

Location ID	Authorization Type	UTM ¹		Culvert ID	Fish Captured/Observed		2024 Survey ²				
		Easting	Northing		DS	US	Date	DS Culvert Velocity (m/s)	US Culvert Velocity (m/s)	Perch (m)	Water Temperature (°C)
CV-049	HADD	529,654	7,926,545	Left	Y	Y	14-Jul	0.50	0.77	0.00	5.0
				Right			14-Jul	Inaccessible	1.30	0.00	5.0
CV-040	HADD	535,168	7,920,326	Left	Y	N	14-Jul	0.46	0.27	0.00	10.0
				Right			14-Jul	0.56	0.31	0.00	10.0
CV-211		536,479	7,920,007		N	N	14-Jul	0.07	0.00	0.00	9.0
CV-212		537,470	7,920,270		N	N	14-Jul	0.10	0.61	0.00	10.0
BG-33		539,720	7,921,082		Y	N	14-Jul	0.15	0.07	0.15	9.0
CV-030	LOA	540,123	7,921,310		N	Y	14-Jul	0.05	0.00	0.00	12.0
BG-32	HADD	540,729	7,921,597	Left	Y	Y	14-Jul	0.42	1.16	0.00	10.0
				Right			14-Jul	0.00	Dry	0.00	10.0
CV-214		541,317	7,921,923		Y	Y	14-Jul	0.15	0.09	0.07	12.0
CV-215		541,956	7,922,174		Y	N	15-Jul	0.63	0.58	0.12	5.0
CV-217 ³	HADD	542,321	7,922,189		Y	Y	15-Jul	-	-	-	-
CV-216	HADD	542,764	7,921,724	Left	Y	Y	15-Jul	0.20	0.07	0.00	12.0
				Centre			15-Jul	0.22	SSF	0.00	12.0
				Right			15-Jul	0.16	0.24	0.00	12.0
BG-30 ⁵	COMP	546,070	7,919,844		Y	Y	15-Jul	0.56	0.00	0.00	8.0
BG-29	LOA	546,229	7,919,877		Y	Y	15-Jul	0.12	0.15	0.00	9.0
CV-021		546,468	7,919,864		Y	N	15-Jul	1.11	0.33	0.00	10.0
BG-27	LOA	547,876	7,919,355	Left	Y	Y	15-Jul	0.07	0.42	0.00	5.0
				Centre			15-Jul	0.08	0.33	0.00	5.0
				Right			15-Jul	0.13	1.32	0.00	5.0
BG-24	HADD	548,766	7,918,878		Y	Y	15-Jul	1.37	0.81	0.00	5.0
BG-17	HADD	550,703	7,917,643		Y	Y	15-Jul	0.53	0.43	0.00	6.5

Location ID	Authorization Type	UTM ¹		Culvert ID	Fish Captured/Observed		2024 Survey ²				
		Easting	Northing		DS	US	Date	DS Culvert Velocity (m/s)	US Culvert Velocity (m/s)	Perch (m)	Water Temperature (°C)
BG-04	HADD	553,250	7,915,100	Left	Y	Y	15-Jul	0.00	0.00	0.00	8.0
				Right			15-Jul	0.00	0.00	0.00	8.0
CV-001	COMP	553,544	7,914,897		N	Y	16-Jul	0.07	0.09	0.00	5.0
BG-03		554,719	7,915,020		Y	N	15-Jul	0.16	0.20	0.00	7.0
CV-223 ³	HADD	555,705	7,914,676	Centre Channel Culvert	Y	Y	15-Jul	0.11	Too deep to access	0.00	7.0
				Right Channel Left Culvert			15-Jul	0.03	0.17	0.00	7.0
				Right Channel Right Culvert			15-Jul	0.38	Steel plate blocking culvert	0.00	7.0
CV-224	HADD	556,238	7,915,044		Y	Y	16-Jul	0.68	0.38	0.12	5.0
CV-225	HADD	557,421	7,915,187	Left	Y	Y	16-Jul	1.26	1.03	0.34	7.0
				Right			16-Jul	1.83	1.29	0.40	7.0
BG-01	HADD	558,000	7,914,928		Y	Y	16-Jul	~1.75	1.27	0.05	5.0
CV-186	LOA	560,705	7,913,498	Left	Y	N	11-Jul	0.23	0.25	0.11	9.0
				Right			11-Jul	0.40	0.43	0.28	9.0
CV-187	COMP	560,957	7,913,414		Y	N	11-Jul	0.02	0.05	0.00	9.0

Y = yes; N = no; NM = not measured; DS = downstream; US = upstream

1 - NAD 83, Zone 17W

2 - Depths and velocities were recorded within the culvert at the inflow and outflow; DS = downstream end of culvert; US = upstream end of culvert. Velocities could not be collected at bridge crossings and some of the high-velocity culvert crossings: CV-128, CV-099, BG-50, CV-217, CV-223, and BG-01.

3 – Observational survey only in spring 2024: bridge sites and larger streams (CV-128, BG-50, CV-217, CV-223) that were too fast, deep, and/or had challenging uneven substrate to effectively electrofish.

4 – Site was nearly dry in spring 2024 and electrofishing could not be conducted.

5 – Large, deep pond upstream of the culverts at BG-30 cannot be effectively electrofished, but many juvenile char were observed.

6 – The culvert channel at BG-50 could not be fished in spring 2024 due to an electrofisher malfunction during the site visit.

TABLE 4. ARCTIC CHAR CATCH DATA FROM FISH-BEARING STREAM CROSSINGS ALONG THE TOTE ROAD, SPRING 2024

Location ID	Transect ¹	Electrofishing Duration (s)	Total Catch ²	CPUE ³	Fork Length (mm) ⁴				
					n	Mean	SD	Min	Max
CV-129	DS	268	1	0.22	1	56.0	-	-	-
	US	216	4	1.11	4	129.0	47.2	69	183
	Total	484	5	0.62	5	114.4	52.3	56	183
CV-128a	DS	145	0	0.00	-	-	-	-	-
	US	155	0	0.00	-	-	-	-	-
	Total	300	0	0.00	-	-	-	-	-
CV-128 ⁵	DS	-	-	-	-	-	-	-	-
	US	-	-	-	-	-	-	-	-
	Total	-	-	-	-	-	-	-	-
CV-115 ⁶	DS	-	-	-	-	-	-	-	-
	US	-	-	-	-	-	-	-	-
	Total	-	-	-	-	-	-	-	-
CV-114	DS	457	15	1.97	9	69.8	17.1	55	110
	US	380	0	0.00	-	-	-	-	-
	Total	837	15	1.08	9	69.8	17.1	55	110
CV-112	DS	202	27	8.02	23	54.7	14.1	42	106
	US	240	5	1.25	5	56.0	6.0	46	62
	Total	442	32	4.34	28	54.9	13.0	42	106
CV-111	DS	174	21	7.24	21	63.6	15.8	43	98
	US	146	1	0.41	1	200.0	-	200	200
	Total	320	22	4.13	22	69.8	32.9	43	200
CV-106	DS	114	3	1.58	3	58.3	9.3	48	66
	US	89	0	0.00	-	-	-	-	-
	Total	203	3	0.89	3	58.3	9.3	48	66
CV-104	DS	389	21	3.24	13	59.4	7.7	43	68
	US	185	0	0.00	-	-	-	-	-
	Total	574	21	2.20	13	59.4	7.7	43	68
CV-102	DS	85	1	0.71	1	45.0	-	-	-
	US	138	11	4.78	11	56.3	14.3	47	97
	Total	223	12	3.23	12	55.3	14.0	45	97
CV-099	DS	212	6	1.70	6	85.3	14.4	73	111
	US	228	3	0.79	2	112.0	1.4	111	113
	Total	440	9	1.23	8	92.0	17.4	73	113
CV-085	DS	96	0	0.00	-	-	-	-	-

