Q. Re page B-5: indicate who uses this access road on a daily basis, what type of vehicle is used on a daily basis and confirm that the road is used once each year to deliver fuel. Confirm the type of vehicle used for fuel deliveries and what other use is made of the road. Provide copies of any engineering studies, condition assessments or reports that document a need for significant upgrades to this road, including any reports of accidents or damage caused by road conditions. Indicate the full length of the road, whether gravel will be placed on all of it and what other alternative access to the plant and structures is available. Provide a breakdown of the project cost and indicate if it is intended to call for competitive bids for this work.

A. The road is used on a daily basis by Hydro staff, using pickup trucks. At other times maintenance personnel use dump trucks and other heavy equipment. Fuel deliveries are made at least once per year, sometimes twice, using conventional commercial delivery trucks.

The road is also used by the general public and a logging contractor.

A condition assessment report is attached.

There have been no reports of accidents but frequent maintenance of vehicles is required, due to the rough condition of the road. Damages have included such things as a broken engine oil pan, broken axle retaining bolts and a broken trailer tow bar.

The length of the road, as stated on Page B-5, is 48 km.

Gravel will be placed over the full length of the road.

The alternative for access to the plant and structures would be via helicopter.

A project cost breakdown will be provided to the Board and to the Intervenors in confidence, to protect competitive bidding.

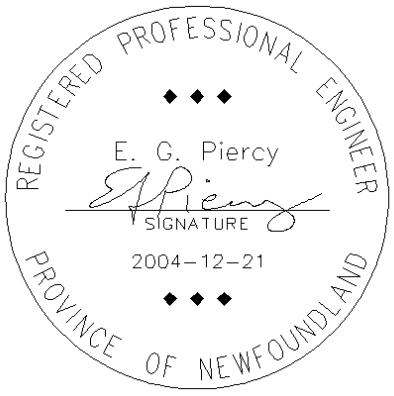
This work will be publicly tendered.

NEWFOUNDLAND & LABRADOR HYDRO

Upper Salmon Access Road

Condition Assessment

2004



Prepared By:

Newfoundland and Labrador Hydro
Generation Engineering

December 21, 2004

Table of Contents

1.0 Introduction

.1 Location

The access road to the Upper Salmon Project was constructed in 1979-80. The work involved construction of 44 kilometers of new road from the Salmon River Spillway to the project site over previously undisturbed county side and upgrading approximately 4 kilometers of existing road from the St. Alban's access road to the spillway. The road extends generally in a northwest direction from the west side of the Bay D'Espoir Reservoir (Long Pond) to the development site.

.2 Road Description

The road has a 6 metre wide driving surface and is constructed of a combination of rock fill and naturally occurring sand and gravel (esker) material. The surface was originally a 100-mm thick, screened sand and gravel mixture obtained from several sources (eskers) along the roadway. The road is designed for all weather use. Corrugated metal culverts are used for all stream crossings with the exception of the West Salmon River crossing which is a 40-meter long metal bridge.

.3 Scope of Work

Early in 2004 the Hydro Generation group, concerned with the lack of topping remaining on the road, approached the Generation Engineering group to review the situation. After some discussion, it was agreed that, after 20+ years of use, it was time to carry out an overall condition assessment of the road, including the condition of the sub-grade, culverts, ditches and topping.

.4 Maintenance History

Detailed records of maintenance history were not kept or are unavailable, however, since construction there are no reports of any major damage to any portions of the road.

Grading of the road surface is carried out on an "as required" basis and vegetation control along the roadway was carried out as sight distances were reduced to unacceptable levels. Recently a vegetation control program consisting of chemical spraying has been initiated.

The steel bridge condition is reviewed under a Preventative Maintenance program for all Hydro Generation bridges.

2.0 Methodology

The field assessment was carried out on October 13th and 14th, 2004 by G. Piercy of Generation Engineering (St. John's) and L. Kearley of Hydro Generation (Bay D'Espoir). The 48 kilometers of roadway involved was traveled by vehicle, noting the locations of all culverts, side roads, pits and quarries and other notable information.

All locations of note were identified by GPS location using a Magellan 315 hand held unit and by vehicle odometer reading referenced to the intersection with the St. Alban's access road. A description of each location and commentary were manually recorded. A table of the collected data is presented in Appendix C.

3.0 Observations

.1 Vegetation

There are no areas of concern with regard to encroachment of brush into the road right-of-way. A program of brush treatment (chemical) was conducted by Bay D'Espoir forces in recent years and appears to be working. Only minor areas near stream crossings (no chemical treatment permitted) may require some manual clearing to ensure proper sight distances.

