			
Obstruction Falls	<u>Ra</u> pids <u>Ch</u> ute	<u>Ca</u> scade <u>Intermittent</u> None	
Est.			
Gradient 0 - 1 %	<u> </u>	J >5 %	
Substrate	Backslope	Cover	
tines less than 2	mm Shallow gully 1 m	Instream submergent/emergent vegetation	
gravei 2mm - 3 cr	n Meduim gully $2-3 \text{ m}$	Overhang grasses/shrubs within 1 m of water	
cobble 6-13 cm	Forest stream see over	can be expressed as % cover	•
/ rubble 14-25 cm	Flood plain see over		Page number
boulder 26 cm and	up Bog/Fen see over		-

TRANS-LABRADOR HIGHWAY STREAM CROSS	ING INFORMATION: CARTWRIGHT JUNCTION TO GOOSE BAY
Ground Survey Completed	Ground Survey not Completed APProx 200
Temperature	Crossing less than 2 km ² (on DWST list)
pH	Bog drainage
Conductivity	Type IV (steady) flow
Dissolved Oxygen	Type III (cascade/rapids) flow
Turbidity	No accessible by helicopter
Surface velocity	Other: No Landing Site
Water Samples collected	Dood trees an Bog prevents
Gradient (inclinometer)	landing at 200 m
Sketch & Measurements of Surveyed Section(s)	

Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

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Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

No Stream Could be Notified at this #35 Stream No. Sketch of the area Sent 24/02 ate Surveyed by mн Kenar Watershed Co-ordinate See 115+ 1 GPS Co-ord. Aerial Photo # 130 16 Map Number None. Photo Numbers Video None. None Area Surveyed ND Water Samples Comments Depth 0 - 1 m >2 m 1 - 2 m Unknown Channel Width 0 - 2 m 2 - 5 m 5 - 20 m >20 m yow Type Steady Riffle **Rapids** Pools (Substrate Cobble/ Type Fines Gravel Rubble Boulder Bedrock Unknown Beak Habitat Type II Type III Type IV Type I Bank <u>Co</u>bble/ <u>G</u>ravel/ Material Fines <u>Ru</u>bble <u>Bo</u>ulder Bedrock Unknown Pebble Shallow Medium Flood Deep Forest Stream Plain Bog/Fen Backslope Gully Gully Gully Bank Vegetation <u>Bog</u> <u>Tr</u>ees Shrubs Grasses Cover Overhang Instream Canopy None Potential Obstruction C<u>h</u>ute Intermittent <u>Falls</u> Rapids Cascade None Est. 0 - 1 % Gradient 1 - 3 % 3 - 5 % >5 % Substrate Backslope Cover fines less than 2 mm Shallow gully 1 m Instream submergent/emergent vegetation gravel 2mm - 3 cm Meduim gully 2-3 m Overhang grasses/shrubs within 1 m of water pebble 3 - 5 cm Deep gully ≥4 m Canopy trees > 1m above water cobble 6-13 cm Forest stream see over can be expressed as % cover rubble 14-25 cm Flood plain see over Page number boulder 26 cm and up Bog/Fen see over

TRANS-LABRADOR HIGHWAY STR	EAM CROSSI	NG INFORI	MATION: CARTWRIGHT JUNCT	ION TO GOOSE BAY
Ground Survey Ground survey completed	·	Ground S	urvey not Completed NO	
) Temperature		V	Crossing less than 2 km ² (on DWS	Γ list)
pH Conductivity		[Bog drainage	stroam
Dissolved Oxygen[L	Type III (cascade/rapids) flow	
Turbidity			No accessible by helicopter	
Water Samples collected		L		
Gradient (inclinometer)				
Sketch & Measurements of Surveyed Se	ection(s)		Man	
			· · ·	

Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

#36 Stream No. Sketch of the area Date 4102 Surveyed by Watershed 210 am See GPS Co-ord. 15t Aerial Photo # ろ Map Number 6 **Photo Numbers** O Video Ver Area Surveyed 500m Aerial 500 Water Samples 2 Comments **a** c 0 - 1 m Depth >2 m 1 - 2 n Unknown Channel 5 INDW Width 0 - 2 m 2 - 5 т 5 - 20 m >20 m 10 90 Flow Type <u>Ri</u>ffle Pools Steady **Rapids** Substrate <u>Co</u>bble/ <u>Co</u>bble/ <u>Ru</u>bble 30 ١Ò Type <u>Bo</u>ulder Unknown Fines Bedrock <u>G</u>ravel Beak Habitat Type III Type IV Type I Type II Cobble/ Bank Gravel/ 10 10 Material Pebble Rubble <u>Bo</u>ulder <u>Bed</u>rock Unknown Fines Forest Shallow Medium Deep Flood Bog/Fen Backslope Gully Gully Plain Gully 100 Stream Bank Trees 20 Vegetation Grasses [Bog Shrubs D Cover Overhang Canopy Instream None Potential Obstruction Falls <u>Rapids</u> Chute Cascade Intermitten None Est. Gradient 3 - 5 % 0 - 1 % 1 - 3 % >5 % Substrate Backslope Cover fines less than 2 mm Shallow gully 1 m Instream submergent/emergent vegetation gravel 2mm - 3 cm Meduim gully 2-3 m Overhang grasses/shrubs within 1 m of water pebble 3 - 5 cm Deep gully $\geq 4 \text{ m}$ Canopy trees > 1m above water cobble 6-13 cm Forest stream see over can be expressed as % cover j rubble 14-25 cm Flood plain see over Page number boulder 26 cm and up Bog/Fen see over



Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

Stream No.	# 31·	Sketch of the area	
e	Sept 24/02		
Surveyed by	BW/mH/pJ		
Watershed	Kenamu		و الم
GPS Co-ord.	See list.	104	hut the
Aerial Photo #		July Su	better low
Map Number	136/16	Som	•
Photo Numbers	71	130	(
Video	Ves	ALL FILMS TH	
Area Surveyed	500 Annul 50 ground	in the 12 - 250	
Water Samples		A**	
] []	Comments
Depth 0 - 1 m	└ 1 - 2 m >2 m	Unknown	
Channel Width 0 - 2 m	2 - 5 m 5 - 20 m	>20 m	
N Type <u>St</u> eady	<u>Riffle</u> <u>Rapids</u> Cobble/		
Type <u>F</u> ines	10 ⁰ <u>G</u> ravel <u>Ru</u> bble	Boulder Bedrock Unknown	
Beak Habitat Type I	Type II 50 Type III	Type IV 50	
Bank	ro <u>Gravel</u> , <u>Co</u> bble/		
Shallow	Medium Deep	Boulder Bedrock Unknown ·	
Backslope Gully	Gully Gully	Stream 50 Plain Bog/Fen 50	
Bank Vegetation <u>Bog</u>	Grasses Shrubs 70	Trees 30	
Cover 98º10	8D		
Potential			
Obstruction Falls	Rapids Chute	Cascade Intermittent None None	
Gradient 0 - 1 %	1 - 3 % 3 - 5 %	>5 %	· .
Substrate fines less than 2 gravel 2mm - 3 cm pebble 3 - 5 cm cobble 6-13 cm rubble 14-25 cm	Backslope mm Shallow gully 1 m n Meduim gully 2-3 m Deep gully ≥.4 m Forest stream see over Flood plain see over	Cover Instream submergent/emergent vegetation Overhang grasses/shrubs within 1 m of water Canopy trees > 1m above water can be expressed as % cover	Page number
boulder 26 cm and t	np Bog/Fen see over		



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Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

Stream No.		38		Sketch of the a	rea /	Aque tic vegetation	<u> </u>
е		Sapt 24/	02		(=	II (2+	0
Surveyed by		Bw/mH/	рт	Small .	patchesish	Run-)	
Watershed		Kenamu		I cascade	Rapids (III)) **	
GPS Co-ord.		see lis	+ .	り。 (工)	alovity Eline	RIFFIC	
Aerial Photo	#				1	W RIFFIE	
Map Numbe	r	13 B/	13		-1.	×;	-
Photo Numb	ers	72				(D)	
Video		Yes			J KI.	O/	
Area Survey	ed <u>57</u>	oom acriel.	somgrund		14	and a	,
Water Samp	les	Yes			/ ₽,	250 -	Comments
			·				
Depth	0 - 1 m 70	1 - 2 m 30	>2 m	Unknown			·
Channel		ר-יו ר		[
Width	0 - 2 m	2 - 5 m	5 - 20 m	>20 m			
w Type	Steady 10	ر <u>Ri</u> ffle	Rapids 10	Pools 10			
ل strate العام	 		Cobble/				
Туре	Fines 10	Gravel	Rubble 20	Boulder 60	Bedrock 13	Unknown	
Beak	[[]		[
Habitat	Type I	Туре II 8 0	Type III 10	Type IV 10			
Bank	<u>[]</u>	<u>G</u> ravel/	<u>Co</u> bble/				
Material	Fines 10	Pebble	Rubble 20	Boulder 60	Bedrock 10	Unknown	·
Backslope	Shallow Gully	Medium Gully	Deep Gully	Forest Stream	Flood Plain	Bog/Fen	
Bank	- <u>-</u>				·		
Vegetation,	Bog	<u>Gras</u> ses	Shrubs 30	Trees 70			· · · · · · · · · · · · · · · · · · ·
Cover 2.	lo Instream 50	Overhang	Canopy 40	None		,	
Potential							
Obstruction	<u>Falls</u>	<u>Rapids</u>	<u>Ch</u> ute	<u>Ca</u> scade	[Intermittent]	None	
Est.							
Gradient	U-1%	<u> </u>	3-5%	>5 %] 		
Substrate fines gravel pebble cobble , rubble	less than 2 mm 2mm - 3 cm 3 - 5 cm 6-13 cm 14-25 cm	Backslope Shallow gully Meduim gully Deep gully Forest stream Flood plain	1 m 2-3 m ≥4 m see over see over	Cover Instream Overhang Canopy	submergent/em grasses/shrubs trees > 1m abov can be expresse	ergent vegetation within 1 m of water ve water ed as % cover	Page number
boulder	26 cm and up	Bog/Fen	see over				

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Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

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Stream No.	39	Sketch of the area
.te Surveyed by	Sopt 24/02 BuilMHI PT	could be H2 0.
Watershed	Kenamu	en 2 places
GPS Co-ord.	See list	NOFIOW + 70
· Aerial Photo #		
Map Number	13B/13	
Photo Numbers	73	770 6100
Video	Yes	
Area Surveyed	500 m Aerial	
Water Samples	No	Comments
Depth 0 - 1 m Channel	1 - 2 m >2 m	Unknown
Width 0 - 2 m	2 - 5 m 5 - 20 m	>20 m
w Type <u>St</u> eady Substrate Type <u>F</u> ines	<u>Riffle</u> <u>Ra</u> pids <u>Co</u> bble/ <u>G</u> ravel <u>Ru</u> bble	Pools UnKnown Boulder Bedrock
Beak Habitat Type I	Type II Type III	Type IV
Bank Material <u>F</u> ines	<u>G</u> ravel/ <u>Co</u> bble/ Pebble <u>Ru</u> bble	Boulder Bedrock Unknown
Shallow Backslope Gully	Medium Deep Gully Gully	Forest Flood Stream Plain Bog/Fen .
Bank Vegetation <u>Bog</u>	<u>Gras</u> ses <u>Sh</u> rubs	10 _{Trees} 30
Cover 990 Instream	Overhang 10 Canopy	None
Obstruction <u>Fa</u> lls	Rapids <u>Ch</u> ute	<u>Ca</u> scade <u>Int</u> ermittent None
Est. Gradient 0 - 1 %	1 - 3 % 3 - 5 %	>5 %
Substrate fines less than 2 r gravel 2mm - 3 cm pebble 3 - 5 cm cobble 6-13 cm rubble 14-25 cm boulder 26 cm and r	Backslope nm Shallow gully 1 m Meduim gully 2-3 m Deep gully ≥ 4 m Forest stream see over Flood plain see over ap Bog/Fen see over	Cover Instream submergent/emergent vegetation Overhang grasses/shrubs within 1 m of water Canopy trees > 1m above water can be expressed as % cover Page number

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TRANS-LABRADOR HIGHWAY STREAM CROSSING INFORMATION: CARTWRIC	GHT JUNCTION TO GOOSE BAY
Ground Survey	
Ground survey completed Ground Survey not Completed	NO
Temperature Crossing less than 2 k	m ² (on DWST list)
pH Bog drainage	
Conductivity Type IV (steady) flow	
Dissolved Oxygen Type III (cascade/rapi	ds) flow
Turbidity No accessible by helic	opter
Surface velocity Other:	
Water Samples collected	
Gradient (inclinometer)	
Sketch & Measurements of Surveyed Section(s)	

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Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

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Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

Stream No.			40			Sketch of the	area		· · · ·
e			Sept 24	102				250m	
Surveyed by	y		BWIMHI	PJ				(
Watershed			Kenam	<u>~</u>		R FI	ow		o holiste.
GPS Co-ord	i.		See lis	+		76	, voughout)	PII Sandy	Smither +
Aerial Phot	o #		c						
Map Numb	er		13B/1	3			क्र	J X - 00	
Photo Num	bers		74)	
Video			Yes				a	·	
Area Surve	yed		500 m an	at some	-	1	Č		· •
Water Sam	ples	<u> </u>	Yes .				\mathcal{I}	250m.	
			/						Comments
Depth	0 - 1 m	V	1 - 2 m	>2 m		Unknown] `		
Channel				. ["			-		
Width	0 - 2 m		2 - 5 m 🗸	5 - 20 m		>20 m			
w Type	<u>St</u> eady		Riffle 910	<u>Ra</u> pids		Pools] .		
Type	Fines	100	Gravel	<u>Co</u> bble/ Rubble		Boulder	Bedrock	Unknown	
Beak	- 1]		
Habitat	Туре І		Type II	Type III		Type IV			
Bank			<u>G</u> ravel/	<u>Co</u> bble/]		
Material	<u>F</u> ines		Pebble	<u>Ru</u> bble		<u>Bo</u> ulder	Bedrock	<u>Un</u> known	
	Shallow		Medium	Deep		Forest] Flood		
Backslope	Gully		Gully	Gully		Stream	Plain	Bog/Fen	
Bank Vegetation,	Bog		Grasses 10	<u>Sh</u> rubs T	50	<u>Tr</u> ees 40			
Cover 40°	lə Instream	טו	Overhang 60	Canopy	30	None]		
Potential]			Г			_] [
Obstruction	<u>Fa</u> lls		<u>Ra</u> pids	<u>Ch</u> ute		<u>Ça</u> scade	Intermittent	None	·
Est.	[]		
Gradient	0 - 1 %		1 - 3 %	3 - 5 %		>5 %			
Substrate fines gravel pebble cobble	less than 2 r 2mm - 3 cm 3 - 5 cm 6-13 cm	nm	Backslope Shallow gully Meduim gully Deep gully Forest stream	l m 2-3 m ≥4 m see over		Cover Instream Overhang Canopy	submergent/er grasses/shrubs trees > 1m abo can be express	nergent vegetation within 1 m of water ove water ed as % cover	L
boulder	26 cm and u	p	Bog/Fen s	ee over					Page number
			· · ·			•			4

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Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

Stream No.	41	Sketch of the area	,,,,,,,
(e	Sept 24/01	1	
Surveyed by	BW/MH/PT	CS	
Watershed	Kenamin	Elow 12	» p.
GPS Co-ord.	See list		
Aerial Photo #			
Map Number	13B/13	TXPEIL	
Photo Numbers	75	All type I SI	
Video	1/en	De low cher	Kon
Area Surveyed	500 m Aerial 50 m grown	a crossing la	vonel 5.
Water Samples	Yor	Ground Sure goolo	5 trom X to 250
] []	Comments
Depth 0 - 1	m 1 - 2 m >2 m	Unknown	
Channel Width 0.2			
Widtin 0-2			
)w Type <u>St</u> ead	dy <u>Riffle</u> Ra pids	Pools 10	
Substrate Type Fin	es 00 Gravel Bubble	Boulder Bedrock Unknown	
Beak	5 ³ 5 ³		
Habitat Type	EIV Type IIV Type III		·····
Bank Material <u>F</u> in	es \b ⁰ <u>Gravel/ Cobble/</u> Pebble <u>Ru</u> bble	Boulder Bedrock Unknown	
Shalle Backslope Cul	Medium Deep	Forest Flood Poor/For	
Bank			
Vegetation <u>Be</u>	<u>og</u> <u>Gras</u> ses <u>Sh</u> rubs 50	<u>Trees</u> 50	
Cover 10 Instrea	m Overhang 60 Canopy 40	D None	
Potential Obstruction Fa	lls Ranids Chute		
Est.			
Gradient 0 - 1	% 1-3% 3-5%	>5 %	
Substrate	Backslope	Cover	
gravel 2mm - 3	cm Meduim gully 2-3 m	Overhang grasses/shrubs within 1 m of water	
pebble 3 - 5 cm	Deep gully ≥ 4 m	Canopy trees > 1m above water	
rubble 14-25 cm	Forest stream see over Flood plain see over	can be expressed as % cover	Page number
boulder 26 cm an	d up Bog/Fen see over		
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Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

Bog/Fen - with few permanent narrow cut channels and auxillary intermittent channels - periodic flooding causes no lasting impact

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Stream No.		42		Sketch of the a	rea		
te	Г	San+2.41	07	more	How \	250	mi
Surveyed by	Г			Substra	te much /)	
Surveyeu by		- BWI MHI	10	<u>_</u>		more	5/A (Forest stream)
Watershed	L	Kenami	<u> </u>			SL allow P	ool To Fish
GPS Co-ord.	Ļ	See 1	ist.		\langle	100	~
Aerial Photo #	#			ТУр	e II sluggish		
Map Number	Γ	13 B/ 1	3			(x	•
Photo Numbe	rs	76		A11	Jines -	$\langle \rangle$	
Video	Γ	Yes			TYPEIN))	
Area Surveye	a [52 IOV		\langle	
	- <u>[</u>	soo maeriai	onground			>)	,
Water Sample	es [- 250	Comments
	[`		
Depth	0 - 1 m	1 - 2 m	>2 m	Unknown			
Channel							
width	0 - 2 m	2 - 5 m	5 - 20 m	>20 m			
w Type	Steady	50 <u>Riffle</u> 40	<u>Ra</u> pids	Pools 10			
Luostrate			Cobble/				
lype	Eines[C	<u>Gravel</u>	Rubble 20	<u>Bo</u> ulder	Bedrock	<u>Un</u> known	
Beak Habitat	Tume	THE	*C				
Bank	T Add T					, <u>,</u>	
Material	Fines 8	0 Pebble	Rubble 20	Boulder	Bedrock	Unknown	• .
	Shallow		Deep	Forest	Flood		
Backslope	Gully 8	O Gully	Gully	Stream 20	Plain	Bog/Fen	
Bank	Γ						
Vegetation,	Bog	<u>Gras</u> ses 10	Shrubs 50	<u>Tr</u> ees 40			
Cover 40° lo	Instream	Overhang 30	Canopy 20	None			
Potential	ſ	-					
Obstruction	<u>Fa</u> lls	<u>Ra</u> pids	<u>Ch</u> ute	<u>Ca</u> scade	Intermittent	None	····
Est.							
Gradient	0 - 1 %	1 - 3 %	3 - 5 %	>5 %			
Substrate fines le gravel 2r pebble 3 cobble 6- rubble 14 boulder 26	ss than 2 m nm - 3 cm - 5 cm 13 cm 4-25 cm 5 cm and up	Backslope m Shallow gully Meduim gully Deep gully Forest stream Flood plain Bog/Fen s	1 m 2-3 m ≥4 m see over see over see over	Cover Instream s Overhang g Canopy t	submergent/eme grasses/shrubs w rees > 1m abov can be expressed	rgent vegetation /ithin 1 m of water e water 1 as % cover	Page number

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Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

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Stream No.	43	Sketch of the area	
Date	Sept 24/02		250 m
Surveyed by	BW/MH/PJ	(0 ond)	
Watershed	Eagle	X (00)	Indicated have
GPS Co-ord.	See list-		+ base of pond
Aerial Photo #		Could not	
Map Number	13 B/13	See this Sections	
Photo Numbers	77	well 1 25	s
Video	Yes	appeared Intermittent	
Area Surveyed	500 m aerial	(Pono) 10/0	1. could not
Water Samples	NO ·		see.
Depth 0 - 1 m	1 - 2 m >2 m	Unknown	Comments
Channel Width 0 - 2 m	2 - 5 m 5 - 20 m	>20 m	
Flow Type <u>St</u> eady	<u>Riffle</u> <u>Ra</u> pids	Pools	
Jubstrate	<u>G</u> ravel <u>Cobbie/</u> <u>Rubble</u>	Boulder Bedrock Unknown	
Beak Habitat Type I	Type II Type III	Type IV	
Bank Material <u>F</u> ines	<u>G</u> ravel/ <u>Cobble/</u> Pebble <u>Ru</u> bble	Boulder Bedrock Unknown	
Shallow Backslope Gully	Medium Deep Gully Gully	Forest Flood Bog/Fen Bog/Fen	
Bank Vegetation <u>Bog</u>	<u>Gras</u> ses <u>Sh</u> rubs 40	Trees 60	
Cover 98º lo Instream	Overhang 40 Canopy 60	None	
Potential Obstructio <u>Fa</u> lls	<u>Ra</u> pids <u>Ch</u> ute	<u>Ca</u> scade <u>Int</u> ermittent None	
Est. Gradient 0 - 1 %	1 - 3 % 3 - 5 %	>5 %	
Substrate fines less than 2 m gravel 2mm - 3 cm pebble 3 - 5 cm cobble 6-13 cm rubble 14-25 cm boulder 26 cm and n	Backslope mmShallow gully 1 m Meduim gully 2-3 m Deep gully ≥ 4 m Forest stream see over Flood plain see over up Bog/Fen see over	Cover Instream submergent/emergent vegetation Overhang grasses/shrubs within 1 m of water Canopy trees > 1m above water can be expressed as % cover	Page number

Ground Survey	2
Ground survey completed	Ground Survey not Completed ∇D
) Temperature	Crossing less than 2 km ² (on DWST list)
pH	Bog drainage
Conductivity	Type IV (steady) flow
Dissolved Oxygen	Type III (cascade/rapids) flow
Turbidity	No accessible by helicopter
Surface velocity	Other:
Water Samples collected	
Gradient (inclinometer)	

Sketch & Measurements of Surveyed Section(s)

LEGENDS / NOTES

Backslope

- . Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material
- Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks erosion may occur due to reduced stability of forest soils
- Flood Plain is a wide shallow course with narrow channel(s) in middle flooding occurs onto grasses with little lasting
 - Bog/Fen with few permanent narrow cut channels and auxillary intermittent channels periodic flooding causes no lasting impact

Stream No.	44-	Sketch of the area
Date	Sep+24/02	11 250 m
Surveyed by	BW/MH/pJ	
Watershed	Gagle	cannot see
GPS Co-ord.	See list	this section Appeared to be
Aerial Photo #		Stream car
Map Number	13B/13	only be seen
Photo Numbers	18	bor 10 m X (00) indicated
Video	425	
Area Surveyed	500 m certal	pond.
Water Samples	NO	-1
		Comments
Depth 0-1 m	1 - 2 m >2 m	Unknown
Channel		
Width 0 - 2 m	2 - 5 m 5 - 20 m	>20 m
Flow Type <u>St</u> eady	<u>Ri</u> ffle <u>Ra</u> pids	Pools
Substrate	<u>Co</u> bble/	
Type <u>F</u> ines	<u>G</u> ravel <u>Ru</u> bble	<u>Bo</u> ulder <u>Bed</u> rock <u>Un</u> known
Beak		
Habitat Type I		
Bank Material Fines	<u>Gravel</u> / <u>Cobble</u> /	Poulder Podrock Unknown
Shallow		
Backslope Gully	Gully Gully	Stream Plain Bog/Fen
Bank		
Vegetation <u>Bog</u>	<u>Gras</u> ses <u>Sh</u> rubs 50	Trees 50
Cover 10° Instream	Overhang 50 Canopy 9	None
Potential		
Obstructio <u>Fa</u> lls	Rapids Chute	Cascade Intermittent None
Est. Gradient 0 - 1 %	1 - 3 % 3 - 5 %	>5 %
Substrate fines less than 2 gravel 2mm - 3 cr pebble 3 - 5 cm cobble 6-13 cm rubble 14-25 cm boulder 26 cm and	Backslope mmShallow gully 1 m n Meduim gully 2-3 m Deep gully ≥ 4 m Forest stream see over Flood plain see over up Bog/Fen see over	Cover Instream submergent/emergent vegetation Overhang grasses/shrubs within 1 m of water Canopy trees > 1m above water can be expressed as % cover Page number
	- 0	

Ground Survey Ground survey completed		Ground Survey not Completed
Temperature		Crossing less than 2 km ² (on DWST list)
pH		Bog drainage
Conductivity	,	Type IV (steady) flow Crossing is at
Dissolved Oxyger		Type III (cascade/rapids) flow pond. Little -{
Turbidity		No accessible by helicopter any Stream 6 low
Surface velocity		Other:
Water Samples collected		
Gradient (inclinometer)		

Sketch & Measurements of Surveyed Section(s)

LEGENDS / NOTES

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Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

Stream No.	45		Sketch of the	area	
Date	Sep+ 24/	02			
Surveyed by	Bu/mt	+/ PJ		II.)	250 ~
Watershed	Eagl.	e		pond'	
GPS Co-ord.	See 1	ist	-	J. 1. 1. 80 m	
Aerial Photo #				TV	Luts of
Map Number	13B/	13	Flor	(> 20M7	Instream
Photo Numbers	79			X(00)m	usquation
Video	Yes				and and
Area Surveyed	500 0	erral		$\langle \rangle$	
Water Samples	NO.			(250	m
<u>_</u>	<u> </u>				Comments
Depth 0-	1 m 1 - 2 m	>2 m	Unknown		
Channel		م ا ا		7	
Width 0-	2 m 2 - 5 m	5 - 20 m	>20 m		ļ
Flow Type St	eady 25 Riffle	Rapids	Pools]	
ubstrate		Cobble/			
Туре <u></u>	ines <u>G</u> ravel	<u>Rubble</u>	Boulder 8	Bedrock Unknown	
Beak		7]	
Habitat Ty			Type IV		
Bank Material B	Gravel/	<u>Co</u> bble/	Davida	Dedeeate	
Sha					
Backslope C	Gully Gully	Gully	Stream	Plain Bog/Fen	
Bank]	
Vegetation	Bog Grasses 5	Shrubs 15	Trees 80		
Cover 15° lo Instr	eam 100 Overhang	Canopy	None]	
Potential					
Obstructio <u>F</u>	<u>alls Rapids</u>	<u>Ch</u> ute	Cascade	Intermittent None	
Est. Gradient 0 -	1 % 1 2 %	2 5 9/	>5 0/		
Gradient 0-			~5 %		
Substrate fines less the	Backslope an 2 mmShallow gully	1 m	Cover	submergent/emergent vegetation	
gravel 2mm -	3 cm Meduim gully	2-3 m	Overhang	grasses/shrubs within 1 m of wate	СГ
pebble 3 - 5 c	m Deep gully	<u>≥</u> 4 m	Canopy	trees > 1m above water	
cobble 6-13 ci rubble 14-25	m Forest stream	See over		can be expressed as % cover	Doge number
boulder 26 cm	and up Bog/Fe	1 see over			rage number
	-				

.

Ground Survey completed	Ground Survey not Completed NO
Temperature	Crossing less than 2 km ² (on DWST list)
pH	Bog drainage
Conductivity	Type IV (steady) flow
Dissolved Oxygen	Type III (cascade/rapids) flow
Turbidity	No accessible by helicopter
Surface velocity	Other:
Water Samples collected	

Sketch & Measurements of Surveyed Section(s)

LEGENDS / NOTES

Backslope

Gradient (inclinometer)

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

Stream No.	[46	•	Sketch of the	area	
, a "ate	[Sept 241	02			
Surveyed by		BW/MH/	PT		· · ·	250 ~~
Watershed	[Eagle				
GPS Co-ord.		See 119	,+		2-5 1 1	
Aerial Photo	#				\sum	
Map Number	r [138/1	3			
Photo Numbe	ers	80				
Video		Ves			5-20	- /
Area Surveye	ed 🗌	500 m F	Aerial		II >20'	
Water Sampl	les	Wo		(Lake)_	250 ~
	·			· · · · · · · · · · · · · · · · · · ·		Comments
Depth	0 - 1 m	1 - 2 m	>2 m	Unknown		
Channel Width	0.2[7	
** Idili	0-2m[2-5 m[*] 5-20 m [-	>20 m	_] ¬	
Tow Type	<u>St</u> eady	b ⁰ <u>Ri</u> ffle	<u>Ra</u> pids	Pools		
Substrate	Fines	Gravel	Cobble/	Boulder	Redroald Unknown	
Beak	<u>7</u> mest					
Habitat	Type I	Type II	Type III	Type IV		
Bank	<u>-</u>	Gravel/	Cobble/			
Material	Eines	Pebble	Rubble	Boulder	Bedrock Unknown	
	Shallow	Medium	Deep	Forest	Flood	
Backslope	Gully	Gully	Gully	Stream	Plain Bog/Fen	· · · · · · · · · · · · · · · · · · ·
Bank Vegetation	Bog	Grasses 30	Shrubs 20	Trees 5	have .	
Cover 20%	Instream	10 Overhang 10	Canopy	None]	
Potential Obstruction	Falls	Rapids	Chute	Cascade		
Est.						
Gradient	0 - 1 %	1 - 3 %	3 - 5 %	>5 %		
Substrate fines 1 gravel 2 pebble 3 cobble 6 rubble 1	ess than 2 m 2mm - 3 cm 3 - 5 cm 5-13 cm 14-25 cm	Backslope m Shallow gully Meduim gully Deep gully Forest stream Flood plain	1 m 2-3 m $\geq 4 \text{ m}$ see over see over	Cover Instream Overhang Canopy	submergent/emergent vegetation grasses/shrubs within 1 m of water trees > 1m above water can be expressed as % cover	Page number
boulder 2	to cm and up	Bog/Fen	see over			

TRANS-LABRADOR HIGHWAY STREAM CROSSING INFORMATION: CARTWRIGHT JUNCTION TO GOOSE BAY Ground Survey Ground survey completed Ground Survey not Completed Temperature pH Bog drainage

Type IV (steady) flow

Other:

Type III (cascade/rapids) flow

No accessible by helicopter

Conductivity

Turbidity

Dissolved Oxygen

Surface velocity

Water Samples collected

Gradient (inclinometer)

Sketch & Measurements of Surveyed Section(s)

LEGENDS / NOTES

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Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

Stream No.	1		41.		Sketch of the a	irea	
Date		\leq	opt 24/0	12		TXPETY	
Surveyed by	ł	1	Bu/mH,	1 pT		(C	CVOSS' vg
Watershed		-	Eagle			x(00)	-
GPS Co-ord.			See li	5+		INF FSAT	
Aerial Photo	#				Lose	un love)) TYDEI	
Map Number	-		13B/1	3	06 -		
Photo Numb	ers		81				River.
Video			les.			fond/stead)	1
Area Survey	ed	6	500 m.	Aerial.	-		
Water Samp	les		NO				Comments
· · · · ·					 7		Comments
Depth	0 - 1 m		1 - 2 m	>2 m	Unknown		
Channel		7] []	
Width	0 - 2 m		2 - 5 m	5 - 20 m	>20 m]	
Flow Type	<u>St</u> eady		Riffle	<u>Ra</u> pids	Pools		
Substrate				<u>Co</u> bble/] [7 .
Туре	<u>F</u> ines	100	Gravel	<u>Ru</u> bble	<u>Bo</u> ulder	Bedrock <u>Un</u> known	
Beak						ł	
Habitat	Type I		Type II	Type III	Type IV		_
Bank	P !		Gravel/	<u>Co</u> bble/	Douldon	Dedrock Unknown	
Iviaterial	<u>F</u> ines						」
Backslope	Snallow Gully	4	Gully	Gully	Stream	Plain Bog/Fen	<u> </u>
Bank]	
Vegetation	<u>Bog</u>	10	<u>Gras</u> ses	Shrubs 97	<u>Trees</u>	1	
Cover 95	lo Instream		Overhang	Canopy	None		
Potential			<u> </u>] [] [7
Obstruction	<u>Fa</u> lls		<u>Ra</u> pids	<u>Ch</u> ute	<u>Ca</u> scade	Intermittent None]
Est. Gradient	0-1%		1 - 3 %	3 - 5 %	>5 %]	
Substrate		-	Backslope		Cover		
tines gravel	less than 2 $2mm = 3$ cr	mm	Shallow gully Meduim gully	1 m 2-3 m	Instream	submergent/emergent vegetation	n ater
pebble	3 - 5 cm		Deep gully	≥4 m	Сапору	trees > 1m above water	
) cobble	6-13 cm		Forest stream	see over		can be expressed as % cover	[]]
fubble boulder	14-25 cm	ידוו	Flood plain	see over			Page number
oounor	en cui dua	պր	Dogri ch				



Sketch & Measurements of Surveyed Section(s)