Location ID	Transect ¹	Electrofishing Duration (s)	Total Catch ²	CPUE ³	Fork Length (mm) ⁴				
					n	Mean	SD	Min	Max
	US	170	1	0.35	1	83.0	-	-	-
	Total	266	1	0.23	1	83.0	-	-	-
CV-079	DS	181	10	3.31	8	65.3	11.5	53	91
	US	144	7	2.92	7	102.7	16.3	72	122
	Total	325	17	3.14	15	82.7	23.6	53	122
CV-078	DS	296	3	0.61	3	83.7	20.5	61	101
	US	194	0	0.00	-	-	-	-	-
	Total	490	3	0.37	3	83.7	20.5	61	101
CV-076	DS	167	17	6.11	11	71.8	23.1	44	113
	US	175	11	3.77	7	68.1	9.4	50	77
	Total	342	28	4.91	18	70.4	18.7	44	113
CV-072	DS	244	18	4.43	14	71.4	11.0	51	94
	US	221	5	1.36	3	109.3	4.9	106	115
	Total	465	23	2.97	17	78.1	18.0	51	115
CV-061	DS	137	11	4.82	11	57.4	9.5	43	70
	US	124	5	2.42	5	89.4	14.0	67	105
	Total	261	16	3.68	16	67.4	18.7	43	105
CV-061b	DS	61	7	6.89	7	55.1	6.8	46	65
	US	119	0	0.00	-	-	-	-	-
	Total	180	7	2.33	7	55.1	6.8	46	65
CV-060	DS	176	8	2.73	8	85.0	24.0	45	110
	US	200	12	3.60	6	88.2	24.1	51	113
	Total	376	20	3.19	14	86.4	23.1	45	113
CV-059	DS	150	5	2.00	3	83.3	21.5	69	108
	US	203	6	1.77	2	85.0	1.4	84	86
	Total	353	11	1.87	5	84.0	15.2	69	108
CV-058	DS	219	0	0.00	-	-	-	-	-
	US	204	3	0.88	3	75.0	6.6	68	81
	Total	423	3	0.43	3	75.0	6.6	68	81
CV-057	DS	231	3	0.78	3	75.3	15.4	65	93
	US	272	2	0.44	2	139.0	43.8	108	170
	Total	503	5	0.60	5	100.8	42.6	65	170
BG-50 ^{5,8}	DS	-	-	-	-	-	-	-	-
	US	-	-	-	-	-	-	-	-
	Total	-	-	-	-	-	-	-	-
CV-049	DS	204	12	3.53	11	120.2	20.7	85	145
	US	142	1	0.42	1	155.0	-	-	-

Location ID	Transect ¹	Electrofishing Duration (s)	Total Catch ²	CPUE ³	Fork Length (mm) ⁴				
					n	Mean	SD	Min	Max
CV-040	Total	346	13	2.25	12	123.1	22.2	85	155
	DS	210	1	0.29	0	-	-	-	-
	US	146	0	0.00	-	-	-	-	-
	Total	356	1	0.17	-	-	-	-	-
CV-211	DS	124	0	0.00	-	-	-	-	-
	US	244	0	0.00	-	-	-	-	-
	Total	368	0	0.00	-	-	-	-	-
CV-212	DS	180	0	0.00	-	-	-	-	-
	US	119	0	0.00	-	-	-	-	-
	Total	299	0	0.00	-	-	-	-	-
BG-33	DS	105	2	1.14	2	163.0	111.7	84	242
	US	166	0	0.00	-	-	-	-	-
	Total	271	2	0.44	2	163.0	111.7	84	242
CV-030	DS	108	0	0.00	-	-	-	-	-
	US	222	0	0.00	-	-	-	-	-
	Total	330	0	0.00	-	-	-	-	-
BG-32	DS	149	1	0.40	1	58.0	-	-	-
	US	159	1	0.38	1	57.0	-	-	-
	Total	308	2	0.39	2	57.5	0.7	57	58
CV-214	DS	98	2	1.22	2	52.5	10.6	45	60
	US	155	2	0.77	2	50.5	4.9	47	54
	Total	253	4	0.95	4	51.5	6.9	45	60
CV-215	DS	192	10	3.13	10	64.9	14.3	46	85
	US	94	0	0.00	-	-	-	-	-
	Total	286	10	2.10	10	64.9	14.3	46	85
CV-217 ⁵	DS	-	-	-	-	-	-	-	-
	US	-	-	-	-	-	-	-	-
	Total	-	-	-	-	-	-	-	-
CV-216	DS	191	0	0.00	-	-	-	-	-
	US	220	6	1.64	5	52.8	5.6	45	60
	Total	411	6	0.88	5	52.8	5.6	45	60
BG-30 ⁷	DS	380	32	5.05	16	68.8	11.2	55	95
	US	258	0	0.00	-	-	-	-	-
	Total	638	32	3.01	16	68.8	11.2	55	95
BG-29	DS	289	27	5.61	27	96.7	50.5	40	220
	US	96	4	2.50	4	60.0	7.1	55	70
	Total	385	31	4.83	31	91.9	48.7	40	220

Location ID	Transect ¹	Electrofishing Duration (s)	Total Catch ²	CPUE ³	Fork Length (mm) ⁴				
					n	Mean	SD	Min	Max
CV-021	DS	232	19	4.91	19	63.8	21.9	30	108
	US	207	0	0.00	-	-	-	-	-
	Total	439	19	2.60	19	63.8	21.9	30	108
BG-27	DS	179	57	19.11	50	66.0	16.5	44	131
	US	156	5	1.92	5	98.6	25.4	72	138
	Total	335	62	11.10	55	69.0	19.6	44	138
BG-24	DS	446	27	3.63	27	75.1	36.0	42	199
	US	185	4	1.30	4	163.8	34.5	135	210
	Total	631	31	2.95	31	86.5	46.4	42	210
BG-17	DS	216	5	1.39	5	64.8	14.3	56	90
	US	179	1	0.34	1	60.0	-	-	-
	Total	395	6	0.91	6	64.0	13.0	56	90
BG-04	DS	284	1	0.21	1	84.0	-	-	-
	US	282	2	0.43	0	-	-	-	-
	Total	566	3	0.32	1	84.0	-	-	-
CV-001	DS	172	0	0.00	-	-	-	-	-
	US	243	1	0.25	1	130.0	-	-	-
	Total	415	1	0.14	1	130.0	-	-	-
BG-03	DS	179	0	0.00	-	-	-	-	-
	US	189	0	0.00	-	-	-	-	-
	Total	368	0	0.00	-	-	-	-	-
CV-223 ⁵	DS	-	-	-	-	-	-	-	-
	US	-	-	-	-	-	-	-	-
	Total	-	-	-	-	-	-	-	-
CV-224	DS	158	27	10.25	24	75.3	22.6	38	145
	US	191	13	4.08	11	93.8	18.4	75	134
	Total	349	40	6.88	35	81.1	22.9	38	145
CV-225	DS	241	22	5.48	17	97.1	25.7	65	154
	US	185	8	2.59	5	130.2	11.9	119	149
	Total	426	30	4.23	22	104.6	27.0	65	154
BG-01	DS	222	28	7.57	23	93.5	27.7	71	200
	US	240	24	6.00	17	136.8	39.8	80	215
	Total	462	52	6.75	40	111.9	39.4	71	215
CV-186	DS	250	36	8.64	18	79.2	18.7	62	136
	US	208	0	0.00	-	-	-	-	-
	Total	458	36	4.72	18	79.2	18.7	62	136

Location ID	Transect ¹	Electrofishing Duration (s)	Total Catch ²	CPUE ³	Fork Length (mm) ⁴				
					n	Mean	SD	Min	Max
CV-187	DS	250	1	0.24	0	-	-	-	-
	US	205	0	0.00	-	-	-	-	-
	Total	455	1	0.13	0	-	-	-	-

DS = downstream; US = upstream; CPUE = catch-per-unit-effort; n = sample size; SD = standard deviation; Min = minimum; Max = maximum.

1 - DS = 50-m transect downstream of the Tote Road crossing; US = 50-m transect upstream of the Tote Road crossing.

2 - Includes fish that were observed while electrofishing but were not captured.

3 - CPUE = Catch-per-unit-effort (# fish/minute).

4 - n = number of fish measured for fork length (may not equal total catch); SD = standard deviation.

5 - Observational survey only in spring 2024: bridge sites and larger streams (CV-128, BG-50, CV-217, CV-223) that were too fast, deep, and/or had challenging uneven substrate to effectively and safely electrofish.

6 - Site was nearly dry in spring 2024 and not electrofished.

7 - Large, deep pond upstream of the culverts at BG-30 cannot be effectively electrofished, but many juvenile char observed.

8 - The culvert channel at BG-50 could not be fished in spring 2024 due to an electrofisher malfunction during the site visit.