.2 Culverts & Ditches

Approximately 120 culvert locations were identified. With the exception of the major stream crossings, many of the 600mm & 900mm culverts require attention. The listing provided in Appendix C provides location information and a brief commentary on each culvert. As well, suggestions regarding the action required and the relative priority of each are included in the listing.

A small number of locations were identified as requiring culverts, even though no damage was evident. These should be investigated further during regular maintenance work, as it is possible that culverts are present and not visible or that flows are directed elsewhere.

.3 Road Bed & Topping

The roadbed (sub-grade) is in good condition. No eroded or soft areas were noted. There are some areas where logging operations have flattened the road shoulder causing partial blockage of ditches but pose no serious problem. Shoulders can easily be reinstated during culvert/ditch maintenance.

Most of the road topping placed during original construction is no longer present. Twenty years of grading, snow clearing and use has resulted in the topping being lost over the road shoulders, making the road wider in some locations and causing some of the culvert and ditch problems noted above. The road subgrade is exposed generally over the entire length of road investigated. It appears that this condition has existed for a number of years. There appears to be some new topping on a portion of the steep grade between Salmon River Spillway and Salmon River.

.4 Traffic

A speed of 40 to 50-kph can be maintained in most areas. Most of the small number of vehicles encountered (approximately 12) during the two day survey, including Hydro vehicles (6), were traveling at 50-kph or less. The recommended maximum speed for a road of this class in good condition is 60-kph.

4.0 Discussion

The problems associated the culvert installations are predominantly partial flow blockages due to ditch erosion, road widening by grading operations and ditch vegetation overgrowth. Although there is presently little or no damage to the roadbed, eventually these problems will cause road overtopping, roadbed saturation and possible washouts. This can be dealt with by general culvert maintenance by in-house labor and equipment, but due to the number involved, a staged program may be warranted (worst first). A priority ranking has been assigned to each installation to aid in planning the work and is included on the Road Survey listing in Appendix C. Should the amount of work required exceed the internal resources available, local outside forces, directed by in-house personnel, could also be utilized to assist with the work.

Even though the majority of road topping has been lost, the present road surface is in fair condition. There are few potholes due to the well draining type of material used in construction, however the surface is very rough, containing numerous cobble-sized rocks. Apart from causing a rough ride, this makes surface grading difficult and much slower than normal. With culvert maintenance and periodic grading of rougher areas (as they develop) the surface should not deteriorate further.

5.0 Cost Estimate

The cost to carry out the work to restore the road to the original condition is summarized below. The estimate is based on recent Contractor pricing for similar work. Engineering and project management is not included.

The current cost ($2004) of production and placement of suitable road topping (100 mm) for the 48 km from the St. Albans Road intersection to the Powerhouse is in the order of $500,000. Should this be capitalized, the budget proposal would be in the order of $650-750,000 (depending on year proposed). The rate of further surface deterioration will dictate when this needs to be done, but it would be prudent to tentatively schedule the work for no later than 2007.

6.0 Recommendations

Replacement of the road topping should be scheduled for 2007.

Increased maintenance of the culverts and ditches should be undertaken over the next three years to protect the road from washout and a preventative maintenance program to monitor all aspects of the road should be put in place. During the work all culverts should be inspected in detail to identify any additional work that may be necessary. All major culvert maintenance work should be completed prior to placement of new topping.