LEGENDS / NOTES

Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

Stream No.			48.		Sketch of the a	area	<u>.</u>
Date		,	Sept24	102		Type I 2	150 m
Surveyed by		4	BW/MH/	PJ		T	
Watershed			Eagle	<u> </u>		THE	
GPS Co-ord			See In	5+		T	(0)
Aerial Photo	#					the card	sig (b)
Map Numbe	r ·		13 B/12			(Froil) TYO	υEI
Photo Numb	ers		82				-
Video			Yes.				
Area Survey	ed	50	som aerial !	50 m grown	K.	Book	
Water Samp	les		1/20	·]			258 m
			/				Comments
Depth	0 - 1 m	V	1 - 2 m	>2 m	Unknown		
Channel			[]		}		
Width	0 - 2 m		2 - 5 m	5 - 20 m 🗸	>20 m]	
l Now Type	Steady	20	Riffle 10	Ranids	Pools		
Substrate	<u>01</u> 0403			Cobble/		י ריי ר	
Туре	Fines	20	Gravel 10	Rubble So	Boulder 40	Bedrock Unknown	
Beak]	
Habitat	Туре I		Type II 80	Type III	Type IV 20	2	
Bank			Gravel/	Cobble/			
Material	<u>F</u> ines		Pebble	<u>Ru</u> bble	Boulder 40	Bedrock Unknown	↗
	Shallow	$\overline{\mathbf{v}}$	Medium	Deep	Forest	Flood	
Backslope	Gully		Gully	Gully[] Stream] Plain Bog/Fen	_J
Bank Vegetation	<u>Bog</u>		Grasses	Shrubs 40	Trees 60	þ	
Cover 20	Instream	30	Overhang 7 0	Canopy 30	None]	
Potential							7
Obstruction	<u>Fa</u> lls		<u>Ra</u> pids	<u>Ch</u> ute	<u>Ca</u> scade	Intermittent None	
Est.							
Gradient	0 - 1 %		1 - 3 %	-3 - 5 %[>5 %]	
Substrate			Backslope		Cover		
tines	less than 2 i	nm	Shallow gully	lm 23m	Instream	submergent/emergent vegetati	on
pebble	211111 - 3 Ch 3 - 5 cm	1	Deen gully	2-5 m > 4 m	Canony	grasses/simuos within 1 m 01 v trees > 1m above water	VAICT
, cobble	6-13 cm		Forest stream	see over	Janopy	can be expressed as % cover	
' rubble	1 4-2 5 cm		Flood plain	see over		·	Page number
boulder	26 cm and u	up	Bog/Fen s	see over			

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Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

	Stream No.		49		Sketch of the :	area	*	- k angara
	Date		Sent241	02				
	Surveyed ₋ by		Bu/ mHI	PT			>	
	Watershed	Ĺ	Zagle]		\leq	$\overline{}$	_
	GPS Co-ord.	·	(AIITY	pe 14
	Aerial Photo	#			GPSE 7.		yhavels (00	•
	Map Number		BB/	13·				
	Photo Numbe	ers 🔄	83				}	
	Video		5.13 1100.)	
	Area Surveye	ed d	500 m 1	Aerial			-250-	
	Water Sampl	es 🗌	w/d					
	_				····			Comments
	Depth	0 - 1 m	1 - 2 m	>2 m	Unknown]		
	Channel] [
	Width	0 - 2 m	2-5m	5 - 20 m] >20 m[]	~	
	flow Type	Steady	Riffle	<u>Ra</u> pids	Pools			
7 / J (Substrate			<u>Co</u> bble/				
	Type — Beak	<u>Fines</u>	<u>G</u> ravel] <u>Bo</u> ulder[]] <u>Bed</u> rock		
	Habitat	Type I	Type II	Type III	Type IV			
	Bank Material	Fines	<u>G</u> ravel/ Pebble	<u>Co</u> bble/	Boulder	Bedrock	Unknown	
		Shallow		Deen	Forest	Flood		
	Backslope	Gully	Gully	Gully	Stream	Plain	Bog/Fen	
	Bank Vegetation	Bog	Grasses	Shrubs 5	D <u>Trees</u>			
	Cover 100	Instream \mathcal{V}	$\rho_{\text{Overhang}} \gamma_{0}$	Canopy	None]	·	
	Potential Obstruction	<u>Fa</u> lls	<u>Ra</u> pids	Chute	Cascade	Intermittent	None	
	Est. Gradient	0 - 1 %	1-3%	3 - 5 %]		
	Substrate fines gravel pebble cobble nubble	less than 2 mm 2mm - 3 cm 3 - 5 cm 6-13 cm 14-25 cm 26 cm and un	Backslope n Shallow gully Meduim gully Deep gully Forest stream Flood plain	1 m 2-3 m $\ge 4 \text{ m}$ see over see over	Cover Instream Overhang Canopy	submergent/eme grasses/shrubs w trees > 1m above can be expressed	ergent vegetation vithin 1 m of water e water d as % cover	Page number
	oonider .	zo on and up	Dug/ren	300 0 401				[



Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

Stream No.			50		Sketch of the a	irea		
Ĵate		5	20+ 24/1	52	Strea	m visible.	in 3 pla	n-t S
Surveyed by		P	SW/MH/	PT	(Stand	Y) NO FI	ow visible.	
Watershed	`		Eagle			, ,		
GPS Co-ord.	1							
Aerial Photo	#							
Map Number			138/1	3 -				
Photo Numbe	ers		84					
Video			yes.					
Area Surveye	d	500	maerial.					
Water Sample	es		NO					
								Comments
Depth	0 - 1 m		1 - 2 m	>2 m	Unknown			
Channel) Г		1		
Width	0 - 2 m	V	2 - 5 m	5 - 20 m	>20 m	-		
L Now Type	Steady		Riffle	Rapids	Pools			
ISubstrate	<u>01</u> 0405			Cobble/]] [
Туре	<u>F</u> ines		Gravel	Rubble	<u>Bo</u> ulder	Bedrock	Unknown	
Beak	— ·							
Habitat	Type I		Type II] Type III) 	ا	
Bank Material	<u>F</u> ines		<u>G</u> ravel/ <u>P</u> ebble	<u>Cobble</u> / <u>Ru</u> bble	Boulder	Bedrock	Unknown	
	Shallow		Medium] Deep	Forest	Flood		
Backslope	Gully		Gully	Gully	Stream V	Plain	Bog/Fen	
Bank Vegetation	Bog	5	Grasses 5	Shrubs 4	Trees 50			
Cover 980	o Instream		Overhang 50	Canopy	None]		
Potential Obstruction	Fails		Rapids	Chute	Cascade	Intermittent	None	
Est.	<u>1 u</u> 110		<u></u>]]]		、
Gradient	0 - 1 %		1 - 3 %	3 - 5 %	>5 %]		
Substrate fines 1 gravel 2 pebble 2) cobble 0 rubble boulder 2	less than 2 2mm - 3 cm 3 - 5 cm 5-13 cm 14-25 cm 26 cm and	nım n	Backslope Shallow gully Meduim gully Deep gully Forest stream Flood plain Bog/Fen	1 m 2-3 m > 4 m see over see over see over	Cover Instream Overhang Canopy	submergent/eme grasses/shrubs v trees > 1m abov can be expressed	ergent vegetation vithin 1 m of water e water d as % cover	Page number

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TRANS-LABRADOR HIGHWAY STREAM CROSSIN	IG INFORMATION: CARTWRIGHT JUNCTION TO GOOSE BAY
Ground Survey Completed	Ground Survey not Completed
Temperature	\checkmark Crossing less than 2 km ² (on DWST list)
pH	Bog drainage
Conductivity	Type IV (steady) flow
Dissolved Oxygen	Type III (cascade/rapids) flow
Turbidity	No accessible by helicopter
Surface velocity	Other:
Water Samples collected	
Gradient (inclinometer)	
Sketch & Measurements of Surveyed Section(s)	
	X 979.

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Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting
Stream No.			51		ļ	Sketch of the a	irea			
te			Sept 24/	02					_	
Surveyed by		P	BW/mH/	ЪЪ					18	
Watershed			Gagle					H	5-20m	
GPS Co-ord	•		See Li	st .		[low]	Af 6	71 10	, m	
Aerial Photo	#	<u>.</u>					41	I 2-5	~~ -X	
Map Numbe	r		13 8/13			\mathbf{V}		2-5	·	
Photo Numb	ers		85				\.	I [
Video			Yes				١	\emptyset		·
Area Survey	ed	500	manual 50m	svoud					5-20-	ر
Water Samp	les		yes		L			T)	Comments
				 				<u></u>		
Depth	0 - 1 m	4	1 - 2 m	>2 m_		Unknown				
Channel				Γ]			
Width	0 - 2 m		2 - 5 m 50	5 - 20 m	50	>20 m	1			
w Type	<u>St</u> eady	50	Riffle 45	Rapids	5	Pools				
Substrate				Cobble/		<u></u>]	[]	. []	
Туре	<u>F</u> ines	50	<u>G</u> ravel	Rubble 3	0	Boulder 20	Bedr	ock <u>U</u> I	nknown	
Beak				ſ	7		1			
Habitat	Type I		Type II	Type III		Type IV 50				
Bank Material	<u>F</u> ines		<u>G</u> ravel/ Pebble	<u>Co</u> bble/ <u>Ru</u> bble		<u>Bo</u> ulder	Bedro	ock Un	known	
Backslope	Shallow		Medium	Deep		Forest	- Fl			
Bank	Guily			Guny		Stream	jr. 1		sog/ren	
Vegetation.	Bog		Grasses lo	<u>Sh</u> rubs 6	,0	<u>Tr</u> ees 30	j			
Cover 2001	o Instream	70	Overhang 20	Canopy	0	None]			
Potential Obstruction	Falls		Rapids	Chute		Cascade	Intermitt	ent	None	
Est.]			
Gradient	0 - 1 %		1 - 3 %	3 - 5 %		>5 %				
Substrate		E	Backslope		(Cover				
tines	less than 2 1	nm S	shallow gully 1	m 2-r		Instream	submerg	ent/emerger	it vegetation	
pebble	3 - 5 cm	ı A	Deen gully 2	ת כ אחר מית ל-		Overhang	grasses/s	m above wa	n i m of water	
cobble	6-13 cm	J	Forest stream s	ee over		Canopy	can be e	xpressed as '	% cover	
/ rubble	14-25 cm		Flood plain s	ee over						Page number
Doulder	26 cm and i	ıp	Bog/Fen s	ee over						
										l j



Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

Stream No.	52	Sketch of the area Rikele	250 m
te	Sop+24/02		
Surveyed by	BWIMHIPJ		
Watershed	Zagle		
GPS Co-ord.	See list.	FIN (1) [3] 101101010 [3] = 5.	
Aerial Photo #	, ,	- (pos) - post + x- oc	
Map Number	13 B 13	72m	
Photo Numbers	86 (18+2185)	- Run	
Video	Yes	L L L L	
Area Surveyed	500 maerial 50 mgrown		,
Water Samples		Steady -	250 m
			Comments
Depth 0 - 1 m	10 1 - 2 m 20 > 2 m 10	Unknown	
Channel			
	2-3 m 5-20 m [*	 	
w Type <u>St</u> eady	35 Riffle 60 Rapids 5	Pools	
Substrate Type Fines	60 Gravel Rubble 10	Boulder 30 Bedrock	
Beak			
Habitat Type I	Type II 65 Type III 5	Type IV 30	
Bank Material Fines	Gravel/ Cobble/	Boulder 30 Bedroek	f Turing Barre
Shallow	Medium Deen		(1) V
Backslope Gully	Gully Gully	Stream Plain Bog/Fen	
Bank Vegetation Dec	22 01 47		
vegetation, Bog			
Cover 20°6 Instream	60 Overhang 30 Canopy 10	None	
Potential Obstruction Ealls	Ranide Chute		
Est.			
Gradient 0 - 1 %	1 - 3 % 3 - 5 %	>5 %	
Substrate fines less than 2 r gravel 2mm - 3 cm pebble 3 - 5 cm cobble 6-13 cm rubble 14-25 cm boulder 26 cm and r	Backsiope nm Shallow gully 1 m n Meduim gully 2-3 m Deep gully ≥4 m Forest stream see over Flood plain see over	Cover Instream submergent/emergent vegetation Overhang grasses/shrubs within 1 m of water Canopy trees > 1m above water can be expressed as % cover	Page nuniber

.



LEGENDS / NOTES

Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little

Stream No.	53	Sketch of the area	
late	Sept 24/02	109 2	50 m
Surveyed by	BWIMH/ PJ	8.9 20 10	
Watershed	hade		
GPS Co-ord.	See list.	Forest	
Aerial Photo #			
Map Number	13B/13	_ + - × (0)	
Photo Numbers			
Video	Yes		
Area Surveyed	500 maerial 50 mgrow		
Water Samples	Yes	250m	
· · · · · · · · · · · · · · · · · · ·			Comments
Depth 0-1m	→ 1 - 2 m >2 m	Unknown	
Channel			
Width 0 - 2 m	2-5m 5-20m	>20 m	
Flow Type Steady	20 Diffe 80 Bonids	Beele	
ubstrate	<u>Rine</u> <u>Rapids</u>		
Type <u>Fines</u>	<u>G</u> ravel <u>Rubble</u>	Boulder Bedrock Unknown	
Beak			
Habitat Type I	Type II V Type III	Type IV 20	
Bank	Gravel/ <u>Co</u> bble/		
Material <u>Fines</u>	Pebble <u>Ru</u> bble	Boulder Bedrock Unknown	
Backslope Gully	Medium Deep Gully Gully	Forest Flood Stream & Plain Bog/Fen 2-3	
Bank			
Vegetation <u>Bog</u>	O Grasses 10 Shrubs 30	D Trees 50	
Cover 80 D Instream	10 Overhang 50 Canopy 40	None	
Potential			-
Obstructio <u>Fa</u> lls	<u>Ra</u> pids <u>Ch</u> ute	<u>Ca</u> scade <u>Int</u> ermittent None	
Est.			
Gradient 0 - 1 %	1 - 3 % 3 - 5 %	>5 %	
Substrate	Backslope	Cover	
fines less than 2	mmShallow gully 1 m	Instream submergent/emergent vegetation	-
pebble 3 - 5 cm	Deep gullv $> 4 \text{ m}$	Canopy trees > 1m above water	Ļ
cobble 6-13 cm	Forest stream see over	can be expressed as % cover	
rubble 14-25 cm	Flood plain see over	-	Page number
	up Dogreen see over		

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Backslope

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Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

NO Stream Bed Could be found at this Co-ordinate Dittle Bitob Bog Dranage loom below crossing. 54 Stream No. Sketch of the area ate 07241 m Surveyed by MH 2ac Watershed ø GPS Co-ord. See List Aerial Photo # 13 B/14 Map Number **Photo Numbers** None no Video Area Surveyed none ND Water Samples Comments 0 - 1 m Depth 1 - 2 m >2 m Unknown Channel Width 0 - 2 m 2 - 5 m 5 - 20 m >20 m low Type Riffle Steady <u>Ra</u>pids Pools Substrate <u>Co</u>bble/ Type Fines <u>Bo</u>ulder <u>G</u>ravel <u>Ru</u>bble Bedrock Unknown Beak Habitat Type I Type II Type III Type IV Bank Gravel/ Cobble/ Material ¹ Fines Pebble Rubble Boulder Bedrock Unknown Shallow Medium Deep Forest Flood Backslope Gully Gully Gully Plain Bog/Fen Stream Bank Vegetation Bog <u>Gras</u>ses <u>Sh</u>rubs Trees Cover Instream Overhang Canopy None Potential Obstruction Falls **Rapids** Chute <u>Ca</u>scade Intermittent None Est 0 - 1 % Gradient 1 - 3 % 3 - 5 % >5 % Substrate Backslope Cover fines less than 2 mm Shallow gully 1 m Instream submergent/emergent vegetation gravel 2mm - 3 cm Meduim gully 2-3 m Overhang grasses/shrubs within 1 m of water pebble 3 - 5 cm Deep gully $\geq 4 \text{ m}$ Canopy trees > 1m above water cobble 6-13 cm Forest stream see over can be expressed as % cover rubble 14-25 cm Flood plain see over Page number boulder 26 cm and up Bog/Fen see over

TRANS-LABRADOR HIGHWAY	STREAM CROS	SSING INFORMATION: CARTWRIGHT JUNCTION TO GOOSE BAY
Ground Survey		#54
Ground survey completed		Ground Survey not Completed ND
r Tempera	ture	Crossing less than 2 km ² (on DWST list)
	pH	Bog drainage no Stroam
Conducti	vity	Type IV (steady) flow
Dissolved Oxy	/gen	Type III (cascade/rapids) flow
Turbi	dity	No accessible by helicopter
Surface velo	ocity	Other:
Water Samples colle	cted	
Gradient (inclinome	eter)	
Sketch & Measurements of Survey	ved Section(s)	

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Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

Stream No.	[55	5	Sketch of the	агеа	
Date	ſ	Senti	24/62			
Surveyed by	· [BW/mH/	pT		$\sum_{i=1}^{n}$	
Watershed	[Eagle	, 		F	
GPS Co-ord	•	Seel	-15+		IIII , oo	
Aerial Photo	o #					
Map Numbe	er [130/	14		(IF)	
Photo Numb	ers	88			120.	
Video	[yes	5 · · · · · · · · · · · · · · ·	n d		
Area Survey	ed	501 m aericl	50 m gra	and	TT /	
Water Samp	les	Yes	-		/ /250	
· · · · · ·				· · · · · · · · · · · · · · · · · · ·		Comments
Depth	0 - 1 m	√ 1 - 2 m	✓ >2 m	Unknown		
Channel	[[
Width	0 - 2 m	2 - 5 m	5 - 20 m	✓ 40 >20 m	160	· · · · · · · · · · · · · · · · · · ·
Jlow Type	<u>St</u> eady	60 <u>Ri</u> ffle	to Rapids	Pools)	
Substrate	ſ		<u>Co</u> bble/			
Туре	<u>F</u> ines	40 <u>G</u> ravel	<u>Ru</u> bble	Boulder	Bedrock <u>Un</u> known	·
Beak			on			
Habitat	Type I	Type II	Type III	Type IV		· · · · · · · · · · · · · · · · · · ·
Bank Material	Fines	<u>G</u> ravel/ Pebble	<u>Co</u> bble/	D Bouldar 5	Pedrock Unknown 20	
I'ta(Cilai	Shallow	<u>r</u> eoore				
Backslope	Gully	Gully	Gully	Stream	Plain Bog/Fen	
Bank	ſ]	
Vegetation	Bog	<u>Gras</u> ses	0 <u>Sh</u> rubs	30 Irees 60		
Cover 10	l. _{Instream}	Overhang	50 Canopy	30 None]	
Potential						
Obstruction	<u>Fa</u> lis	<u>Ra</u> pids	<u>Ch</u> ute	<u>Ca</u> scade	Intermittent None	
Est.	0 1 9/	1.20	7 6 64	25.00		
Grautent	U-1%	1-5%			}	
Substrate	less the - 0	Backslope	. 1	Cover	• · · · · · · · · · · · · · · · · · · ·	
ines gravel	2mm - 3 cm	un Shallow gul Meduim gul	1y 1m	Instream	submergent/emergent vegetation	r.
pebble	3 - 5 cm	Deep gul	$y \ge 4 m$	Canopy	trees > 1m above water	L
cobble	6-13 cm	Forest stream	m see over		can be expressed as % cover	
rubble	14-25 cm	Flood pla	n see over			Page number
boulder	20 cm and u	p · Bog/I	en see over			1



Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

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Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

Stream No.	[56.		Sk	etch of the a	irea		
Date	[Sep-	+241	02					¥
Surveyed by	. [Bu/m	н/р	F			that	intern	n +tom 7
Watershed	[Ga	gle			١	ntown		
GPS Co-ord	. [See	1.5+					7 (00)	
Aerial Photo	,# [A R		
Map Numbe	r [13 1	3/14			~ \o	w]	1	
Photo Numb	ers [8	9			(·
Video	[(/e	? ·				\mathbf{V}	{	
Area Survey	ed	500 m as	rial 1	50 m gro	und			+	
Water Samp	les [(/	en:						
	 Г	······································				·	1		Comments
Depth	0 - 1 m	<u> </u>	m	>2 m	_] u	Inknown			
Channel	F			Г	7	[
Width	0 - 2 m	2 - 5	m	5 - 20 m		>20 m			
Jow Type	<u>St</u> eady	Rif	fle	Rapids		Pools			
Substrate	L			Cobble/			, I [–) – i	,
Туре	<u>F</u> ines	20 <u>G</u> rav	/el	Rubble	σ	Boulder 60	Bedrock	<u>Un</u> known	
Beak Habitat	Type I	Туре	∇_{n}	Type III		Type IV			
Bank	C	Grav	el/	Cobble/			 		
Material	<u>F</u> ines	Peb	ole	<u>Ru</u> bble		Boulder 69	<u>Bed</u> rock	Unknown 43	
	Shallow	Mediu	ım	Deep	٦	Forest	Flood		
Backslope	Gully	Gu	lly	Gully		Stream 🚩	Plain	Bog/Fen	
Bank Vegetation	<u>Bog</u>	Grass	es	Shrubs 9	0	<u>Tr</u> ees 50			
Cover 040	Instream	Overha	08 gn	Canopy 2		None			
Potential	ſ						[7	
Obstruction	<u>Fa</u> lls	<u>Ra</u> pi	ds	<u>Ch</u> ute		<u>Ca</u> scade	Intermittent V	None	
Est. Gradient	0 - 1 %	1 - 3	%	3 - 5 %		>5 %			
Substrate fines gravel pebble cobble rubble boulder	less than 2 m 2mm - 3 cm 3 - 5 cm 6-13 cm 14-25 cm 26 cm and u	Backslop nm Shallow Meduim Deep Forest st Flood p Bo	e gully 1 n gully 2- gully <u>></u> ream see plain see pg/Fen see	m 3 m 4 m e over e over e over	Co	ver Instream Overhang Canopy	submergent/em grasses/shrubs trees > 1m abov can be expresse	ergent vegetation within 1 m of wate ve water ed as % cover	r Page number

TRANS-LABRADOR HIGHWAY STREAM C	ROSSING INFORMATION: CARTWRIGHT JUNCTION TO GOOSE BAY
	156. Cen land.
Ground Survey	
Ground survey completed	Ground Survey not Completed
Temperature 4.57	Crossing less than 2 km ² (on DWST list)
pH 6.49	Bog drainage
Conductivity 3.9	Type IV (steady) flow
Dissolved Oxygen 10.95	Type III (cascade/rapids) flow
Turbidity 3.)	No accessible by helicopter
Surface velocity 73 Rev	Other:
Vater Samples collected No.	- STRelling
White Sumples concored 423.	
Gradient (inclinometer) 5 %	
Sketch & Measurements of Surveyed Section(s)	
	Stream × 162
	TYPE IL Helicopter (D 963
Substrat	e.
BR	20°10 Cover 95%
B Stream B	50°/0 Instream 20°/0
1005e ground + RI.	200/2. Overhang 40%
windowof low them to	10% ··· Comp? : 40%
INTER Level P	
0.5\$	IN FIGUE
T _{io}	
964 ph-40	965
0h. 174	40 A V
prive by	Dapth 2 13cm
10 Oking Dis	P. EEL. Eloup Stylen d'
Cent	undergrown

Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

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Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

| Stream No.                                                             | #51                                                                          | Sketch of the area                                                                                                              |              |
|------------------------------------------------------------------------|------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|--------------|
| Date                                                                   | Sept 24/02                                                                   | Dia dentificable                                                                                                                | Stream       |
| Surveyed by                                                            | BW/MH/PT                                                                     | 100 forming                                                                                                                     | location     |
| Watershed                                                              | Eagle                                                                        | bed at this                                                                                                                     |              |
| GPS Co-ord.                                                            | See list                                                                     |                                                                                                                                 |              |
| Aerial Photo #                                                         |                                                                              |                                                                                                                                 |              |
| Map Number                                                             | 138/14                                                                       |                                                                                                                                 |              |
| Photo Numbers                                                          | None                                                                         |                                                                                                                                 |              |
| Video                                                                  | None                                                                         |                                                                                                                                 |              |
| Area Surveyed                                                          | more                                                                         |                                                                                                                                 |              |
| Water Samples                                                          | Mohe                                                                         |                                                                                                                                 |              |
|                                                                        |                                                                              |                                                                                                                                 | Comments     |
| Depth 0-1 m                                                            | 1 - 2 m >2 m                                                                 | Unknown                                                                                                                         |              |
| Channel                                                                |                                                                              |                                                                                                                                 |              |
| Width 0-2 m                                                            | 2 - 5 m 5 - 20 m                                                             | >20 m                                                                                                                           |              |
|                                                                        |                                                                              |                                                                                                                                 |              |
| flow Type <u>St</u> eady                                               | Riffle Rapids                                                                | Pools                                                                                                                           |              |
| Type <u>F</u> ines                                                     | <u>Gravel</u> <u>Co</u> bble/<br><u>Gravel</u> Rubble                        | Boulder Bedrock Unknown                                                                                                         |              |
| Beak                                                                   |                                                                              |                                                                                                                                 |              |
| Habitat Type I                                                         | Type II Type III                                                             | Type IV                                                                                                                         |              |
| Bank                                                                   | <u>G</u> ravel/ <u>Co</u> bble/                                              |                                                                                                                                 |              |
| Material <u>Fines</u>                                                  | Pebble <u>Ru</u> bble                                                        | <u>Bo</u> ulder <u>Bed</u> rock <u>Un</u> known                                                                                 |              |
| Backslope Gully                                                        | Medium Deep<br>Gully Gully                                                   | Forest Flood<br>Stream Plain Bog/Fen                                                                                            |              |
| Bank                                                                   |                                                                              |                                                                                                                                 |              |
| Vegetation <u>Bog</u>                                                  | <u>Gras</u> ses <u>Sh</u> rubs                                               | Trees                                                                                                                           |              |
| Cover Instream                                                         | Overhang Canopy                                                              | None                                                                                                                            |              |
| Potential                                                              |                                                                              |                                                                                                                                 |              |
| Obstruction <u>Falls</u>                                               | <u>Ra</u> pids <u>Ch</u> ute                                                 | <u>Ca</u> scade <u>Intermittent</u> None                                                                                        |              |
| Est.                                                                   |                                                                              |                                                                                                                                 |              |
| Gradient 0-1%                                                          | 1-3% 3-5%                                                                    | >5 %                                                                                                                            |              |
| Substrate<br>fines less than 2<br>gravel 2mm - 3 cr<br>pebble 3 - 5 cm | Backslope<br>mm Shallow gully 1 m<br>n Meduim gully 2-3 m<br>Deep gully ≥4 m | Cover<br>Instream submergent/emergent vegetation<br>Overhang grasses/shrubs within 1 m of wate<br>Canopy trees > 1m above water | 1            |
| ) cobble $6-13 \text{ cm}$<br>rubble $14-25 \text{ cm}$                | Forest stream see over<br>Flood plain see over                               | can be expressed as % cover                                                                                                     | Page number  |
| boulder 26 cm and                                                      | up Bog/Fen see over                                                          |                                                                                                                                 | r age number |
|                                                                        |                                                                              |                                                                                                                                 |              |

| Ground Survey           | 井ちつ                                          |           |
|-------------------------|----------------------------------------------|-----------|
| Ground survey completed | Ground Survey not Completed                  |           |
| Temperature             | Crossing less than $2 \text{ km}^2$ (on DWST | list)     |
| pH                      | Bog drainage                                 | no stream |
| Conductivity            | Type IV (steady) flow                        | •         |
| Dissolved Oxygen        | Type III (cascade/rapids) flow               |           |
| Turbidity               | No accessible by helicopter                  |           |
| Surface velocity        | Other:                                       | ·····     |
| Water Samples collected | ]                                            |           |
| Gradient (inclinometer) | 7                                            |           |

## Sketch & Measurements of Surveyed Section(s)

#### **LEGENDS / NOTES**

#### Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

|   | Stream No.                                                                                                                           | 58                                                                                                                                               | Sketch of the area                                                                                                                                              |             |
|---|--------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
|   | Jate                                                                                                                                 | Sept 24/02                                                                                                                                       | · · · ·                                                                                                                                                         | /           |
|   | Surveyed by                                                                                                                          | Rw/mH/pt                                                                                                                                         | NT BOGY                                                                                                                                                         | 5/200       |
|   | Watershed                                                                                                                            | Gaele                                                                                                                                            | box in to                                                                                                                                                       | T           |
|   | GPS Co-ord.                                                                                                                          | See list                                                                                                                                         |                                                                                                                                                                 |             |
|   | Aerial Photo #                                                                                                                       |                                                                                                                                                  | -10W + -                                                                                                                                                        |             |
|   | Map Number                                                                                                                           | 138/14                                                                                                                                           | FI                                                                                                                                                              | o~•         |
|   | Photo Numbers                                                                                                                        | 90                                                                                                                                               |                                                                                                                                                                 | -           |
|   | Video                                                                                                                                | Yes .                                                                                                                                            | Trees ) II Trees                                                                                                                                                |             |
|   | Area Surveyed                                                                                                                        | 57.0 2 2 2 2 2 2                                                                                                                                 |                                                                                                                                                                 |             |
|   | Water Samples                                                                                                                        | NO                                                                                                                                               |                                                                                                                                                                 |             |
|   | ·                                                                                                                                    |                                                                                                                                                  |                                                                                                                                                                 | Comments    |
|   | Depth 0-1m                                                                                                                           | 1 - 2 m >2 m                                                                                                                                     | Unknown                                                                                                                                                         |             |
|   | Channel                                                                                                                              |                                                                                                                                                  |                                                                                                                                                                 |             |
|   | Width 0 - 2 m                                                                                                                        | ∠ 2 - 5 m 5 - 20 m                                                                                                                               | >20 m                                                                                                                                                           |             |
| ſ | ow Type <u>St</u> eady                                                                                                               | <u>Riffle</u> <u>Rapids</u>                                                                                                                      | Pools                                                                                                                                                           |             |
|   | Substrate                                                                                                                            | Cravel Rubble                                                                                                                                    |                                                                                                                                                                 |             |
|   | Beak                                                                                                                                 |                                                                                                                                                  | Boulder Bedrock Unknown                                                                                                                                         |             |
|   | Habitat Type I                                                                                                                       | Type II Type III                                                                                                                                 |                                                                                                                                                                 |             |
|   | Bank<br>Material <u>Fines</u>                                                                                                        | $\sqrt{\frac{G}{Pebble}} \frac{Cobble}{Rubble}$                                                                                                  | Boulder Bedrock Unknown                                                                                                                                         |             |
|   | Shallow                                                                                                                              | Medium Deep                                                                                                                                      | Forest, Flood                                                                                                                                                   |             |
|   | Backslope Gully                                                                                                                      | Gully Gully                                                                                                                                      | Stream 60 Plain Bog/Fen 40                                                                                                                                      |             |
|   | Vegetation Bog                                                                                                                       | 20 Grasses Shrubs 50                                                                                                                             | Trees 30                                                                                                                                                        |             |
|   | Cover 60% Instream                                                                                                                   | 10 Overhang 40 Canopy 50                                                                                                                         | None                                                                                                                                                            |             |
|   | Potential                                                                                                                            |                                                                                                                                                  |                                                                                                                                                                 |             |
|   | Est.                                                                                                                                 | <u>Kapids</u> <u>Ch</u> ute                                                                                                                      | Cascade Intermittent Nonc                                                                                                                                       |             |
| Į | Gradient 0 - 1 %                                                                                                                     | 1 - 3 % 3 - 5 %                                                                                                                                  | >5 %                                                                                                                                                            |             |
| × | Substrate<br>fines less than 2 m<br>gravel 2mm - 3 cm<br>pebble 3 - 5 cm<br>cobble 6-13 cm<br>rubble 14-25 cm<br>boulder 26 cm and m | Backslope<br>Im Shallow gully 1 m<br>Meduim gully 2-3 m<br>Deep gully ≥4 m<br>Forest stream sce over<br>Flood plain see over<br>Bog/Fen sce over | Cover<br>Instream submergent/emergent vegetation<br>Overhang grasses/shrubs within 1 m of water<br>Canopy trees > 1m above water<br>can be expressed as % cover | Page number |
|   |                                                                                                                                      | PORTEU SCE OVEL                                                                                                                                  |                                                                                                                                                                 |             |

| TRANS-LABRADOR HIGHWAY STREAM CROSSING INFORMATION: CARTWRIGHT JUNCTION TO GOOSE BAY |                                                    |  |  |
|--------------------------------------------------------------------------------------|----------------------------------------------------|--|--|
| Ground Survey                                                                        | <b>H</b> 58                                        |  |  |
| Ground survey completed                                                              | Ground Survey not Completed NO                     |  |  |
| Temperature                                                                          | Crossing less than $2 \text{ km}^2$ (on DWST list) |  |  |
| pH                                                                                   | Bog drainage                                       |  |  |
| Conductivity                                                                         | Type IV (steady) flow                              |  |  |
| Dissolved Oxygen                                                                     | Type III (cascade/rapids) flow                     |  |  |
| Turbidity                                                                            | No accessible by helicopter                        |  |  |
| Surface velocity                                                                     | Other:                                             |  |  |
| Water Samples collected                                                              |                                                    |  |  |
| Gradient (inclinometer)                                                              |                                                    |  |  |

Sketch & Measurements of Surveyed Section(s)

# **LEGENDS / NOTES**

#### Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

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| TRANS-LABRADOR HIGHWAY STREAM CROSSIN | G INFORMATION: CARTWRIGHT JUNCTION TO GOOSE BAY     |
|---------------------------------------|-----------------------------------------------------|
| Ground Survey Completed               | Ground Survey not Completed                         |
| Temperature                           | Crossing less than 2 km <sup>2</sup> (on DWST list) |
| pH                                    | Bog drainage                                        |
| Conductivity                          | Type IV (steady) flow                               |
| Dissolved Oxygen                      | Type III (cascade/rapids) flow                      |
| Turbidity                             | No accessible by helicopter                         |
| Surface velocity                      | Other:                                              |
| Water Samples collected               |                                                     |
| Gradient (inclinometer)               |                                                     |