TABLE 5 NINESPINE STICKLEBACK CATCH DATA FROM FISH-BEARING STREAM CROSSINGS ALONG THE TOTE ROAD, SPRING 2024

Location ID	Transect ¹	Electrofishing Duration (s)	Total Catch ²	CPUE ³	Fork Length (mm) ⁴				
					n	Mean	SD	Min	Max
CV-129	DS	268	3	0.67	3	31.7	9.3	24	42
	US	216	0	0.00	-	-	-	-	-
	Total	484	3	0.37	3	31.7	9.3	24	42
CV-128a	DS	145	2	0.83	2	27.0	5.7	23	31
	US	155	1	0.39	1	68.0	-	-	-
	Total	300	3	0.60	3	40.7	24.0	23	68
CV-128 ⁵	DS	-	-	-	-	-	-	-	-
	US	-	-	-	-	-	-	-	-
	Total	-	-	-	-	-	-	-	-
CV-115 ⁶	DS	-	-	-	-	-	-	-	-
	US	-	-	-	-	-	-	-	-
	Total	-	-	-	-	-	-	-	-
CV-114	DS	457	0	0.00	-	-	-	-	-
	US	380	0	0.00	-	-	-	-	-
	Total	837	0	0.00	-	-	-	-	-
CV-112	DS	202	0	0.00	-	-	-	-	-
	US	240	0	0.00	-	-	-	-	-
	Total	442	0	0.00	-	-	-	-	-
CV-111	DS	174	0	0.00	-	-	-	-	-
	US	146	0	0.00	-	-	-	-	-
	Total	320	0	0.00	-	-	-	-	-
CV-106	DS	114	0	0.00	-	-	-	-	-
	US	89	0	0.00	-	-	-	-	-
	Total	203	0	0.00	-	-	-	-	-
CV-104	DS	389	0	0.00	-	-	-	-	-
	US	185	0	0.00	-	-	-	-	-
	Total	574	0	0.00	-	-	-	-	-
CV-102	DS	85	0	0.00	-	-	-	-	-
	US	138	0	0.00	-	-	-	-	-
	Total	223	0	0.00	-	-	-	-	-
CV-099	DS	212	0	0.00	-	-	-	-	-
	US	228	0	0.00	-	-	-	-	-
	Total	440	0	0.00	-	-	-	-	-
CV-085	DS	96	0	0.00	-	-	-	-	-
	US	170	0	0.00	-	-	-	-	-

Location ID	Transect ¹	Electrofishing Duration (s)	Total Catch ²	CPUE ³	Fork Length (mm) ⁴				
					n	Mean	SD	Min	Max
	Total	266	0	0.00	-	-	-	-	-
CV-079	DS	181	0	0.00	-	-	-	-	-
	US	144	0	0.00	-	-	-	-	-
	Total	325	0	0.00	-	-	-	-	-
CV-078	DS	296	0	0.00	-	-	-	-	-
	US	194	0	0.00	-	-	-	-	-
	Total	490	0	0.00	-	-	-	-	-
CV-076	DS	167	0	0.00	-	-	-	-	-
	US	175	0	0.00	-	-	-	-	-
	Total	342	0	0.00	-	-	-	-	-
CV-072	DS	244	0	0.00	-	-	-	-	-
	US	221	0	0.00	-	-	-	-	-
	Total	465	0	0.00	-	-	-	-	-
CV-061	DS	137	0	0.00	-	-	-	-	-
	US	124	0	0.00	-	-	-	-	-
	Total	261	0	0.00	-	-	-	-	-
CV-061b	DS	61	0	0.00	-	-	-	-	-
	US	119	0	0.00	-	-	-	-	-
	Total	180	0	0.00	-	-	-	-	-
CV-060	DS	176	0	0.00	-	-	-	-	-
	US	200	0	0.00	-	-	-	-	-
	Total	376	0	0.00	-	-	-	-	-
CV-059	DS	150	0	0.00	-	-	-	-	-
	US	203	0	0.00	-	-	-	-	-
	Total	353	0	0.00	-	-	-	-	-
CV-058	DS	219	0	0.00	-	-	-	-	-
	US	204	0	0.00	-	-	-	-	-
	Total	423	0	0.00	-	-	-	-	-
CV-057	DS	231	0	0.00	-	-	-	-	-
	US	272	0	0.00	-	-	-	-	-
	Total	503	0	0.00	-	-	-	-	-
BG-50 ^{5,8}	DS	-	-	-	-	-	-	-	-
	US	-	-	-	-	-	-	-	-
	Total	-	-	-	-	-	-	-	-
CV-049	DS	204	0	0.00	-	-	-	-	-
	US	142	0	0.00	-	-	-	-	-
	Total	346	0	0.00	-	-	-	-	-

Location ID	Transect ¹	Electrofishing Duration (s)	Total Catch ²	CPUE ³	Fork Length (mm) ⁴				
					n	Mean	SD	Min	Max
CV-040	DS	210	0	0.00	-	-	-	-	-
	US	146	0	0.00	-	-	-	-	-
	Total	356	0	0.00	-	-	-	-	-
CV-211	DS	124	0	0.00	-	-	-	-	-
	US	244	0	0.00	-	-	-	-	-
	Total	368	0	0.00	-	-	-	-	-
CV-212	DS	180	0	0.00	-	-	-	-	-
	US	119	0	0.00	-	-	-	-	-
	Total	299	0	0.00	-	-	-	-	-
BG-33	DS	105	1	0.57	1	50.0	-		
	US	166	0	0.00	-	-	-	-	-
	Total	271	1	0.22	1	50.0	-	-	-
CV-030	DS	108	0	0.00	-	-	-	-	-
	US	222	6	1.62	6	49.7	15.4	33	67
	Total	330	6	1.09	6	49.7	15.4	33	67
BG-32	DS	149	0	0.00	-	-	-	-	-
	US	159	0	0.00	-	-	-	-	-
	Total	308	0	0.00	-	-	-	-	-
CV-214	DS	98	10	6.12	10	38.4	15.2	20	66
	US	155	2	0.77	2	33.5	0.7	33	34
	Total	253	12	2.85	12	37.6	13.9	20	66
CV-215	DS	192	11	3.44	11	28.9	9.2	21	52
	US	94	0	0.00	-	-	-	-	-
	Total	286	11	2.31	11	28.9	9.2	21	52
CV-217 ⁵	DS	-	-	-	-	-	-	-	-
	US	-	-	-	-	-	-	-	-
	Total	-	-	-	-	-	-	-	-
CV-216	DS	191	0	0.00	-	-	-	-	-
	US	220	1	0.27	0	-	-	-	-
	Total	411	1	0.15	0	-	-	-	-
BG-30 ⁷	DS	380	0	0.00	-	-	-	-	-
	US	258	0	0.00	-	-	-	-	-
	Total	638	0	0.00	-	-	-	-	-
BG-29	DS	289	2	0.42	2	52.5	3.5	50	55
	US	96	4	2.50	4	38.8	11.1	25	50
	Total	385	6	0.94	6	43.3	11.3	25	55

Location ID	Transect ¹	Electrofishing Duration (s)	Total Catch ²	CPUE ³	Fork Length (mm) ⁴				
					n	Mean	SD	Min	Max
CV-021	DS	232	15	3.88	15	45.5	12.2	19	60
	US	207	0	0.00	-	-	-	-	-
	Total	439	15	2.05	15	45.5	12.2	19	60
BG-27	DS	179	0	0.00	-	-	-	-	-
	US	156	0	0.00	-	-	-	-	-
	Total	335	0	0.00	-	-	-	-	-
BG-24	DS	446	0	0.00	-	-	-	-	-
	US	185	0	0.00	-	-	-	-	-
	Total	631	0	0.00	-	-	-	-	-
BG-17	DS	216	0	0.00	-	-	-	-	-
	US	179	1	0.34	1	40.0	-	-	-
	Total	395	1	0.15	1	40.0	-	-	-
BG-04	DS	284	4	0.85	4	40.0	4.3	34	44
	US	282	1	0.21	1	55.0	-	-	-
	Total	566	5	0.53	5	43.0	7.7	34	55
CV-001	DS	172	0	0.00	-	-	-	-	-
	US	243	0	0.00	-	-	-	-	-
	Total	415	0	0.00	-	-	-	-	-
BG-03	DS	179	2	0.67	2	50.0	7.1	45	55
	US	189	0	0.00	-	-	-	-	-
	Total	368	2	0.33	2	50.0	7.1	45	55
CV-223 ⁵	DS	-	-	-	-	-	-	-	-
	US	-	-	-	-	-	-	-	-
	Total	-	-	-	-	-	-	-	-
CV-224	DS	158	6	2.28	6	45.8	10.7	38	66
	US	191	0	0.00	-	-	-	-	-
	Total	349	6	1.03	6	45.8	10.7	38	66
CV-225	DS	241	0	0.00	-	-	-	-	-
	US	185	0	0.00	-	-	-	-	-
	Total	426	0	0.00	-	-	-	-	-
BG-01	DS	222	3	0.81	3	74.3	19.4	52	87
	US	240	0	0.00	-	-	-	-	-
	Total	462	3	0.39	3	74.3	19.4	52	87
CV-186	DS	250	0	0.00	-	-	-	-	-
	US	208	0	0.00	-	-	-	-	-
	Total	458	0	0.00	-	-	-	-	-

Location ID	Transect ¹	Electrofishing Duration (s)	Total Catch ²	CPUE ³	Fork Length (mm) ⁴				
					n	Mean	SD	Min	Max
CV-187	DS	250	0	0.00	-	-	-	-	-
	US	205	0	0.00	-	-	-	-	-
	Total	455	0	0.00	-	-	-	-	-

1 - DS = 50-m transect downstream of the Tote Road crossing; US = 50-m transect upstream of the Tote Road crossing.