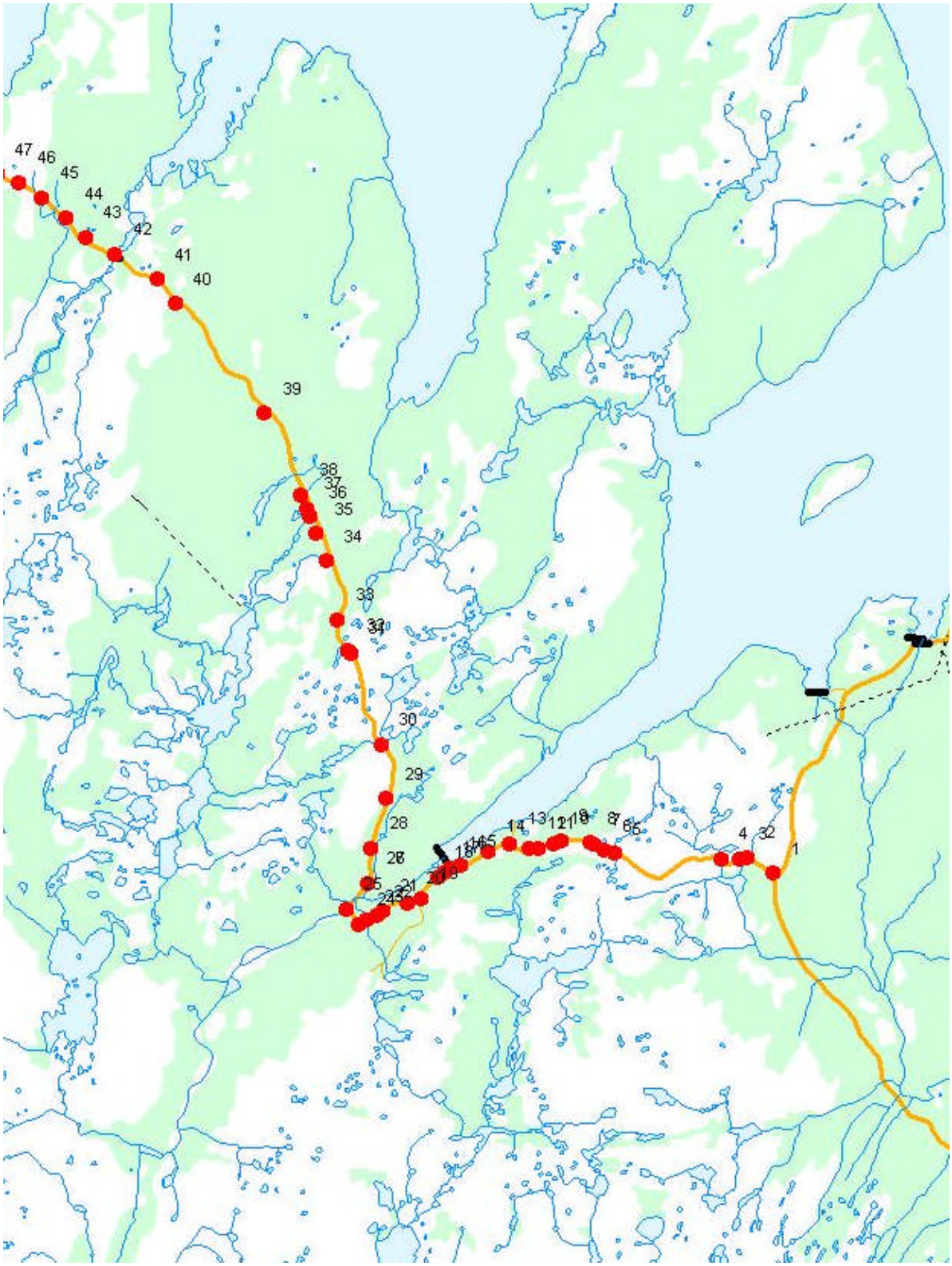
Roadside brush control should continue as required to maintain proper sight distances.

Grading should continue in rougher areas as they develop and as required. Small amounts of topping can be imported to repair rougher areas where required.