# Sketch & Measurements of Surveyed Section(s)

#### LEGENDS / NOTES

#### Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

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|        | Stream No.                                                                                                                           | (10)                                                                                                                                                  | Sketch of the area                                                                                                                                              |                                        |
|--------|--------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| •      | )ate                                                                                                                                 | Sept 25/02                                                                                                                                            | becoment GP                                                                                                                                                     | spt                                    |
|        | Surveyed by                                                                                                                          | BW/mH/Hm/PJ                                                                                                                                           | Lesmitten - 2 7 50                                                                                                                                              | 15 -                                   |
|        | Watershed                                                                                                                            | Cagle.                                                                                                                                                | eng x log                                                                                                                                                       | Bog                                    |
|        | GPS Co-ord.                                                                                                                          | See list                                                                                                                                              | The second second                                                                                                                                               |                                        |
|        | Aerial Photo #                                                                                                                       |                                                                                                                                                       | the t                                                                                                                                                           | 250                                    |
|        | Map Number                                                                                                                           | 13B/14                                                                                                                                                |                                                                                                                                                                 | nches ]                                |
|        | Photo Numbers                                                                                                                        | 93                                                                                                                                                    |                                                                                                                                                                 | C. 1055109                             |
|        | Video                                                                                                                                | Yes                                                                                                                                                   |                                                                                                                                                                 | V GI                                   |
|        | Area Surveyed                                                                                                                        | 500 m aevial                                                                                                                                          |                                                                                                                                                                 | X Trees.                               |
|        | Water Samples                                                                                                                        | ND                                                                                                                                                    |                                                                                                                                                                 |                                        |
|        | ·····                                                                                                                                |                                                                                                                                                       | ······································                                                                                                                          | Comments                               |
|        | Depth 0-1m                                                                                                                           | ↓ 1 - 2 m > 2 m                                                                                                                                       | Unknown                                                                                                                                                         |                                        |
|        | Channel                                                                                                                              |                                                                                                                                                       |                                                                                                                                                                 | · · · · · · · · · · · · · · · · · · ·  |
|        | Width 0 - 2 m                                                                                                                        | 2 - 5 m 5 - 20 m                                                                                                                                      | >20 m                                                                                                                                                           |                                        |
| 15     | Now Type Steady                                                                                                                      | Riffle Rapids                                                                                                                                         | Pools                                                                                                                                                           |                                        |
| \<br>\ | Substrata                                                                                                                            |                                                                                                                                                       |                                                                                                                                                                 |                                        |
|        | Type <u>Fines</u>                                                                                                                    | <u>G</u> ravel <u><u>Co</u>bble/<br/><u>Ru</u>bble</u>                                                                                                | Boulder Bedrock Unknown                                                                                                                                         |                                        |
|        | Beak                                                                                                                                 |                                                                                                                                                       |                                                                                                                                                                 |                                        |
|        | Habitat Type I<br>Bank                                                                                                               | Gravel/ Cobble/                                                                                                                                       |                                                                                                                                                                 |                                        |
|        | Material <u>Fines</u>                                                                                                                | Pebble Rubble                                                                                                                                         | Boulder Bedrock Unknown                                                                                                                                         |                                        |
|        | Shallow<br>Backslope Gully                                                                                                           | Medium Deep<br>Gully Gully                                                                                                                            | Forest Flood<br>Stream 50 Plain Bog/Fen 50                                                                                                                      |                                        |
|        | Bank                                                                                                                                 |                                                                                                                                                       |                                                                                                                                                                 |                                        |
|        | vegetation <u>Bog</u>                                                                                                                | <u>Gras</u> ses <u>Sh</u> rubs                                                                                                                        |                                                                                                                                                                 | ······································ |
|        | Cover Instream                                                                                                                       | Overhang 60 Canopy A                                                                                                                                  | o None                                                                                                                                                          |                                        |
|        | Potential<br>Obstruction <u>Fa</u> lls                                                                                               | Rapids <u>Ch</u> ute                                                                                                                                  | <u>Cascade</u> <u>Int</u> ermittent None                                                                                                                        | · · · · · · · · · · · · · · · · · · ·  |
|        | Est.<br>Gradient 0 - 1 %                                                                                                             | 1 - 3 % 3 - 5 %                                                                                                                                       | >5 %                                                                                                                                                            |                                        |
|        | Substrate<br>fines less than 2 r<br>gravel 2mm - 3 cm<br>pebble 3 - 5 cm<br>cobble 6-13 cm<br>rubble 14-25 cm<br>boulder 26 cm and u | Backslope<br>mm Shallow gully 1 m<br>n Meduim gully 2-3 m<br>Deep gully ≥4 m<br>Forest stream see over<br>Flood plain see over<br>up Bog/Fen see over | Cover<br>Instream submergent/emergent vegetation<br>Overhang grasses/shrubs within 1 m of water<br>Canopy trees > 1m above water<br>can be expressed as % cover | Page number                            |

| TRANS-LABRADOR HIGHWAY STREAM CROSSIN        | IG INFORMATION: CARTWRIGHT JUNCTION TO GOOSE BAY   |
|----------------------------------------------|----------------------------------------------------|
| Ground Survey completed                      | Ground Survey not Completed NO                     |
| Temperature                                  | Crossing less than $2 \text{ km}^2$ (on DWST list) |
| pH                                           | Bog drainage                                       |
| Conductivity                                 | Type IV (steady) flow                              |
| Dissolved Oxygen                             | Type III (cascade/rapids) flow                     |
| Turbidity                                    | No accessible by helicopter                        |
| Surface velocity                             | Other:                                             |
| Water Samples collected                      |                                                    |
| Gradient (inclinometer)                      |                                                    |
| Sketch & Measurements of Surveyed Section(s) |                                                    |
|                                              |                                                    |
|                                              |                                                    |
|                                              |                                                    |
|                                              |                                                    |

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#### Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

| Stream No.                                                              |                                                              |         | 61                                                                                       | ]                                                           | Sketch of the a                         | rea                                                                        |                                                                     |             |
|-------------------------------------------------------------------------|--------------------------------------------------------------|---------|------------------------------------------------------------------------------------------|-------------------------------------------------------------|-----------------------------------------|----------------------------------------------------------------------------|---------------------------------------------------------------------|-------------|
| `e                                                                      |                                                              | <       | p+ 25/0                                                                                  | 2                                                           |                                         |                                                                            | II Sta                                                              |             |
| Surveyed by                                                             | ,                                                            | 6       | w/mH/Hn                                                                                  | 1.05                                                        |                                         | <b>}</b> -                                                                 | /                                                                   | - 7         |
| Watershed                                                               |                                                              |         | Sagle                                                                                    |                                                             |                                         |                                                                            | /                                                                   |             |
| GPS Co-ord                                                              | •                                                            |         | See 1.                                                                                   | st .                                                        |                                         |                                                                            | ( mainly !                                                          | RIFFIE      |
| Aerial Photo                                                            | ) #                                                          |         |                                                                                          |                                                             |                                         | ) #                                                                        | Flow                                                                |             |
| Map Numbe                                                               | er                                                           |         | 13 B/1                                                                                   | 4                                                           | t and                                   | er thow (                                                                  | x 00                                                                | -           |
| Photo Numb                                                              | ers                                                          |         | 103.                                                                                     |                                                             | t t                                     | ) à                                                                        | )                                                                   |             |
| Video                                                                   |                                                              |         | yos                                                                                      | ]                                                           |                                         |                                                                            | mainly                                                              | Run Flow    |
| Area Survey                                                             | <b>ved</b>                                                   | 50      | om aerial                                                                                | 50 m grown                                                  |                                         |                                                                            | ) at th                                                             | sand. ,     |
| Water Samp                                                              | oles                                                         |         | yes.                                                                                     |                                                             |                                         |                                                                            | /                                                                   | Comments    |
|                                                                         |                                                              |         |                                                                                          |                                                             |                                         |                                                                            | ·                                                                   |             |
| Depth<br>Channel                                                        | 0 - 1 m                                                      |         | 1 - 2 m                                                                                  | >2 m                                                        | Unknown                                 | ן<br>ו                                                                     |                                                                     |             |
| Width                                                                   | 0 - 2 m                                                      |         | 2 - 5 m                                                                                  | 5 - 20 m                                                    | >20 m                                   |                                                                            |                                                                     |             |
| w Type                                                                  | <u>St</u> eady                                               | 5       | Riffle 90                                                                                | Rapids                                                      | Pools 5                                 |                                                                            |                                                                     |             |
| Distrate                                                                | *                                                            | 2.0     |                                                                                          | Cobble/                                                     |                                         |                                                                            |                                                                     |             |
| Type<br>Beak                                                            | Fines                                                        |         | <u>G</u> ravel                                                                           | <u>Ru</u> bble                                              | Boulder                                 | Bedrock                                                                    | Unknown                                                             |             |
| Habitat                                                                 | Type I                                                       |         | Type II 45                                                                               | Type III                                                    | Type IV 5                               | ]                                                                          |                                                                     |             |
| Bank<br>Material                                                        | Fines                                                        | 30      | <u>G</u> ravel/<br>Pebble                                                                | <u>Cobble/</u><br><u>Rubble</u> عن                          | Boulder 40                              | <u>Bed</u> rock                                                            | Unknown                                                             |             |
| D l - l                                                                 | Shallow                                                      |         | Medium                                                                                   | Deep                                                        | Forest                                  | Flood                                                                      |                                                                     |             |
| Backslope<br>Bank                                                       | Gully                                                        |         | Gully                                                                                    | Gully                                                       |                                         |                                                                            | Bog/Fen                                                             |             |
| Vegetation.                                                             | Bog                                                          |         | Grasses [0                                                                               | <u>Sh</u> rubs 3°                                           | Trees 60                                |                                                                            |                                                                     |             |
| Cover Ar                                                                | Instream                                                     | 5       | Overhang 35                                                                              | Canopy 60                                                   | None                                    |                                                                            |                                                                     |             |
| Potential<br>Obstruction                                                | Falls                                                        |         | Banids                                                                                   | Chute                                                       | Cascade                                 | Intermittent                                                               | None                                                                |             |
| Est.                                                                    |                                                              |         |                                                                                          |                                                             |                                         | ]                                                                          | , <u> </u>                                                          |             |
| Gradient                                                                | 0 - 1 %                                                      |         | 1 - 3 %                                                                                  | 3 - 5 %                                                     | >5 %                                    |                                                                            |                                                                     |             |
| Substrate<br>fines<br>gravel<br>pebble<br>cobble<br>/ rubble<br>boulder | less than 2<br>2mm - 3 cm<br>3 - 5 cm<br>6-13 cm<br>14-25 cm | mm<br>a | Backslope<br>Shallow gully<br>Meduim gully<br>Deep gully<br>Forest stream<br>Flood plain | 1  m<br>2-3 m<br>$\geq 4 \text{ m}$<br>see over<br>see over | Cover<br>Instream<br>Overhang<br>Canopy | submergent/eme<br>grasses/shrubs w<br>trees > 1m above<br>can be expressed | ergent vegetation<br>vithin 1 m of water<br>e water<br>d as % cover | Page number |
| oounder                                                                 | 20 CH 200 -                                                  | սբ      | ьog/ren                                                                                  | see over                                                    |                                         |                                                                            |                                                                     |             |



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#### Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

| Stream No.                                                            |                                                                                 | 62                                                                                                    |                                               | Sketch of the a                         | area                                                                                                                         |                  |
|-----------------------------------------------------------------------|---------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|-----------------------------------------------|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------|------------------|
| ate                                                                   |                                                                                 | Sept 29                                                                                               | 5102                                          |                                         | ~~ X                                                                                                                         |                  |
| Surveyed by                                                           |                                                                                 | BW/mH/Hm/                                                                                             | PT                                            | X                                       | (0.9)                                                                                                                        |                  |
| Watershed                                                             |                                                                                 | Zagle                                                                                                 |                                               | -+1025                                  | X BOI                                                                                                                        |                  |
| GPS Co-ord                                                            | . [                                                                             | See li                                                                                                | 5+                                            |                                         | N/                                                                                                                           | B08              |
| Aerial Photo                                                          | ,#                                                                              |                                                                                                       |                                               |                                         | /) · · · ·                                                                                                                   |                  |
| Map Numbe                                                             | r                                                                               | 13 B/I                                                                                                | 4                                             |                                         | $\int \Delta$                                                                                                                |                  |
| Photo Numb                                                            | ers                                                                             | 94                                                                                                    |                                               |                                         | 899                                                                                                                          | -                |
| Video                                                                 |                                                                                 | 1/an                                                                                                  |                                               |                                         |                                                                                                                              |                  |
| Area Survey                                                           | ed                                                                              | 500 m 0                                                                                               | revil                                         |                                         | >                                                                                                                            |                  |
| Water Samp                                                            | les                                                                             | NO                                                                                                    | • .                                           |                                         |                                                                                                                              |                  |
|                                                                       |                                                                                 |                                                                                                       |                                               |                                         | <b>a</b> ·                                                                                                                   | Comments         |
| Depth                                                                 | 0 - 1 m                                                                         | I - 2 m                                                                                               | >2 m                                          | Unknown                                 |                                                                                                                              |                  |
| Channel                                                               |                                                                                 |                                                                                                       |                                               | ] [                                     | ]                                                                                                                            |                  |
| Width                                                                 | 0 - 2 m                                                                         | 2 - 5 m                                                                                               | 5 - 20 m                                      | >20 m                                   |                                                                                                                              |                  |
| ]<br>Jow Type                                                         | Steady                                                                          | Riffle                                                                                                | Rapids                                        | Pools                                   |                                                                                                                              |                  |
| Substrate                                                             |                                                                                 |                                                                                                       | <u>Cobble/</u>                                |                                         | ן רייז ר                                                                                                                     |                  |
| Туре                                                                  | Fines_                                                                          | Gravel                                                                                                | Rubble                                        | Boulder                                 | Bedrock <u>Un</u> known                                                                                                      |                  |
| Beak                                                                  | Г                                                                               |                                                                                                       |                                               |                                         | ]                                                                                                                            |                  |
| Habitat                                                               | Type I                                                                          | Type II                                                                                               | Type III                                      | Type IV                                 |                                                                                                                              |                  |
| Bank                                                                  |                                                                                 | <u>G</u> ravel/                                                                                       | <u>Co</u> bble/                               |                                         |                                                                                                                              |                  |
| Material                                                              | Enes                                                                            |                                                                                                       | <u>Ru</u> bble                                | <u>Bo</u> ulder                         | Bedrock Unknown                                                                                                              |                  |
| Backslope                                                             | Shallow<br>Gully                                                                | Medium<br>Gully                                                                                       | Deep<br>Gully                                 | Forest<br>Stream                        | Flood<br>Plain Bog/Fen                                                                                                       |                  |
| Bank                                                                  |                                                                                 |                                                                                                       |                                               |                                         |                                                                                                                              |                  |
| Vegetation                                                            | Bog                                                                             | <u>Gras</u> ses                                                                                       | Shrubs 🕶                                      | Trees 30                                |                                                                                                                              |                  |
| Cover 05                                                              | Instream                                                                        | $\int_{\text{Overhang}} \mathcal{V}$                                                                  | Canopy 30                                     | None                                    |                                                                                                                              |                  |
| Potential                                                             |                                                                                 |                                                                                                       |                                               |                                         |                                                                                                                              |                  |
| Obstruction                                                           | <u>Fa</u> lls                                                                   | <u>Ra</u> pids                                                                                        | <u>Ch</u> ute                                 | <u>Ca</u> scade                         | Intermittent None None                                                                                                       |                  |
| Est.                                                                  | 0 1 9/                                                                          |                                                                                                       | 2 5 0/                                        |                                         |                                                                                                                              |                  |
|                                                                       | U-1%                                                                            | 1-3 %                                                                                                 | ۵-۵ %L                                        | >> %                                    |                                                                                                                              |                  |
| Substrate<br>fines<br>gravel<br>pebble<br>cobble<br>rubble<br>boulder | less than 2 mr<br>2mm - 3 cm<br>3 - 5 cm<br>6-13 cm<br>14-25 cm<br>26 cm and up | Backslope<br>n Shallow gully<br>Meduim gully<br>Deep gully<br>Forest stream<br>Flood plain<br>Bog/Fep | 1 m<br>2-3 m<br>> 4 m<br>see over<br>see over | Cover<br>Instream<br>Overhang<br>Canopy | submergent/emergent vegetation<br>grasses/shrubs within 1 m of wate<br>trees > 1m above water<br>can be expressed as % cover | r<br>Page number |
| ) rubble<br>boulder                                                   | 14-25 cm<br>26 cm and up                                                        | Flood plain<br>Bog/Fen                                                                                | see over<br>see over                          |                                         | an of expressed as 70 cover                                                                                                  | Page number      |

| TRANS-LABRADOR HIGHWAY STREA              | AM CROSSIN | NG INFORMATION: CARTWRIGHT JUNCTION TO GOOSE BAY  |
|-------------------------------------------|------------|---------------------------------------------------|
| Ground Survey                             | -24.95     |                                                   |
| Ground survey completed                   |            | Ground Survey not Completed NO                    |
| Temperature                               |            | Crossing less than 2 $\text{km}^2$ (on DWST list) |
| pH                                        |            | Bog drainage                                      |
| Conductivity                              |            | Type IV (steady) flow                             |
| Dissolved Oxygen                          |            | Type III (cascade/rapids) flow                    |
| Turbidity                                 |            | No accessible by helicopter                       |
| Surface velocity                          |            | Other:                                            |
| Water Samples collected                   |            |                                                   |
| Gradient (inclinometer)                   |            |                                                   |
| Sketch & Measurements of Surveyed Section | ion(s)     |                                                   |
|                                           |            | Structure × 958                                   |
|                                           | 1 I.       | Helington 959 (110 m)                             |
|                                           |            |                                                   |
|                                           |            |                                                   |
|                                           | •          |                                                   |
|                                           |            |                                                   |
|                                           |            |                                                   |
|                                           |            |                                                   |
|                                           |            |                                                   |
|                                           |            |                                                   |
|                                           | •          |                                                   |
|                                           |            |                                                   |
|                                           |            |                                                   |
|                                           |            |                                                   |
|                                           |            |                                                   |
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|                                           |            |                                                   |

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#### Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting



| TRANS-LABRADOR HIGHWAY STREAM CROSS          | ING INFORMATION: CARTWRIGHT JUNCTION TO GOOSE BAY   |
|----------------------------------------------|-----------------------------------------------------|
| Ground Survey At 04                          | J•                                                  |
| Ground survey completed                      | Ground Survey not Completed NO                      |
| Temperature                                  | Crossing less than 2 km <sup>2</sup> (on DWST list) |
| pH                                           | Bog drainage                                        |
| Conductivity                                 | Type IV (steady) flow                               |
| Dissolved Oxygen                             | Type III (cascade/rapids) flow                      |
| Turbidity                                    | No accessible by helicopter                         |
| Surface velocity                             | Other:                                              |
| Water Samples collected                      |                                                     |
| Gradient (inclinometer)                      |                                                     |
| Sketch & Measurements of Surveyed Section(s) |                                                     |
|                                              |                                                     |

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#### Backslope

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| Stream No.     |                     |              | 64                 |                 | Sketch of the    | area                                          |                   |                |
|----------------|---------------------|--------------|--------------------|-----------------|------------------|-----------------------------------------------|-------------------|----------------|
| )ate           |                     |              | Sept 25            | 102             |                  |                                               |                   | pmit viten     |
| Surveyed by    |                     | l            | bu/mH/Hr           | M DT            | 0.04             | o.t.                                          |                   | tepe of 15t 64 |
| Watershed      |                     |              | Zagle              |                 | Gom              | NB                                            |                   | (upstuson)     |
| GPS Co-ord.    | , ,                 |              | See lis            | ,+ .            | actua            | l'crossing.                                   |                   |                |
| Aerial Photo   | #                   |              | ·····              |                 |                  |                                               | 4 - 12            |                |
| Map Numbe      | r                   |              | 13 B/              | 14              |                  |                                               | Kor               |                |
| Photo Numb     | ers                 |              | 96                 |                 |                  | +                                             | the               |                |
| Video          |                     |              | Ver                |                 |                  | $\langle \rangle$                             |                   |                |
| Area Survey    | ed                  |              | aerial 50          | on              |                  | Ť                                             |                   |                |
| Water Samp     | les                 |              | Yes                |                 |                  | 163                                           |                   |                |
|                | ······              |              |                    |                 |                  |                                               |                   | Comments       |
| Depth          | 0 - 1 m             | $\checkmark$ | 1 - 2 m            | >2 m            | Unknown          |                                               |                   |                |
| Channel        | Ī                   | নি হ         | 50                 |                 | i —              | -                                             |                   |                |
| Width          | 0 - 2 m             | V            | 2 - 5 m 🗹          | 5 - 20 m        | >20 m            |                                               |                   |                |
| l<br>Slow Type | Steady              | 20           | Riffle 10          | Ranids          | Pools            |                                               |                   |                |
| JSubstrate     | ](~2                |              |                    | Cobble/         |                  | ןל<br>ר                                       |                   |                |
| Туре           | Fines               | $\mathbf{v}$ | <u>G</u> ravel     | Rubble          | <u>Bo</u> ulder  | Bedrock                                       | Unknown           |                |
| Beak           | [                   |              |                    |                 |                  | ]                                             |                   |                |
| Habitat        | Type I              |              |                    | Type III        | Type IV 30       | ]                                             |                   |                |
| Bank           | <b>F</b>            |              | <u>G</u> ravel/    | <u>Co</u> bble/ |                  |                                               |                   |                |
| Material       | <u>F</u> ines       | <u> </u>     |                    | Rubble          | Boulder          | Bedrock                                       | Unknown           |                |
| Backslope      | Gully               |              | Gully              | Deep<br>Gully   | Stream 80        | Flood<br>Plain                                | Bog/Fen <b>20</b> |                |
| Bank           | [                   |              | 2.                 |                 |                  | ]                                             |                   |                |
| Vegetation     | Bog                 | 20           | <u>Gras</u> ses 20 | Shrubs 20       | <u>Tr</u> ees To |                                               |                   |                |
| Cover 90'lo    | Instream            | 1            | Overhang 60        | Canopy 40       | None             |                                               |                   |                |
| Potential      | ſ                   |              |                    |                 |                  |                                               |                   |                |
| Obstruction    | <u>Fa</u> lls       |              | <u>Ra</u> pids     | <u>Ch</u> ute   | <u>Ca</u> scade  | Intermittent                                  | None              | · · · ·        |
| Est.           | 0.10/               |              |                    |                 |                  | ]                                             |                   |                |
| Grautent       | 0-1%                |              | 1 - 3 %            | 3-5%            | >5 %             | ]                                             |                   |                |
| Substrate      | ess than 7 -        | E<br>Second  | Backslope          |                 | Cover            | au hara a sa |                   |                |
| gravel 2       | 2mm - 3 cm          | un c<br>N    | Meduim gully 2     | -3 m            | Overhang         | grasses/shrubs wit                            | thin 1 m of water |                |
| pebble         | 3 - 5 cm            | 1            | Deep gully ≥       | <u>•</u> 4 m    | Canopy           | trees > 1m above                              | water             |                |
| cobble (       | 5-13 cm<br>14-25 cm | ]            | Forest stream s    | ee over         |                  | can be expressed a                            | as % cover        | <b>D</b>       |
| boulder 2      | 26 cm and u         | р            | Bog/Fen s          | ee over         |                  |                                               |                   | rage number    |
|                |                     |              | -                  |                 |                  |                                               |                   |                |



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#### Backslope

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65 Stream No. Sketch of the area ate 25 02 50m Surveyed by тH P m Watershed 9 au O  $\overline{\mathbf{x}}$ GPS Co-ord. Ser 1154-T Aerial Photo # 180 Map Number 13 4 B 1 II 9 Photo Numbers Video Ver 250 Area Surveyed 500 m acrial 50m 010 Water Samples (es vi Comments 0-1 m >2 m Depth 1 - 2 m Unknown Channel 2 - 5 m 50 >20 m Width 5 - 20 m 0 - 2 m . Pools Vlow Type Steady Riffle <u>Rapids</u> Substrate Cobble/ 10 Туре <u>Ru</u>bble <u>Bo</u>ulder Bedrock <u>Un</u>known Fines Gravel Beak Type IV 30 Habitat Type II 70 Type III Type I Bank Gravel/ Cobble/ Material Fines Pebble <u>Ru</u>bble Boulder Bedrock Unknown Shallow Medium Deep Forest Flood Backslope Gully Gully Gully Stream Plain Bog/Fer Bank Shrubs 30 <u>Trees</u> 30 Vegetation Bog 30 Grasses poilo 20 Cover Overhang 40 Instream Сапору None Potential Obstruction **Falls Rapids** Chute Cascade Intermittent None Est. Gradient 0 - 1 % 1 - 3 % 3 - 5 % >5 % Substrate Backslope Cover fines less than 2 mm Shallow gully 1 m Instream submergent/emergent vegetation gravel 2mm - 3 cm Meduim gully 2-3 m Overhang grasses/shrubs within 1 m of water pebble 3 - 5 cm Deep gully  $\geq 4 \text{ m}$ Canopy trees > 1m above water cobble 6-13 cm Forest stream see over can be expressed as % cover rubble 14-25 cm Flood plain see over Page number boulder 26 cm and up Bog/Fen see over



#### Backslope

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| Stream No.                                                              | [                                                                              | 66                                                                                                    |                                                             | Sketch of the                           | area                                                                                           |                                          |                                       |
|-------------------------------------------------------------------------|--------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|-----------------------------------------|------------------------------------------------------------------------------------------------|------------------------------------------|---------------------------------------|
| .e                                                                      | [                                                                              | Sopt 25                                                                                               | 5/02                                                        |                                         |                                                                                                |                                          |                                       |
| Surveyed by                                                             | у [                                                                            | BW/MH/                                                                                                | Hmlot                                                       | FISH                                    | seen (                                                                                         | 2-5m                                     |                                       |
| Watershed                                                               | [                                                                              | Gagle                                                                                                 |                                                             |                                         |                                                                                                | ć                                        |                                       |
| GPS Co-ord                                                              | ı. [                                                                           | See li                                                                                                | st .                                                        | J                                       |                                                                                                | ,                                        | с.                                    |
| Aerial Phot                                                             | o#                                                                             |                                                                                                       |                                                             | (F)0                                    | x X X                                                                                          | ( Bo                                     | 8 /                                   |
| Map Numb                                                                | er [                                                                           | 13 B/                                                                                                 | ]4                                                          | V E                                     | $(0 - \frac{x}{x}) + x - \frac{x}{x}$                                                          | - 070                                    | 1                                     |
| Photo Num                                                               | bers                                                                           | 98                                                                                                    |                                                             |                                         | - (fx                                                                                          | \<br>\                                   |                                       |
| Video                                                                   |                                                                                | Yes                                                                                                   |                                                             |                                         | × X                                                                                            | ~ '                                      |                                       |
| Area Surve                                                              | yed                                                                            | 500 m                                                                                                 | aerial.                                                     |                                         |                                                                                                | 2m                                       | · · · · · · · · · · · · · · · · · · · |
| Water Sam                                                               | ples                                                                           | NO                                                                                                    |                                                             |                                         | J.                                                                                             |                                          | X (1995)                              |
|                                                                         | <br>Г                                                                          |                                                                                                       |                                                             |                                         | <u></u>                                                                                        | <del></del>                              | Comments                              |
| Depth                                                                   | 0 - 1 m                                                                        | 1 - 2 m                                                                                               | >2 m                                                        | Unknown                                 |                                                                                                |                                          |                                       |
| Channel                                                                 | 8                                                                              | 29                                                                                                    |                                                             |                                         | 7                                                                                              |                                          |                                       |
| Width                                                                   | 0 - 2 m                                                                        | 2 - 5 m                                                                                               | 5 - 20 m                                                    | >20 m                                   |                                                                                                |                                          |                                       |
| w Type                                                                  | <u>St</u> eady                                                                 | 10 <u>Ri</u> ffle                                                                                     | <u>Ra</u> pids                                              | Pools                                   |                                                                                                | ·                                        |                                       |
| Joubstrate                                                              | [                                                                              |                                                                                                       | <u>Co</u> bble/                                             |                                         |                                                                                                | []                                       |                                       |
| Туре                                                                    | <u>F</u> ines V                                                                | Gravel                                                                                                | <u>Ru</u> bble                                              | <u>Bo</u> ulder                         | Bedrock Unk                                                                                    | nown                                     |                                       |
| Beak                                                                    | [                                                                              |                                                                                                       |                                                             |                                         | ]                                                                                              |                                          |                                       |
| Habitat                                                                 | Type I                                                                         | Type II                                                                                               | Type III                                                    | Type IV 90                              |                                                                                                |                                          |                                       |
| Bank                                                                    |                                                                                | <u>G</u> ravel/                                                                                       | <u>Co</u> bble/                                             |                                         |                                                                                                |                                          |                                       |
| Materiai                                                                |                                                                                |                                                                                                       | Rubble                                                      | Boulder                                 | Bedrock Unk                                                                                    | nown                                     |                                       |
| Backslone                                                               | Snallow<br>Gully                                                               | Gully                                                                                                 | Deep                                                        | Forest                                  | Flood                                                                                          | 120                                      |                                       |
| Bank                                                                    |                                                                                |                                                                                                       |                                                             | J Stream 70                             |                                                                                                | g/ren                                    |                                       |
| Vegetation,                                                             | Bog                                                                            | 0 <u>Gras</u> ses                                                                                     | <u>Sh</u> rubs                                              | Trees                                   |                                                                                                |                                          |                                       |
| Cover 80                                                                | o Instream                                                                     | 0 Overhang 10                                                                                         | Canopy 20                                                   | None 40                                 |                                                                                                |                                          |                                       |
| Potential                                                               | Γ                                                                              | []                                                                                                    | [                                                           |                                         |                                                                                                |                                          |                                       |
| Obstruction                                                             | <u>Fa</u> lls                                                                  | <u>Ra</u> pids                                                                                        | <u>Ch</u> ute                                               | <u>Ca</u> scade                         | Intermittent                                                                                   | None                                     |                                       |
| Est.                                                                    |                                                                                |                                                                                                       |                                                             | ] [                                     |                                                                                                |                                          |                                       |
| Gradient                                                                | 0 - 1 %                                                                        | 1 - 3 %                                                                                               | 3 - 5 %                                                     | >5 %                                    |                                                                                                |                                          |                                       |
| Substrate<br>fines<br>gravel<br>pebble<br>cobble<br>/ rubble<br>boulder | less than 2 m<br>2mm - 3 cm<br>3 - 5 cm<br>6-13 cm<br>14-25 cm<br>26 cm and up | Backslope<br>m Shallow gully<br>Meduim gully<br>Deep gully<br>Forest stream<br>Flood plain<br>Bog/Fer | 1  m<br>2-3 m<br>$\geq 4 \text{ m}$<br>see over<br>see over | Cover<br>Instream<br>Overhang<br>Canopy | submergent/emergent<br>grasses/shrubs within<br>trees > 1m above wate<br>can be expressed as % | vegetation<br>1 m of water<br>r<br>cover | Page number                           |
|                                                                         | on and up                                                                      | Dogrien                                                                                               |                                                             |                                         |                                                                                                |                                          |                                       |

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| TRANS-LABRADOR HIGHWAY STREAM | <b>CROSSING INFORMATION: CARTWRIGHT</b> | ' JUNCTION TO GOOSE BAY |
|-------------------------------|-----------------------------------------|-------------------------|
|-------------------------------|-----------------------------------------|-------------------------|

| Ground Su | rvey HO                 | do<br>do   | 1                                                   |
|-----------|-------------------------|------------|-----------------------------------------------------|
| G         | round survey completed  | Ground Sur | vey not Completed 🚺 O                               |
| ì         | Temperature             |            | Crossing less than 2 km <sup>2</sup> (on DWST list) |
|           | pH                      |            | Bog drainage                                        |
|           | Conductivity            |            | Type IV (steady) flow                               |
|           | Dissolved Oxygen        |            | Type III (cascade/rapids) flow                      |
|           | Turbidity               |            | No accessible by helicopter                         |
|           | Surface velocity        |            | Other:                                              |
|           | Water Samples collected |            |                                                     |
|           | Gradient (inclinometer) |            |                                                     |

# Sketch & Measurements of Surveyed Section(s)

### LEGENDS / NOTES

#### Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

Bog/Fen - with few permanent narrow cut channels and auxillary intermittent channels - periodic flooding causes no lasting impact

N R R

| Stream No.     | · [              | 67                              |                | Sketch of the         | area A Bog                                                  | )           |
|----------------|------------------|---------------------------------|----------------|-----------------------|-------------------------------------------------------------|-------------|
| ate            | Ľ                | Sopt 25                         | 102            |                       |                                                             |             |
| Surveyed by    |                  | Bw/mH/Hn                        | 1PT            |                       |                                                             |             |
| Watershed      |                  | Eagle                           |                | 1                     | H                                                           |             |
| GPS Co-ord.    |                  | See lis-                        | ⊢`             |                       | Flain                                                       | _           |
| Aerial Photo # | ¥ [              | · · · · · · · · · · · · · · · · |                | Flow                  | TIGK.                                                       | 250 m       |
| Map Number     |                  | 13 B/10                         | 1              | N                     | The was                                                     | pond.       |
| Photo Numbe    | rs 🗌             | 99                              |                |                       |                                                             |             |
| Video          | [                | Jer.                            |                | 5                     |                                                             |             |
| Area Surveye   | d z              | soom acrial                     | 50 mgro        | und.                  | 250 -                                                       |             |
| Water Sample   | es [             | (Jes                            |                |                       |                                                             |             |
|                |                  |                                 |                |                       | 7                                                           | Comments    |
| Depth          | 0 - 1 m          | 1 - 2 m                         | >2 m           | Unknown               |                                                             |             |
| Channel        |                  | 10                              | []             |                       | 7                                                           |             |
| Width          | 0 - 2 m          | 2 - 5 m                         | 5 - 20 m       | >20 m                 |                                                             |             |
| Jow Type       | Steady 1         | ں <sub>Riffle</sub> <b>9</b> 0  | <u>Ra</u> pids | Pools                 |                                                             |             |
| Substrate      | Λ                |                                 | Cobble/        |                       |                                                             |             |
| Туре           | <u>F</u> ines    | <u>G</u> ravel                  | Rubble 20      | Boulder <b>AC</b>     | Bedrock Unknown                                             |             |
| Beak           | Γ                |                                 |                |                       | 1                                                           |             |
| Habitat        | Type I           | Type II                         | Type III       | Type IV               |                                                             |             |
| Bank           |                  | o <u>Gravel</u>                 | Cobble/        |                       |                                                             |             |
| Material       | Eines            |                                 | Rubble 29      | <u>Bo</u> ulder       | Bedrock Unknown                                             |             |
| Backsione      | Shallow<br>Gully | Medium                          | Deep           | Forest                | Flood<br>Plain Boy/Fen                                      |             |
| Bank           |                  |                                 |                | Sucant <mark>r</mark> |                                                             |             |
| Vegetation     | Bog              | Grasses 5                       | Shrubs 40      | <u>Tr</u> ees 55      | 1                                                           |             |
| Cover 50°lo    | Instream         | 0 <sub>Overhang</sub> 20        | Canopy 60      | None                  | ]                                                           | -           |
| Potential      |                  |                                 |                |                       |                                                             |             |
| Obstruction    | <u>Fa</u> lls    | <u>Ra</u> pids                  | <u>Ch</u> ute  | <u>Ca</u> scade       | Intermittent None                                           |             |
| Est.           |                  |                                 |                |                       | ]                                                           |             |
| Gradient       | 0 - 1 %          | 1 - 3 %                         | 3 - 5 %        | >5 %                  |                                                             |             |
| Substrate      |                  | Backslope                       |                | Cover                 |                                                             |             |
| tines le       | ess than 2 m     | m Shallow gully                 | 1 m            | Instream              | submergent/emergent vegetation                              |             |
| pebble 3       | - 5 cm           | Deen gully                      | נ-ג m<br>≥ 4 m | Overhang<br>Capony    | grasses/shrubs within 1 m of water trees $> 1m$ above water |             |
| cobble 6       | -13 cm           | Forest stream                   | ee over        | Junopy                | can be expressed as % cover                                 | -           |
| / rubble 1     | 4-25 cm          | Flood plain                     | ee over        |                       | -                                                           | Page number |
| boulder 20     | 6 cm and up      | Bog/Fen s                       | ee over        |                       |                                                             |             |