2 - Includes fish that were observed while electrofishing but were not captured.

3 - CPUE = Catch-per-unit-effort (# fish/minute).

4 - n = number of fish measured for fork length (may not equal total catch); SD = standard deviation.

5 - Observational survey only in spring 2024: bridge sites and larger streams (CV-128, BG-50, CV-217, CV-223) that were too fast, deep, and/or had challenging uneven substrate to effectively and safely electrofish.

6 - Site was nearly dry in spring 2024 and not electrofished.

7 - Large, deep pond upstream of the culverts at BG-30 cannot be effectively electrofished, but many juvenile char observed.

8 – The culvert channel at BG-50 could not be fished in spring 2024 due to an electrofisher malfunction during the site visit.

TABLE 6. SUMMARY OF FISH HABITAT STATUS, FISH PASSAGE, AND REMEDIATION WORK ALONG THE TOTE ROAD IN 2024

Location ID	Fish Habitat at Crossing (Y/N)	Fish Captured / Observed DS in 2024	Fish Captured / Observed US in 2024	Potential Project-Related Fish Passage or Habitat Issues	Recommended Remediation Actions ¹
CV-129	Y	Y	Y	YES - Slight perch; damaged culvert requires repair.	Small height of perch, not currently impeding fish passage but may in the future. Repair damaged culvert.
CV-128a	Y	Y	Y	NONE - Blockage of culvert under old road observed in previous years not an issue in 2024.	Recommend removing old road to avoid potential future blockages.
CV-128	Y	Y	Y	NONE	N/A
CV-115	Y	N	N	NONE	N/A
CV-114	Y	Y	N	YES - Both culverts perched.	Site to be remediated as per approvals
CV-112	Y	Y	Y	NONE	Site to be remediated as per approvals
CV-111	Y	Y	Y	YES - Culvert has a significant perch that is preventing upstream movements; fish may also access upstream habitat from an upstream lake	Site to be remediated as per approvals
CV-106	Y	Y	N	YES - Site remediated in winter 24 but apron and in-culvert material oversized, resulting in impassable subsurface flows following freshet	Culvert apron was remediated to improve passage in July 2024.
CV-104	Y	Y	N	NONE	N/A
CV-102	Y	Y	Y	YES - Site remediated in winter 24 but apron and in-culvert material oversized, resulting in impassable subsurface flows following freshet. Char upstream of the crossing were stranded at the time of the survey.	Culvert apron was remediated to improve passage in July 2024
CV-099	Y	Y	Y	NONE	N/A
CV-085	Y	N	Y	NONE	N/A
CV-079	Y	Y	Y	NONE	Site to be remediated as per approvals
CV-078	Y	Y	N	NONE	Site to be remediated as per approvals
CV-076	Y	Y	Y	NONE	N/A
CV-072	Y	Y	Y	NONE	N/A

Location ID	Fish Habitat at Crossing (Y/N)	Fish Captured / Observed DS in 2024	Fish Captured / Observed US in 2024	Potential Project-Related Fish Passage or Habitat Issues	Recommended Remediation Actions ¹
CV-061	Y	Y	Y	YES – Culvert is slightly perched when water levels are very low (as in spring 2024).	Road has redirected upstream overland flows from a large area into one culvert crossing, resulting in ponding upstream and creation of a channel downstream that were not present prior to road construction. If necessary, remove perching via rocky ramp.
CV-061b	Y	Y	N	YES – Culverts become moderately perched when water levels are very low (as in spring 2024).	Persistent perched culvert but there would be no upstream habitat without the road concentrating overland meltwater flows. Habitat downstream of the culvert consists of backwatering from Katiktok Lake during spring. If necessary, remove perching via rocky ramp.
CV-060	Y	Y	Y	NONE	N/A
CV-059	Y	Y	Y	NONE	Remediated in winter 2024. No current fish passage issues.
CV-058	Y	N	Y	NONE	N/A
CV-057	Y	Y	Y	NONE	Remediated in winter 20/24. No current fish passage issues.
BG-50	Y	N/A	N/A	YES - Culverts remain perched and impassable. However, fish can access upstream habitat via the channel crossed by the bridge.	Site to be remediated as per approvals
CV-049	Y	Y	Y	NONE	Monitor emergency culvert repairs
CV-040	Y	Y	N	NONE	N/A
CV-211	P	N	N	NONE	N/A
CV-212	Y	N	N	NONE	N/A
BG-33	Y	Y	N	YES - Upstream flow was subsurface under aggregate placed to control erosion. Very low water levels in spring 2024 also resulted in loss of step-pool connectivity at the downstream end of the culvert.	Adjust upstream aggregate and adjust downstream step-pool to better withstand low water levels.
CV-030	Y	N	Y	NONE	N/A
BG-32	Y	Y	Y	NONE	N/A

Location ID	Fish Habitat at Crossing (Y/N)	Fish Captured / Observed DS in 2024	Fish Captured / Observed US in 2024	Potential Project-Related Fish Passage or Habitat Issues	Recommended Remediation Actions ¹
CV-214	Y	Y	Y	YES - Very low water levels in spring 2024 resulted in slight perch but fish passage likely unaffected. Char were observed upstream of the crossing in spring 2024.	Monitor perching.
CV-215	Y	Y	N	YES - Very low water levels in spring 2024 resulted in slight perch.	Monitor perching.
CV-217	Y	N	N	NONE	N/A
CV-216	Y	N	Y	YES – Site remediated in winter 2023/24. Sediment accumulation among newly placed boulders in culvert and apron, especially upstream. Fish captured upstream. Geotechnical instability experienced at crossing following monitoring visit.	Removal of some boulders from the channel may be required. Site remediated in 224. Further work required due to geotechnical challenges
BG-30	Y	Y	Y	NONE	Site to be remediated as per approvals
BG-29	Y	Y	Y	NONE	N/A
CV-021	Y	N	Y	NONE	N/A
BG-27	Y	Y	Y	YES – Two of three culverts badly damaged.	Site to be remediated as per approvals
BG-24	Y	Y	Y	NONE	Site to be remediated as per approvals
BG-17	Y	Y	Y	NONE	Site to be remediated as per approvals
BG-04	Y	Y	Y	NONE	Remediated in winter 24. No current fish passage issues but large size of apron material could cause issues under water levels lower than those occurring during the survey.
CV-001	Y	N	Y	NONE	Remediated in winter 24. No current fish passage issues.
BG-03	Y	Y	N	YES – Step-pool approach to culvert may not be suitable for stickleback use.	Adjustments could be made to the step-pool to enhance passage.
CV-223	Y	Y	Y	NONE	N/A
CV-224	Y	Y	Y	YES – Small perch at both culverts.	Site to be remediated as per approvals

Location ID	Fish Habitat at Crossing (Y/N)	Fish Captured / Observed DS in 2024	Fish Captured / Observed US in 2024	Potential Project-Related Fish Passage or Habitat Issues	Recommended Remediation Actions ¹
CV-225	Y	Y	N	YES - Moderate to large perch at both culverts and high velocity flows are typical through the culverts in spring. Old road crossing embankments continue to obstruct flows to one of the downstream branches of this stream.	Site to be remediated as per approvals
BG-01	Y	Y	N	NONE	Site to be remediated as per approvals
CV-186	Y	Y	N	YES - Both culverts now badly damaged and perched at the downstream end. No fish captured or observed upstream and fish passage may now be largely obstructed.	New culvert installation to restore fish passage and improve sediment and erosion control.
CV-187	Y	Y	N	NONE	N/A