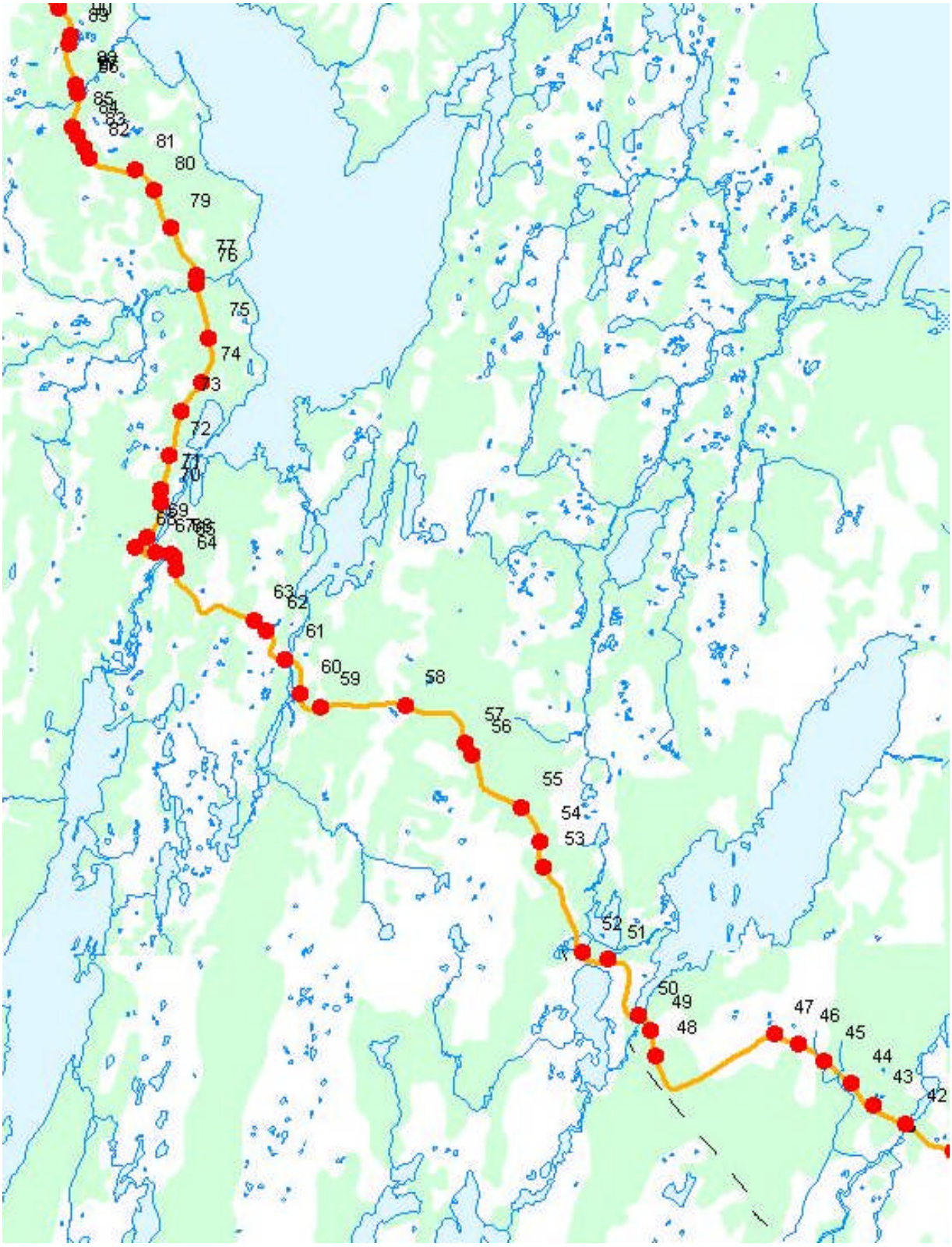
APPENDIX A

MAPS OF UPPER SALMON ROAD

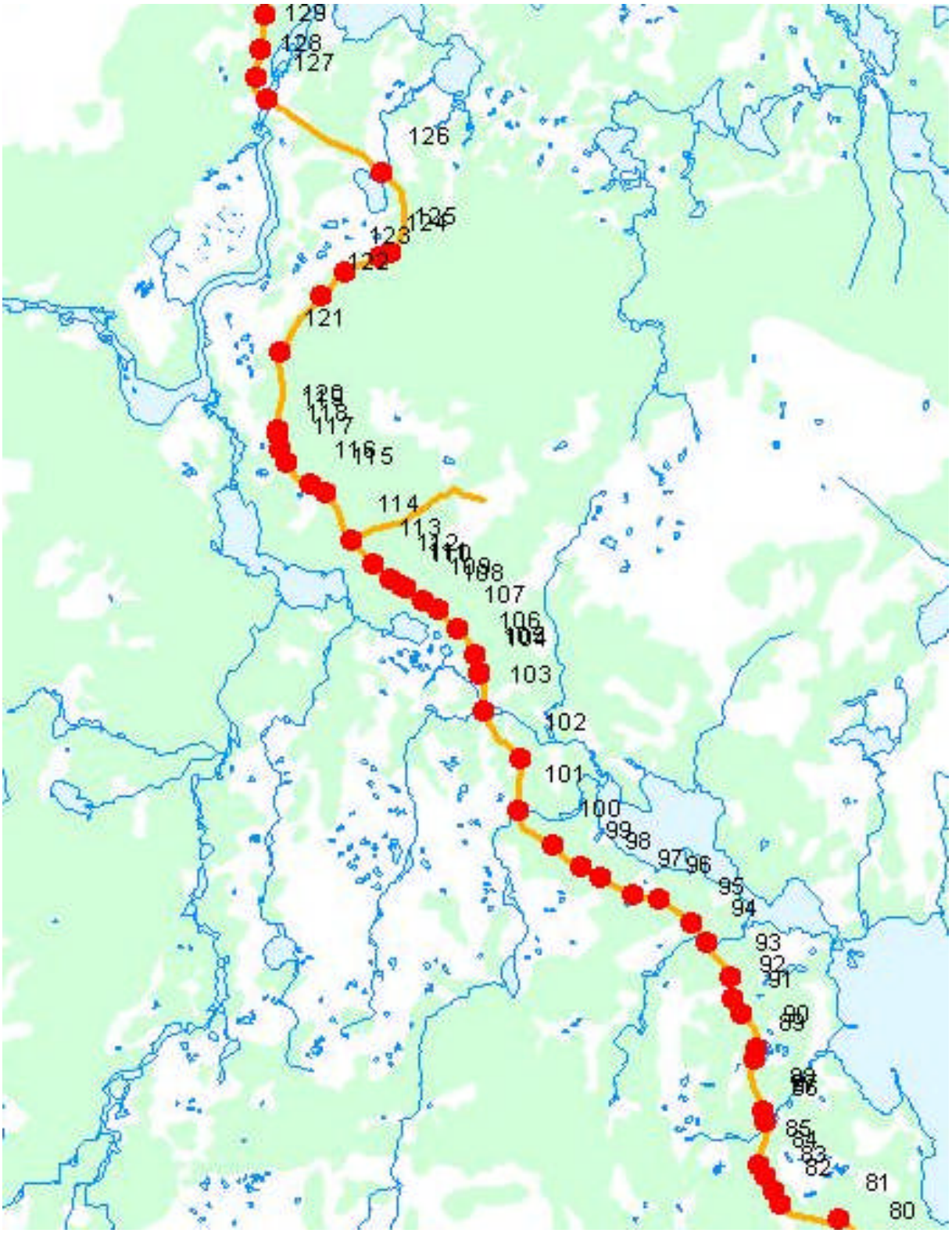
Upper Salmon Access Road



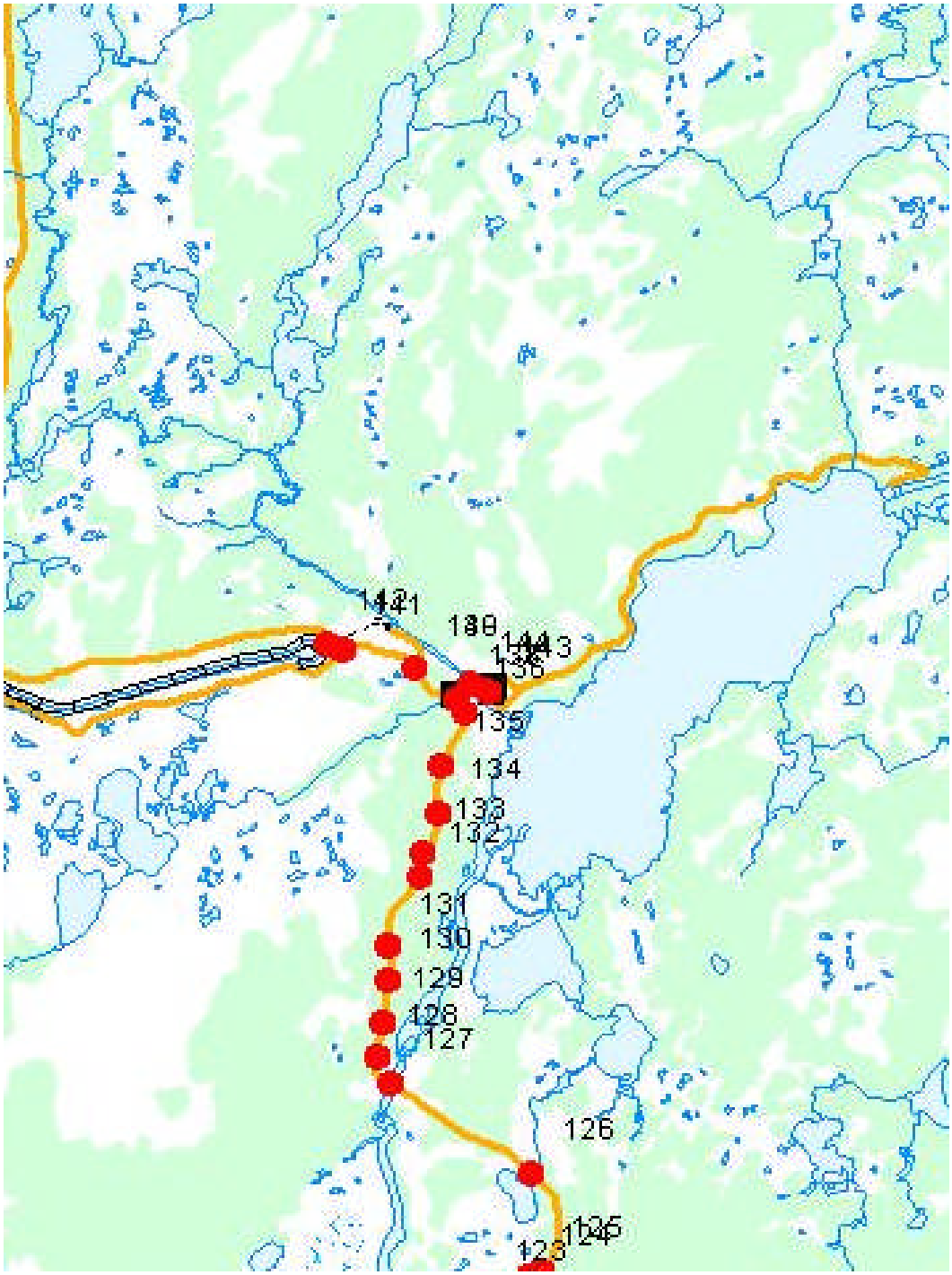
Km 0.0 to Km 16.0



Km 16.0 to Km 32.0



Km 32.0 to Km 44.0



Km 44.0 to Powerhouse

APPENDIX B

PHOTOS

Photo #1: Average Road Condition, October 2004.

Photo #2: Average Road Condition (Close-up), October 2004.

Photo #3: Typical Rough Area, October 2004.

Photo #4: Road Surface after Grading, October 2004.

APPENDIX C

ROAD SURVEY DATA

UPPER SALMON DEVELOPMENT -- ROAD SURVEY

Oct 13/14, 2004

	Distance from BDE Intersection (km)	Easting (Zone 21) (m)	Northing (m)	Description	Notes	Action/ Priority	
1	0.0	581821	5307751	Road Start	BDE Intersection	-	-
2	0.3	581514	5307934	900 Culvert	OK, RS Partly Buried	2	C
3	0.4	581429	5307918	600 Culvert	End Damage	4	C
4	0.6	581210	5307923	900 Culvert	Shoulder Erosion	3	B
5	2.1	579975	5307979	300 Culvert	OK, DS Restriction	2	C
6	2.2	579856	5308019	600 Culvert	OK	1	C
7	2.3	579735	5308085	??? Culvert	Ponded US, Overgrown	3	A
8	2.4	579694	5308108	??? Culvert	Ponded US, Overgrown	3	A
9	2.7	579354	5308130	600 Culvert	OK, Minor Overgrown	2	C
10	2.8	579270	5308097	600 Culvert	OK, Minor Overgrown	2	C