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Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

| Stream No.         | [                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 6                  | , 8                   |            | Sketch of the a     | rea                           |                                              |                                       |           |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-----------------------|------------|---------------------|-------------------------------|----------------------------------------------|---------------------------------------|-----------|
| .e                 | [                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Sep                | +25/02                | ]          |                     | · · ·                         | ( ( - 250n                                   |                                       |           |
| Surveyed by        | y [                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Bw/mt              | /Hm/pJ                | ]          |                     | Bog. G                        | x) ) Bog                                     |                                       |           |
| Watershed          | [                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Sag                | le                    | ]          |                     | 4                             |                                              |                                       |           |
| GPS Co-ord         | i. [                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Se                 | e list                | ]          |                     | _ :f                          | -/ 100m                                      |                                       |           |
| Aerial Phot        | o#                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                    |                       | ]          |                     | ⊥ (                           | Trees                                        |                                       | · · · · · |
| Map Numb           | er [                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 13                 | B/14                  |            |                     |                               | 17 -00                                       |                                       |           |
| Photo Num          | bers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0                  | 0                     |            |                     | TYPES (                       | Tvers'                                       |                                       |           |
| Video              | [                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Yes                |                       | ]          |                     |                               |                                              |                                       |           |
| Area Surve         | yed [                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 500mae             | rual 50m qro          | لسا        |                     |                               | II.                                          |                                       | ,         |
| Water Sam          | oles                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | ye                 | S                     |            | L                   | )                             | - 250                                        | · · · · · · · · · · · · · · · · · · · |           |
|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <u></u>            |                       |            |                     |                               |                                              | Comments                              |           |
| Depth              | 0 - 1 m                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 1 - 2 m            | >2 m                  |            | Unknown             |                               |                                              |                                       |           |
| Channel            | 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 30                 | 20                    |            |                     |                               |                                              |                                       |           |
| Width              | 0 - 2 m                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 2-5 m              | 5 - 20 m              |            | >20 m               |                               |                                              |                                       |           |
| ∦<br>₩ Type        | Steady                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 50 Riffle          | 50 Rapids             |            | Pools               |                               |                                              | ł                                     |           |
| Substrate          | <u>-</u> - |                    | Cobble/               |            |                     | ſ                             |                                              |                                       |           |
| Type               | <u>Fines</u>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 4-0 <u>G</u> ravel | Rubble                | 30         | Boulder 40          | <u>Bed</u> rock               | Unknown                                      |                                       |           |
| Beak               | Г                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                    |                       |            |                     | 5                             |                                              |                                       |           |
| Habitat            | Type I                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Type II            | 50 Type III           |            | Type IV 50          |                               |                                              |                                       |           |
| Bank               | F                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <u>G</u> ravel     | <u>Cobble/</u>        |            | · _ ]               | Γ                             | ·]                                           |                                       |           |
| Material           | <u>F</u> ines                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Pebble             | <u>Ru</u> bble        |            | <u>Bo</u> ulder     | <u>Bed</u> rock               | <u>Un</u> known                              |                                       |           |
| Backslope          | Shallow<br>Gully                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Medium<br>Gully    | Deep<br>Gully         | 445.1<br>4 | Forest<br>Stream 90 | Flood<br>Plain                | Bog/Fen IO                                   |                                       |           |
| Bank               | Γ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                    |                       | =          |                     |                               |                                              |                                       |           |
| Vegetation.        | Bog                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0 <u>Gras</u> ses  | 10 <u>Sh</u> rubs     | 90         | Trees AU            |                               |                                              |                                       |           |
| Cover 70           | Instream                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Overhang           | 60 Canopy             | 30         | None                |                               |                                              |                                       |           |
| Potential          | [                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                    |                       |            |                     | . [                           |                                              |                                       |           |
| Dostruction        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <u>Ra</u> pids     | <u></u> <u>Ch</u> ute |            | <u>Ca</u> scade     | <u>intermittent</u>           | None                                         | ·                                     |           |
| Est.<br>Gradient   | 0 1 %                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 1 2 0/             | 7.50/                 |            |                     |                               |                                              |                                       |           |
|                    | 0.1.10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1 = 5 76           | <u> </u>              |            | >3 %                |                               | ·                                            |                                       |           |
| Substrate<br>fines | less than 2 m                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Backslope          | Hy Im                 |            | Cover               |                               |                                              |                                       |           |
| gravel             | 2mm - 3 cm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Meduim gu          | lly 2-3 m             | •          | Overhang            | suomergent/e<br>grasses/shuth | mergent vegetation<br>is within 1 m of water |                                       |           |
| pebble             | 3 - 5 cm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Deep gu            | lly ≥4 m              |            | Canopy              | rees > 1m ab                  | ove water                                    | •                                     |           |
| cobble             | 6-13 cm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Forest stre        | am see over           |            | - (                 | can be expres                 | ssed as % cover                              |                                       |           |
| boulder            | 26 cm and ur                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | D Bog              | Fen see over          |            |                     |                               |                                              | Page number                           |           |
|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <b>- - -</b>       | <b>v</b> · <b>v</b> . |            |                     |                               |                                              |                                       |           |



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#### Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting
| Stream No.                           | 69                                      | Sketch of the area                                                           |                |
|--------------------------------------|-----------------------------------------|------------------------------------------------------------------------------|----------------|
| ate                                  | Sopt 25/02                              | Pilas tissm                                                                  | Frid video     |
| Surveyed by                          | Bw/mH/Hm/pJ                             | Kinge Tosh                                                                   | NSE OL         |
| Watershed                            | Eagle                                   | T = DD X AR                                                                  | tuel crossing. |
| GPS Co-ord.                          | See list.                               | stream in Riffle                                                             | 0              |
| Aerial Photo #                       |                                         | Place about X III                                                            |                |
| Map Number                           | 13B/15                                  | Type Incres 7 250                                                            |                |
| Photo Numbers                        | 101                                     |                                                                              |                |
| Video                                | Yes:                                    |                                                                              | Bog )          |
| Area Surveyed                        | 350 acril                               | Boy                                                                          |                |
| Water Samples                        | NO                                      |                                                                              |                |
|                                      |                                         |                                                                              | Comments       |
| Depth 0-1 m                          | ✓ 1 - 2 m >2 m                          | -≓″<br>Unknown                                                               |                |
| Channel                              |                                         |                                                                              |                |
| Width 0-2 m                          | 2-5 m 5-20 m                            | >20 m                                                                        |                |
| Now Type Steady                      | <b>50</b> Riffle <b>59</b> Rapids       | Pools                                                                        |                |
| )                                    |                                         |                                                                              |                |
| Type <u>F</u> ines                   | <u>G</u> ravel <u>Ru</u> bble           | Boulder Bedrock Unknown                                                      |                |
| Beak                                 |                                         |                                                                              |                |
| Habitat Type I                       | Type II 50 Type III                     | Type IV 50                                                                   |                |
| Bank                                 | <u>G</u> ravel/ <u>Co</u> bble/         |                                                                              |                |
| Material <u>Fines</u>                | <u>Pebble</u> <u>Ru</u> bble            | Boulder Bedrock Unknown                                                      |                |
| Backslope Gully                      | Medium Deep<br>Gully Gully              | Stream 60 Plain Bog/Fen                                                      |                |
| Bank                                 |                                         |                                                                              |                |
| Vegetation <u>Bog</u>                | Grasses Shrubs                          | <u>Trees</u>                                                                 |                |
| Cover (%°) Instream                  | Overhang 30 Canopy                      | None                                                                         |                |
| Potential                            |                                         |                                                                              |                |
| Obstruction <u>Falls</u>             | <u>Rapids</u> <u>Ch</u> ute             | <u>Ca</u> scade <u>Int</u> ermittent None                                    |                |
| Est.<br>Gradient 0 - 1 %             | 1 - 3 % 3 - 5 %                         | >5 %                                                                         |                |
| Substrate                            | Backslope                               | Cover                                                                        | L              |
| fines less than 2                    | mm Shallow gully 1 m                    | Instream submergent/emergent vegetation                                      |                |
| gravei 2mm - 3 cr<br>pebble 3 - 5 cm | n Meduim guily 2-3 m<br>Deen guily >4 m | Overhang grasses/shrubs within 1 m of water<br>Canony trees > 1m above water |                |
| cobble 6-13 cm                       | Forest stream see over                  | can be expressed as % cover                                                  |                |
| houlder 26 cm                        | Flood plain see over                    |                                                                              | Page number    |
|                                      | up Dug/ren see over                     |                                                                              |                |

#### Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

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| Stream No.       | [              | 7.               | 2                 |                  | Sketch o          | f the a   | rea                      |                 |                     |                               | ·           |         |
|------------------|----------------|------------------|-------------------|------------------|-------------------|-----------|--------------------------|-----------------|---------------------|-------------------------------|-------------|---------|
| te               | [              | Say              | 2+ 25             | 102              |                   |           | )                        | ) <u>+</u> F    | lish see            | n he                          | æ           |         |
| Surveyed by      | [              | Bw/mr            | 1/Hm              | Hm               |                   | 60        | x (/                     | Bo              | X                   |                               |             |         |
| Watershed        | [              | Za               | gle               |                  | 100               |           |                          | 4               | 0                   |                               |             |         |
| GPS Co-ord       | . [            | See              | <u></u><br>]15-   | F                |                   |           | )                        |                 |                     |                               |             | ļ       |
| Aerial Photo     | •# [           | ر                |                   |                  |                   |           | (-t-                     | ~ 50            |                     |                               |             | · · · ( |
| Map Numbe        | r [            | 13               | 3/1               | 5                |                   | bry       | ;                        | -7              |                     | •                             |             |         |
| Photo Numb       | ers [          |                  | 02                |                  |                   |           | HT                       |                 | u Ha                |                               | over undu   | 5       |
| Video            |                |                  | <u></u>           |                  |                   |           | H                        | (50             | 544 544             | ction (                       | E)          |         |
| Area Survey      | ed [           | 500m             | alaria            |                  |                   | Bog       |                          | Bog             |                     |                               |             | ,       |
| Water Samp       | oles           | N                | 0 .               |                  |                   |           |                          | 2.50            | r                   |                               |             |         |
| ·                |                |                  |                   |                  |                   |           | <u>-</u>                 |                 |                     |                               | Comments    |         |
| Depth            | 0 - 1 m        | 1.2              |                   | >2 m             |                   |           | × ×                      |                 |                     |                               |             |         |
| Channel          | ]              |                  |                   |                  |                   | را<br>۲ا  |                          |                 |                     |                               |             |         |
| Width            | 0 - 2 m        | 2-5              | m                 | 5 - 20 m         | >20               | m         |                          |                 |                     |                               |             |         |
|                  | [              |                  |                   |                  |                   |           |                          |                 |                     |                               |             |         |
| w Type           | <u>St</u> eady | <u> </u>         | le 20             | <u>Ra</u> pids   | Poo               | ols       |                          |                 |                     |                               | ļ           |         |
| Tune             | Fines          | 60 600           |                   | Cobble/          | o Rould           | 20        | Bedrocl                  |                 | Unknown             |                               | -           |         |
| Reak             | Tures          |                  |                   |                  | _] <u>b</u> uuu   |           |                          | <u>`</u> ]      |                     | L1                            |             |         |
| Habitat          | Type I         | Туре             | 11 20             | Type III         | Туре              | IV 80     |                          |                 |                     |                               |             |         |
| Bank             | Ĩ              | <br><u>G</u> rav | e1/               | <u>Co</u> bble/  | 7                 |           |                          | $\square$       |                     |                               |             |         |
| Material         | <u> </u>       | <u>P</u> ebł     | le                | <u>Ru</u> bble   | <u>Bo</u> ula     | ler       | <u>Bed</u> rocl          | <               | <u>Un</u> known     |                               | ļ           |         |
| Backslone        | Shallow        | Mediu            | m                 | Deep             | For               | est<br>Ze | Flood<br>Plair           | d               | Bog/Fen             | 80                            |             |         |
| Bank             | ](             |                  |                   | ou,              |                   | ····[]    | 1 101                    | ···[]           | 205.10              | ·ł                            |             |         |
| Vegetation,      | Bog            | 40 Grass         | es 20             | <u>Sh</u> rubs 2 | ol <sub>Tre</sub> | es 20     |                          |                 |                     |                               |             |         |
| Cover 20°        | 6 Instream     | 20 Overhai       | 1g 50             | Canopy 3         | ა <sub>No</sub>   | ne        |                          |                 |                     |                               |             |         |
| Potential        | [              |                  | $\overline{\Box}$ | Ē                |                   |           |                          |                 |                     |                               |             | Ì       |
| Obstruction      | <u>Fa</u> lls  | <u>Ra</u> pi     | ds []             | <u>Ch</u> ute    | <u> </u>          | de        | <u>Int</u> ermitten      | .t[]            | None                | $\mathbf{\underline{\nabla}}$ | ļ           |         |
| Est.<br>Gradient | 0 - 1 %        | 1-3              | %                 | 3 - 5 %          | >5                | %         |                          |                 |                     |                               |             |         |
| L<br>Substrate   |                | Backslon         | <br>e             |                  | Cover             |           |                          | <u></u>         | <u> </u>            |                               | L           | J       |
| fines            | less than 2 r  | nm Shallow       | gully             | 1 m              | Ins               | tream     | submergen                | t/emer          | gent veget          | ation                         |             |         |
| gravel<br>nebble | 2mm - 3 cm     | Meduim           | gully<br>mily     | 2-3  m           | Ove               | rhang     | grasses/shr trees $> 1m$ | ubs wi<br>above | thin 1 m o<br>water | t water                       |             |         |
| cobble           | 6-13 cm        | Forest st        | ream              | see over         | <i>\</i> 2        | шору      | can be exp               | ressed          | as % cove:          | ť                             |             |         |
| ) rubble         | 14-25 cm       | Flood            | plain             | see over         |                   |           | ľ                        |                 |                     |                               | Page number |         |
| boulder          | 26 cm and u    | ip Bo            | g/Fen             | see over         |                   |           |                          |                 |                     |                               |             | ļ       |
|                  |                |                  |                   |                  |                   |           |                          |                 |                     |                               | L           |         |

| TRANS-LABRADOR HIGHWAY STREAM CROS | SSING INFORMATION: CARTWRIGHT JUNCTION TO GOOSE BAY |
|------------------------------------|-----------------------------------------------------|
| Ground Survey                      | #70. Landing site on site                           |
| Ground survey completed            | Ground Survey not Completed NO                      |
| Temperature                        | Crossing less than 2 km <sup>2</sup> (on DWST list) |
| pH                                 | Bog drainage                                        |
| Conductivity                       | Type IV (steady) flow                               |
| Dissolved Oxygen                   | Type III (cascade/rapids) flow                      |
| Turbidity                          | No accessible by helicopter                         |
| Surface velocity                   | Other:                                              |
| Water Samples collected            | · .                                                 |
| Gradient (inclinometer)            |                                                     |

## Sketch & Measurements of Surveyed Section(s)

#### LEGENDS / NOTES

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#### Backslope

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| Stream No.                                                            |                                                                               | 7                                                                                             |                                                                                  | Sketch of the                           | area                                                                                                                       |                          |
|-----------------------------------------------------------------------|-------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|-----------------------------------------|----------------------------------------------------------------------------------------------------------------------------|--------------------------|
| ate                                                                   |                                                                               | Sept 7                                                                                        | 5102                                                                             |                                         |                                                                                                                            |                          |
| Surveyed by                                                           | ,                                                                             | Bulmit                                                                                        | Hm/ PT                                                                           |                                         |                                                                                                                            |                          |
| Watershed                                                             |                                                                               | - Eagl                                                                                        | e                                                                                |                                         |                                                                                                                            |                          |
| GPS Co-ord                                                            |                                                                               | See                                                                                           | list .                                                                           |                                         | I                                                                                                                          | THE T                    |
| Aerial Photo                                                          | o #                                                                           |                                                                                               | · · · · · · · · · · · · · · · · ·                                                |                                         |                                                                                                                            |                          |
| Map Numbe                                                             | r                                                                             | 13 3                                                                                          | 1 15                                                                             |                                         | ++×                                                                                                                        |                          |
| Photo Numb                                                            | ers                                                                           | 10                                                                                            | 4                                                                                |                                         |                                                                                                                            |                          |
| Video                                                                 |                                                                               | Ve/                                                                                           | 2                                                                                |                                         |                                                                                                                            |                          |
| Area Survey                                                           | ređ                                                                           | 500 m a                                                                                       | erial.                                                                           |                                         |                                                                                                                            |                          |
| Water Same                                                            | les                                                                           | NO                                                                                            |                                                                                  |                                         |                                                                                                                            |                          |
|                                                                       |                                                                               |                                                                                               | l                                                                                | L                                       |                                                                                                                            | Comments                 |
| Denth                                                                 | 0 - 1 m                                                                       |                                                                                               | >2 m                                                                             | Linknown                                | ]                                                                                                                          |                          |
| Channel                                                               |                                                                               |                                                                                               |                                                                                  |                                         | _/<br>¬                                                                                                                    |                          |
| Width                                                                 | 0,- 2 m                                                                       | 2 - 5 m                                                                                       | 5 - 20 m                                                                         | $\rightarrow 20 \text{ m}$              | þ                                                                                                                          |                          |
| ]<br>Now Type                                                         | Steady                                                                        | as <sub>Riffle</sub>                                                                          | 5 Ranida                                                                         | Pools                                   |                                                                                                                            |                          |
| ISubstrate                                                            | <u>[]</u>                                                                     |                                                                                               | Cobble/                                                                          |                                         |                                                                                                                            | ¬                        |
| Туре                                                                  | <u>F</u> ines                                                                 | <b>50</b> <u>G</u> ravel                                                                      | <u>Rubble</u> 20                                                                 | Boulder 25                              | Bedrock Unknown                                                                                                            |                          |
| Beak                                                                  | [                                                                             | ]                                                                                             |                                                                                  |                                         | ]                                                                                                                          |                          |
| Habitat                                                               | Type I                                                                        | Type II                                                                                       | Type III                                                                         | Type IV                                 |                                                                                                                            |                          |
| Bank                                                                  | <b>_</b> .                                                                    | <u>G</u> ravel/                                                                               | Cobble/                                                                          | 2                                       |                                                                                                                            |                          |
| Iviaterial                                                            | <u>Fines</u>                                                                  | <u>Pebble</u>                                                                                 |                                                                                  | Boulder                                 | Bedrock Unknown                                                                                                            | _                        |
| Backslope                                                             | Gully                                                                         | Gully                                                                                         | Gully                                                                            | Stream                                  | Plood<br>Plain Bog/Fen                                                                                                     |                          |
| Bank                                                                  | [                                                                             |                                                                                               |                                                                                  |                                         | ]                                                                                                                          | -                        |
| Vegetation                                                            | Bog                                                                           | <u>Gras</u> ses                                                                               | <u>Sh</u> rubs                                                                   | $\underline{T_{I}}ees$                  | 2                                                                                                                          |                          |
| Cover Slo                                                             | Instream                                                                      | 6 Overhang                                                                                    | 30 Canopy VC                                                                     | None                                    |                                                                                                                            |                          |
| Potential<br>Obstruction                                              | Falls                                                                         | Ranids                                                                                        | 'Chute                                                                           | Cascade                                 | Intermittent                                                                                                               | 7                        |
| Est.                                                                  | ][                                                                            | <u></u> p(                                                                                    |                                                                                  | ] <u>ou</u> seade[]                     |                                                                                                                            | -                        |
| Gradient                                                              | 0 - 1 %                                                                       | 1 - 3 %                                                                                       | 3 - 5 %                                                                          | >5 %                                    |                                                                                                                            |                          |
| Substrate<br>fines<br>gravel<br>pebble<br>cobble<br>rubble<br>bouider | less than 2 r<br>2mm - 3 cm<br>3 - 5 cm<br>6-13 cm<br>14-25 cm<br>26 cm and u | Backslope<br>nm Shallow gul<br>Meduim gul<br>Deep gul<br>Forest strea<br>Flood pla<br>p Bog/J | ly 1 m<br>ly 2-3 m<br>ly $\geq$ 4 m<br>m see over<br>in see over<br>Fen see over | Cover<br>Instream<br>Overhang<br>Canopy | submergent/emergent vegetation<br>grasses/shrubs within 1 m of wa<br>trees > 1m above water<br>can be expressed as % cover | n<br>iter<br>Page number |
|                                                                       | •                                                                             | -                                                                                             |                                                                                  |                                         |                                                                                                                            | 1                        |

| TRANS-LABRADOR HIGHWAY STRE            | AM CROSSIN | G INFORM     | MATION: CARTWRIGHT JUNCTION TO GOOSE BAY            |
|----------------------------------------|------------|--------------|-----------------------------------------------------|
| Ground Survey                          | #-11.      |              | land Rt on Rulen                                    |
| Ground survey completed                |            | Ground Si    | rvey not Completed NO                               |
| Temperature                            |            |              | Crossing less than 2 km <sup>2</sup> (on DWST list) |
| pH                                     |            |              | Bog drainage                                        |
| Conductivity                           |            | $\checkmark$ | Type IV (steady) flow                               |
| Dissolved Oxygen                       |            |              | Type III (cascade/rapids) flow                      |
| Turbidity                              | · · ·      |              | No accessible by helicopter                         |
| Surface velocity                       |            |              | Other:                                              |
| Water Samples collected                |            |              |                                                     |
| Gradient (inclinometer)                |            |              |                                                     |
| Sketch & Measurements of Surveyed Sect | tion(s)    | ·····        |                                                     |
|                                        |            |              |                                                     |
|                                        |            |              |                                                     |
|                                        |            |              | · · · · · · · · · · · · · · · · · · ·               |

#### Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

| Stream No.     |                |              | 72              |                  | Sketch of the   | area                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 260         |
|----------------|----------------|--------------|-----------------|------------------|-----------------|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| /ate           |                |              | Sapt 25/        | 02               |                 |                            | pund                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |             |
| Surveyed by    | y I            | E            | Bu/mH/HI        | MDT              |                 |                            | B                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |             |
| Watershed      |                |              | Eagle           |                  |                 | OPS                        | The second secon | 60          |
| GPS Co-ord     | I <b>.</b>     |              | See list        | +                |                 | 60m e                      | 1 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |             |
| Aerial Photo   | o #            |              |                 |                  |                 | ~                          | XX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             |
| Map Numbe      | er             |              | 13 B/1          | 5                |                 | 1                          | × × 2!                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 50          |
| Photo Numł     | pers           |              | 105             |                  |                 | 1                          | 7 X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |             |
| Video          |                |              | Ver             |                  |                 |                            | 7 ) × 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | /           |
| Area Survey    | /ed            |              | 500 m a         | erial.           |                 |                            | 0.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |             |
| Water Samp     | oles           |              | No:             |                  | L               | Ľ                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |             |
|                |                |              |                 | -····            |                 |                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Comments    |
| Depth          | 0 - 1 m        | $\checkmark$ | 1 - 2 m         | >2 m             | Unknown         |                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |             |
| Channel        |                |              |                 | <u>г</u> —       | [               | 7                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |             |
| Width          | 0 - 2 m        | 80           | 2 - 5 m 20      | 5 - 20 m         | >20 m           |                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |             |
| <br>  Jow Type | <u>St</u> eady | 100          | Riffle          | Rapids           | Pools           | ]                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |             |
| Substrate      | 1              |              |                 | Cobble/          |                 | -<br>1 r                   | <b>п — п</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |             |
| Туре           | <u>F</u> ines  | 80           | <u>G</u> ravel  | Rubble           | Boulder 10      | Bedrock                    | <u>Un</u> known                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |             |
| Beak           | ]              |              |                 |                  |                 | i <u> </u>                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |             |
| Habitat        | Type I         |              | Type II         | Type III         | Type IV         |                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |             |
| Bank           | [              |              | <u>G</u> ravel/ | <u>Co</u> bble/  | ] [             | ] [                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |             |
| Material       | <u>F</u> ines  |              | Pebble          | <u>Ru</u> bble   | <u>Bo</u> ulder | Bedrock                    | <u>Un</u> known X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |             |
| Backslope      | Shallow        | 20           | Medium          | Deep             | Forest          | Flood                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |             |
| Bank           | Guiiy          |              |                 |                  |                 | ן Plain                    | Bog/Fen                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |             |
| Vegetation     | Bog            |              | Grasses 10      | Shrubs 40        | Trees 50        |                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |             |
| 550            | lo [           | 50           |                 |                  |                 | ]                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |             |
| Cover *        | Instream       |              | Overhang 40     | <b>oc</b> lanopy | . None          | ]                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |             |
| Potential      | E-11-          |              |                 |                  |                 |                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |             |
| Fot            |                | _            |                 | <u>Ch</u> ute    | <u>Ca</u> scade | j <u>int</u> ermittent     | None                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |             |
| Gradient       | 0 - 1 %        |              | 1 - 3 %         | 3 - 5 %          | >5 %            |                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |             |
| Substrate      |                |              |                 | ······           |                 | 1                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |             |
| fines          | less than 2 n  | um 🤉         | Shallow gully 1 | m                | Lover           | submergent/em              | ergent vegetation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |             |
| gravel         | 2mm - 3 cm     | N            | Meduim gully 2  | 2-3 m            | Overhang        | grasses/shubs v            | within 1 m of wate                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | r           |
| pebble         | 3 - 5 cm       | -            | Deep gully >    | <u>&gt;</u> 4 m  | Canopy          | trees > $1 \text{ m abov}$ | e water                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | •           |
| cobble         | 6-13 cm        |              | Forest stream s | ee over          | 17              | can be expressed           | d as % cover                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |             |
| rubble         | 14-25 cm       |              | Flood plain s   | ee over          |                 | -                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Page number |
| Jouider        | 20 cm and u    | р            | Bog/Fen s       | ee over          |                 |                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |             |

| Ground Survey           | #73                                                 |
|-------------------------|-----------------------------------------------------|
| Ground survey completed | Ground Survey not Completed NO                      |
| Temperature             | Crossing less than 2 km <sup>2</sup> (on DWST list) |
| pH                      | Bog drainage                                        |
| Conductivity            | Type IV (steady) flow                               |
| Dissolved Oxygen        | Type III (cascade/rapids) flow                      |
| Turbidity               | No accessible by helicopter                         |
| Surface velocity        | Other:                                              |
| Water Samples collected |                                                     |
| Gradient (inclinometer) |                                                     |

#### Sketch & Measurements of Surveyed Section(s)

#### LEGENDS / NOTES

)

#### Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

| Date $\sum p \neq 2                                    $                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Stream No.                                                | [                                                        | 73                                                                          |                                  | Sketch of the                           | area                                                                                  |                                                         | · .            |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|----------------------------------------------------------|-----------------------------------------------------------------------------|----------------------------------|-----------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------|----------------|
| Surveyed by $\underbrace{\mathbb{G}_{ull} / m \cdot r / m / p \cdot T}_{Watershed}$<br>Watershed $\underbrace{\mathbb{G}_{Cacale}}_{Scells}$<br>Map Number $\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>Photo Numbers $\underbrace{\mathbb{G}_{Scells}}_{Iost}$<br>Water Samples $\underbrace{\mathbb{G}_{Scells}}_{Vec}$<br>Water Samples $\underbrace{\mathbb{G}_{Scells}}_{Vec}$<br>Water Samples $\underbrace{\mathbb{G}_{Scells}}_{Vec}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>Water Samples $\underbrace{\mathbb{G}_{Scells}}_{Vec}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Scells}$<br>$\underbrace{\mathbb{G}_{Scells}}_{Sce$ | Date                                                      | [                                                        | Sept 231                                                                    | 02                               |                                         |                                                                                       | , (                                                     | 250 m          |
| Watershed       Zacale         GPS Co-ord.       See 1ist         Aerial Photo #       Fist         Map Number       13 p. ist         Photo Numbers       106         Video       V45         Area Surveyed       500 m awisel for may         Water Samples       Yes         Water Samples       Yes         Pepth       0 - 1 m         0 - 2 m       2 - 5 m         Substrate       Gable 2 - 5 m         Type       Steady         Riffe 10       - 2 - 5 m         Substrate       Gable 2 - 5 m         Type       Steady         Riffe 10       - 2 - 5 m         Substrate       Gravel         Baak       Gravel         Rubble 20       Baulder 60         Backstope       Gulty         Gulty       Gulty         Shallow       Medium         Deepti       0 - 1 m         Type       Euse         Gravel       Rubble 20         Back       Back         Type       Type II         Type II       Type III         Type III       Type III         Shallow       Gulty                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Surveyed by                                               |                                                          | Bu/mH/H                                                                     | -105                             |                                         |                                                                                       | ium >                                                   | $\mathbf{i}$   |
| GPS Co-ord.       See 1:5:1       Bud value       File         Aerial Photo #       File       File       Bud value         Map Number       13 P.J. 5       File       File         Photo Numbers       Io6       Video       Video       File         Video       Video       Video       File       File         Water Samples       Ye 5       File       Badvack conterrop         Water Samples       Ye 5       Comments       Comments         Depth       0 - 1 m.       1 - 2 m.       52 m.       520 m.         Vidto       0 - 2 m.       2 - 5 m.       5 - 20 m.       >20 m.         Shubtrate       Comments       Comments       Ecological       Ecological         Type       Eines       Gravel       Rabble 20       Boulder 60       Bedrock 10       Linknown         Bank       Gravel       Rabble 20       Boulder 60       Bedrock 20       Unknown       Material         Bank       Gravel       Rabble 20       Boulder 60       Bedrock 20       Unknown         Bank       Caree       File       Boulder 60       Bedrock 20       Unknown         Bank       Caree       Strallow       Medium       Deepti                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Watershed                                                 | [                                                        | Eagle                                                                       |                                  |                                         |                                                                                       |                                                         |                |
| Aerial Photo #Photo Number $P_3 \oplus 1 + 2 \oplus 1 + 2 \oplus 1 \oplus$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | GPS Co-ord.                                               | Ĺ                                                        | See lis                                                                     | +                                | a brack-                                | RIPE                                                                                  | 'e /                                                    | •              |
| Map NumberIst by the set of t                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Aerial Photo                                              | #                                                        | · · · · · · · · · · · · · · · · · · ·                                       |                                  | outerop                                 |                                                                                       |                                                         | Lark outerop   |
| Photo Numbers       Io6       Video                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Map Number                                                |                                                          | 13 B/ 15                                                                    |                                  | — )-                                    | Frist -                                                                               | -/-                                                     |                |
| Video       V=5       Bit FEIE       Bit FEIE         Area Surveyed       500 m a.ex inl. 50 m.g.ym       For FEIE       For FEIE       Bit FEIE         Water Samples       yes       Comments       Comments         Depth       0 - 1 m       1 - 2 m       > 2 m       > 0 m/s         Channel       0 - 2 m       2 - 5 m       5 - 20 m       > 20 m/s         Vidto       0 - 2 m       2 - 5 m       5 - 20 m       > 20 m/s         Flow Type       Steady       Riffle 100       Rapids       Pools         Substrate       Gravel       Cabble       Boulder 60       Bedrock 10       Unknown         Bank       Type II       Type III       Type IV       Inknown       Inknown         Bank       Giravel       Cabble       Boulder 60       Bedrock 20       Unknown         Bank       Giravel       Catoble       Boulder 60       Bedrock 20       Unknown         Bank       Giravel       Cabble       Cobble       Boulder 60       Bedrock 20       Unknown         Bank       Giravel       Canopy       None       Plain       Bog/Fen       Bog/Fen         Bank       Bog       Girasies bo       Shubs 40       Irees 50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Photo Numbe                                               | rs                                                       | 106                                                                         |                                  | F                                       | FIFFIE                                                                                |                                                         | 5              |
| Area SurveyedSoom a.e. i.el. 50 m gymFust $R_{i}F_{i}r_{i}$ Contract outbors of the second s                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Video                                                     |                                                          | Yeg                                                                         |                                  |                                         | RIFFIC                                                                                |                                                         | •              |
| Water Samples $1 - 2 m$ $2 - 5 m$ $5 - 20 m$ $2 - 0 m$ SubstrateBackslopeGradient0 - 1 \%1 - 3 \%3 - 5 \% $2 - 5 \%$ $2 - 0 m$ <td< td=""><td>Area Surveye</td><td>d [</td><td>500 manual</td><td>50 mgrun</td><td>+ <del>/</del></td><td>St RIFFIE</td><td>JE B.</td><td>edrock outerop</td></td<>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Area Surveye                                              | d [                                                      | 500 manual                                                                  | 50 mgrun                         | + <del>/</del>                          | St RIFFIE                                                                             | JE B.                                                   | edrock outerop |
| CommentsCommentsDepth $0 - 1 m$ $1 - 2 m$ $> m$ <td>. Water Sample</td> <td>es [</td> <td>Yes.</td> <td></td> <td><u>l</u></td> <td>FIFFIC</td> <td>1 250m</td> <td></td>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | . Water Sample                                            | es [                                                     | Yes.                                                                        |                                  | <u>l</u>                                | FIFFIC                                                                                | 1 250m                                                  |                |
| Depth       0 - 1 m       1 - 2 m       9       >2 m       90       Unknown         Width       0 - 2 m       2 - 5 m       5 - 20 m       >20 m       >20 m          Flow Type       Steady       Riffle       100       Rapids       Pools          Substrate       Gravel       Cobble       Boulder       60       Bedrock       10       Linknown         Baak       Type I       Type II       Type III       Type IV       Boulder       60       Bedrock       20       Unknown         Bank       Gravel       Cabble       Boulder       60       Bedrock       20       Unknown          Bank       Gravel       Cabble       Boulder       60       Bedrock       20       Unknown          Bank       Gravel       Gully       Gully       Stream       Flood       Bog/Fen          Bank       Bog       Grasses       Shrubs 40       Trees       50             Vegetation       Bog       Grasses       Shrubs 40       Trees       50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b></b>                                                   |                                                          |                                                                             |                                  |                                         | ····                                                                                  |                                                         | Comments       |
| Channel<br>Width       0 - 2 m       2 - 5 m       5 - 20 m       >20 m         Study       Riffle       0°       Rapids       Pools         Substrate       Gravel       Rubble       Boulder       6 a       Bedrock       10 Unknown         Beak       Type       Eines       Gravel       Cobble/       Boulder       6 a       Bedrock       10 Unknown         Bank       Gravel       Cobble/       Cobble/       Boulder       6 a       Bedrock       2 a       Unknown         Backslope       Gully       Gully       Gully       Stream       Plain       Bog/Fen         Bank       Grasses       b       Shrubs       6 a       Trees       5 b         Backslope       Gully       Gully       Gully       Stream       Plain       Bog/Fen         Bank       Vegetation       Eog       Grasses       b       Shrubs       fo       Trees       5 b         Cover       *%       Instream       6 overhang       Canopy       None       None       Instream       Submergent/emergent vegetation         Substrate       Backslope       Cover       Instream       submergent/emergent vegetation       Overhang       Caropy       Vegetat                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Depth                                                     | 0 - 1 m                                                  | 1 - 2 m 50                                                                  | >2 m 50                          | Unknown                                 |                                                                                       |                                                         |                |
| Width       0 - 2 m       2 - 5 m       5 - 20 m       > 20 m                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Channel                                                   | Г                                                        |                                                                             |                                  |                                         | 1                                                                                     |                                                         |                |
| Flow Type       Steady       Riffle       Rapids       Pools         Substrate       Gravel       Cobble/So       Boulder 60       Bedrock       Unknown         Beak       Habitat       Type I       Type II       Type III       Type IV         Bank       Gravel/       Cobble/Loo       Boulder 60       Bedrock       20 Unknown         Bank       Gravel/       Cobble/Loo       Boulder 60       Bedrock 20 Unknown       Image: Cobble/Loo         Bank       Gravel/       Cobble/Loo       Boulder 60       Bedrock 20 Unknown       Image: Cobble/Loo         Bank       Grasses       Deep       Forest       Flood       Bedrock 20 Unknown       Image: Cobble/Loo         Bank       Cover       Stream       Plain       Bog/Fen       Image: Cobble/Loo       Image: Cobble/Loo       Image: Cobble/Loo       Image: Cobe                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Width                                                     | 0 - 2 m                                                  | 2 - 5 m                                                                     | 5 - 20 m                         | >20 m                                   |                                                                                       |                                                         |                |
| View Type       Siteady       Riffle       No       Rapids       Pools         Substrate       Gravel       Rubble       So       Boulder       Bedrock       Unknown         Beak       Type       Type II       Type III       Type IV       Bedrock       Unknown         Bank       Gravel       Cobble       Rubble       Boulder       Bedrock       Unknown         Bank       Gravel       Cobble       Rubble       Boulder       Bedrock       Unknown         Backslope       Gully       Gully       Gully       Stream       Plain       Bog/Fen         Bank       Grasses       Shrubs       Trees       So       None       Plain       Bog/Fen         Bank       Grasses       Shrubs       Grasses       Shrubs       Trees       So         Cover       So       Instream       Grasses       Shrubs       So       So         Potential       Ostruction       Ealls       Rapids       Chute       Cascade       Intermittent       None         Substrate       Backslope       Cover       Instream       submergent/emergent vegetation         grave       2mn       3 - 5 %       >5 %       Overhang       gras                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                           |                                                          |                                                                             |                                  |                                         | 2                                                                                     |                                                         |                |
| Substrate<br>TypeEinesGravelCobble/<br>RubbleBoulder 60BedrockUnknownBeak<br>HabitatType IType IIType IIIType IVBank<br>MaterialGravelCobble/<br>PebbleBoulder 60Bedrock 20UnknownBackslopeGullyGullyDeep<br>GullyForest<br>StreamFlood<br>PlainBog/FenBank<br>VegetationBogGrassesShrubs 40Trees 50Cover $5^{0}$ Instream 96OverhangCanopyNonePotential<br>ObstructionGallsRapidsChuteCascadeIntermittentNoneSubstrate<br>pebble 3 - 5 cm<br>pubble 14-25 cmBackslopeCover<br>Forest stream see overCover<br>set overCover<br>set overPlain<br>painSubsergent/emergent vegetation<br>grasses/shrubs within 1 m of water<br>can be expressed as % coverNubble 14-25 cm<br>pubble 126 cm and upBog/Fen see overPlain<br>Bog/Fen see overPage number                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Flow Type                                                 | <u>St</u> eady                                           | <u>Ri</u> ffle 100                                                          | <u>Ra</u> pids                   | Pools                                   |                                                                                       |                                                         |                |
| Image: Second                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Substrate<br>Type                                         | Fines                                                    | Gravel                                                                      | <u>Co</u> bble/                  | Boulder 60                              | Bedrock                                                                               | Inknown                                                 |                |
| DetailHabitatType IIType IIIType IVBankGravelCobble/BoulderBoulderBackslopeGullyGullyGullyGullyBankMediumGullyGullyStreamPlainBog/FenBankWegetationBogGrassesIoShrubsTreesFloodCoverSoldInstreamGoverhangCanopyNoneNonePotentialOverhangChuteCascadeIntermittentNoneObstructionEallsRapidsChuteCascadeIntermittentNoneSubstrateBackslopeCoverStallow gully1 nStallow gully2-3 mCoverfinesless than 2 mmShallow gully1 mInstreamsubmergent/emergent vegetationgravel2mm - 3 cmMeduim gully2-3 mCoverInstreamsubmergent/emergent vegetationgravel2mm - 3 cmMeduim gully2-3 mCoverInstreamsubmergent/emergent vegetationpebble3 - 5 cmDeep gully24 mCanopytrees > 1m above waterPage numberouble14-25 cmFlood plainsee overPage numberPage number                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Beak                                                      | <u></u>                                                  |                                                                             |                                  |                                         |                                                                                       |                                                         |                |
| Bank<br>MaterialGravel/<br>EinesGravel/<br>PebbleCobble/<br>RubbleBoulder 60Bedrock 20UnknownBackslopeGullyMedium<br>GullyDeep<br>GullyForest<br>StreamFlood<br>PlainBog/FenBank<br>VegetationBogGrasses 10<br>GrassesShrubs 40<br>Trees 50Trees 50Cover<br>Potential<br>ObstructionGrassesNonePotential<br>ObstructionRapidsChuteCascadeInstream<br>gravel0 - 1 %1 - 3 %3 - 5 %Substrate<br>finesBackslope<br>InstreamCover<br>StreamSolution<br>StreamSubstrate<br>pebble 3 - 5 cm<br>rubbleBackslope<br>Deep gully<br>2 4 mCover<br>Cover<br>Cover<br>CanopyCover<br>Instream<br>CascadeSubstrate<br>pebble 3 - 5 cm<br>rubbleBackslope<br>Forest 3 - 5 cm<br>Deep gully<br>Bog/Fen see overCover<br>Instream<br>Cover<br>Submergent/emergent vegetation<br>Cover<br>Instream<br>Canopy<br>Cover<br>Instream<br>Canopy<br>Cover<br>Cover<br>Instream<br>Canopy<br>Cover<br>Cover<br>Cover<br>Instream<br>Canopy<br>Pebble 3 - 5 cm<br>rubble 14-25 cm<br>Flood plain see over<br>Hood plain see overPage numberPage numberBog/Fen see overPage number                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Habitat                                                   | Type I                                                   |                                                                             | Type III                         | Type IV                                 |                                                                                       |                                                         |                |
| Material       Eines       Debble       Rubble       Deep       Boulder       Go       Bedrock       Zo       Unknown         Backslope       Gully       Gully       Gully       Gully       Stream       Plain       Bog/Fen         Bank       Eog       Grasses       Image: So       Stream       Plain       Bog/Fen       Bog/Fen         Bank       Eog       Grasses       Image: So       Stream       Plain       Bog/Fen       Bog/Fen         Cover       So       Instream       Go       Overhang       Canopy       None       None         Potential       Obstruction       Falls       Rapids       Chute       Cascade       Intermittent       None         Est.       Gradient       0 - 1 %       1 - 3 %       3 - 5 %       >5 %       So         Substrate       Backslope       Cover       Instream       submergent/emergent vegetation       Overhang         gravel       2mm - 3 cm       Meduin gully       2-3 m       Overhang       grasses/shrubs within 1 m of water         pebble       3 - 5 cm       Deep gully       24 m       Canopy       trees > 1m above water         cobble       6-13 cm       Flood plain see over       Canopy <td>Bank</td> <td></td> <td>Gravel/</td> <td></td> <td></td> <td>יישרא<br/>ער דייידיין</td> <td><b></b></td> <td></td>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Bank                                                      |                                                          | Gravel/                                                                     |                                  |                                         | יישרא<br>ער דייידיין                                                                  | <b></b>                                                 |                |
| ShallowMediumDeepForestFloodBackslopeGullyGullyGullyStreamPlainBog/FenBankVegetationBogGrassesShrubsTrees50Cover $5^{o}l_{s}$ InstreamGoverhangCanopyNonePotentialOverhangCanopyNoneObstructionFallsRapidsChuteCascadeInstream0-1 %1-3 %3-5 %>5 %SubstrateBackslopeCoverfinesless than 2 mmShallow gully1 mgravel2mm - 3 cmMeduin gully2-3 mOverhanggravel2mm - 3 cmDeep gully24 mCanopytrees > 1 m above watercobble6-13 cmForest stream see overCanopytrees > 1 m above waterrubble14-25 cmFlood plain see overCanopyFrees > 1 m above waterboulder26 cm and upBog/Fen see overPage number                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Material                                                  | <u>F</u> ines                                            | <u>P</u> ebble                                                              | <u>مع Rubble</u>                 | Boulder 60                              | Bedrock 20 U                                                                          | nknown                                                  |                |
| BackslopeGullyGullyGullyStreamPlainBog/FenBank<br>VegetationBogGrasses $\bigcirc$ Shrubs $4o$ Trees $5o$ Cover $\checkmark o$ Instream $\bigcirc Grasses$ $\bigcirc$ Shrubs $4o$ Trees $5o$ Cover $\checkmark o$ Instream $\bigcirc Grasses$ $\bigcirc$ $\bigcirc$ None $\square$ Potential<br>ObstructionFallsRapidsChuteCascadeIntermittentNoneEst.<br>Gradient $0 - 1 \%$ $1 - 3 \%$ $3 - 5 \%$ $>5 \%$ $\square$ Substrate<br>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                           | Shallow                                                  | Medium                                                                      | Deep                             | Forest                                  | Flood                                                                                 |                                                         |                |
| Bank       Orasses       Shrubs       Trees       Solution         Cover       Solution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Backslope                                                 | Gully                                                    | Gully                                                                       | Gully                            | Stream                                  | Plain                                                                                 | Bog/Fen                                                 |                |
| VegetationBogGrassesGrassesShrubs $49$ Trees $50$ Cover $5^{\circ}$ Instream $45$ OverhangCanopyNonePotentialOverhangCanopyNoneIntermittentNoneObstructionFallsRapidsChuteCascadeIntermittentNoneEst.Gradient $0 - 1 \%$ $1 - 3 \%$ $3 - 5 \%$ >5 %IntermittentNoneSubstrateBackslopeCoverInstreamsubmergent/emergent vegetationgravel 2mm - 3 cmMeduin guily 2-3 mOverhanggrasses/shrubs within 1 m of waterpebble $3 - 5$ cmDeep guily $\geq 4 m$ Canopytrees > 1m above watercobble $6 - 13$ cmForest streamsee overcanopytrees > 1m above waterrubble 14-25 cmFlood plainsee overPage numberPage number                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Bank                                                      | - [                                                      |                                                                             |                                  | -                                       | ]                                                                                     |                                                         |                |
| Cover $5^{\circ}b$ Instream $q.5$ Overhang $c$ CanopyNonePotential<br>ObstructionFallsRapidsChuteCascadeIntermittentNoneEst.<br>Gradient $0 - 1 \%$ $1 - 3 \%$ $3 - 5 \%$ >5 %Substrate<br>finesBackslope<br>finesCover<br>Meduin gully 2-3 mCover<br>InstreamSubmergent/emergent vegetation<br>gravel 2mm - 3 cm<br>Deep gully $\geq 4 m$ Cover<br>Instreampebble $3 - 5 cm$<br>cobbleDeep gully $\geq 4 m$ Canopy<br>trees > 1m above water<br>can be expressed as % coverrubble14-25 cm<br>Bog/Fen see overFlood plain<br>Bog/Fen see overPage number                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Vegetation                                                | Bog                                                      | <u>Gras</u> ses 10                                                          | Shrubs 40                        | <u>Tr</u> ees مح                        | ]                                                                                     |                                                         |                |
| Potential<br>ObstructionRapidsChuteCascadeIntermittentNoneEst.<br>Gradient $0 - 1 \%$ $1 - 3 \%$ $3 - 5 \%$ >5 %Substrate<br>finesBackslope<br>Shallow gully $1 m$ Instream<br>gravelsubmergent/emergent vegetation<br>gravelgravel2mm - 3 cm<br>pebbleMeduim gully $2 - 3 m$<br>Deep gullyOverhang<br>Canopygrasses/shrubs within 1 m of water<br>trees > 1m above water<br>can be expressed as % coverrubble14-25 cm<br>Bog/Fen see overFlood plain<br>Bog/Fen see overPage number                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Cover 506                                                 | Instream                                                 | overhang 5                                                                  | Canopy                           | None                                    |                                                                                       | ,                                                       |                |
| ObstructionFallsRapidsChuteCascadeIntermittentNoneEst.Gradient $0 - 1 \%$ $1 - 3 \%$ $3 - 5 \%$ >5 %SubstrateBackslopeCoverfinesless than 2 mmShallow gully1 mInstreamsubmergent/emergent vegetationgravel2mm - 3 cmMeduim gully2-3 mOverhanggrasses/shrubs within 1 m of waterpebble $3 - 5 cm$ Deep gully $\ge 4 m$ Canopytrees > 1 m above watercobble $6 - 13 cm$ Forest streamsee overcan be expressed as % covernubble14-25 cmFlood plainsee overPage numberboulder26 cm and upBog/Fen see overPage number                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Potential                                                 | Γ                                                        |                                                                             |                                  |                                         |                                                                                       |                                                         |                |
| Est.<br>Gradient $0 - 1 \%$ $1 - 3 \%$ $3 - 5 \%$ $>5 \%$ SubstrateBackslopeCoverfinesless than 2 mmShallow gully1 mgravel2mm - 3 cmMeduim gully2-3 mOverhangpebble $3 - 5 cm$ Deep gully $\geq 4 m$ Canopycobble $6 - 13 cm$ Forest streamsee overcan be expressed as % coverrubble14-25 cmFlood plainsee overPage numberboulder26 cm and upBog/Fen see overPage number                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Obstruction                                               | <u>Fa</u> lls                                            | <u>Ra</u> pids                                                              | <u>Ch</u> ute                    | <u>Ca</u> scade                         | <u>Intermittent</u>                                                                   | None                                                    |                |
| Gradient       0 - 1 %       1 - 3 %       3 - 5 %       >5 %         Substrate       Backslope       Cover         fines       less than 2 mm       Shallow gully       1 m       Instream       submergent/emergent vegetation         gravel       2mm - 3 cm       Meduim gully       2-3 m       Overhang       grasses/shrubs within 1 m of water         pebble       3 - 5 cm       Deep gully       ≥4 m       Canopy       trees > 1m above water         cobble       6-13 cm       Forest stream       see over       can be expressed as % cover         nubble       14-25 cm       Flood plain       see over       Page number         boulder       26 cm and up       Bog/Fen see over       Page number                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Est.                                                      |                                                          |                                                                             |                                  |                                         |                                                                                       |                                                         |                |
| Substrate       Backslope       Cover         fines       less than 2 mm       Shallow gully       1 m       Instream       submergent/emergent vegetation         gravel       2mm - 3 cm       Meduim gully       2-3 m       Overhang       grasses/shrubs within 1 m of water         pebble       3 - 5 cm       Deep gully       ≥4 m       Canopy       trees > 1m above water         cobble       6-13 cm       Forest stream       see over       can be expressed as % cover         rubble       14-25 cm       Flood plain       see over       Page number         boulder       26 cm and up       Bog/Fen see over       Page number                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Gradient                                                  | 0 - 1 %                                                  | 1 - 3 %                                                                     | 3 - 5 %                          | >5 %                                    | [                                                                                     |                                                         |                |
| boulder 26 cm and up Bog/Fen see over Page number                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Substrate<br>fines le<br>gravel 2<br>pebble 3<br>cobble 6 | ess than 2 m<br>mm - 3 cm<br>- 5 cm<br>-13 cm<br>4-25 cm | Backslope<br>m Shallow gully<br>Meduim gully<br>Deep gully<br>Forest stream | 1 m<br>2-3 m<br>≥4 m<br>see over | Cover<br>Instream<br>Overhang<br>Canopy | submergent/emerge<br>grasses/shrubs with<br>trees > 1m above w<br>can be expressed as | ent vegetation<br>in 1 m of water<br>vater<br>5 % cover | []]            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | boulder 2                                                 | $6 \mathrm{cm}$ and $\mathrm{ur}$                        | Bog/Fen s                                                                   | ee over                          |                                         |                                                                                       |                                                         | rage number    |



#### Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

| Stream No.                                                            |                                                                               | 74                                                                                                       |                                              | Sketch of the                           | area                                                                                                                       | · · · · ·                               |
|-----------------------------------------------------------------------|-------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|----------------------------------------------|-----------------------------------------|----------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|
| e                                                                     |                                                                               | Sep+ 25                                                                                                  | 102                                          | Co                                      | ould not see S.                                                                                                            | trean well                              |
| Surveyed by                                                           |                                                                               | BW/mH/H                                                                                                  | Im/pJ                                        | Ring                                    | uch to classify                                                                                                            | · ·                                     |
| Watershed                                                             |                                                                               | Eagle                                                                                                    |                                              |                                         |                                                                                                                            |                                         |
| GPS Co-ord                                                            |                                                                               | See 1                                                                                                    | 15+                                          |                                         |                                                                                                                            |                                         |
| Aerial Photo                                                          | ) #                                                                           |                                                                                                          |                                              |                                         |                                                                                                                            |                                         |
| Map Numbe                                                             | r                                                                             | 138/1                                                                                                    | 5                                            |                                         |                                                                                                                            |                                         |
| Photo Numb                                                            | ers                                                                           | 107                                                                                                      |                                              | -<br>-                                  |                                                                                                                            |                                         |
| Video                                                                 |                                                                               | Yes                                                                                                      |                                              |                                         |                                                                                                                            |                                         |
| Area Survey                                                           | ed                                                                            | 500 m arr                                                                                                | 10                                           |                                         |                                                                                                                            | · · · · · · · · · · · · · · · · · · ·   |
| Water Samp                                                            | les                                                                           | ND.                                                                                                      |                                              |                                         |                                                                                                                            |                                         |
|                                                                       | ······································                                        |                                                                                                          |                                              |                                         |                                                                                                                            | Comments                                |
| Depth                                                                 | 0 - 1 m                                                                       | 1 - 2 m                                                                                                  | >2 m                                         | Unknown                                 |                                                                                                                            |                                         |
| Channel                                                               |                                                                               |                                                                                                          | ] [—                                         |                                         | 7                                                                                                                          |                                         |
| Width                                                                 | 0 - 2 m                                                                       | ✓ 2 - 5 m                                                                                                | 5 - 20 m                                     | >20 m                                   |                                                                                                                            |                                         |
| w Type                                                                | <u>St</u> eady                                                                | Riffle                                                                                                   | <u>Ra</u> pids                               | Pools                                   |                                                                                                                            |                                         |
| istrate                                                               | ſ                                                                             | [                                                                                                        | Cobble/                                      |                                         |                                                                                                                            | 7 · · · · · · · · · · · · · · · · · · · |
| Туре                                                                  | Fines                                                                         | <u>G</u> ravel                                                                                           | <u>Ru</u> bble                               | <u>Bo</u> ulder                         | Bedrock Unknown                                                                                                            | ]                                       |
| Habitat                                                               | Type I                                                                        | Туре П                                                                                                   | Type III                                     | Type IV                                 |                                                                                                                            |                                         |
| Bank                                                                  | -<br>[                                                                        | Gravel/                                                                                                  | Cobble/                                      |                                         |                                                                                                                            | 1                                       |
| Material                                                              | Fines                                                                         | Pebble                                                                                                   | Rubble                                       | <u>Bo</u> ulder                         | Bedrock Unknown                                                                                                            |                                         |
|                                                                       | Shallow                                                                       | Medium                                                                                                   | ] Deep                                       | Forest                                  | ] Flood                                                                                                                    |                                         |
| Backslope                                                             | Gully                                                                         | Gully                                                                                                    | Gully                                        | Stream                                  | Plain Bog/Fen                                                                                                              |                                         |
| Bank                                                                  |                                                                               |                                                                                                          |                                              | 1.0                                     |                                                                                                                            |                                         |
| vegetation                                                            | <u>Boa</u> [                                                                  | <u>Gras</u> ses                                                                                          | <u>Sh</u> rubs                               | <u>Tr</u> ees                           | <br>¬                                                                                                                      |                                         |
| Cover 100                                                             | Instream                                                                      | Overhang AD                                                                                              | Canopy 60                                    | None                                    |                                                                                                                            |                                         |
| Potential                                                             | [                                                                             |                                                                                                          |                                              |                                         |                                                                                                                            |                                         |
| Obstruction                                                           | <u>Fa</u> lls[                                                                | <u>Ra</u> pids                                                                                           | <u>Ch</u> ute                                | <u>Ca</u> scade                         | <u>Intermittent</u> None                                                                                                   |                                         |
| Est.                                                                  | 0 10/                                                                         |                                                                                                          |                                              |                                         |                                                                                                                            |                                         |
|                                                                       | U-1%                                                                          | 1-3%                                                                                                     | 3-5%                                         | >5 %                                    |                                                                                                                            |                                         |
| Substrate<br>fines<br>gravel<br>pebble<br>cobble<br>rubble<br>boulder | less than 2 n<br>2mm - 3 cm<br>3 - 5 cm<br>5-13 cm<br>14-25 cm<br>26 cm and u | Backslope<br>Im Shallow gully<br>Meduim gully<br>Deep gully<br>Forest stream<br>Flood plain<br>B Bog/Fen | 1 m<br>2-3 m<br>≥4 m<br>see over<br>see over | Cover<br>Instream<br>Overhang<br>Canopy | submergent/emergent vegetation<br>grasses/shrubs within 1 m of wa<br>trees > 1m above water<br>can be expressed as % cover | ter<br>Page number                      |
|                                                                       | •                                                                             | . 205/104                                                                                                |                                              |                                         |                                                                                                                            |                                         |

#### TRANS-LABRADOR HIGHWAY STREAM CROSSING INFORMATION: CARTWRIGHT JUNCTION TO GOOSE BAY #14 Ground Survey Ground survey completed Ground Survey not Completed Crossing less than 2 km<sup>2</sup> (on DWST list) Temperature pН Bog drainage Conductivity Type IV (steady) flow Dissolved Oxygen Type III (cascade/rapids) flow Turbidity No accessible by helicopter Surface velocity Other: Water Samples collected Gradient (inclinometer)

#### LEGENDS / NOTES

#### Backslope

Sketch & Measurements of Surveyed Section(s)

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

| Stream No.                                                              |                                                                               |                                                               | 5                                         |                                                              |      | Sketch of the                           | area                                                                 |                                                                        |              |
|-------------------------------------------------------------------------|-------------------------------------------------------------------------------|---------------------------------------------------------------|-------------------------------------------|--------------------------------------------------------------|------|-----------------------------------------|----------------------------------------------------------------------|------------------------------------------------------------------------|--------------|
| te                                                                      |                                                                               | Sep-                                                          | - 25                                      | 102                                                          |      |                                         | $\mathbf{X}$                                                         |                                                                        | )            |
| Surveyed by                                                             | ¥.                                                                            | Bu/m                                                          | н/ н                                      | m/pJ                                                         |      | where stre                              | ~ ) I                                                                | Kubble/Sam                                                             | d            |
| Watershed                                                               |                                                                               | 2                                                             | igle                                      | <u>&gt;</u>                                                  |      | Was Visib                               | Low RIFFI                                                            |                                                                        | 52. LA N     |
| GPS Co-orc                                                              | 1.                                                                            | Se                                                            | <u>e 11</u>                               | st .                                                         |      |                                         | $\sqrt{V}$                                                           | 58                                                                     | 39           |
| Aerial Phot                                                             | o #                                                                           |                                                               |                                           |                                                              |      | -                                       | 5/8                                                                  | -x6                                                                    | 3) Flow      |
| Map Numb                                                                | er                                                                            | 13                                                            | 31.                                       | <u>र</u>                                                     |      |                                         | <sup>245</sup> / J                                                   |                                                                        | $\checkmark$ |
| Photo Numi                                                              | pers                                                                          |                                                               | <u>ه</u> د                                |                                                              |      |                                         | RIFF                                                                 |                                                                        |              |
| Video                                                                   |                                                                               | ¥4                                                            | 25                                        |                                                              |      |                                         | T                                                                    |                                                                        | •            |
| Area Survey                                                             | ved                                                                           | 500~                                                          | arv                                       | rol.                                                         |      |                                         |                                                                      |                                                                        | · · · · · ·  |
| Water Samp                                                              | oles                                                                          | 1                                                             | ND .                                      |                                                              |      |                                         | <b>l</b>                                                             |                                                                        | Comments     |
|                                                                         | ·                                                                             |                                                               | [                                         | <br>  [                                                      | <br> | · · · · · · · · · · · · · · · · · · ·   |                                                                      | · · · · · · · · · · · · · · · · · · ·                                  |              |
| Depth                                                                   | 0 - 1 m                                                                       | 1-2                                                           | m                                         | >2 m                                                         |      | Unknown                                 |                                                                      |                                                                        |              |
| Channel                                                                 | [                                                                             |                                                               |                                           | [                                                            |      |                                         | 7                                                                    |                                                                        |              |
| Width                                                                   | 0 - 2 m                                                                       | 2 - 5                                                         | ; m                                       | 5 - 20 m                                                     |      | >20 m                                   |                                                                      |                                                                        |              |
| w Type                                                                  | <u>St</u> eady                                                                | Ri                                                            | fle 100                                   | <u>Ra</u> pids                                               |      | Pools                                   |                                                                      |                                                                        |              |
| 1 ustrate                                                               | [                                                                             |                                                               |                                           | <u>Co</u> bble/                                              |      |                                         | ] [                                                                  |                                                                        |              |
| Туре                                                                    | <u>F</u> ines                                                                 | <b>50</b> <u>G</u> ra                                         | vel                                       | <u>Ru</u> bble                                               | 40   | Boulder 10                              | Bedrock                                                              | Unknown                                                                |              |
| Beak                                                                    |                                                                               |                                                               |                                           | Γ                                                            |      |                                         | ]                                                                    |                                                                        |              |
| Habitat                                                                 | Type I                                                                        | Тур                                                           | n ►                                       | Type III                                                     |      | Type IV                                 |                                                                      |                                                                        |              |
| Bank                                                                    | <b>T</b>                                                                      | <u>G</u> rav                                                  | /el/                                      | <u>Co</u> bble/                                              |      |                                         | ] . [                                                                |                                                                        |              |
| Materia                                                                 | <u>Fines</u>                                                                  | <u>P</u> eb                                                   |                                           | Rubble                                                       | _    | <u>Bo</u> ulder                         | ] <u>Bed</u> rock                                                    |                                                                        |              |
| Backslope                                                               | Snanow<br>Guliv                                                               | G                                                             | um<br>illv                                | Deep                                                         |      | Stream                                  | Flood                                                                | Bog/Fen                                                                |              |
| Bank                                                                    | ] [                                                                           | ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~                            | ····/                                     | <br>                                                         |      | oncan                                   |                                                                      |                                                                        |              |
| Vegetation,                                                             | Bog                                                                           | Gras                                                          | ses 5                                     | <u>Sh</u> rubs                                               | 30   | Trees 65                                |                                                                      |                                                                        |              |
| Cover 90                                                                | lo Instream                                                                   | 5 Overha                                                      | ng 35                                     | Canopy                                                       | 00   | None                                    | ļ                                                                    |                                                                        |              |
| Potential                                                               | F                                                                             |                                                               |                                           | ſ                                                            | ]    |                                         |                                                                      |                                                                        |              |
| Obstruction                                                             | <u>Fa</u> lls                                                                 | <u>Rap</u>                                                    | ids                                       | <u>Ch</u> ute                                                |      | <u>Ca</u> scade                         | Intermittent                                                         | None                                                                   |              |
| Est.                                                                    |                                                                               |                                                               |                                           | Γ                                                            |      |                                         |                                                                      |                                                                        |              |
| Gradient                                                                | 0-1%                                                                          | 1 - 3                                                         | % <u> </u>                                | 3 - 5 %                                                      |      | >5 %                                    | ]                                                                    |                                                                        |              |
| Substrate<br>fines<br>gravel<br>pebble<br>cobble<br>) rubble<br>boulder | less than 2 n<br>2mm - 3 cm<br>3 - 5 cm<br>6-13 cm<br>14-25 cm<br>26 cm and w | Backslop<br>nm Shallow<br>Meduim<br>Deep<br>Forest s<br>Flood | gully<br>gully<br>gully<br>tream<br>plain | 1  m<br>2-3  m<br>$\geq 4 \text{ m}$<br>see over<br>see over | (    | Cover<br>Instream<br>Overhang<br>Canopy | submergent/en<br>grasses/shrubs<br>trees > 1m abo<br>can be expresse | nergent vegetation<br>within 1 m of water<br>ve water<br>ed as % cover | Page number  |
|                                                                         | wind U                                                                        | r D                                                           | cerr cu                                   |                                                              |      |                                         |                                                                      |                                                                        |              |

| TRANS-LABRADOR HIGHWAY STREAM CR             | OSSING INFORMATION: CARTWRIGHT JUNCTION TO GOOSE BAY |
|----------------------------------------------|------------------------------------------------------|
| Ground Survey                                | #75                                                  |
| Ground survey completed                      | Ground Survey not Completed NO                       |
| Temperature                                  | Crossing less than 2 km <sup>2</sup> (on DWST list)  |
| pH                                           | Bog drainage                                         |
| Conductivity                                 | Type IV (steady) flow                                |
| Dissolved Oxygen                             | Type III (cascade/rapids) flow                       |
| Turbidity                                    | No accessible by helicopter                          |
| Surface velocity                             | Other:                                               |
| Water Samples collected                      |                                                      |
| Gradient (inclinometer)                      |                                                      |
| Sketch & Measurements of Surveyed Section(s) |                                                      |
|                                              | · · · ·                                              |
|                                              |                                                      |
|                                              |                                                      |
|                                              | •                                                    |
|                                              |                                                      |

#### Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

| Stream No.               |                             |              | 76.                          |                 | Sketch of the       | area                       |                     |                                       |
|--------------------------|-----------------------------|--------------|------------------------------|-----------------|---------------------|----------------------------|---------------------|---------------------------------------|
| <b>e</b>                 |                             |              | Sep+ 25                      | 102             |                     |                            |                     | o m                                   |
| Surveyed by              |                             | Bu           | /mH/Hm/                      | PJ              | all typ             | 20 III                     | $(\square)$         |                                       |
| Watershed                |                             |              | Scelle                       |                 |                     |                            | 2 (                 | -IBW                                  |
| GPS Co-ord.              |                             |              | See 115                      | .+              |                     |                            | $\left( \right)$    |                                       |
| Aerial Photo             | #                           |              | ·                            |                 |                     |                            |                     | (• •)                                 |
| Map Number               | r                           |              | 13 B/15                      | ;               |                     |                            | 5                   | $\nabla$                              |
| Photo Numb               | ers                         |              | 109                          |                 |                     | × _                        | 12                  | 1                                     |
| Video                    | i                           |              | yes                          |                 |                     | $\sum$                     | 10                  | 0 m                                   |
| Area Survey              | ed                          | , c          | soo m aari                   | a               |                     |                            |                     | · · · · · ·                           |
| Water Samp               | les                         |              | NO.                          |                 |                     |                            | - 2501              | ~                                     |
| [                        |                             |              | <br>[]                       | <br>            | <br>1               |                            |                     | Comments                              |
| Depth                    | 0 - 1 m                     | $\checkmark$ | 1 - 2 m                      | >2 m            | Unknown             |                            |                     |                                       |
| Channel                  |                             | 2            |                              |                 | ] . [               | ]                          |                     |                                       |
| Width                    | 0 - 2 m                     |              | 2 - 5 m                      | 5 - 20 m        | ] >20 m[            |                            |                     | · · · · · · · · · · · · · · · · · · · |
| w Type                   | <u>St</u> eady              | $\checkmark$ | <u>Ri</u> ffle               | <u>Ra</u> pids  | Pools               |                            |                     |                                       |
| Substrate                |                             | ~            |                              | <u>Co</u> bble/ | <u> </u>            | -<br>  [                   |                     | · · ·                                 |
| Туре                     | <u>F</u> ines               | পণ           | <u>G</u> ravel               | <u>Ru</u> bble  | <u>Bo</u> ulder     | Bedrock                    | <u>Un</u> known     |                                       |
| Beak<br>Habitat          | Type I                      |              | Type II                      | Type III        | Type IV             | 1                          |                     |                                       |
| Bank                     |                             | aal          | <u>G</u> ravel/              | <u>Co</u> bble/ |                     | -                          | ] []                |                                       |
| Iviaterial               | Eines                       |              |                              | <u>Ru</u> bble  | ] <u>Bo</u> ulder[] | Bedrock                    |                     | · · · ·                               |
| Backslope                | Gully                       |              | Gully                        | Gully           | Stream              | Plain                      | Bog/Fen             |                                       |
| Bank<br>Vegetation.      | Bog                         | av           | Grasses                      | Shrubs          |                     | ]                          |                     |                                       |
|                          | <u>يەنىم</u>                |              |                              | <u></u>         | ] <u> </u>          | ]                          |                     |                                       |
| Cover \0"                | o Instream                  | 50           | Overhang 40                  | Canopy 10       | None                |                            |                     |                                       |
| Potential<br>Obstruction | Falls                       |              | Rapids                       | Chute           | Cascade             | Intermittent               | None                |                                       |
| Est.                     |                             |              |                              |                 | ]                   | ]                          |                     |                                       |
| Gradient                 | 0 - 1 %                     |              | 1 - 3 %                      | 3 - 5 %         | >5 %                |                            |                     |                                       |
| Substrate                | less the C                  |              | Backslope                    |                 | Cover               |                            |                     |                                       |
| gravel                   | iess uian 2 i<br>2mm - 3 cm | 11111<br>    | Snanow guily<br>Meduim pully | 1 m<br>2-3 m    | Overhang            | submergent/en:             | within 1 m of water |                                       |
| pebble                   | 3 - 5 cm                    |              | Deep gully                   | ≥_4 m           | Сапору              | trees $> 1 \text{ m abov}$ | ve water            |                                       |
| cobble                   | 6-13 cm                     |              | Forest stream                | see over        | - ··· P'J           | can be expresse            | ed as % cover       |                                       |
| nubble<br>houldar        | 14-25 cm                    |              | Flood plain                  | see over        |                     |                            |                     | Page number                           |
| Dominet                  | 20 cm and t                 | ιp           | Bog/Fen                      | see over        |                     |                            |                     |                                       |

| Ground Survey           | #16.                                                |
|-------------------------|-----------------------------------------------------|
| Ground survey completed | Ground Survey not Completed NO                      |
| Temperature             | Crossing less than 2 km <sup>2</sup> (on DWST list) |
| pH                      | Bog drainage                                        |
| Conductivity            | Type IV (steady) flow                               |
| Dissolved Oxygen        | Type III (cascade/rapids) flow                      |
| Turbidity               | No accessible by helicopter                         |
| Surface velocity        | Other:                                              |
| Water Samples collected |                                                     |
| Gradient (inclinometer) |                                                     |

### Sketch & Measurements of Surveyed Section(s)

#### LEGENDS / NOTES

#### Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

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| Stream No.                                                                                   | [                                                              | 77                                                                                                      |                                                                  | Sketch of the                           | area                                                                    | Can                                                                  | £                                      |
|----------------------------------------------------------------------------------------------|----------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|-----------------------------------------|-------------------------------------------------------------------------|----------------------------------------------------------------------|----------------------------------------|
| ate                                                                                          | [                                                              | Sept 25                                                                                                 | 102                                                              | toomer                                  | type II.                                                                | T J                                                                  | P 250 m.                               |
| Surveyed by                                                                                  |                                                                | BW/MH/H                                                                                                 | m/pJ                                                             | at upst                                 | earne and                                                               | J I/O                                                                | Ð/                                     |
| Watershed                                                                                    | [                                                              | Gagle                                                                                                   |                                                                  |                                         |                                                                         |                                                                      | 150m'                                  |
| GPS Co-ord.                                                                                  | Γ                                                              | See                                                                                                     | 154                                                              |                                         |                                                                         | T                                                                    |                                        |
| Aerial Photo #                                                                               |                                                                |                                                                                                         |                                                                  |                                         | مر.                                                                     |                                                                      | Flow                                   |
| Map Number                                                                                   |                                                                | 13B/                                                                                                    | 15                                                               | Aqua to                                 | · /                                                                     | $\rightarrow$ /                                                      |                                        |
| Photo Numbers                                                                                | • [                                                            | 110                                                                                                     | •                                                                | Vegetati                                | •~ ( ⊐                                                                  | 2.                                                                   | . •                                    |
| Video                                                                                        | Γ                                                              | Y-es                                                                                                    |                                                                  |                                         | -)                                                                      | ×                                                                    | (00)                                   |
| Area Surveyed                                                                                | ſ                                                              | 500m arri                                                                                               |                                                                  |                                         |                                                                         | 4                                                                    |                                        |
| Water Samples                                                                                | ſ                                                              | NO '                                                                                                    |                                                                  |                                         | LAK                                                                     | <u>e</u> .                                                           | - 250 m                                |
|                                                                                              | ·                                                              |                                                                                                         |                                                                  | · · · · · · · · · · · · · · · · · · ·   |                                                                         |                                                                      | Comments .                             |
|                                                                                              | <u> </u>                                                       |                                                                                                         |                                                                  | ]                                       | ן                                                                       |                                                                      |                                        |
| Depth                                                                                        | 0-1m[                                                          |                                                                                                         | >2 m                                                             | ] Unknown[                              | ]                                                                       | •                                                                    |                                        |
| Width                                                                                        | 0 - 2 m                                                        | 2 - 5 m 2                                                                                               | o <sub>5-20 m</sub> 10                                           | >20 m 70                                |                                                                         |                                                                      |                                        |
|                                                                                              |                                                                |                                                                                                         |                                                                  |                                         | 7                                                                       |                                                                      |                                        |
| ow Type                                                                                      | Steady                                                         | 80 Riffle 2                                                                                             | • <u>Ra</u> pids                                                 | Pools                                   |                                                                         |                                                                      |                                        |
| Substrate                                                                                    | Finan                                                          |                                                                                                         | Cobble/                                                          | Douldon 40                              | Dadraak                                                                 |                                                                      |                                        |
| I ype                                                                                        | <u>r</u> mest_                                                 |                                                                                                         |                                                                  |                                         | ] <u>Ben</u> rock                                                       |                                                                      | ······································ |
| Habitat                                                                                      | Type I                                                         | Type II 2                                                                                               | o <sub>Type III</sub>                                            | Type IV 80                              |                                                                         |                                                                      |                                        |
| Bank                                                                                         |                                                                | <u>G</u> ravel/                                                                                         | <br>] <u>Co</u> bble/                                            |                                         | ] [""                                                                   | רן ר                                                                 |                                        |
| Material                                                                                     | Eines <sup>2</sup>                                             | Pebble                                                                                                  | Rubble 30                                                        | Boulder 40                              | Bedrock                                                                 | Unknown                                                              |                                        |
| De alasta                                                                                    | Shallow                                                        | Medium                                                                                                  | Deep                                                             | Forest                                  | Flood                                                                   |                                                                      |                                        |
| Backstope                                                                                    | Gully                                                          | Gully                                                                                                   |                                                                  | ] Stream                                | ] Plain                                                                 | Bog/Fen                                                              |                                        |
| Vegetation                                                                                   | Bog                                                            | Grasses lo                                                                                              | Shrubs 30                                                        | <u>Trees</u>                            |                                                                         |                                                                      |                                        |
| Cover 1500 I                                                                                 | Instream                                                       | Overhang                                                                                                | Canopy 20                                                        | None                                    |                                                                         |                                                                      |                                        |
| Potential                                                                                    | <b>_</b> [                                                     |                                                                                                         |                                                                  |                                         |                                                                         |                                                                      |                                        |
| Obstruction                                                                                  |                                                                | <u>Rapids</u>                                                                                           | <u>Ch</u> ute                                                    | <u>Ca</u> scade                         | <u> Int</u> ermittent                                                   | None None                                                            |                                        |
| Gradient                                                                                     | 0 - 1 %                                                        | 1 - 3 %                                                                                                 | 3 - 5 %                                                          | >5 %                                    |                                                                         |                                                                      |                                        |
| Substrate<br>fines less<br>gravel 2m<br>pebble 3 -<br>cobble 6-1<br>rubble 14-<br>boulder 26 | s than 2 m<br>um - 3 cm<br>5 cm<br>3 cm<br>-25 cm<br>cm and up | Backslope<br>Im Shallow gully<br>Meduim gully<br>Deep gully<br>Forest stream<br>Flood plain<br>D Bog/Fe | 1 m<br>2-3 m<br>$\geq 4$ m<br>see over<br>see over<br>n see over | Cover<br>Instream<br>Overhang<br>Canopy | submergent/em<br>grasses/shrubs v<br>trees > 1m abov<br>can be expresse | ergent vegetation<br>within 1 m of water<br>ve water<br>d as % cover | Page number                            |

| TRANS-LABRADOR HIGHWAY STREAM CRO     | SSING INFORM      | LATION: CARTWRIGHT JUNCTION TO GOOSE BAY            |
|---------------------------------------|-------------------|-----------------------------------------------------|
| Ground Survey Ground survey completed | 昇11・<br>Ground Su | rvey not Completed WO but mostly TYPE ]             |
| Temperature                           |                   | Crossing less than 2 km <sup>2</sup> (on DWST list) |
| pH                                    |                   | Bog drainage                                        |
| Conductivity                          |                   | Type IV (steady) flow                               |
| Dissolved Oxygen                      |                   | Type III (cascade/rapids) flow                      |
| Turbidity                             |                   | No accessible by helicopter                         |
| Surface velocity                      |                   | Other:                                              |
| Water Samples collected               |                   |                                                     |
| Gradient (inclinometer)               |                   |                                                     |

#### Sketch & Measurements of Surveyed Section(s)

#### LEGENDS / NOTES

#### Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

| Stream No.    |                     |              | 78                           |                 | Sketch of the     | area                 |                     |             |
|---------------|---------------------|--------------|------------------------------|-----------------|-------------------|----------------------|---------------------|-------------|
| ate           |                     |              | Sent 2                       | 5/02            |                   |                      | <u></u>             |             |
| Surveyed by   | Y                   | Į            | Bu/mH/H                      | tm/ PJ          |                   | 80g ju               | 0 609               |             |
| Watershed     |                     |              | Eagle                        |                 |                   | J.                   | `)                  |             |
| GPS Co-ord    |                     |              | See lis                      | +               |                   | × :                  | 4                   |             |
| Aerial Photo  | o #                 |              |                              |                 |                   | + :                  | ×                   |             |
| Map Numbe     | er                  |              | 13 8/15                      | 5               |                   | 4.                   | <i>[</i> ]          |             |
| Photo Numb    | pers                |              | /                            |                 |                   | 1.4                  |                     |             |
| Video         |                     |              | Yes                          |                 |                   | 2:4                  | <u>'</u>            |             |
| Area Survey   | /ed                 | 5            | oo mae                       | viel .          |                   | L it                 | -                   |             |
| Water Samp    | oles                |              | NO                           |                 |                   | 1                    |                     |             |
| [             |                     |              |                              |                 |                   |                      |                     | Comments    |
| Depth         | 0 - 1 m             | $\sim$       | 1 - 2 m                      | >2 m            | Unknown           |                      |                     |             |
| Channel       | ſ                   | =            |                              |                 | ]                 |                      |                     |             |
| Width         | 0 - 2 m             | $\checkmark$ | 2 - 5 m                      | 5 - 20 m        | >20 m             |                      |                     |             |
|               | ]                   | 0            |                              |                 | i r               |                      |                     |             |
| Jow Type      | <u>St</u> eady      | 100          | <u>Ri</u> ffle               | <u>Ra</u> pids  | Pools             |                      |                     |             |
| Substrate     | <b>r</b> .          |              |                              | <u>Co</u> bble/ | ][                | ] [                  |                     | •           |
| Type<br>Baala | Eines               |              | Gravel                       | <u>Ru</u> bble  | ] <u>Bo</u> ulder | <u> </u>             | ] <u>Un</u> known   |             |
| Habitat       | Type I              |              | Type II                      | Type III        | Type IV           | 2                    |                     |             |
| Bank          | ]                   |              | Gravel/                      | Cobble/         | ] ] ] [           |                      | י ריי               | ,           |
| Material      | Fines               |              | Pebble                       | Rubble          | Boulder           | Bedrock              | Unknown             |             |
| Backslope     | Shallow<br>Gullv    |              | Medium                       | Deep<br>Gully   | Forest Stream     | Flood<br>Plain       | Bog/Eer             |             |
| Bank          | ] [                 |              |                              |                 | ] []              |                      |                     |             |
| Vegetation    | Bog                 |              | Grasses 10                   | Shrubs 20       | Trees 10          | 2                    |                     |             |
| Cover QB      | Instream            |              | Overhang 30                  | Canopy 10       | None              |                      |                     |             |
| Potential     | Ealla               |              |                              |                 |                   |                      |                     |             |
| Fet           |                     |              |                              | <u>Ch</u> ute   | <u>Ca</u> scade   | <u>Int</u> ermittent | None                |             |
| Gradient      | 0 - 1 %             |              | 1 - 3 %                      | 3-5%            | >5 %              |                      |                     |             |
| L             | ·                   |              |                              |                 |                   |                      |                     |             |
| fines         | less than 2 n       | m l          | Sackstope<br>Shallow gully 1 | m               | Cover<br>Instream | submergent/eme       | rgent vegetation    |             |
| gravel        | 2mm - 3 cm          | 1            | Meduim gully 2               | 3 m             | Overhang          | grasses/shrubs w     | vithin I m of water |             |
| pebble        | 3 - 5 cm            |              | Deep gully $\geq$            | <u>·</u> 4 m    | Canopy            | trees > 1m above     | e water             |             |
| rubble        | 0-15 cm<br>14-25 cm |              | Forest stream se             | ee over         |                   | can be expressed     | l as % cover        | D           |
| boulder       | 26 cm and u         | р            | Bog/Fen s                    | ee over         |                   |                      |                     | rage number |
|               |                     |              | -                            |                 |                   |                      |                     |             |

| Ground Survey           |                                                     |
|-------------------------|-----------------------------------------------------|
| Ground survey completed | Ground Survey not Completed NO                      |
| Temperature             | Crossing less than 2 km <sup>2</sup> (on DWST list) |
| pH                      | Bog drainage                                        |
| Conductivity            | Type IV (steady) flow                               |
| Dissolved Oxygen        | Type III (cascade/rapids) flow                      |
| Turbidity               | No accessible by helicopter                         |
| Surface velocity        | Other:                                              |
| Water Samples collected |                                                     |
| Gradient (inclinometer) | /                                                   |

### Sketch & Measurements of Surveyed Section(s)

#### **LEGENDS / NOTES**

#### Backslope

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| Stream No.                                                            |                                                                               | -79                                                                                                      |                                                            | Sketch of the a                                      | rea                                                                     | <u></u>                                                     |                                       |
|-----------------------------------------------------------------------|-------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|------------------------------------------------------------|------------------------------------------------------|-------------------------------------------------------------------------|-------------------------------------------------------------|---------------------------------------|
| e                                                                     |                                                                               | Sept25                                                                                                   | 102                                                        |                                                      | Flow /                                                                  | , ]-                                                        |                                       |
| Surveyed by                                                           | ,                                                                             | Bu/mH/1                                                                                                  | +m/pJ                                                      |                                                      | <b>'   </b> "                                                           |                                                             |                                       |
| Watershed                                                             | ĺ                                                                             | Eagle                                                                                                    |                                                            |                                                      | V/I                                                                     | T /                                                         |                                       |
| GPS Co-ord                                                            | •                                                                             | See                                                                                                      | list.                                                      |                                                      |                                                                         | ·····                                                       | •                                     |
| Aerial Photo                                                          | o #                                                                           |                                                                                                          |                                                            |                                                      | T                                                                       | (                                                           |                                       |
| Map Numbe                                                             | r                                                                             | 13 B                                                                                                     | 116                                                        |                                                      |                                                                         | -/×(                                                        | (oo)                                  |
| Photo Numb                                                            | pers                                                                          | 112                                                                                                      |                                                            |                                                      | ) ® T                                                                   |                                                             |                                       |
| Video                                                                 |                                                                               | Yes                                                                                                      |                                                            |                                                      |                                                                         |                                                             |                                       |
| Area Survey                                                           | red [                                                                         | 500 maerial,                                                                                             | som grand                                                  |                                                      |                                                                         | - 190                                                       | ~ · ,                                 |
| Water Samp                                                            | les                                                                           | Yes                                                                                                      |                                                            |                                                      | 1                                                                       | 1 - 250                                                     | m                                     |
| [                                                                     |                                                                               |                                                                                                          |                                                            |                                                      | <u> </u>                                                                |                                                             | Comments                              |
| Depth                                                                 | 0 - 1 m                                                                       | 30 1-2m3                                                                                                 | ں <sub>&gt;2 m</sub>                                       | Unknown                                              |                                                                         |                                                             |                                       |
| Channel                                                               | ]                                                                             |                                                                                                          | 7 –                                                        |                                                      |                                                                         |                                                             |                                       |
| Width                                                                 | 0 - 2 m                                                                       | 2 - 5 m                                                                                                  | 5 - 20 m                                                   | >20 m                                                |                                                                         |                                                             | ·                                     |
| w Type                                                                | <u>St</u> eady                                                                | 50 <u>Riffle</u> 4                                                                                       | o <sub>Rapids</sub>                                        | Pools 10                                             |                                                                         |                                                             |                                       |
| C_ostrate                                                             | ſ                                                                             |                                                                                                          | <u>Co</u> bble/                                            |                                                      |                                                                         |                                                             |                                       |
| Type                                                                  | <u>F</u> ines                                                                 | 30 <u>G</u> ravel                                                                                        | <u>Ru</u> bble <b>A</b>                                    | Boulder 30                                           | Bedrock                                                                 | <u>Un</u> known                                             |                                       |
| Beak                                                                  |                                                                               |                                                                                                          |                                                            |                                                      |                                                                         |                                                             |                                       |
| Roph                                                                  | i ype i [                                                                     |                                                                                                          |                                                            |                                                      |                                                                         |                                                             |                                       |
| Material                                                              | Fines                                                                         | Pebble                                                                                                   | <u>Co</u> bble/<br>Rubble                                  | Boulder                                              | Bedrock                                                                 | Unknown                                                     |                                       |
|                                                                       | Shallow                                                                       | Medium                                                                                                   |                                                            |                                                      | Flood                                                                   |                                                             |                                       |
| Backslope                                                             | Gully                                                                         | Gully                                                                                                    | Gully                                                      | Stream                                               | Plain                                                                   | Bog/Fen                                                     |                                       |
| Bank                                                                  | Γ                                                                             |                                                                                                          |                                                            |                                                      |                                                                         |                                                             |                                       |
| Vegetation                                                            | <u>Bog</u>                                                                    | <u>Gras</u> ses                                                                                          | Shrubs 30                                                  | <u>Tr</u> ees                                        |                                                                         |                                                             |                                       |
| Cover (5)                                                             | ) <sub>Instream</sub>                                                         | 60 Overhang 2                                                                                            | Canopy 20                                                  | None                                                 |                                                                         |                                                             | -                                     |
| Potential                                                             | [                                                                             |                                                                                                          | ] [                                                        |                                                      |                                                                         |                                                             |                                       |
| Obstruction                                                           | <u>Fa</u> lls                                                                 | <u> </u>                                                                                                 | <u>Ch</u> ute                                              | ] <u>Ca</u> scade <u>I</u> 1                         | ntermittent                                                             | None                                                        | · · · · · · · · · · · · · · · · · · · |
| Gradient                                                              | 0 - 1 %                                                                       | 1 - 3 %                                                                                                  | 3 - 5 %                                                    | >5 %                                                 |                                                                         |                                                             |                                       |
| Substrate<br>fines<br>gravel<br>pebble<br>cobble<br>rubble<br>boulder | less than 2 m<br>2mm - 3 cm<br>3 - 5 cm<br>6-13 cm<br>14-25 cm<br>26 cm and u | Backslope<br>nm Shallow gully<br>Meduim gully<br>Deep gully<br>Forest stream<br>Flood plain<br>p Bog/Fet | 1 m<br>2-3 m<br>≥4 m<br>see over<br>see over<br>n see over | Cover<br>Instream se<br>Overhang g<br>Canopy tr<br>c | ubmergent/emer<br>rasses/shrubs wi<br>ees > 1m above<br>an be expressed | gent vegetation<br>thin 1 m of water<br>water<br>as % cover | Page number                           |



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Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

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| Stream No.                           | 80 ·                                                        | Sketch of the area                          |             |
|--------------------------------------|-------------------------------------------------------------|---------------------------------------------|-------------|
| ate                                  | Sept 25/02                                                  | 00000 +011                                  | /           |
| Surveyed by                          | BW/mH/Hm/DJ                                                 | Kipper 81.                                  |             |
| Watershed                            | Gayle                                                       | She/                                        |             |
| GPS Co-ord.                          |                                                             | 6 6 6 81 50 m                               | Bob         |
| Aerial Photo #                       |                                                             | 3005 T/-                                    |             |
| Map Number                           |                                                             | 80,                                         |             |
| Photo Numbers                        | 113                                                         | 80 ×                                        |             |
| Video                                | Ves                                                         |                                             | 81.         |
| Area Surveyed                        | 500 m aeriel.                                               | 1. 1 8090                                   |             |
| Water Samples                        | No                                                          |                                             | Comments    |
|                                      |                                                             |                                             | Comments    |
| Depth 0 - 1 m                        | ✓ 1 - 2 m >2 m                                              | Unknown                                     | ·<br>·      |
| Channel<br>Width 0.2 m               |                                                             | >20 m                                       |             |
|                                      |                                                             | ] >20 m[]                                   | · · · · ·   |
| Vow Type <u>St</u> eady              | NO <u>Riffle</u> <u>Rapids</u>                              | Pools                                       |             |
| Substrate<br>Type Fines              | Gravel Cobble/<br>Rubble                                    | Boulder Vo Bedrock Unknown                  |             |
| Beak                                 |                                                             |                                             |             |
| Habitat Type I                       | Type II Type III                                            | Type IV                                     |             |
| Bank<br>Material <u>F</u> ines       | Q0 <u>G</u> ravel/ <u>Co</u> bble/<br>Pebble <u>Ru</u> bble | Boulder 10 Bedrock Unknown                  |             |
| Backslope Gully                      | Medium Deep                                                 | Forest Flood Blain Bog/Een                  |             |
| Bank                                 |                                                             |                                             |             |
| Vegetation <u>Bog</u>                | <u>Gras</u> ses <u>Sh</u> rubs                              | Trees 50                                    |             |
| Cover 80° b Instream                 | V Overhang & Canopy                                         | None                                        |             |
| Potential                            |                                                             |                                             |             |
| Obstruction Falls                    | <u>Ra</u> pids <u>Ch</u> ute                                | <u>Cascade</u> Intermittent None            |             |
| Est.<br>Gradient 0 - 1 %             | 1 - 3 % 3 - 5 %                                             | >5 %                                        |             |
| Substrate                            | Backslope                                                   | Cover                                       | L           |
| fines less than 2                    | mm Shallow gully 1 m                                        | Instream submergent/emergent vegetation     | • •         |
| gravel 2mm - 3 cm                    | n Meduim gully $2-3 \text{ m}$                              | Overhang grasses/shrubs within 1 m of water |             |
| cobble 6-13 cm                       | Forest stream see over                                      | can be expressed as % cover                 |             |
| rubble 14-25 cm<br>boulder 26 cm and | Flood plain see over<br>up Bog/Fen see over                 |                                             | Page number |
|                                      |                                                             |                                             |             |

| Ground Survey           |                                                            |
|-------------------------|------------------------------------------------------------|
| Ground survey completed | Ground Survey not Completed NO                             |
| Temperature             | $\sim$ Crossing less than 2 km <sup>2</sup> (on DWST list) |
| pH                      | Bog drainage                                               |
| Conductivity            | Type IV (steady) flow                                      |
| Dissolved Oxygen        | Type III (cascade/rapids) flow                             |
| Turbidity               | No accessible by helicopter                                |
| Surface velocity        | Other:                                                     |
| Water Samples collected |                                                            |
| Gradient (inclinometer) |                                                            |

### Sketch & Measurements of Surveyed Section(s)

#### LEGENDS / NOTES

#### Backslope

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| Stream No.                                                                          | [                                                                       | 8                                                                                  |                                                                  | Sketch of the                           | area                                                                                                                       |                                       |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------|------------------------------------------------------------------------------------|------------------------------------------------------------------|-----------------------------------------|----------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| ate                                                                                 | [                                                                       | Sont 2                                                                             | 5/02                                                             |                                         |                                                                                                                            |                                       |
| Surveyed by                                                                         | [                                                                       | BW/MH                                                                              | Hm/ DT                                                           |                                         | an or prov                                                                                                                 | + + + + + + + + + + + + + + + + + + + |
| Watershed                                                                           | [                                                                       | Lag                                                                                | le.                                                              | Star                                    | 81 X                                                                                                                       |                                       |
| GPS Co-ord.                                                                         | ſ                                                                       | <u> </u>                                                                           | (15+                                                             | . So                                    | AT A A A                                                                                                                   |                                       |
| Aerial Photo                                                                        | # [                                                                     |                                                                                    |                                                                  |                                         | 4/2                                                                                                                        | Bor                                   |
| Map Number                                                                          | · [                                                                     | 13                                                                                 | B/16                                                             |                                         | EN AN AN                                                                                                                   |                                       |
| Photo Numbe                                                                         | ers [                                                                   |                                                                                    | 14                                                               |                                         | t x                                                                                                                        |                                       |
| Video                                                                               | [                                                                       | Ve                                                                                 |                                                                  | 4                                       | Pra X                                                                                                                      |                                       |
| Area Surveye                                                                        | a [                                                                     | 500 m                                                                              | aerul.                                                           |                                         | 1 pog                                                                                                                      | 8.                                    |
| Water Sample                                                                        | es [                                                                    | <br>                                                                               | 0                                                                |                                         |                                                                                                                            |                                       |
| ·                                                                                   | ·                                                                       |                                                                                    |                                                                  | L                                       |                                                                                                                            | Comments                              |
| Depth                                                                               | 0 - 1 m                                                                 | ✓ 1 - 2 m                                                                          | >2 m                                                             | Unknown                                 |                                                                                                                            |                                       |
| Channel                                                                             | L<br>L                                                                  |                                                                                    |                                                                  | <br>                                    |                                                                                                                            |                                       |
| Width                                                                               | 0 - 2 m                                                                 | 2 - 5 m                                                                            | 5 - 20 m                                                         | >20 m                                   |                                                                                                                            |                                       |
| ]<br>Jow Type                                                                       | <u>St</u> eady                                                          | رو <sup>ن</sup><br><u>Ri</u> ffle                                                  | Rapids                                                           | Pools                                   | ]                                                                                                                          |                                       |
| Substrate                                                                           | Г                                                                       |                                                                                    | <u> </u>                                                         |                                         | _<br>_                                                                                                                     | 7                                     |
| Туре                                                                                | <u>F</u> ines                                                           | <u>G</u> ravel                                                                     | Rubble                                                           | Boulder 10                              | <u>Bed</u> rock <u>Un</u> known                                                                                            |                                       |
| Beak                                                                                | Г                                                                       |                                                                                    |                                                                  |                                         |                                                                                                                            |                                       |
| Habitat                                                                             | Type I                                                                  | Type II                                                                            | Type III                                                         | Type IV                                 | · .                                                                                                                        |                                       |
| Bank                                                                                |                                                                         | <u>G</u> ravel/                                                                    | <u>Co</u> bble/                                                  | ]                                       |                                                                                                                            |                                       |
| Material                                                                            | Fines                                                                   | <u>P</u> ebble                                                                     | <u>Ru</u> bble                                                   | <u>Boulder</u>                          | Bedrock Unknown                                                                                                            |                                       |
| Backslope                                                                           | Shallow                                                                 | Medium                                                                             | Deep                                                             | Forest Stream                           | Flood<br>Plain Bog/For                                                                                                     |                                       |
| Bank                                                                                |                                                                         |                                                                                    |                                                                  |                                         |                                                                                                                            | J                                     |
| Vegetation                                                                          | Bog                                                                     | Grasses                                                                            | Shrubs 50                                                        | <u>Trees</u> 50                         |                                                                                                                            |                                       |
| Cover 800                                                                           | Instream                                                                | \ <b>0</b> Overhang                                                                | AS Canopy                                                        | None                                    |                                                                                                                            |                                       |
| Potential<br>Obstruction                                                            | Falls                                                                   | Rapids                                                                             | Chute                                                            | Cascade                                 |                                                                                                                            |                                       |
| Est.                                                                                | C                                                                       |                                                                                    |                                                                  |                                         | ]                                                                                                                          |                                       |
| Gradient                                                                            | 0 - 1 %                                                                 | 1 - 3 %                                                                            | 3 - 5 %                                                          | >5 %                                    |                                                                                                                            |                                       |
| Substrate<br>fines le<br>gravel 2<br>pebble 3<br>cobble 6<br>rubble 1-<br>boulder 2 | ess than 2 m<br>mm - 3 cm<br>- 5 cm<br>- 13 cm<br>4-25 cm<br>6 cm and w | Backslope<br>um Shallow gul<br>Meduim gul<br>Deep gul<br>Forest strea<br>Flood pla | ly 1 m<br>ly 2-3 m<br>ly $\geq$ 4 m<br>m see over<br>in see over | Cover<br>Instream<br>Overhang<br>Canopy | submergent/emergent vegetation<br>grasses/shrubs within 1 m of wa<br>trees > 1m above water<br>can be expressed as % cover | Page number                           |
|                                                                                     |                                                                         | e nogu                                                                             | CH SCC OVEL                                                      |                                         |                                                                                                                            |                                       |

| TRANS-LABRADOR HIGHWAY STREAM CROSSIN | NG INFORMATION: CARTWRIGHT JUNCTION TO GOOSE BAY    |
|---------------------------------------|-----------------------------------------------------|
| Ground Survey                         | ξ1                                                  |
| Ground survey completed               | Ground Survey not Completed Nリ                      |
| Temperature                           | Crossing less than 2 km <sup>2</sup> (on DWST list) |
| pH                                    | Bog drainage                                        |
| Conductivity                          | Type IV (steady) flow                               |
| Dissolved Oxygen                      | Type III (cascade/rapids) flow                      |
| Turbidity                             | No accessible by helicopter                         |
| Surface velocity                      | Other:                                              |
| Water Samples collected               |                                                     |
| Gradient (inclinometer)               |                                                     |

Sketch & Measurements of Surveyed Section(s)

#### Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

|              |                |    |                    |                |                    | (                | 1                                     | 250                 | 2 m         |   |
|--------------|----------------|----|--------------------|----------------|--------------------|------------------|---------------------------------------|---------------------|-------------|---|
| Stream No.   | Į              |    | 82                 |                | Sketch of the      | area             |                                       | 15                  | ·           |   |
| łe           |                | 1  | Sep+25/            | 102            | ļ                  | -                | ]V_ ( ·                               | 170 W               | -           |   |
| Surveyed by  |                | ß  | w/mH/H             | m/PJ           |                    |                  |                                       | $\backslash$        |             |   |
| Watershed    | [              |    | Eagle              |                |                    | ( ]              | I                                     | )                   |             |   |
| GPS Co-ord   | . [            |    | See                | list.          |                    |                  | E                                     | 80                  | , m         |   |
| Aerial Photo | #              |    |                    |                |                    | _ [ =            |                                       | A X-(00)            |             |   |
| Map Numbe    | er             |    | 133                | 116            |                    |                  | for                                   |                     |             |   |
| Photo Numb   | ers            |    | 115                |                |                    |                  | )=(                                   | Porl)               |             |   |
| Video        |                |    | Yes                |                |                    | /                | A A                                   | > /                 | •           |   |
| Area Survey  | ed (           | 50 | om aniel 5         | on grand       | 1                  | )                | 0                                     | (                   |             | , |
| Water Samp   | les            |    | yes.               |                |                    | <u> </u>         | Ð                                     | <u> </u>            |             |   |
| <u> </u>     |                |    |                    |                |                    |                  |                                       | <u></u>             | Comments    |   |
| Depth        | 0 - 1 m        | 70 | 1 - 2 m <b>30</b>  | >2 m           | Unknown            |                  |                                       |                     |             |   |
| Channel      | ļ              |    |                    |                |                    |                  |                                       |                     |             | ] |
| Width        | 0 - 2 m        |    | 2 - 5 m 90         | 5 - 20 m       | ● >20 m            |                  |                                       |                     | ·           |   |
| w Type       | <u>St</u> eady | 15 | <u>Ri</u> ffle 50  | <u>Ra</u> pids | Pools 3            | 5                |                                       |                     |             |   |
| Substrate    | ]              |    |                    | Cobble/        |                    | -<br>-           | r                                     |                     |             |   |
| Туре         | Fines          | to | <u>G</u> ravel     | Rubble 5       | b Boulder 4        | ם <sub>Bed</sub> | rock                                  | Unknown             |             |   |
| Beak         | .              |    |                    |                |                    | <br>             |                                       | · <u> </u>          |             |   |
| Habitat      | Type I         |    | Type II 80         | Type III       | Type IV 2          | D                |                                       |                     |             |   |
| Bank         |                |    | Gravel/            | Cobble/        |                    | <br>             | <u>г</u>                              |                     |             |   |
| Material     | Eines          | 10 | Pebble             | Rubble 4       | 0 Boulder 4        | 2 Bed            | rock                                  | <u>Un</u> known     |             |   |
| Backslone    | Shallow        |    | Medium<br>Gully    | Deep           | Forest             | F                | 'lood<br>Plain                        | Bog/Fen             |             |   |
| Bank         | 1              |    |                    |                |                    | -) ·<br>-)       | · · · · · · · · · · · · · · · · · · · | ] = "3" []          |             |   |
| Vegetation,  | Bog            |    | <u>Gras</u> ses lo | Shrubs 4       | U <u>Tr</u> ees 51 | 2                |                                       |                     |             |   |
| Cover        | Instream       | २० | Overhang 40        | Canopy 3       | o None             | ]                |                                       |                     |             |   |
| Potential    |                |    |                    |                | -                  |                  | <u> </u>                              |                     |             |   |
| Obstruction  | <u>Fa</u> lls  |    | <u>Ra</u> pids     | <u>Ch</u> ute  | <u>Ca</u> scade    | <u>Int</u> ermi  | ttent '                               | None                | ļ           |   |
| Est.         | (              |    |                    |                |                    | ,                |                                       |                     |             |   |
| Gradient     | 0 - 1 %        |    | 1 - 3 %            | 3 - 5 %        | >5 %               |                  |                                       |                     |             |   |
| Substrate    |                |    | Backslope          |                | Cover              |                  |                                       |                     |             |   |
| fines        | less than 2 r  | nm | Shallow gully      | l m            | Instream           | submer           | gent/eme                              | ergent vegetation   |             |   |
| gravel       | 2mm - 3 cm     | 1  | Meduim gully       | 2-3 m          | Overhang           | grasses          | /shrubs v                             | within 1 m of water |             |   |
| pebble       | 3 - 5 cm       |    | Deep gully         | ≥_4 m          | Canopy             | trees >          | Im abov                               | e water             |             |   |
| j rubble     | 14-25 cm       |    | Flood plain        | see over       |                    | can be           | CAPIESSE                              | 1 43 70 CUVCI       | Page number |   |
| boulder      | 26 cm and u    | ıp | Bog/Fen            | see over       |                    |                  |                                       |                     |             |   |



#### Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting



|                                              | 1 07.                                               |
|----------------------------------------------|-----------------------------------------------------|
| TRANS-LABRADOR HIGHWAY STREAM CROSSING       | INFORMATION: CARTWRIGHT JUNCTION TO GOOSE BAY       |
| Ground Survey                                |                                                     |
| Ground survey completed                      | Ground Survey not Completed NO SIZE                 |
| Temperature                                  | Crossing less than 2 km <sup>2</sup> (on DWST list) |
| pH                                           | Bog drainage                                        |
| Conductivity                                 | Type IV (steady) flow                               |
| Dissolved Oxygen                             | Type III (cascade/rapids) flow                      |
| Turbidity                                    | No accessible by helicopter                         |
| Surface velocity                             | Other:                                              |
| Water Samples collected                      |                                                     |
| Gradient (inclinometer)                      |                                                     |
| Sketch & Measurements of Surveyed Section(s) |                                                     |
|                                              |                                                     |
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#### LEGENDS / NOTES

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#### Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

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| Stream No.          |                |          | 84             |                                         | r | Sketch of the      | area                |                                      |             |
|---------------------|----------------|----------|----------------|-----------------------------------------|---|--------------------|---------------------|--------------------------------------|-------------|
| Date                |                |          | Sept 26        | 102                                     |   |                    | $\sim$              | 7 250'                               |             |
| Surveyed by         |                |          | BW/MH/A        | +m/pJ                                   |   | 1                  |                     |                                      |             |
| Watershed           | -              |          | Davadi         | se                                      |   | /                  | 1.140               |                                      |             |
| GPS Co-ord          | •              |          | See 1          | 15+.                                    |   | in                 | 1858                | 88                                   |             |
| Aerial Photo        | o #            |          |                |                                         |   | f-                 | 47                  | 00                                   |             |
| Map Numbe           | er             |          | 13 A/          | 13                                      |   | Li                 | re the              |                                      |             |
| Photo Numb          | pers           |          | 117            |                                         |   | tro                | Jeel -              | 3                                    |             |
| Video               |                |          | yes            | -                                       |   |                    |                     | • <u></u>                            |             |
| Area Survey         | /ed            | 50       | om aer         | iel ·                                   |   | +                  | 4 (                 | ) _ (Little B                        | /R<br>D-S.  |
| Water Samp          | oles           |          | No             |                                         |   | / / / /            | : <u>C</u>          | 250                                  |             |
|                     |                |          |                |                                         |   |                    |                     |                                      | Comments    |
| Depth               | 0 - 1 m        | Ko<br>Ko | 1 - 2 m        | >2 m                                    |   | Unknown            |                     |                                      |             |
| Channel             |                |          |                |                                         |   |                    | 1                   |                                      |             |
| Width               | 0 - 2 m        | 50       | 2 - 5 m 5      | 5 - 20 m                                |   | >20 m              |                     |                                      |             |
| Flow Type           | Steady         | њD       | Biffle         | Banids                                  |   | Pools              | ]                   |                                      |             |
| - Substrata         | <u>01</u> 0203 |          |                |                                         |   | 1 0013             | ן<br>ז ר            |                                      |             |
| Type                | <u>F</u> ines  | 90       | <u>G</u> ravel | <u><u>Co</u>bble/<br/><u>Ru</u>bble</u> | 5 | Boulder 5          | Bedrock             | Unknown                              |             |
| Beak<br>Habitat     | Type I         |          | Type II        | ] Type III                              |   | Type IV <b>b</b> 0 | )<br>)<br>          |                                      |             |
| Bank                | İ              |          | <u> </u>       | ] <u>Co</u> bble/                       |   | · · ·              | ] [                 |                                      |             |
| Material            | Fines          | v        | Pebble         | <u>Ru</u> bble                          |   | <u>Bo</u> ulder    | <u>Bed</u> rock     | <u>Un</u> known                      |             |
|                     | Shallow        |          | Medium         | Deep                                    |   | Forest             | ] Flood             |                                      | •           |
| Backslope           | Gully          |          | Gully          | Gully                                   |   | Stream             | ] Plain             | Bog/Fen                              |             |
| Bank                | _              | hd       |                | ] . [                                   |   | -                  | ]                   |                                      |             |
| Vegetation          | Bog            | -17      | Grasses        | <u>Sh</u> rubs                          |   | ح <u>Tr</u> ees    | ]                   |                                      |             |
| Cover 40            | Instream       | GD       | Overhang 20    | Canopy                                  |   | None               |                     |                                      |             |
| Potential           |                |          |                | ] [                                     |   |                    | ] [                 |                                      |             |
| Obstruction         | <u>Fa</u> lls  |          | <u>Ra</u> pids | <u>Ch</u> ute                           |   | <u>Ca</u> scade    | <u>Intermittent</u> | None                                 |             |
| Est.                |                |          |                | ] [                                     |   |                    | ] .                 |                                      |             |
| Gradient            | 0 - 1 %        |          | 1 - 3 %        | 3 - 5 %                                 |   | >5 %               | ]                   |                                      |             |
| Substrate           |                |          | Backslope      |                                         |   | Cover              |                     |                                      |             |
| fines               | less than 2 i  | mm       | Shallow gully  | 1 m                                     |   | Instream           | submergent/         | emergent vegetation                  |             |
| gravel<br>nebble    | 2  mm - 3  cm  | 1        | Deep gully     | 2-3 m<br>> 4 m                          |   | Overhang           | grasses/shrut       | os within 1 m of water<br>bove water |             |
| , cobble            | 6-13 cm        |          | Forest stream  | see over                                |   | Canopy             | can be expre        | ssed as % cover                      |             |
| <sup>i</sup> rubble | 14-25 cm       |          | Flood plain    | see over                                |   |                    | *                   |                                      | Page number |
| boulder             | 26 cm and u    | ıp       | Bog/Fen        | see over                                |   |                    |                     |                                      |             |

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| Ground Survey           |                                                    |
|-------------------------|----------------------------------------------------|
| Ground survey completed | Ground Survey not Completed NU                     |
| Temperature             | Crossing less than $2 \text{ km}^2$ (on DWST list) |
| pH                      | Bog drainage                                       |
| Conductivity            | Type IV (steady) flow                              |
| Dissolved Oxygen        | Type III (cascade/rapids) flow                     |
| Turbidity               | No accessible by helicopter                        |
| Surface velocity        | Other:                                             |
| Water Samples collected |                                                    |
| Gradient (inclinometer) |                                                    |

### Sketch & Measurements of Surveyed Section(s)

### **LEGENDS / NOTES**

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#### Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

85/ Stream No. Sketch of the area identificiale stream at Date nt 26/02 ЙЙ Surveyed by Hm locat this mH appears to be the Bapper Watershed revadice GPS Co-ord. portion of drainage from ridge Aerial Photo # Nearest pond Several 13 A Map Number 13 Kilometers away Site is an extremely NO Dhoto. **Photo Numbers** NO: Video wooded vidge None Area Surveyed None. Water Samples Comments 0 - 1 m Depth >2 m 1 - 2 m Unknown Channel Width 0 - 2 m 2 - 5 m 5 - 20 m >20 m **Flow Type** Riffle Steady <u>Rapids</u> Pools Substrate Cobble/ Fines Type <u>Bed</u>rock Gravel Rubble <u>Bo</u>ulder Unknown Beak Habitat Type I Type II Type III Type IV Валк Gravel/ Cobble/ Material Fines Pebble Rubble Boulder Bedrock Unknown Shallow Medium Deep Forest Flood Backslope Gully Gully Gully Stream Plain Bog/Fen Bank Vegetation Bog Grasses Shrubs Trees Cover Instream Overhang Сапору None Potential Obstruction <u>Fa</u>lls **Rapids** <u>Ch</u>ute Intermittent <u>Ca</u>scade None Est. Gradient 0 - 1 % 3 - 5 % 1 - 3 % >5 % Substrate Backslope Cover fines less than 2 mm Shallow gully 1 m Instream submergent/emergent vegetation gravel 2mm - 3 cm Meduim gully 2-3 m Overhang grasses/shrubs within 1 m of water pebble 3 - 5 cm Deep gully  $\geq 4 \text{ m}$ Canopy trees > 1m above water cobble 6-13 cm Forest stream see over can be expressed as % cover rubble 14-25 cm Flood plain see over Page number boulder 26 cm and up Bog/Fen see over

| Ground Survey                                |                                                   |
|----------------------------------------------|---------------------------------------------------|
| Ground survey completed                      | Ground Survey not Completed ND                    |
| Temperature                                  | Crossing less than 2 $\text{km}^2$ (on DWST list) |
| pH                                           | Bog drainage                                      |
| Conductivity                                 | Type IV (steady) flow                             |
| Dissolved Oxygen                             | Type III (cascade/rapids) flow                    |
| Turbidity                                    | No accessible by helicopter                       |
| Surface velocity                             | Other:                                            |
| Water Samples collected                      |                                                   |
| Gradient (inclinometer)                      |                                                   |
| Sketch & Measurements of Surveyed Section(s) |                                                   |

#### **LEGENDS / NOTES**

#### Backslope

Gullies are typically well defined steep sided channels which contain spordic.flooding but may suffer bank erosion depending on bank material

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Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

| Stream No.                                                            |                                                                                 | 86                                                                                                  |                                                                         | Sketch of the                           | area                                                                                  |                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------------------------------------------------------------|---------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|-----------------------------------------|---------------------------------------------------------------------------------------|------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Date                                                                  |                                                                                 | Sept.                                                                                               | 26/02                                                                   |                                         |                                                                                       | 45                                                   | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Surveyed by                                                           | v [                                                                             | Bu/mH/                                                                                              | Hm/pJ                                                                   |                                         | X>-                                                                                   | × 1 II                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Watershed                                                             |                                                                                 | Paradi                                                                                              | se                                                                      | -                                       |                                                                                       |                                                      | $\lambda$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| GPS Co-ord                                                            | I.                                                                              | Sec 1                                                                                               | 5+.                                                                     |                                         | 74                                                                                    |                                                      | }×                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Aerial Photo                                                          | o #                                                                             |                                                                                                     |                                                                         |                                         |                                                                                       |                                                      | <u> </u>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Map Numbe                                                             | er 🗌                                                                            | 13 H                                                                                                | 14                                                                      |                                         | <u></u>                                                                               | I/                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Photo Numł                                                            | oers                                                                            | 11                                                                                                  |                                                                         | /                                       |                                                                                       |                                                      | 307.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Video                                                                 |                                                                                 | Yes                                                                                                 |                                                                         |                                         | 208 / ( IV                                                                            |                                                      | Ū                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Area Survey                                                           | ved S                                                                           | vom ae                                                                                              | vial'                                                                   |                                         | / }                                                                                   | ) {                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Water Samp                                                            | oles                                                                            | No ·                                                                                                |                                                                         |                                         |                                                                                       |                                                      | <u>)</u> .<br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><b< td=""></b<> |
| ·                                                                     | <u> </u>                                                                        |                                                                                                     |                                                                         |                                         |                                                                                       |                                                      | Comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Depth                                                                 | 0 - 1 m                                                                         | 1 - 2 m                                                                                             | ] >2 m                                                                  | Unknown                                 |                                                                                       |                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Channel                                                               |                                                                                 | ] [                                                                                                 |                                                                         | l [                                     | ٦                                                                                     |                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Width                                                                 | 0 - 2 m                                                                         | 2 - 5 m                                                                                             | 5 - 20 m 40                                                             | ط m 20 m                                | 9                                                                                     |                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| ow Type                                                               | Steady V                                                                        | Riffle                                                                                              | Rapids                                                                  | Pools                                   |                                                                                       |                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Substrate<br>Type                                                     | Fines 90                                                                        | Gravel                                                                                              | Cobble/<br>Rubble 2                                                     | Boulder                                 | Bedrock                                                                               | Inknown                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Paole                                                                 | <u>_</u>                                                                        |                                                                                                     |                                                                         |                                         |                                                                                       |                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Habitat                                                               | Type I                                                                          | Type II                                                                                             | Type III                                                                | Type IV                                 | -                                                                                     |                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Bank                                                                  | <br>[                                                                           | - Gravel/                                                                                           | Cobble/                                                                 |                                         | רז ר                                                                                  | <del>ا ا</del>                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Material                                                              | Fines                                                                           | Pebble                                                                                              | Rubble 10                                                               | <u>Bo</u> ulder                         | Bedrock U                                                                             | nknown                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|                                                                       | Shallow                                                                         | Medium                                                                                              | Deep                                                                    | Forest                                  | Flood                                                                                 |                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Backslope                                                             | Gully                                                                           | Gully                                                                                               | Gully                                                                   | Stream                                  | Plain                                                                                 | Bog/Fen                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Bank<br>Vegetation                                                    | Bog 20                                                                          | Grasses 10                                                                                          | Shrubs 30                                                               | Trees 3                                 | 3                                                                                     |                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Cover 20                                                              | Instream                                                                        | Overhang                                                                                            | Canopy                                                                  | None                                    | ]                                                                                     |                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Potential<br>Obstruction                                              | Falls                                                                           | Rapids                                                                                              | Chute                                                                   | Cascade                                 |                                                                                       | None                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Fet                                                                   |                                                                                 | ] <u>,</u> p[                                                                                       |                                                                         |                                         |                                                                                       |                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Gradient                                                              | 0 - 1 %                                                                         | 1 - 3 %                                                                                             | 3 - 5 %                                                                 | >5 %                                    |                                                                                       |                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Substrate<br>fines<br>gravel<br>pebble<br>cobble<br>rubble<br>boulder | less than 2 mm<br>2mm - 3 cm<br>3 - 5 cm<br>6-13 cm<br>14-25 cm<br>26 cm and up | Backslope<br>Shallow gully<br>Meduim gully<br>Deep gully<br>Forest stream<br>Flood plain<br>Bog/Fen | 1  m<br>2-3 m<br>$\geq 4 \text{ m}$<br>see over<br>see over<br>see over | Cover<br>Instream<br>Overhang<br>Canopy | submergent/emerge<br>grasses/shrubs with<br>trees > 1m above w<br>can be expressed as | ent vegetation<br>in 1 m of water<br>ater<br>% cover | Page number                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

I

| TRANS-LABRADOR HIGHWAY STREAM CROSSIN        | IG INFO | RMATION: CARTWRIGHT JUNC                    | TION TO GOOSE BAY |
|----------------------------------------------|---------|---------------------------------------------|-------------------|
| Ground Survey                                | Ŧ       | 96.                                         | Although          |
| Ground survey completed                      | Ground  | Survey not Completed NO                     | 9000              |
| Temperature                                  |         | Crossing less than $2 \text{ km}^2$ (on DW) | ST list) Landing  |
| pH                                           |         | Bog drainage                                | site              |
| Conductivity                                 |         | Type IV (steady) flow                       |                   |
| Dissolved Oxygen                             |         | Type III (cascade/rapids) flow              |                   |
| Turbidity                                    |         | No accessible by helicopter                 |                   |
| Surface velocity                             |         | Other:                                      |                   |
| Water Samples collected                      |         |                                             |                   |
| Gradient (inclinometer)                      |         |                                             |                   |
| Sketch & Measurements of Surveyed Section(s) |         | · · · · · · · · · · · · · · · · · ·         |                   |
|                                              |         |                                             |                   |
|                                              |         |                                             |                   |
|                                              |         |                                             | i i               |

#### Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting
| Stream No.                                                            |                                                                               |              | 81                                                                                                              |                                                    | Sketch of the                            | area                                                                                                                          |                                        |
|-----------------------------------------------------------------------|-------------------------------------------------------------------------------|--------------|-----------------------------------------------------------------------------------------------------------------|----------------------------------------------------|------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| )ate                                                                  |                                                                               |              | Sept 261                                                                                                        | 102                                                | an a | 250                                                                                                                           | ······································ |
| Surveyed by                                                           | Ŷ                                                                             | Į            | Bu/mH/H                                                                                                         | m/pJ                                               | Fi 'INP                                  |                                                                                                                               |                                        |
| Watershed                                                             |                                                                               |              | Davadise                                                                                                        |                                                    |                                          | ( - 150                                                                                                                       |                                        |
| GPS Co-ord                                                            | 1.                                                                            |              | See lis-                                                                                                        | + .                                                | A SAN                                    | Dry Ba                                                                                                                        | wen                                    |
| Aerial Photo                                                          | o #                                                                           |              |                                                                                                                 |                                                    | -low                                     | 11# Ave                                                                                                                       | a with                                 |
| Map Numbe                                                             | er                                                                            |              | 13H/                                                                                                            | 4-                                                 | U                                        | I a part                                                                                                                      | des of                                 |
| Photo Numl                                                            | bers                                                                          |              | 119                                                                                                             | •                                                  |                                          | II TH                                                                                                                         | 023                                    |
| Video                                                                 | ·                                                                             |              | Yes                                                                                                             |                                                    |                                          |                                                                                                                               |                                        |
| Area Survey                                                           | yed                                                                           | 500          | macrial 5                                                                                                       | omground                                           |                                          | الركس                                                                                                                         |                                        |
| Water Samp                                                            | oles                                                                          |              | yes.                                                                                                            |                                                    |                                          | Γ (                                                                                                                           |                                        |
|                                                                       | ······                                                                        |              | · · · · · · · · · · · · · · · · · · ·                                                                           |                                                    |                                          | -                                                                                                                             | Comments                               |
| Depth                                                                 | 0 - 1 m                                                                       | $\checkmark$ | 1 - 2 m                                                                                                         | >2 m                                               | Unknown                                  |                                                                                                                               |                                        |
| Channel                                                               |                                                                               |              |                                                                                                                 |                                                    | ] [                                      |                                                                                                                               |                                        |
| Width                                                                 | 0 - 2 m                                                                       |              | 2 - 5 m                                                                                                         | 5 - 20 m                                           | >20 m                                    |                                                                                                                               |                                        |
| Jlow Type                                                             | <u>St</u> eady                                                                | 37           | Riffle 10                                                                                                       | <u>Ra</u> pids                                     | Pools                                    | ]                                                                                                                             |                                        |
| Substrate<br>Type                                                     | Fines                                                                         | 30           | Gravel 10                                                                                                       | $\frac{Cobble}{Rubble}$                            | Boulder 40                               | Bedrock                                                                                                                       |                                        |
| Beak                                                                  | - 1                                                                           |              |                                                                                                                 |                                                    |                                          |                                                                                                                               |                                        |
| Habitat                                                               | Type I                                                                        |              | Type II                                                                                                         | Type III                                           | Type IV 30                               | •                                                                                                                             |                                        |
| Bank<br>Material                                                      | <b>F</b> irman                                                                | 20           | <u>Gravel</u>                                                                                                   | Cobble/                                            | Ai                                       |                                                                                                                               |                                        |
| 1774101141                                                            | <u>r</u> mes <sub>[</sub><br>Shallow[                                         | <u> </u>     | Medium                                                                                                          |                                                    | Boulder                                  | Bedrock Unknown                                                                                                               |                                        |
| Backslope                                                             | Gully                                                                         | 20           | Gully                                                                                                           | Guily                                              | Stream                                   | Plain Bog/Fen 20                                                                                                              |                                        |
| Bank                                                                  | ]                                                                             |              |                                                                                                                 |                                                    |                                          | ]                                                                                                                             |                                        |
| Vegetation.                                                           | Bog                                                                           | ]            | Grasses 20                                                                                                      | Shrubs 60                                          | Trees 20                                 |                                                                                                                               |                                        |
| Cover to                                                              | lo<br>Instream                                                                | 20           | Overhang 6                                                                                                      | Canopy 20                                          | None                                     |                                                                                                                               |                                        |
| Potential<br>Obstruction                                              | <u>Fa</u> lls                                                                 |              | Rapids                                                                                                          | Chute                                              | Cascade                                  | Intermittent None                                                                                                             |                                        |
| Est.                                                                  | . [                                                                           |              |                                                                                                                 |                                                    |                                          | ]                                                                                                                             |                                        |
| Gradient                                                              | 0 - 1 %                                                                       |              | 1 - 3 %                                                                                                         | 3 - 5 %                                            | >5 %                                     |                                                                                                                               |                                        |
| Substrate<br>fines<br>gravel<br>pebble<br>cobble<br>rubble<br>boulder | less than 2 m<br>2mm - 3 cm<br>3 - 5 cm<br>6-13 cm<br>14-25 cm<br>26 cm and u | nm<br>J      | Backslope<br>Shallow gully 1<br>Meduim gully 2<br>Deep gully ≥<br>Forest stream s<br>Flood plain s<br>Bog/Fen s | m<br>-3 m<br>-4 m<br>ee over<br>ee over<br>ee over | Cover<br>Instream<br>Overhang<br>Canopy  | submergent/emergent vegetation<br>grasses/shrubs within 1 m of water<br>trees > 1m above water<br>can be expressed as % cover | Page number                            |

1

TRANS-LABRADOR HIGHWAY STREAM CROSSING INFORMATION: CARTWRIGHT JUNCTION TO GOOSE BAY #81 Good landing Ground Survey Ground Survey not Completed Ground survey completed 125 Crossing less than 2 km<sup>2</sup> (on DWST list) Temperature 3.67 pH 6.05 Bog drainage Type IV (steady) flow Conductivity 5.6 Type III (cascade/rapids) flow Dissolved Oxygen 12.90 No accessible by helicopter Turbidity 3,4 Surface velocity SIRENAIN Other: 12 cm / middle OF STREAM Water Samples collected Ves Gradient (inclinometer) 4% Sketch & Measurements of Surveyed Section(s) Sept 30/02 20% G J.S 30 TYpeII Stream crossing 156 LOOKING ٥O 10F 933 wpt

**LEGENDS / NOTES** 

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10 m soction at top NU Fish Seen-Type II + hvoughout 1 hard 2 600/2 growel. mostly

Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting



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Stream No. Sketch of the area te T 02 Surveyed by 140 Watershed GPS Co-ord. 115+ Aerial Photo # Map Number 13 4 Н 12 **Photo Numbers** Ves Video Area Surveyed 500 m acria 50 m 910 11.4 a por Water Samples 25 250 Comments 0 - 1 m Depth 1 - 2 m >2 m Unknown Channel 2-5 m **A**O 5 - 20 m 10 Width 0 - 2 m >20 m ) w Туре Steady 2 Riffle 100 Pools Rapids Substrate Cobble/ 0 Eines 20 Bedrock Туре <u>Ru</u>bble <u>Bo</u>ulder **G**ravel <u>Un</u>known Beak Type IV 30 Habitat Type I Type II 70 Type III Bank Gravel/ <u>Co</u>bble/ Material Fines Pebble <u>Ru</u>bble Boulder |2 Bedrock 10 Unknown Shallow Deep Medium Forest Flood Backslope Gully Gully Gully Stream Plain Bog/Fen Bank Trees 20 Vegetation <u>Bog</u> Grasses U Shrubs 2010 Instream 30 Cover Overhang 60 Сапору None Potential Obstruction Falls Rapids Chute Cascade Intermittent None Est. Gradient 0 - 1 % 1 - 3 % 3 - 5 % >5 % Substrate Backslope Cover fines less than 2 mm Shallow gully 1 m Instream submergent/emergent vegetation gravel 2mm - 3 cm Meduim gully 2-3 m Overhang grasses/shrubs within 1 m of water pebble 3 - 5 cm Deep gully  $\geq 4 \text{ m}$ Canopy trees > 1m above water cobble 6-13 cm Forest stream see over can be expressed as % cover rubble 14-25 cm Flood plain see over Page number boulder 26 cm and up Bog/Fen see over



## LEGENDS / NOTES

### Backslope

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| Stream No.                                                 | [                                                              | 2                                                         | 90·                                                    |                                           | Sketch of the ar                        | ea                                                                    |                                                                       |                        |
|------------------------------------------------------------|----------------------------------------------------------------|-----------------------------------------------------------|--------------------------------------------------------|-------------------------------------------|-----------------------------------------|-----------------------------------------------------------------------|-----------------------------------------------------------------------|------------------------|
| iate                                                       | [                                                              | Sept                                                      | -26/0                                                  | 2                                         |                                         |                                                                       | h                                                                     |                        |
| Surveyed by                                                | · [                                                            | Bw/m                                                      | H/Hm                                                   | 1pt                                       |                                         |                                                                       | 1                                                                     |                        |
| Watershed                                                  | [                                                              | Pa                                                        | vadis-                                                 | e                                         |                                         |                                                                       | I                                                                     |                        |
| GPS Co-ord.                                                | [                                                              |                                                           | e lis                                                  | +                                         |                                         | 70m                                                                   | J.                                                                    | A march (Amer          |
| Aerial Photo                                               | #                                                              |                                                           |                                                        |                                           |                                         | ×                                                                     | +                                                                     | -inviguout             |
| Map Number                                                 | r [                                                            | 13                                                        | 3 H/ 4                                                 | H                                         | F                                       | low ]                                                                 | Fr                                                                    | substrute periodically |
| Photo Numb                                                 | ers                                                            |                                                           | 122                                                    |                                           |                                         | $\downarrow$                                                          | (III                                                                  | changes to more        |
| Video                                                      |                                                                | Ý                                                         | les                                                    |                                           |                                         | Hant J.                                                               |                                                                       | Dans D.                |
| Area Survey                                                | ed                                                             | 500 m a                                                   | serial 5                                               | 50 m groun                                | inter!                                  | this and                                                              | Î.                                                                    |                        |
| Water Samp                                                 | les                                                            | y                                                         | les.                                                   |                                           | or                                      | 1                                                                     |                                                                       | Commente               |
| ·                                                          |                                                                |                                                           |                                                        |                                           |                                         |                                                                       | ····                                                                  |                        |
| Depth                                                      | 0 - 1 m                                                        | V 1-1                                                     | 2 m                                                    | >2 m                                      | Unknown                                 |                                                                       |                                                                       |                        |
| Channel                                                    |                                                                |                                                           |                                                        | -                                         |                                         |                                                                       |                                                                       |                        |
| Width                                                      | 0 - 2 m                                                        | V 2-                                                      | 5 m                                                    | 5 - 20 m                                  | >20 m                                   |                                                                       |                                                                       |                        |
|                                                            | 0                                                              | <u>ارما</u>                                               |                                                        | D and dat                                 |                                         |                                                                       |                                                                       |                        |
| Jow Type                                                   | <u>St</u> eady                                                 | KI KI                                                     |                                                        |                                           |                                         | r                                                                     | -,                                                                    |                        |
| Substrate                                                  |                                                                |                                                           |                                                        | Cobble/                                   | D 11 2D                                 | Delest                                                                |                                                                       |                        |
| Туре                                                       | <u>F</u> ines                                                  | <u>G</u> ra                                               | avel                                                   |                                           | Boulder                                 | Bedrock                                                               |                                                                       |                        |
| Beak                                                       |                                                                |                                                           | . an                                                   |                                           | T T (60                                 |                                                                       |                                                                       |                        |
| Habitat <sup>,</sup>                                       | I ype I                                                        |                                                           |                                                        |                                           |                                         | ,                                                                     |                                                                       |                        |
| Bank                                                       | Tinor                                                          | RO Gra                                                    | hhla                                                   | Cobble/                                   | Pouldar 20                              | Bedrock                                                               | Unknown                                                               |                        |
| Material                                                   | <u>E</u> mesj                                                  |                                                           |                                                        |                                           |                                         |                                                                       |                                                                       |                        |
| Backslope                                                  | Gully                                                          | G                                                         | iully                                                  | Gully                                     | Stream                                  | Plain                                                                 | Bog/Fen                                                               |                        |
| Bank                                                       | -                                                              |                                                           |                                                        | 2                                         |                                         |                                                                       |                                                                       |                        |
| Vegetation                                                 | <u>Bog</u>                                                     | Gra                                                       | <u>s</u> ses                                           | <u>O</u> ح <u>Sh</u> rubs                 | <u>Tr</u> ees                           |                                                                       |                                                                       |                        |
| Cover 100                                                  | Instream                                                       | Overh                                                     | ang 30                                                 | Canopy 70                                 | None                                    |                                                                       |                                                                       | · · ·                  |
| Potential                                                  | ĺ                                                              |                                                           |                                                        |                                           |                                         |                                                                       |                                                                       |                        |
| Obstruction                                                | <u>Fa</u> lls                                                  | Raj                                                       | pids                                                   | <u>Ch</u> ute                             | <u>Ca</u> scade                         | intermittent                                                          | None                                                                  |                        |
| Est.                                                       |                                                                |                                                           |                                                        | [                                         |                                         |                                                                       |                                                                       |                        |
| Gradient                                                   | 0 - 1 %                                                        | i - 1                                                     | 3 %                                                    | 3 - 5 %                                   | >5 %                                    |                                                                       |                                                                       |                        |
| Substrate<br>fines<br>gravel<br>pebble<br>cobble<br>rubble | less than 2 r<br>2mm - 3 cm<br>3 - 5 cm<br>6-13 cm<br>14-25 cm | Backslo<br>mm Shallow<br>Meduin<br>Deep<br>Forest<br>Floo | ope<br>w gully 1<br>n gully 2<br>p gully ≥<br>stream s | m<br>2-3 m<br>≥ 4 m<br>ee over<br>ee over | Cover<br>Instream<br>Overhang<br>Canopy | submergent/em<br>grasses/shrubs<br>trees >.1m abou<br>can be expresse | ergent vegetation<br>within 1 m of water<br>ve water<br>ed as % cover | Page number            |
| boulder                                                    | 26 cm and u                                                    | ip I                                                      | Bog/Fen s                                              | ee over                                   |                                         |                                                                       |                                                                       |                        |



#### Backslope

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### LEGENDS / NOTES

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| TRANS-LABRADOR HIGHWAY STREAM CROSSING INFORMATION: CARTWRIGHT JUNC | FION TO GOOSE BAY |
|---------------------------------------------------------------------|-------------------|
|---------------------------------------------------------------------|-------------------|

| Ground Survey<br>Ground survey completed | Ground Survey not Completed NO                      |
|------------------------------------------|-----------------------------------------------------|
| Temperature                              | Crossing less than 2 km <sup>2</sup> (on DWST list) |
| pH                                       | Bog drainage                                        |
| Conductivity                             | Type IV (steady) flow                               |
| Dissolved Oxygen                         | Type III (cascade/rapids) flow                      |
| Turbidity                                | No accessible by helicopter                         |
| Surface velocity                         | Other: intermittant near                            |
| Water Samples collected                  | pond not accessible to<br>Fish                      |
| Gradient (inclinometer)                  |                                                     |

6 1

## Sketch & Measurements of Surveyed Section(s)

#### LEGENDS / NOTES

### Backslope

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| Ground Survey                                | 4 93                                                |
|----------------------------------------------|-----------------------------------------------------|
| Ground survey completed                      | Ground Survey not Completed N D                     |
| Temperature                                  | Crossing less than 2 km <sup>2</sup> (on DWST list) |
| pH                                           | Bog drainage                                        |
| Conductivity                                 | Type IV (steady) flow                               |
| Dissolved Oxygen                             | Type III (cascade/rapids) flow                      |
| Turbidity                                    | No accessible by helicopter                         |
| Surface velocity                             | Other:                                              |
| Water Samples collected                      |                                                     |
| Gradient (inclinometer)                      |                                                     |
| Sketch & Measurements of Surveyed Section(s) | i,,                                                 |