Note: erosion is an issue at all unremediated crossings

TABLE 7. INSTALLATION SUMMARY OF REMAINING HADD AND HABITAT COMPENSATION SITES ALONG THE TOTE ROAD

Crossing ID	UTM ¹		Crossing Size Classification	Authorization (HADD or Compensation) ²	Initial Work Completion Date ³	Additional Work Completion Date ⁴	Years Monitored	Additional Monitoring Required
	Easting	Northing						
CV-129	512381	7966783	Large	HADD	17-Sep-07	July 2011 Winter 2014/15 September 2019 September 2020	2008-2024	Continue monitoring of rocky ramp for successful passage and if any changes are made to the culverts
CV-128	513556	7965889	Extra-large	HADD	23-Sep-07	Winter 2013/14 March 2017	2009-2024	Routine Only
CV-114	520278	7956528	Medium	HADD	29-Sep-07	July 2011 September 2019 September 2020	2009-2024	Once alternative remediation is complete monitor success of measures
CV-111	521355	7954524	Medium	HADD	28-Sep-07	Winter 2018/19 September 2019	2009-2024	Once alternative remediation is complete monitor success of measures
CV-104	521732	7952788	Medium	HADD	01-Oct-07	November 2016	2009-2024	Routine Only
CV-099	521886	7948843	Large	HADD	04-Oct-07	Winter 2014/15 December 2017	2008-2024	Routine Only
CV-079	525538	7937314	Large	HADD	08-Jul-08	June 2018	2008-2024	Once alternative remediation is complete monitor success of measures
CV-078	525852	7936787	Large	HADD	09-Jul-08	N/A	2008-2024	Once alternative remediation is complete monitor success of measures
CV-072	526897	7934576	Large	HADD	05-Mar-08	N/A	2009-2024	Routine Only
CV-060	527622	7930342	Medium	HADD	27-Feb-08	N/A	2009-2024	Routine Only
BG-50	529294	7926852	Extra-large	HADD	30-Oct-07	Winter 2013/14 Winter 2014/15 November 2016 September 2019	2008-2024	Once alternative remediation is complete monitor success of measures
CV-049	529654	7926545	Large	HADD	10-Mar-08	N/A	2009-2024	Routine Only

Crossing ID	UTM ¹		Crossing Size Classification	Authorization (HADD or Compensation) ²	Initial Work Completion Date ³	Additional Work Completion Date ⁴	Years Monitored	Additional Monitoring Required
	Easting	Northing						
BG-32	540729	7921597	Large	HADD	04-Apr-08	August 2012 September 2017	2009-2024	Routine Only
CV-217	542321	7922189	Extra-large	HADD	17-Apr-08	Winter 2013/14 Winter 2014/15 March 2017	2009-2024	Routine Only
CV-216	542764	7921724	Large	HADD	08-Jun-08	October 2017 September 2019 September 2020 Winter 2024	2009-2024	Site remediated in winter 2024, further scheduled. Continue to monitor results.
BG-30	546070	7919844	Small	Compensation - RA	2012	August 2012	2010-2024	Routine monitoring and maintenance of constructed fishway
BG-24	548766	7918878	Medium	HADD	15-May-08	N/A	2008-2024	Once alternative remediation is complete monitor success of measures
BG-17	550703	7917643	Large	HADD	09-May-08	N/A	2009-2024	Once alternative remediation is complete monitor success of measures
BG-04	553250	7915100	Medium	HADD	05-May-08	August 2012 February 2018 June 2018 Winter 2024	2009-2024	Site remediated in winter 2024. Continue to monitor results.
CV-001	553544	7914897	Small	Compensation - RH	08-May-08	Winter 2014/15 Winter 2024	2009-2024	Site remediated in winter 2024. Continue to monitor results.
CV-223	555705	7914676	Extra-large	HADD	03-May-08	Winter 2013/14	2008-2024	Routine Only
CV-224	556238	7915044	Medium	HADD	04-May-08	January 2018	2008-2024	Once alternative remediation is complete monitor success of measures

Crossing ID	UTM ¹		Crossing Size Classification	Authorization (HADD or Compensation) ²	Initial Work Completion Date ³	Additional Work Completion Date ⁴	Years Monitored	Additional Monitoring Required
	Easting	Northing						
CV-225	557421	7915187	Large	HADD	21-Sep-07	August 2010 Winter 2014/15 September 2019	2008-2024	Once alternative remediation is complete monitor success of measures
BG-01	558000	7914928	Medium	HADD	20-Sep-07	August 2010 October 2017 September 2019	2008-2024	Once alternative remediation is complete monitor success of measures
CV-187	560957	7913414	Small	Compensation - RH	14-Jun-08	N/A	2008-2024	Routine Only

1 - NAD 83, Zone 17

2 - Includes current HADD and compensation sites and not those eliminated from calculations following 2010 surveys; RA = restored access, RH = restored habitat

3 - Includes work outlined during the initial planning and construction phase

4 - Includes repair work, installation of fish access improvement structures, ERP upgrades, and remediation work