11	3.0	579099	5308045	600 Culvert	OK, Minor Overgrown	2	C
12	3.1	578993	5308042	600 Culvert	OK, Minor Overgrown	2	C
13	3.3	578764	5308094	600 Culvert	OK, Minor Overgrown	2	C
14	3.6	578524	5308010	600 Culvert	Overgrown, Deep Fill	2	C
15	4.0	578190	5307843	600 Culvert	Overgrown, Deep Fill	2	C
16	4.1	578075	5307810	Spillway Structure		-	-
17	4.2	578002	5307762	LS Ditch	Blocked with Topping	3	A
18	4.3	577929	5307713	1000 Culvert	OK, Minor Overgrown	2	C
19	4.6	577745	5307460	Quarry Access	Start of Downhill to Salmon R.	-	-
20	4.8	577583	5307409	1500 Culvert	Narrow Road - 6m, Deep Fill	1	C
21	5.1	577294	5307316	Culvert Required (600)	Minor Edge Erosion	3	B
22	5.2	577223	5307256	900 Culvert	OK	1	C
23	5.3	577112	5307209	900 Culvert	OK	1	C
24	5.4	577022	5307161	900 Culvert	OK	1	C
25	5.7	576869	5307335	2-1500 Culverts	OK, Salmon River	1	C
26	6.1	577127	5307637	Ditch	Blocked with Topping	3	A
27	6.1	577127	5307638	2-900 Culverts (Skewed)	1 Blocked	3	B
28	6.5	577158	5308044	1000 Culvert	Minor Overgrown	2	C
29	7.1	577330	5308617	900 Culvert	OK	1	C
30	7.8	577274	5309246	900 Culvert	OK	1	C
31	9.0	576921	5310299	Culvert Required (600)	US Flooding	4	B
32	9.0	576896	5310335	900 Culvert	OK	1	C
33	9.4	576767	5310692	900 Culvert	OK	1	C
34	10.2	576639	5311370	1000 Culvert	OK, Minor Overgrown	2	C