### **LEGENDS / NOTES**

#### Backslope

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| Stream No.                             | 94                                                     | Sketch of the area                                                                             | 6            |
|----------------------------------------|--------------------------------------------------------|------------------------------------------------------------------------------------------------|--------------|
| Jate                                   | S-0+26/02                                              |                                                                                                |              |
| Surveyed by                            | Bu/mH/Hm/DJ                                            | (Dox) RIFFIER                                                                                  |              |
| Watershed                              | Davadise                                               |                                                                                                | A150         |
| GPS Co-ord.                            | See list.                                              | <b>@</b>                                                                                       | K            |
| Aerial Photo #                         |                                                        | putert                                                                                         |              |
| Map Number                             | 13 4/4                                                 | (B) (B)                                                                                        | 150          |
| Photo Numbers                          | 127                                                    | 110                                                                                            | MBR out -rop |
| Video                                  | 12 yes                                                 |                                                                                                | 4            |
| Area Surveyed                          | 500 m ale viel. 50 m Grow                              | 1 E 50m-60m                                                                                    | ->\          |
| Water Samples                          | VPS.                                                   |                                                                                                | 1            |
|                                        | <u>_</u>                                               |                                                                                                | Comments     |
| Depth 0 - 1 m                          | → 1 - 2 m <b>30</b> > 2 m <b>9</b>                     | 2 Unknown                                                                                      |              |
| Channel<br>Width 0 - 2 m               | 2 - 5 m 5 - 20 m                                       | >20 m                                                                                          |              |
| ]low Type <u>St</u> eady               | Riffle 10 Rapids                                       | Pools 30                                                                                       |              |
| Substrate                              | <u>Cobble/</u>                                         |                                                                                                |              |
| Beak                                   |                                                        |                                                                                                |              |
| Habitat Type I                         | Type II Type III                                       | Type IV                                                                                        |              |
| Bank<br>Material <u>F</u> ines         | <u>Gravel/</u><br>Pebble 10 <u>Rubble</u> 10           | Boulder bo Bedrock 20 Unknown                                                                  |              |
| Shallow                                | Medium Deep                                            | Forest Flood                                                                                   |              |
| Backstope Gully                        |                                                        | Stream Plam Bog/Fen                                                                            |              |
| Vegetation <u>Bog</u>                  | <u>Gras</u> ses <u>Sh</u> rubs 30                      | D Trees 70                                                                                     | ·            |
| Cover 6 Instream                       | 15 Overhang 5 Canopy                                   | None                                                                                           |              |
| Potential<br>Obstruction <u>Fa</u> lls | Rapids Chute                                           | Cascade Intermittent None                                                                      | •            |
| Est.                                   |                                                        |                                                                                                |              |
| Gradient 0 - 1 %                       | 1 - 3 % 3 - 5 %                                        | >5 %                                                                                           |              |
| Substrate<br>fines less than 2 m       | Backslope<br>m Shallow gully 1 m<br>Meduim gully 2-3 m | Cover<br>Instream submergent/emergent vegetation<br>Overhang grasses/shrubs within 1 m of wate | ٣            |





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TRANS-LABRADOR HIGHWAY STREAM CROSSING INFORMATION: CARTWRIGHT JUNCTION TO GOOSE BAY

|    | Stream No.                                                                              | .[                                                                    | 95.                                                                                                     |                                                      | Sketch of the a                                    | rea                                                                         |                                                             |               |
|----|-----------------------------------------------------------------------------------------|-----------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|------------------------------------------------------|----------------------------------------------------|-----------------------------------------------------------------------------|-------------------------------------------------------------|---------------|
|    | Date                                                                                    | Γ                                                                     | Sept 26                                                                                                 | 102                                                  |                                                    | Kidge                                                                       | culvent                                                     |               |
|    | Surveyed by                                                                             | ſ                                                                     | Bu/mH/Hr                                                                                                | NPJ                                                  |                                                    |                                                                             | 200                                                         | с ` с         |
|    | Watershed                                                                               |                                                                       | Parudis.                                                                                                | e                                                    |                                                    | 1                                                                           |                                                             |               |
|    | GPS Co-ord.                                                                             |                                                                       | See                                                                                                     | list.                                                |                                                    |                                                                             | $\rangle$                                                   | Havely        |
|    | Aerial Photo #                                                                          | -<br>۱                                                                |                                                                                                         |                                                      | -low                                               | G-PS                                                                        |                                                             | Forestad      |
|    | Map Number                                                                              |                                                                       | 13 H/                                                                                                   | 4                                                    | 710                                                | 1 - 51m                                                                     |                                                             |               |
|    | Photo Number                                                                            | rs .                                                                  | 123                                                                                                     |                                                      |                                                    |                                                                             | Qlar                                                        | 10. 124 2 125 |
|    | Video                                                                                   |                                                                       | yes.                                                                                                    |                                                      |                                                    |                                                                             | 100                                                         |               |
|    | Area Surveyed                                                                           | 1                                                                     | 500 m acrial                                                                                            | 50 m qnu                                             | 1                                                  | V                                                                           |                                                             | 250           |
|    | Water Sample                                                                            | s                                                                     | yes.                                                                                                    |                                                      |                                                    | -                                                                           |                                                             |               |
|    |                                                                                         |                                                                       |                                                                                                         |                                                      | · · · · · · · · · · · · · · · · · · ·              |                                                                             |                                                             | Comments      |
|    | Depth                                                                                   | 0 - 1 m                                                               |                                                                                                         | >2 m                                                 | Unknown                                            |                                                                             | ·                                                           |               |
|    | Channel                                                                                 | <u>г</u>                                                              |                                                                                                         |                                                      |                                                    |                                                                             |                                                             |               |
|    | Width                                                                                   | 0 - 2 m                                                               | 2-5m                                                                                                    | 5 - 20 m                                             | >20 m                                              |                                                                             |                                                             | . •           |
| ť. | Jlow Type                                                                               | <u>St</u> eady                                                        |                                                                                                         | <u>Ra</u> pids                                       | Pools                                              |                                                                             | • .                                                         |               |
| ι. | Šubstrate<br>Type                                                                       | <u>F</u> ines                                                         | 0 Gravel 10                                                                                             | <u>Co</u> bble/<br><u>Ru</u> bble                    | Boulder vo                                         | Bedrock                                                                     | Unknown                                                     |               |
|    | Beak<br>Habitat                                                                         | Type I                                                                | Type II                                                                                                 | Type III                                             | Type IV                                            |                                                                             |                                                             |               |
|    | Bank<br>Material                                                                        | Eines                                                                 | <u>G</u> ravel/<br><u>P</u> ebble                                                                       | <u>Co</u> bble/<br><u>Ru</u> bble                    | Boulder                                            | Bedrock                                                                     | Unknown                                                     |               |
|    | Backslope                                                                               | Shallow<br>Gully                                                      | Medium<br>Gully                                                                                         | Deep                                                 | Forest                                             | <ul> <li>Flood</li> <li>Plain</li> </ul>                                    | Bog/Fen                                                     |               |
|    | Bank                                                                                    |                                                                       |                                                                                                         |                                                      |                                                    |                                                                             |                                                             | · .           |
|    | Vegetation                                                                              | Bog                                                                   | <u>Gras</u> ses                                                                                         | <u>Sh</u> rubs <b>'</b>                              | <u>Tr</u> ees                                      |                                                                             |                                                             |               |
| -  | Cover 💞                                                                                 | Instream                                                              | Overhang 20                                                                                             | Canopy <b>SU</b>                                     | None                                               |                                                                             |                                                             |               |
| ,  | Potential<br>Obstruction                                                                | <u>Fa</u> lls                                                         | <u>Ra</u> pids                                                                                          | <u>Ch</u> ute                                        | <u>Ca</u> scade I                                  | ntermittent                                                                 | None                                                        |               |
|    | Est.<br>Gradient                                                                        | 0 - 1 %                                                               | 1 - 3 %                                                                                                 | 3 - 5 %                                              | >5 %                                               |                                                                             |                                                             |               |
|    | Substrate<br>fines les<br>gravel 2r<br>pebble 3<br>cobble 6-<br>rubble 14<br>boulder 26 | ss than 2 m<br>nm - 3 cm<br>- 5 cm<br>13 cm<br>1-25 cm<br>5 cm and up | Backslope<br>n Shallow gully<br>Meduim gully<br>Deep gully<br>Forest stream<br>Flood plain<br>Bog/Fen s | m<br>2-3 m<br>2-4 m<br>ee over<br>ee over<br>ee over | Cover<br>Instream s<br>Overhang g<br>Canopy t<br>c | submergent/emer<br>grasses/shrubs wi<br>rees > 1m above<br>can be expressed | gent vegetation<br>thin 1 m of water<br>water<br>as % cover | Page number   |
|    |                                                                                         |                                                                       |                                                                                                         |                                                      |                                                    |                                                                             |                                                             | 1             |

.



Backslope

Gullies are typically well defined steep sided channels which contain spordic flooding but may suffer bank erosion depending on bank material

9+26/02

Forest Stream has low to medium gradient and a well defined channel with some spilling over the banks - erosion may occur due to reduced stability of forest soils

Flood Plain is a wide shallow course with narrow channel(s) in middle - flooding occurs onto grasses with little lasting

**APPENDIX 3** 

## PHOTOGRAPHS

## APPENDIX 3 PHOTOGRAPHS

## LEGEND

The location of watercourse crossings are shown on Figure 1.1.

Photos are listed in sequence from 035 - 196, which represents the camera frame number and the order in which photos were taken in the field. These numbers correspond to photo numbers listed on field data sheets contained in Appendix 2.

Aerial photographs are designated by the 3 digit frame number followed by the crossing #.

Ground photos are designated by the 3 digit frame number, the crossing # and (Gr).



035 Crossing #1



036 Crossing #2



037 Crossing #3



038 Crossing #4



039 Crossing #5



040 Crossing #6



041 Crossing # 7



042 Crossing # 8



043 Crossing # 9



044 Crossing # 10

23. 9. 2002



10045 Crossing # 10046 Crossing # 11Photographs of TLH-Phase III Stream Crossings



047 Crossing # 12



048 Crossing # 13



049 Crossing # 14



050 Crossing # 15



051 Crossing # 16



052 Crossing # 17



053 Crossing # 18



054 Crossing # 19



055 Crossing # 20



056 Crossing # 21 Phote



23.9.20

21057 Crossing # 22058 Crossing # 23Photographs of TLH-Phase III Stream Crossings



059 Crossing # 24



060 Crossing # 25



061 Crossing # 26



062 Crossing # 27



063 Crossing # 28



064 Crossing # 29



065 Crossing # 30



066 Crossing # 31



067 Crossing # 32



068 Crossing # 33 Photog



23. 9. 2002

33069 Crossing # 34070 Crossing # 36Photographs of TLH-Phase III Stream Crossings



071 Crossing # 37



072 Crossing # 38



073 Crossing # 39



074 Crossing # 40



075 Crossing # 41



076 Crossing # 42



077 Crossing # 43



078 Crossing # 44



079 crossing # 45



080 Crossing # 46 Pho



46081 Crossing # 47082Photographs of TLH-Phase III Stream Crossings



082 Crossing # 48 ings



083 Crossing # 49



084 Crossing # 50



**085 Crossing # 51** 



**086 Crossing # 52** 



**087** Crossing # 53



**088** Crossing # 55



**089** Crossing # 56



**090** Crossing # 58



**091 Crossing # 59** 



092 Wrong Stream Photog



am 093 Crossing # 60 094 Photographs of TLH-Phase III Stream Crossings



094 Crossing # 62 sings



**095** Crossing # 63



**096 Crossing # 64** 



**097** Crossing # 65



**098 Crossing # 66** 



099 Crossing # 67



**100 Crossing # 68** 



101 Crossing # 69



102 Crossing # 70



**103 Crossing # 61** 



104 Crossing # 71 Phot



25. 9. 2002

71105 Crossing # 72106 Crossing # 73Photographs of TLH-Phase III Stream Crossings



**107 Crossing # 74** 



108 Crossing # 75



**109 Crossing # 76** 



**110 Crossing # 77** 



111 Crossing # 78



112 Crossing # 79



113 Crossing # 80



114 Crossing # 81



**115 Crossing # 82** 



116 Crossing # 83 Phot





83 117 Crossing # 84 118 Crossing # 86 Photographs of TLH-Phase III Stream Crossings



**119 Crossing # 87** 



120 Crossing # 88



121 Crossing # 89



122 Crossing # 90



123 Crossing # 96



124 Crossing # 96 Gr.



125 Crossing # 96 Gr.



126 Crossing # 95



127 Crossing # 94



128 Crossing # 94 Gr. Phote



Gr.129 Crossing # 94 Gr.130Photographs of TLH-Phase III Stream Crossings



130 Crossing # 93 sings



131 Crossing # 92



**132 Crossing # 91** 



133 Crossing # 91 Gr.



134 Crossing # 91 Gr.



135 Crossing #8 Gr



136 Crossing # 9 Gr



137 Crossing # 13 Gr



138 Crossing #16 Gr



139 Crossing #22 Gr



140 Crossing # 23 Gr. Photo



Gr.141 Crossing # 24 Gr142 GPhotographs of TLH-Phase III Stream Crossings



142 Crossing # 28 Gr ossings



143 Crossing # 28 Gr



144 Crossing # 36 Gr



145 Crossing # 36 Gr



146 Crossing # 37 Gr



147 Crossing # 38 Gr



148 Crossing # 38 Gr



149 Crossing # 90 Gr



150 Crossing # 90 Gr



151 Crossing # 89 Gr



152 Crossing # 89 Gr Phot



Gr153 Crossing # 89 Gr154 GrPhotographs of TLH-Phase III Stream Crossings



154 Crossing # 88 Gr ssings



155 Crossing # 88 Gr



156 Crossing # 87 Gr



157 Crossing # 87 Gr



158 Crossing # 82 Gr



159 Crossing # 82 Gr



160 Crossing # 79 Gr



161 Crossing # 79 Gr



162 Crossing # 73 Gr



163 Crossing # 73 Gr



164 Crossing # 68 Gr Photo



Gr 165 Crossing # 68 Gr 166 C Photographs of TLH-Phase III Stream Crossings



166 Crossing # 67 Gr ossings



167 Crossing # 67 Gr



168 Crossing # 65 Gr



169 Crossing # 65 Gr



170 Crossing # 64 Gr



171 Crossing # 64 Gr



172 Crossing # 61 Gr



173 Crossing # 61 Gr



174 Crossing # 56 Gr



175 Crossing # 56 Gr



176 Crossing # 55 Gr Phot



Gr177 Crossing # 55 Gr178Photographs of TLH-Phase III Stream Crossings



178 Crossing # 55 Gr ssings



179 Crossing # 53 Gr



180 Crossing # 53 Gr



181 Crossing # 52 Gr



182 Crossing # 52 Gr



183 Crossing # 52 Gr



**184 Crossing # 52** 



185 Crossing # 52



186 Crossing # 51 Gr



187 Crossing # 51 Gr



188 Crossing # 48 Gr Phot



Gr 189 Crossing # 48 Gr 190 Photographs of TLH-Phase III Stream Crossings



190 Crossing # 48 Gr ssings



191 Crossing # 42 Gr



192 Crossing # 42 Gr



193 Crossing # 41 Gr



194 Crossing # 41 Gr



195 Crossing # 40 Gr



196 Crossing # 40 Gr

## **APPENDIX 4**

# FIELD AND LABORATORY WATER QUALITY RESULTS

| Appendix 4 | - TLH-Phase | III, Fish | Habitat | Component | Study | Water | Quality  |
|------------|-------------|-----------|---------|-----------|-------|-------|----------|
| 11         |             | ,         |         | 1         | •     |       | <b>`</b> |

|                          | Stream Crossing Number |     |         |       |       |       |       |       |       |       |       |       |
|--------------------------|------------------------|-----|---------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Parameters               | Method                 | EQL | Units   | #8    | #9    | #13   | #16   | #22   | #23   | #24   | #28   | #36   |
| Field Measurements       |                        |     |         |       |       |       |       |       |       |       |       |       |
| Temperature              | Hydrolab               |     | °C      | 7.79  | 7.83  | 5.49  | 5.42  | 5.39  | 5.81  | 5.88  | 6.33  | 6.72  |
| рН                       | Hydrolab               |     | units   | 7.99  | 8.76  | 8.6   | 8.5   | 8.17  | 8.53  | 7.97  | 7.73  | 8.6   |
| Conductivity             | Hydrolab               |     | µS/cm   | 7.1   | 9.9   | 7     | 5.4   | 5.5   | 5.5   | 5.9   | 5.6   | 8.6   |
| Dissolved O <sub>2</sub> | Hydrolab               |     | mg/L    | 10.14 | 9.28  | 12.67 | 11.56 | 11.11 | 11.04 | 11.23 | 12.72 | 10.86 |
| Turbidity                | Hydrolab               | 0.1 | NTU     | 0.8   | 3.3   | 4.4   | 4.1   | 1.5   | 1.4   | 2.4   | 9.7   | 0.6   |
| Laboratory Analysis      |                        |     |         |       |       |       |       |       |       |       |       |       |
| Alkalinity (as CaCO3)    | COBAS                  | 5   | mg/L    | 8     | 11    | 9     | 6     | 7     | 7     | 7     | 7     | 11    |
| Total Dissolved Solids   | Grav.                  | 10  | mg/L    | 40    | 50    | 30    | 40    | 30    | 40    | 50    | 30    | 30    |
| Aluminum                 | ICP-MS                 | 10  | µg/L    | 310   | 240   | 200   | 220   | 190   | 150   | 210   | 210   | 110   |
| Antimony                 | ICP-MS                 | 2   | µg/L    | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   |
| Arsenic                  | ICP-MS                 | 2   | µg/L    | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   |
| Barium                   | ICP-MS                 | 5   | µg/L    | 12    | 22    | 14    | 10    | 10    | 11    | 10    | 9     | 8     |
| Beryllium                | ICP-MS                 | 5   | µg/L    | < 5   | < 5   | < 5   | < 5   | < 5   | < 5   | < 5   | < 5   | < 5   |
| Bismuth                  | ICP-MS                 | 2   | µg/L    | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   |
| Boron                    | ICP-MS                 | 5   | µg/L    | 11    | 9     | 5     | < 5   | < 5   | < 5   | < 5   | < 5   | < 5   |
| Cadmium                  | ICP-MS                 | 0.3 | µg/L    | < 0.3 | < 0.3 | < 0.3 | < 0.3 | < 0.3 | < 0.3 | < 0.3 | < 0.3 | < 0.3 |
| Chromium                 | ICP-MS                 | 2   | µg/L    | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   |
| Cobalt                   | ICP-MS                 | 1   | µg/L    | < 1   | < 1   | < 1   | < 1   | < 1   | < 1   | < 1   | < 1   | < 1   |
| Copper                   | ICP-MS                 | 2   | µg/L    | 2     | 5     | 2     | 3     | 2     | 2     | 2     | 2     | 2     |
| Iron                     | ICP-MS                 | 20  | µg/L    | 890   | 470   | 150   | 610   | 640   | 770   | 940   | 820   | 520   |
| Lead                     | ICP-MS                 | 0.5 | µg/L    | < 0.5 | 0.8   | < 0.5 | 0.5   | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Manganese                | ICP-MS                 | 2   | µg/L    | 12    | 20    | 2     | 7     | 8     | 13    | 20    | 28    | 10    |
| Molybdenum               | ICP-MS                 | 2   | µg/L    | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   |
| Nickel                   | ICP-MS                 | 2   | µg/L    | < 2   | < 2   | < 2   | 2     | < 2   | < 2   | < 2   | < 2   | < 2   |
| Selenium                 | ICP-MS                 | 2   | µg/L    | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   |
| Silver                   | ICP-MS                 | 0.5 | µg/L    | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Strontium                | ICP-MS                 | 5   | µg/L    | 14    | 22    | 24    | 16    | 17    | 17    | 17    | 14    | 19    |
| Thallium                 | ICP-MS                 | 0.1 | µg/L    | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Tin                      | ICP-MS                 | 2   | µg/L    | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   |
| Titanium                 | ICP-MS                 | 2   | µg/L    | 8     | 2     | 2     | 3     | 3     | 3     | 4     | 6     | 2     |
| Uranium                  | ICP-MS                 | 0.1 | µg/L    | < 0.1 | 0.1   | 0.2   | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Vanadium                 | ICP-MS                 | 2   | µg/L    | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   |
| Zinc                     | ICP-MS                 | 2   | µg/L    | 6     | 4     | 3     | 5     | 3     | 3     | 2     | 2     | 2     |
|                          |                        |     |         |       |       |       |       |       |       |       |       |       |
| Stream Velocity          | Gurley                 |     | m/s     | 0.11  | 0.07  | 0.49  | 0.51  | 0.33  | 0.44  | 0.28  | 0.49  | 0.24  |
| Gradient                 | Inclinomete            | r   | degrees | 1     | 1     | 4     | 2     | 2.5   | 1.5   | 4     | 1     | 1     |
## Stream Crossing Number Method EQL Units #37 #38 #42 #51 #52 Parameters #40 #48 #41 **Field Measurements** °C 3.71 Temperature 6.95 5.52 Hydrolab 5 84 5 21 4 58 6 4 4 571 7.22 Hydrolab 7.74 7.48 7.72 7.39 7.59 7.54 units 8.39 pН Conductivity Hydrolab µS/cm 4.6 6.6 6.9 4.9 4.9 4.9 6.1 6 Dissolved O<sub>2</sub> Hydrolab mg/L 8.93 11.52 10.3 11.16 9.35 12.19 11.55 11.54 Turbidity Hydrolab 0.1 NTU 6.1 0.5 1 1.1 1.5 3.2 2 2.1 Laboratory Analysis Alkalinity (as CaCO3) COBAS 5 mg/L 6 8 9 8 7 6 6 9 **Total Dissolved Solids** Grav. 10 30 20 20 20 20 10 30 30 mg/L 110 ICP-MS 10 120 150 80 100 110 µg/L 100 100 Aluminum ICP-MS 2 < 2 < 2 < 2 Antimony < 2 < 2 < 2 < 2 < 2 µg/L Arsenic ICP-MS 2 < 2 < 2 < 2 < 2 < 2 < 2 < 2 < 2 µg/L ICP-MS 5 7 8 12 19 10 5 < 5 Barium µg/L < 5 Beryllium ICP-MS 5 < 5 < 5 < 5 < 5 < 5 < 5 < 5 < 5 µg/L Bismuth ICP-MS 2 µg/L < 2 < 2 < 2 < 2 < 2 < 2 < 2 < 2 ICP-MS Boron 5 µg/L < 5 < 5 < 5 < 5 < 5 < 5 < 5 < 5 < 0.3 < 0.3 ICP-MS 0.3 < 0.3 < 0.3 < 0.3 < 0.3 < 0.3 Cadmium µg/L < 0.3 ICP-MS 2 < 2 Chromium < 2 < 2 < 2 < 2 < 2 < 2 < 2 µg/L Cobalt ICP-MS 1 µg/L 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1

< 2

450

< 0.5

6

< 2

< 2

< 2

< 0.5

17

< 0.1

< 2

2

< 0.1

< 2

2

< 2

220

< 0.5

4

< 2

< 2

< 2

< 0.5

18

< 0.1

< 2

< 2

< 0.1

< 2

3

< 2

190

< 0.5

3

< 2

< 2

< 2

< 0.5

15

< 0.1

< 2

< 2

< 0.1

< 2

3

< 2

110

< 0.5

4

< 2

< 2

< 2

< 0.5

12

< 0.1

< 2

< 2

< 0.1

< 2

2

2

3200

< 0.5

100

< 2

< 2

< 2

< 0.5

11

< 0.1

< 2

2

< 0.1

< 2

4

µg/L

## Appendix 4 - TLH-Phase III, Fish Habitat Component Study Water Quality

| Stream Velocity | Gurley       | m/s     | 0.14 | 0.36 | 0.30 | 0.52 | 0.16 | 0.24 | 0.22 | 0.16 | 0.16 |
|-----------------|--------------|---------|------|------|------|------|------|------|------|------|------|
| Gradient        | Inclinometer | degrees | <1   | 1.5  | 1    | 1    | 0.5  | 2    | 1.5  | 1    | 0.5  |

ICP-MS

Copper

Iron

Lead

Nickel

Silver

Tin

Zinc

Selenium

Strontium

Thallium

Titanium

Uranium

Vanadium

Manganese

Molybdenum

2

20

0.5

2

2

2

2

0.5

5

0.1

2

2

0.1

2

2

#53

4.25

7.14

7.7

11.24

2

34

30

150

< 2

< 2

5

< 5

< 2

< 5

< 0.3

< 2

< 1

2

830

< 0.5

11

< 2

< 2

< 2

< 0.5

14

< 0.1

< 2

< 2

< 0.1

< 2

8

< 2

540

< 0.5

9

< 2

< 2

< 2

< 0.5

10

< 0.1

< 2

< 2

< 0.1

< 2

2

2

460

< 0.5

6

< 2

< 2

< 2

< 0.5

11

< 0.1

< 2

< 2

< 0.1

< 2

3

< 2

440

< 0.5

7

< 2

< 2

< 2

< 0.5

10

< 0.1

< 2

< 2

< 0.1

< 2

2

| Appendix 4 - | TLH-Phase | III, Fish | Habitat | Component | Study ' | Water | Quality |
|--------------|-----------|-----------|---------|-----------|---------|-------|---------|
|              |           | ,         |         | r         |         |       | C       |

|                          | Stream Crossing Number |     |         |       |       |       |       |       |       |       |       |       |
|--------------------------|------------------------|-----|---------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Parameters               | Method                 | EQL | Units   | #55   | #56   | #61   | #64   | #65   | #67   | #68   | #73   | #79   |
| Field Measurements       |                        |     |         |       |       |       |       |       |       |       |       |       |
| Temperature              | Hydrolab               |     | °C      | 3.27  | 4.57  | 4.16  | 3.92  | 4.14  | 4.6   | 4.29  | 6.09  | 5.16  |
| рН                       | Hydrolab               |     | units   | 7.4   | 6.49  | 7.8   | 7.61  | 7.33  | 7.72  | 7.06  | 7.51  | 7.09  |
| Conductivity             | Hydrolab               |     | µS/cm   | 6.4   | 3.9   | 8.2   | 7.2   | 8     | 9.2   | 7.5   | 5.6   | 2.4   |
| Dissolved O <sub>2</sub> | Hydrolab               |     | mg/L    | 10.65 | 10.95 | 11.16 | 10.97 | 9.61  | 12.57 | 10.81 | 10.72 | 10.9  |
| Turbidity                | Hydrolab               | 0.1 | NTU     | 2.5   | 3.1   | 1.4   | 3.5   | 4.1   | 7.8   | 2.2   | 9.2   | 8.9   |
| Laboratory Analysis      |                        |     |         |       |       |       |       |       |       |       |       |       |
| Alkalinity (as CaCO3)    | COBAS                  | 5   | mg/L    | 9     | < 5   | 9     | 8     | 9     | 10    | 7     | 6     | < 5   |
| Total Dissolved Solids   | Grav.                  | 10  | mg/L    | 30    | 20    | 20    | 20    | 40    | 40    | 40    | 30    | 30    |
| Aluminum                 | ICP-MS                 | 10  | µg/L    | 90    | 170   | 120   | 90    | 90    | 80    | 150   | 120   | 100   |
| Antimony                 | ICP-MS                 | 2   | µg/L    | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   |
| Arsenic                  | ICP-MS                 | 2   | µg/L    | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   |
| Barium                   | ICP-MS                 | 5   | µg/L    | < 5   | 5     | < 5   | < 5   | < 5   | < 5   | 6     | 8     | 5     |
| Beryllium                | ICP-MS                 | 5   | µg/L    | < 5   | < 5   | < 5   | < 5   | < 5   | < 5   | < 5   | < 5   | < 5   |
| Bismuth                  | ICP-MS                 | 2   | µg/L    | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   |
| Boron                    | ICP-MS                 | 5   | µg/L    | < 5   | < 5   | < 5   | 6     | < 5   | < 5   | < 5   | < 5   | < 5   |
| Cadmium                  | ICP-MS                 | 0.3 | µg/L    | < 0.3 | < 0.3 | < 0.3 | 0.3   | < 0.3 | < 0.3 | < 0.3 | < 0.3 | < 0.3 |
| Chromium                 | ICP-MS                 | 2   | µg/L    | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   |
| Cobalt                   | ICP-MS                 | 1   | µg/L    | < 1   | < 1   | < 1   | < 1   | < 1   | < 1   | < 1   | < 1   | < 1   |
| Copper                   | ICP-MS                 | 2   | µg/L    | 2     | < 2   | < 2   | 2     | < 2   | < 2   | < 2   | < 2   | < 2   |
| Iron                     | ICP-MS                 | 20  | µg/L    | 520   | 1800  | 150   | 250   | 520   | 290   | 390   | 920   | 900   |
| Lead                     | ICP-MS                 | 0.5 | µg/L    | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Manganese                | ICP-MS                 | 2   | µg/L    | 10    | 71    | 6     | 13    | 31    | 7     | 7     | 18    | 18    |
| Molybdenum               | ICP-MS                 | 2   | µg/L    | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   |
| Nickel                   | ICP-MS                 | 2   | µg/L    | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   |
| Selenium                 | ICP-MS                 | 2   | µg/L    | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   |
| Silver                   | ICP-MS                 | 0.5 | µg/L    | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Strontium                | ICP-MS                 | 5   | µg/L    | 11    | 10    | 13    | 13    | 17    | 16    | 18    | 15    | 7     |
| Thallium                 | ICP-MS                 | 0.1 | µg/L    | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Tin                      | ICP-MS                 | 2   | µg/L    | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   |
| Titanium                 | ICP-MS                 | 2   | µg/L    | < 2   | 2     | < 2   | < 2   | < 2   | < 2   | < 2   | 3     | 2     |
| Uranium                  | ICP-MS                 | 0.1 | µg/L    | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Vanadium                 | ICP-MS                 | 2   | µg/L    | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   | < 2   |
| Zinc                     | ICP-MS                 | 2   | µg/L    | 3     | 6     | 2     | 4     | 2     | 2     | 2     | 3     | 6     |
|                          |                        |     |         |       |       |       |       |       |       |       |       |       |
| Stream Velocity          | Gurley                 |     | m/s     | 0.36  | 0.36  | 0.53  | 0.25  | 0.09  | 0.39  | 0.51  | 0.59  | 0.28  |
| Gradient                 | Inclinomete            | r   | degrees | 2     | 5     | 1     | 1     | 0.5   | 2     | 6     | 1.5   | 1     |

## Stream Crossing Number Method EQL Units #82 #87 #88 #91 #94 #96 Parameters #90 #89 **Field Measurements** °C 3.07 3.67 5.78 10.43 Temperature Hydrolab 3 36 2 82 114 5.9 Hydrolab 7.56 6.41 8.09 7.81 units 7.1 6.05 6.03 5.72 pН Conductivity Hydrolab µS/cm 4.8 4.5 3.1 5.6 4.8 4.1 5.7 8.1 Dissolved O<sub>2</sub> Hydrolab mg/L 11.16 12.9 11.51 11.6 10.19 8.91 10.35 12.27 Turbidity Hydrolab 0.1 NTU 8.3 3.4 6.7 4.2 4.7 0.5 0.1 0.1 Laboratory Analysis Alkalinity (as CaCO3) COBAS 5 mg/L < 5 < 5 < 5 < 5 < 5 < 5 < 5 7 **Total Dissolved Solids** Grav. 10 30 50 50 40 30 30 40 30 mg/L ICP-MS 10 310 330 370 260 280 150 130 90 Aluminum µg/L < 2 ICP-MS 2 < 2 < 2 Antimony < 2 < 2 < 2 < 2 < 2 µg/L Arsenic ICP-MS 2 < 2 < 2 < 2 < 2 < 2 < 2 < 2 < 2 µg/L ICP-MS 5 6 9 10 10 9 7 6 Barium µg/L 11 Beryllium ICP-MS 5 < 5 < 5 < 5 < 5 < 5 < 5 < 5 < 5 µg/L Bismuth ICP-MS 2 µg/L < 2 < 2 < 2 < 2 < 2 < 2 < 2 < 2 ICP-MS Boron 5 µg/L < 5 < 5 < 5 < 5 < 5 < 5 < 5 < 5 ICP-MS < 0.3 0.3 < 0.3 < 0.3 < 0.3 < 0.3 < 0.3 Cadmium µg/L < 0.3 < 0.3 ICP-MS 2 < 2 Chromium < 2 < 2 < 2 < 2 < 2 < 2 < 2 µg/L Cobalt ICP-MS 1 µg/L < 1 < 1 < 1 < 1 < 1 < 1 < 1 < 1 ICP-MS 2 2 2 2 Copper µg/L < 2 < 2 < 2 < 2 < 2 Iron ICP-MS 20 µg/L 2300 780 940 800 440 450 650 420 Lead ICP-MS 0.5 µg/L < 0.5 < 0.5 < 0.5 < 0.5 < 0.5 < 0.5 < 0.5 < 0.5 ICP-MS Manganese 2 µg/L 16 12 15 14 5 9 8 8 2 < 2 ICP-MS < 2 < 2 < 2 Molybdenum µg/L < 2 < 2 < 2 < 2 ICP-MS 2 < 2 < 2 < 2 < 2 < 2 < 2 < 2 Nickel µg/L < 2 ICP-MS 2 < 2 Selenium < 2 < 2 < 2 < 2 < 2 < 2 µg/L < 2 ICP-MS Silver 0.5 µg/L < 0.5 < 0.5 < 0.5 < 0.5 < 0.5 < 0.5 < 0.5 < 0.5 Strontium **ICP-MS** 5 µg/L 9 11 12 10 13 9 13 16 Thallium ICP-MS 0.1 µg/L < 0.1 < 0.1 < 0.1 < 0.1 < 0.1 < 0.1 < 0.1 < 0.1 ICP-MS Tin 2 µg/L < 2 < 2 < 2 < 2 < 2 < 2 < 2 < 2 Titanium **ICP-MS** 2 µg/L < 2 4 5 5 3 3 2 2 < 0.1 ICP-MS 0.1 < 0.1 Uranium < 0.1 < 0.1 < 0.1 < 0.1 < 0.1 0.1 µg/L Vanadium ICP-MS 2 µg/L < 2 < 2 < 2 < 2 < 2 < 2 < 2 < 2 ICP-MS 2 Zinc 2 µg/L 4 4 3 8 3 4 4

## Appendix 4 - TLH-Phase III, Fish Habitat Component Study Water Quality

Stream Velocity

Gradient

Gurley

Inclinometer

m/s

degrees

0.21

2

0.40

4

0.36

1

0.34

2

0.12

0.5

0.16

1

0.36

1

0.29

0.5