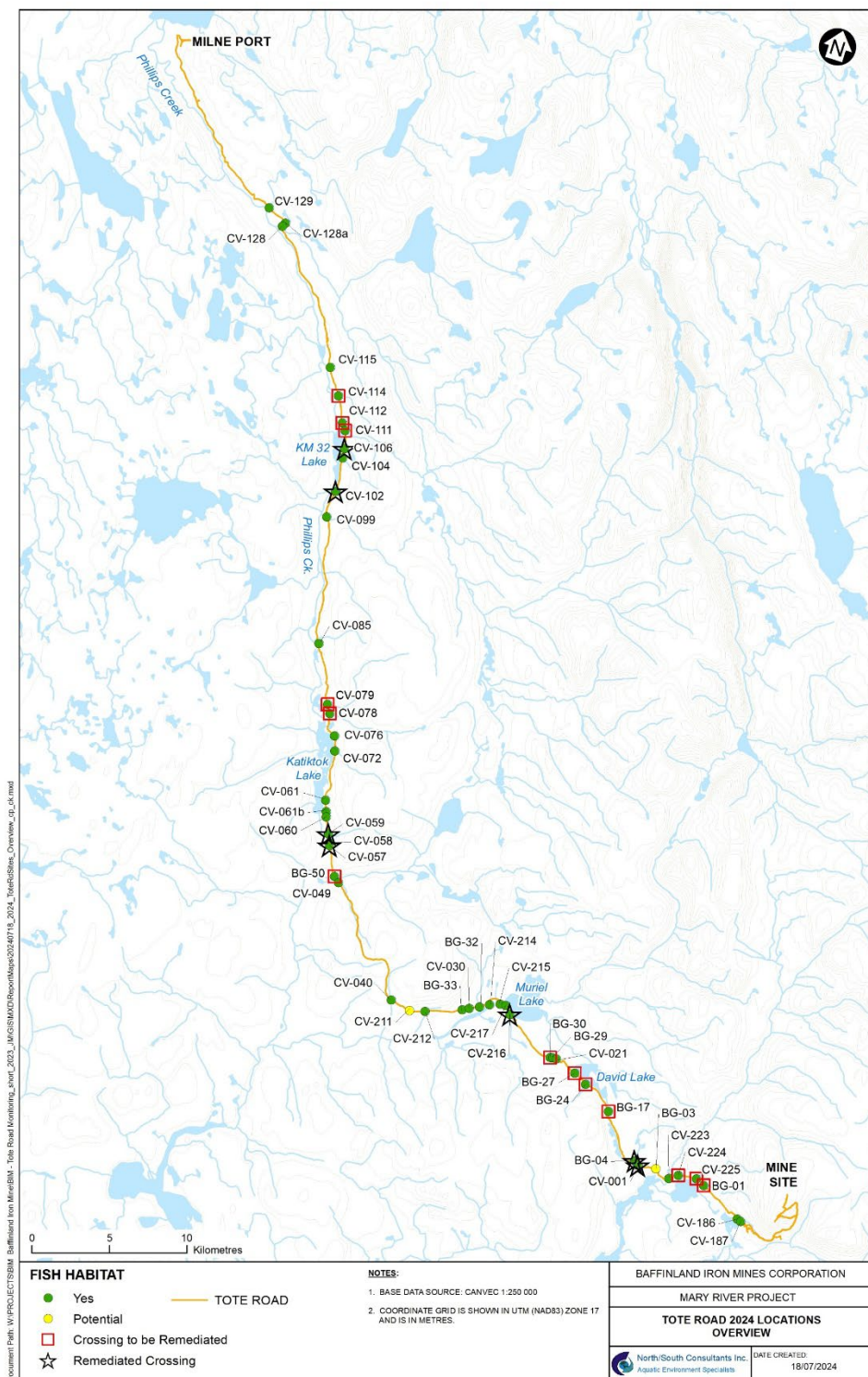


FIGURE 1. MAP OF TOTE ROAD SITES SURVEYED IN SPRING 2024 FISH AND FISH HABITAT ASSESSMENT FIELD PROGRAMS

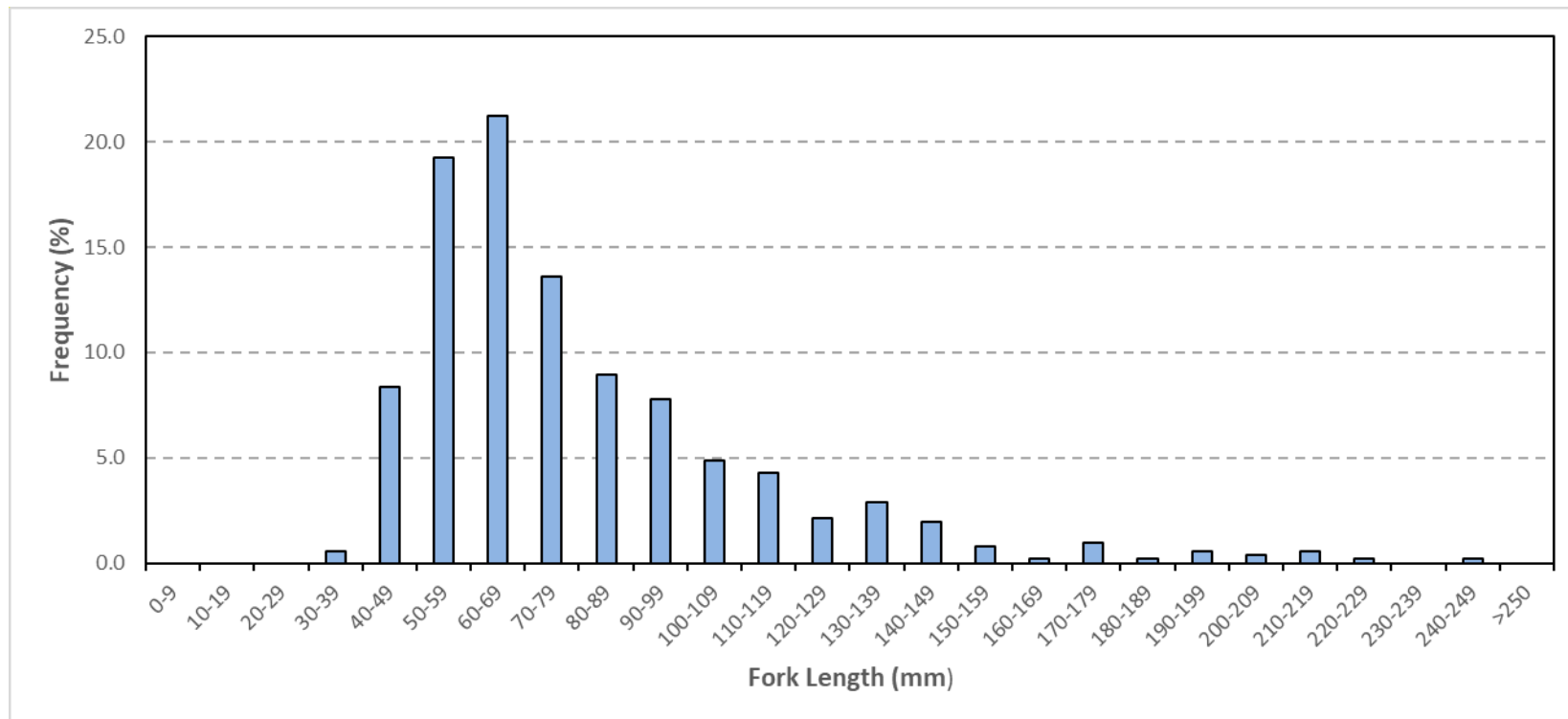


FIGURE 2. FORK LENGTH-FREQUENCY FOR ALL ARCTIC CHAR CAPTURED DURING SPRING 2024 SURVEYS OF FISH-BEARING SITES ALONG THE TOTE ROAD

APPENDIX A

DFO AUTHORIZATIONS AND AMENDMENTS



September 20, 2013

our file

Voire référence

Our file

Notre référence

07-HCAA-CA7-00050

Oliver Curran
Baffinland Iron Mines Corporation
2275 Upper Middle Road East, Suite 300
Oakville, ON
L6H 0C3

Dear Mr. Curran:

Subject: Proposal not likely to result in impacts to fish and fish habitat.

Fisheries and Oceans Canada – Fisheries Protection Program (DFO) received your proposal on August 29, 2013. Please refer to the file number and title below:

DFO File No.: **07-HCAA-CA7-00050**

Title: **Mary River Iron Ore Project, Baffin Island (Baffinland), Nunavut**

You may be aware of changes to the *Fisheries Act*, however these have not affected the review of your project at this time. For more information on current changes to the *Fisheries Act* please refer to the DFO website at www.dfo-mpo.gc.ca/media/infocus-alaune/2012/habitat-eng.htm.

Your proposal has been reviewed to determine whether it is likely to result in impacts to fish and fish habitat which are prohibited by the habitat protection provisions of the *Fisheries Act* or those prohibitions of the *Species at Risk Act* that apply to aquatic species.*

Our review consisted of:

Changes to Culverts along the Tote Road, Submission dated August 29, 2013 from Oliver Curran - Baffinland Iron Mines Corporation

Freshwater Aquatic Baseline Synthesis Report 2005-2011 (January 2012), Baffinland Iron Mines Corporation, Mary River Project, Prepared by North/South Consultants Inc.

*Those sections most relevant to the review of development proposals include 20, 22, 32 and 35 of the *Fisheries Act* and sections 32, 33 and 58 of the *Species at Risk Act*. For more information please visit www.dfo-mpo.gc.ca.

We understand that you propose to carry out the following culvert upgrades along the Tote Road:

Culvert ID	Proposed Culvert Diameter (m)	Proposed Culvert Length (m)	Area of Rip Rap (m2)	Proposed Culvert Upgrade
BG31A	1.2	19.5	24.96	Extend 1m left & 2.5m right
BG30	1	22	17.33	Extend 7m right
BG29	1	31	0	Extend 7.5m left & 8.5m right
BG27B	0.5	31	4.33	Extend 5m left & 8m right
BG27C	0.5	31	0	Extend 5m left & 8m right
BG27A	0.5	31	0	Extend 4.5m left & 8.5m right
BG17A	1.2	36.5	24.96	Extend 8m left & 13.5m right
BG17B	1.2	37.5	24.96	Extend 15.5m left & 7m right
BG04A	1.2	24	0	Extend 5.5m left & 3.5m right
BG04B	1.2	24	0	Extend 5m left & 4m right
CV224A	1	26	0	Extend 6m left & 5m right
CV224B	1	26.5	0	Extend 6.5m left & 5m right
CV225B	1.2	18	0	Replace with new length of 18m
CV225A	1	18.5	17.33	Replace with new length of 18.5m
BG01C	1.2	37	24.96	Extend 11m left & 8m right
BG01A	1.2	36.5	24.96	Extend 11.5m left & 7m right
BG01B	1.2	37	24.96	Extend 12m left & 7m right
BG01D	0.5	10	0	New Culvert
BG01F	0.5	18	0	New Culvert
BG01E	1.0	10	0	New Culvert
BG01G	0.5	23	0	New Culvert
CV186	1	27	0	Extend 6m left
CV187A	0.5	20.5	0	Extend 6m left & 4.5m right
CV187B	0.5	16	0	New Culvert
CV166A	1	23.5	17.33	Extend 8.5m right
CV166B	0.5	22.5	0	Extent 7.5m right
CV115A	0.5	17.5	0	Extend 2.5m left
CV115B	1	17	0	Extend 2m left

Provided that your plans are implemented as described DFO has concluded that your proposal is not likely to result in impacts to fish and fish habitat.

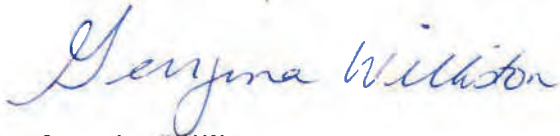
You will not need to obtain a formal approval from DFO in order to proceed with your proposal.

If the plans have changed or if the description of your proposal is incomplete you should contact this office to determine if the advice in this letter still applies.

Please be advised that any unauthorized impacts to fish and fish habitat which result from a failure to implement this proposal as described could lead to corrective action such as enforcement.

If you have any questions please contact the undersigned at (867) 669-4927 or by email at Georgina.Williston@dfo-mpo.gc.ca.

Yours sincerely,



Georgina Williston
Fisheries Protection Biologist

cc. Stuart Niven- Fisheries and Oceans Canada
Jim Millard- Baffinland Iron Mines Corporation
Bevin LeDrew- Sikumiut Environmental Management Ltd.



Fisheries and Oceans
Canada

Pêches et Océans
Canada

301-5204 50th Ave
Yellowknife, NT
X1A 1E2

Our file Notre référence
NU-07-0050

December 16, 2013

Baffinland Iron Mines Corp.
275 Upper Middle Road East Suite 300
Oakville, ON L6H 0C3

Dear Mr. Curran:

Subject: Implementation of mitigation measures to avoid and mitigate serious harm to fish.

The Fisheries Protection Program (the Program) of Fisheries and Oceans Canada received your proposal on August 28, 2013.

Your proposal has been reviewed to determine whether it is likely to result in serious harm to fish which is prohibited under subsection 35(1) of the *Fisheries Act*.

Our review consisted of:

Baffinland Submission: Tote Road Upgrade-Four Seacan Bridge Replacements, Tote Road Upgrade- Fish Bearing Culvert submission, Attachments 1 &2, August 2013.