35	10.5	576518	5311687	??? Culvert	Buried	3	B
36	10.7	576448	5311879	??? Culvert	Buried	3	B
37	10.8	576411	5311975	900 Culvert	OK, Road Width 10m	1	C
38	11.0	576348	5312142	2-1500 Culverts	OK	1	C
39	12.1	575926	5313080	500 Culvert	OK	1	C
40	13.8	574890	5314349	900 Culvert	Set Too Deep, 75% Full	4	B
41	14.2	574681	5314633	900 Culvert	OK	1	C
42	14.8	574190	5314929	2-2100 & 6-1500 Culverts	50m Stream, Large Flow	1	C
43	15.2	573852	5315116	Pit, Esker	Wales Back Pit	-	-
44	15.5	573625	5315344	900 Culvert	OK	1	C
45	15.9	573352	5315582	900 Culvert	OK	1	C
46	16.2	573082	5315759	900 Culvert	OK	1	C
47	16.5	572825	5315854	900 Culvert	OK	1	C
48	18.1	571600	5315630	900 Culvert	OK, Partly Flooded	1	B
49	18.3	571545	5315898	900 Culvert	OK	1	C
50	18.6	571418	5316046	4-2400 Culverts	30m Stream, Large Flow	1	C
51	19.5	571099	5316629	Pit, Esker	Sandy Lake Pit	-	-
52	19.7	570832	5316707	600 Culvert	OK, in Pit	1	C
53	20.7	570431	5317591	900 Culvert	OK	1	C
54	21.0	570395	5317854	1200 Culvert	OK	1	C
55	21.5	570205	5318213	900 Culvert	OK	1	C
56	22.3	569685	5318758	600 Culvert	OK, Partly Blocked	2	B
57	22.4	569615	5318883	600 Culvert	OK	1	C
58	23.3	568996	5319268	900 Culvert	OK	1	C
59	24.2	568116	5319253	Logging Road	LS	-	-
60	24.5	567911	5319381	900 Culvert	OK	1	C