We understand that you propose to: Upgrade the following crossings along the Tote Road.

The following seacan crossings will be removed and replaced with clear span bridges

- STA 17 (CV 128)
- STA 62 (BG50)
- STA 80 (CV 217)
- STA 97 (CV223)

The following culvert crossings will be upgraded as follows:

Culvert ID	Proposed Culvert Diameter (m)	Proposed Culvert Length (m)	Area of Rip Rap (m2)	Proposed works to be completed
CV217B	1.2	16	24.96	Extend 1m right
CV217C	1.2	16	24.96	Extend 1m right
CV217A	1.2	16	24.96	Extend 1m right
CV217D	0.15		0	Abandon
CV216B	1.2	17.5	0	Extend 1.5m left & 1m right
CV216C	1.2	16.5	0	Extend 1.5m left
CV216A	1.2	18.5	0	Extend 1.5m left & 2m right
CV216D	0.5	14.5	0	Replace with new length of 14.5m
CV216E	0.5	14	0	Abandon and replace with new length of 14m
CV216F	0.5	12	0	Replace with new length of 12m
CV223B	1.2	28	24.96	Extend 13m left
CV223C	1.2	28	24.96	Extend 13m left
CV223D	1.2	29	24.96	Extend 14m left
CV223A	2	24	69.33	Extend 14m left
CV223E	1.2	19.5	0	Extend 4.5m left
CV223F	1.2	19	0	Extend 4m left
CV115C	0.5	15.5	0	Extend 3.5m right
CV115D	0.5	17	4.33	Extend 8m left
CV114A	1	15.5	17.33	Extend 0.5m right
CV114B	0.5	14	0	Extend 5m left
CV114C	0.5	11	4.33	Replace with new length of 11m
CV114D	0.5	11.5	4.33	Extend 2m left & 0.5m right
CV112A	1.2	17.5	24.96	Extend 2.5m right
CV112B	0.5	24	0	Extend 9m right
CV112C	0.5	21	4.33	Extend 9m left
CV111	1	24	17.33	Extend 4.5m left & 1.5m right
CV106	1	19	17.33	Extend 4m left
CV104A	1.2	19	24.96	Extend 4m left
CV104B	1.2	19	24.96	Extend 4m left
CV102A	1	22.5	17.33	Extend 7.5m left
CV102B	0.5	21.5	0	Extend 6.5m left
CV102C	0.5	21.5	0	Extend 6.5m left
CV102D	0.5	20.5	0	Extend 5.5m left
CV099B	1.2	17	24.96	Replace with new length of 17m

Culvert ID	Proposed Culvert Diameter (m)	Proposed Culvert Length (m)	Area of rip rap (m2)	Proposed works to be completed
CV099A	1.2		0	Remove culvert
CV099C	2	18.5	69.33	Replace with new length of 18.5m
CV099D	0.5		0	Remove culvert
CV099E	0.5		0	Remove culvert
CV099F	0.5	14	0	Extend 2m right
CV087B	1.2	19	24.96	Extend 6.5m left & 0.5m right
CV087A	1.2	18.5	24.96	Extend 6m left & 0.5m right
CV087C	0.5	18	0	Extend 6m right
CV079B	1.2	16.5	0	Extend 1.5m left
CV079A	1.2	16.5	0	Extend 1.5m left
CV079C	0.15		0	Remove culvert
CV079D	0.15		0	Remove culvert
CV078A	1.2	16.5	0	Extend 1.5m left
CV078B	1	19.5	0	Extend 1.5m left
CV078C	1	19.5	0	Extend 1.5m left
CV078D	2	22	0	Extend 2m right
CV076	1	11.5	0	Replace with new length of 11.5m
CV072B	1.2	17.5	0	Replace with new length of 17.5m
CV072C	1.2	17.5	0	Replace with new length of 17.5m
CV072A	1.2	17.5	0	Replace with new length of 17.5m
CV060A	1	16.5	0	Extend 1.5m left
CV060B	1	16.5	0	Extend 1.5m left
CV059B	0.5	16.5	0	Extend 3.5m left & 1m right
CV059A	0.5	16	0	Extend 3m left & 1m right
CV059C	0.5	16.5	0	Extend 4m left & 0.5m right
CV059D	0.5	16.5	0	Extend 4m left & 0.5m right
CV057B	0.5	16.5	0	Extend 1.5m left
CV057C	0.5	16.5	0	Extend 1.5m left
CV057A	0.5	16.5	0	Extend 1.5m left
BG50A	1.2	33.5	24.96	Extend 15.5m left
BG50B	1.2	32	24.96	Extend 14m left
CV049A	1.2	24.5	24.96	Extend 5.5m left & 4m right
CV049B	1.2	24.5	24.96	Extend 4.5m left & 5m right
CV030A	1	16	0	Extend 1m left
CV030B	0.5	16	0	Extend 1m left

To avoid the potential of serious harm to fish and their habitat, we are recommending that the following mitigation measures be included into your plans.

- If in-stream work is required during the open water season it should be completed in the dry by de-watering the work area and diverting and/or pumping flows around cofferdams placed at the limits of the work area.
- Existing stream flows should be maintained downstream of the de-watered work area without interruption, during all stages of the work.
- A fish stranding program should be implemented if necessary by a qualified fisheries person, who is experienced in this area, immediately following isolation and prior to de-watering to ensure that fish are removed from any dewatered area and released alive immediately downstream of the work area.
- Flow dissipaters and/or filter bags, or equivalent, should be placed at water discharge points to prevent erosion and sediment release.
- Silt or debris that has accumulated around the temporary cofferdams should be removed prior to their withdrawal.

Provided that these mitigation measures are incorporated into your plans, the Program is of the view that your proposal will not result in serious harm to fish. No formal approval is required from the Program under the *Fisheries Act* in order to proceed with your proposal.

If your plans have changed or if the description of your proposal is incomplete, or changes in the future, you should consult our website (<http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html>) or consult with a qualified environmental consultant to determine if further review is required by the Program.

Please notify this office at least 10 days before starting your project. A copy of this letter should be kept on site while the work is in progress.

If you have any questions, please contact Georgina Williston at our Yellowknife office at 867-669-4927, by fax at 867-669-4940 or by email at geogina.williston@dfo-mpo.gc.ca. Please refer to the file number referenced above when corresponding with the Program.

Yours sincerely,



Stu Niven
Senior Fisheries Protection Biologist
Fisheries and Oceans Canada

Georgina Williston- Fisheries and Oceans Canada
Bevin LeDrew- Sikumiut Environmental Management Ltd.
Tessa Mackay- Hatch



Fisheries and Oceans Canada Pêches et Océans Canada

5204-50th Avenue
Yellowknife, NT
X1A 1E2

December 9, 2014

Your file *Votre référence*

Our file *Notre référence*
NU-07-0050

Baffinland Iron Mines Corp.
Attention: Jim Millard, Environmental Manager
2275 Upper Middle Road, Suite 300
Oakville, ON
L6H 0C3

Dear Mr. Millard:

Subject: Implementation of mitigation measures to avoid and mitigate impacts to fish and fish habitat and listed aquatic species at risk – Mary River Project

The Fisheries Protection Program (the Program) of Fisheries and Oceans Canada received your proposal on November 27, 2014.

Your proposal has been reviewed to determine whether it is likely to result in serious harm to fish which is prohibited under subsection 35(1) of the *Fisheries Act*.

Your proposal has also been reviewed to determine whether it will adversely impact listed aquatic species at risk and contravene sections 32, 33 or 58 of the *Species at Risk Act (SARA)*.

Our review considered the following:

- Letter from Baffinland Iron Mines RE: Realignment of Tote Road at Culvert CV099. Dated November 27, 2014 and submitted by James Millard, with 1 attachment.
- Attachment 1- Mark up of proposed field change, Drawing H349000-3000-10-012-0052

We understand that you propose to:

- Realign the existing Tote Road and install one 2 metre diameter culvert in the stream bed and two 1.2 metre overflow culverts. Culverts will be approximately 27 metres in length.

- Install culverts during the winter months when the stream is frozen to bottom.
- Remove existing culverts along the old Tote Road alignment.

Since there are no SARA species or their habitats identified in the project area, no additional approvals under SARA will be required for your proposed activities.

To avoid the potential for serious harm to fish that is prohibited under the *Fisheries Act*, the mitigation measures set out in your project plans are to be followed.

Provided that you implement the required mitigation measures for your project, and follow the guidance available on the DFO website at <http://www.dfo-mpo.gc.ca/pnw-ppe/measures/index-eng.html>, the Program is of the view that your proposal should not result in serious harm to fish or contravene sections 32, 33 or 58 of the *Species at Risk Act*. No formal approval is required from the Program under the *Fisheries Act* or the *Species at Risk Act* in order to proceed with your proposal.