	Distance from BDE Intersection (km)	Easting (Zone 21) (m)	Northing (m)	Description	Notes	Action/ Priority	
61	25.0	567756	5319743	3-1800 Culverts	OK	1	C
62	25.4	567565	5320046	Culvert Required (600)		4	B
63	25.5	567427	5320152	900 Culvert	OK	1	C
64	26.7	566629	5320669	600 Culvert	RS Damage	4	B
65	26.8	566606	5320804	1200 Culvert	OK	1	C
66	26.9	566569	5320834	Pit, Sandy Esker	Old Pauls Sand Pit	-	-
67	27.1	566406	5320845	6-1500 Culverts	Old Pauls Brook	1	C
68	27.2	566202	5320905	Forest Access Road	LS, Pit Potential	-	-
69	27.4	566324	5321006	900 Culvert	OK	1	C
70	27.7	566455	5321366	900 Culvert	OK, Deep Fill	1	C
71	27.9	566471	5321503	900 Culvert	OK	1	C
72	28.2	566552	5321852	900 Culvert	OK	1	C
73	28.7	566671	5322310	900 Culvert	OK	1	C
74	29.1	566880	5322618	900 Culvert	OK, RS Damage	4	C
75	29.6	566963	5323077	??? Culvert, Required (600)		4	B
76	30.2	566836	5323640	4-2400 Culverts	20m Wide, 6m between Guiderails, 2 Damaged US	4	B
77	30.3	566827	5323727	Trail	RS, L. Diamond's Cabin	-	-
78	30.4	566820	5323765	600 Culvert	OK	1	C
79	30.8	566561	5324218	600 Culvert	Damaged & Buried RS	3	A
80	31.2	566396	5324604	900 Culvert	Poor Drainage LS	3	B
81	31.5	566197	5324824	900 Culvert	OK	1	C
82	32.1	565716	5324946	600 Culvert	Poor Flow	3	B
83	32.2	565672	5325054	??? Culvert	Buried, Road 8m Wide	3	A
84	32.4	565598	5325175	Forest Access Road	LS	-	-
85	32.5	565548	5325264	900 Culvert	OK	1	C
86	32.8	565606	5325609	900 Culvert	OK	1	C
87	32.8	565600	5325632	2-600 Culverts	OK, No Apparent Purpose	1	C
88	32.9	565582	5325697	900 Culvert	Damaged LS	4	B
89	33.4	565505	5326135	Culvert Required (600)	Possible Ditch to Next Culvert	4	B
90	33.5	565529	5326208	600 Culvert	Buried	3	A
91	33.7	565403	5326490	600 Culvert	OK	1	C
92	33.9	565334	5326613	600 Culvert	OK	1	C
93	34.1	565312	5326794	600 Culvert	Partly Blocked LS	3	B
94	34.4	565115	5327078	2-1500 Culverts	8m Road, 10m Culverts	1	C
95	34.6	565002	5327242	900 Culvert	OK	1	C
96	35.0	564737	5327425	2-900 Culverts	OK, Minor Cleanup	2	C
97	35.2	564517	5327477	900 Culvert	OK	1	C
98	35.5	564253	5327617	600 Culvert	OK	1	C
99	35.7	564091	5327701	900 Culvert	OK	1	C
100	36.0	563870	5327875	600 Culvert	OK, Overgrown	2	C
101	36.4	563584	5328158	2-1500 Culverts	OK	1	C
102	36.8	563596	5328588	Pit	Sand/ Gravel	-	-
103	37.3	563305	5328977	2-1500 Culverts	OK	1	C
104	37.6	563272	5329271	Forest Access Road	RS, White Hills	-	-
105	37.6	563264	5329292	900 Culvert	OK, Cleanup RS	2	B
106	37.8	563228	5329422	900 Culvert	OK	1	C
107	38.0	563098	5329633	900 Culvert	OK, Minor Washout LS	1	C
108	38.3	562925	5329803	900 Culvert	OK, Skewed, 16m Long	1	C
109	38.4	562813	5329860	900 Culvert	OK	1	C
110	38.6	562662	5329966	900 Culvert	OK	1	C
111	38.6	562636	5329987	Forest Access Road	LS	-	-
112	38.7	562546	5330050	1200 Culvert	OK, Deep Fill	1	C
113	38.9	562409	5330172	Culvert Required (600)	Ponding	3	B
114	39.2	562229	5330369	Access Road	RS, Former White Hills Tower	-	-
115	39.6	562015	5330753	900 Culvert	OK	1	C
116	39.8	561885	5330814	500 Culvert & Quarry	OK, Quarry RS	1	C
117	40.0	561703	5330996	600 Culvert	OK	1	C
118	40.2	561643	5331103	600 Culvert	OK, Inlet Damage	1	C
119	40.3	561622	5331228	??? Culvert	Buried/ Required/ Ditching	3	A
120	40.3	561623	5331271	900 Culvert	OK	1	C
121	41.0	561642	5331894	600 Culvert	OK	1	C

	Distance from BDE Intersection (km)	Easting (Zone 21) (m)	Northing (m)	Description	Notes	Action/ Priority	
122	41.8	562166	5332558	600 Culvert	OK	1	C
123	42.2	562460	5332667	600 Culvert	OK	1	C
124	42.3	562539	5332710	Forest Access Road	White Hills	-	-
125	43.0	562476	5333370	900 Culvert	OK	1	C
126	44.1	561548	5333962	40m Steel Bridge	W. Salmon River	-	-
127	44.3	561446	5334133	600 Culvert	OK	1	C
128	44.6	561484	5334370	600 Culvert	OK	1	C
129	44.9	561523	5334648	900 Culvert	OK	1	C
130	45.1	561520	5334873	600 Culvert	OK	1	C
131	45.6	561726	5335345	600 Culvert	OK	1	C
132	45.8	561758	5335498	900 Culvert	OK	1	C
133	46.1	561863	5335769	900 Culvert	OK	1	C
134	46.4	561879	5336086	600 Culvert	OK	1	C
135	46.8	562031	5336431	900 Culvert	OK	1	C
136	46.9	561979	5336525	900 Culvert	OK	1	C
137	46.9	561979	5336525	Intersection	RS, Road to Accommodations	-	-
138	47.2	561705	5336727	900 Culvert	OK	1	C
139	47.2	561705	5336727	Intersection	RS, Road to Powerhouse	-	-
140	47.8	561213	5336860	Intersection	LS, Road to Intake	-	-
141	48.0	561109	5336897	Concrete Bridge	Penstock	-	-
142	------	562199	5336582	Accommodations	Cookhouse	-	-
143	------	562060	5336622	Steel Bridge	Tailrace	-	-

Note: RS=Right Side, LS=Left Side, US=Upstream, DS=Downstream

Action Required:

1 Inspect & Hand Cleaning if Required
2 Hand Cleaning
3 Equipment Cleaning/ Work
4 Replace/ Repair

Priority:

A ASAP - Next Opportunity
B During Summer 2005
C Within 3 Years