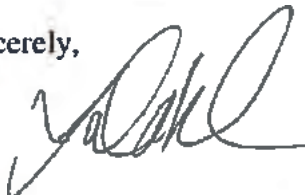
It remains your responsibility to ensure you avoid causing serious harm to fish in compliance with the *Fisheries Act*, and that you meet the requirements under the *Species at Risk Act* as it may apply to your project. If your plans have changed or if the description of your proposal is incomplete, or changes in the future, you should consult our website (<http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html>) or consult with a qualified environmental consultant to determine if further review is required by the Program.

Please be advised that it is also your *Duty to Notify* DFO if you have caused, or are about to cause, serious harm to fish that are part of or support a commercial, recreational or Aboriginal fishery. Such notifications should be directed to <http://www.dfo-mpo.gc.ca/pnw-ppe/violation-infraction/index-eng.html>.

A copy of this letter should be kept on site while the work is in progress. It remains your responsibility to meet all other federal or territorial requirements that apply to your project.

If you have any questions, please contact Georgina Williston at our Yellowknife office at 867-669-4927 or by email at Georgina.Williston@dfo-mpo.gc.ca. Please refer to the file number referenced above when corresponding with the Program.

Yours sincerely,



Julie Dahl
Regional Manager, Regulatory Reviews
Fisheries Protection Program

cc: Oliver Curran- Baffinland Iron Mines
Erik Madsen – Baffinland Iron Mines



5204-50th Avenue
Yellowknife, NT
X1A 1E2

October 27, 2014

Your file *Votre référence*

Our file *Notre référence*
NU-07-0050

Baffinland Iron Mines Corp.
Attention : Jim Millard, Environmental Manager
2275 Upper Middle Road, Suite 300
Oakville, ON
L6H 0C3

Dear Mr. Millard:

Subject: Implementation of mitigation measures to avoid and mitigate impacts to fish and fish habitat and listed aquatic species at risk – Mary River Project

The Fisheries Protection Program (the Program) of Fisheries and Oceans Canada received your proposal on October 17, 2014.

Your proposal has been reviewed to determine whether it is likely to result in serious harm to fish which is prohibited under subsection 35(1) of the *Fisheries Act*.

Your proposal has also been reviewed to determine whether it will adversely impact listed aquatic species at risk and contravene sections 32, 33 or 58 of the *Species at Risk Act* (SARA).

Our review considered the following:

- Letter from Baffinland Iron Mines RE: Realignment of Tote Road at Culvert CV225B. Dated October 16, 2014 and submitted by James Millard, with 2 attachments.
- Attachment 1- Mark of proposed field change, Drawing H349000-3000-10-012-0139
- Attachment 2- Project Wide, Civil Standard Drawing, Typical Culvert Detail, H349000-1000-10-041-0003

We understand that you propose to:

- Realign the existing Tote Road and install two new 1.2 metre culverts in the stream bed and one 1.0 metre culvert 45 m away as an overflow. Culverts will be approximately 27metres in length.

- Install culverts during the winter months when the stream is frozen to bottom.
- Remove the two existing 1.2m culverts along the old Tote Road alignment.

Since there are no *SARA* species or their habitats identified in the project area, no additional approvals under *SARA* will be required for your proposed activities.

To avoid the potential for serious harm to fish that is prohibited under the *Fisheries Act*, the mitigation measures set out in your project plans are to be followed.

Provided that you implement the required mitigation measures for your project, and follow the guidance available on the DFO website at <http://www.dfo-mpo.gc.ca/pnw-ppe/measures/index-eng.html>, the Program is of the view that your proposal should not result in serious harm to fish or contravene sections 32, 33 or 58 of the *Species at Risk Act*. No formal approval is required from the Program under the *Fisheries Act* or the *Species at Risk Act* in order to proceed with your proposal.

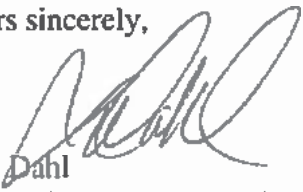
It remains your responsibility to ensure you avoid causing serious harm to fish in compliance with the *Fisheries Act*, and that you meet the requirements under the *Species at Risk Act* as it may apply to your project. If your plans have changed or if the description of your proposal is incomplete, or changes in the future, you should consult our website (<http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html>) or consult with a qualified environmental consultant to determine if further review is required by the Program.

Please be advised that it is also your *Duty to Notify* DFO if you have caused, or are about to cause, serious harm to fish that are part of or support a commercial, recreational or Aboriginal fishery. Such notifications should be directed to <http://www.dfo-mpo.gc.ca/pnw-ppe/violation-infraction/index-eng.html>.

A copy of this letter should be kept on site while the work is in progress. It remains your responsibility to meet all other federal or territorial requirements that apply to your project.

If you have any questions, please contact Georgina Williston at our Yellowknife office at 867-669-4927 or by email at Georgina.Williston@dfo-mpo.gc.ca. Please refer to the file number referenced above when corresponding with the Program.

Yours sincerely,



Julie Dahl
Regional Manager, Regulatory Reviews
Fisheries Protection Program

cc. Oliver Curran- Baffinland Iron Mines
Erik Madsen – Baffinland Iron Mines
Stu Niven – Fisheries and Oceans Canada



Suite 301 – 5204 59th Ave.
Yellowknife NT, X1A 1E2

Our file Notre référence
NU-07-0050

February 20, 2015

James Millard
Environmental Manager
Baffinland Iron Mines Corp.
275 Upper Middle Road East Suite 300
Oakville, ON L6H 0C3

Dear Mr. Millard:

Subject: Implementation of mitigation measures to avoid and mitigate serious harm to fish – Mary River Project, Tote Road Realignment.

The Fisheries Protection Program of Fisheries and Oceans Canada received your proposal on February 15, 2015.

Your proposal has been reviewed to determine whether it is likely to result in serious harm to fish which is prohibited under subsection 35(1) of the *Fisheries Act*.

Your proposal has also been reviewed to determine whether it will adversely impact listed aquatic species at risk and contravene sections 32, 33 or 58 of the *Species at Risk Act (SARA)*.

Our review considered the following:

- Letter from Baffinland Iron Mines Re: Mary River Project – Request for Advice on Realignment of Tote Road at Culvert CV076, Km 53 Tote Road, DFO File dated February 15, 2015 and submitted by James Millard with 1 attachment.
- Attachment 1 - Mark-up of proposed field change, Drawing H349000-3000-10-012-0073

We understand that you propose to:

- Realign the existing Tote Road at Culvert CV076, 160 meters upstream from the existing crossing and install one culvert which is 1.2m in diameter and 18 m in length.
- Install culverts during the winter months when the stream is frozen to bottom.
- Remove existing culvert from the old Tote Road alignment.

Since there are no *SARA* species or their habitats identified in the project area, no additional approvals under *SARA* will be required for your proposed activities. To avoid the potential for serious harm to fish that is prohibited under the *Fisheries Act*, the mitigation measures set out in your project plans are to be followed.

Provided that you implement the required mitigation measures for your project, and follow the guidance available on the DFO website at <http://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures/index-eng.html>, the Program is of the view that your proposal should not result in serious harm to fish or contravene sections 32, 33 or 58 of the *Species at Risk Act*. No formal approval is required from the Program under the *Fisheries Act* or the *Species at Risk Act* in order to proceed with your proposal.

It remains your responsibility to ensure you avoid causing serious harm to fish in compliance with the *Fisheries Act*, and that you meet the requirements under the *Species at Risk Act* as it may apply to your project. If your plans have changed or if the description of your proposal is incomplete, or changes in the future, you should consult our website (<http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html>) or consult with a qualified environmental consultant to determine if further review is required by the Program.

Please be advised that it is also your *Duty to Notify* DFO if you have caused, or are about to cause, serious harm to fish that are part of or support a commercial, recreational or Aboriginal fishery. Such notifications should be directed to <http://www.dfo-mpo.gc.ca/pnw-ppe/violation-infraction/index-eng.html>.

A copy of this letter should be kept on site while the work is in progress. It remains your responsibility to meet all other federal or territorial requirements that apply to your project.

If you have any questions, please contact Georgina Williston at our Yellowknife office at (867) 669-4927, by fax at (867) 669-4940, or by email at georgina.williston@dfo-mpo.gc.ca. Please refer to the file number referenced above when corresponding with the Program.

Yours sincerely,



Julie Dahl
Regional Manager, Regulatory Reviews
Fisheries Protection Program

cc.
Georgina Williston- Fisheries and Oceans Canada
Oliver Curran-Baffinland Iron Mines Corp.
Erik Madsen-Baffinland Iron Mines Corp.

APPENDIX B

HABITAT ASSESSMENT SHEETS

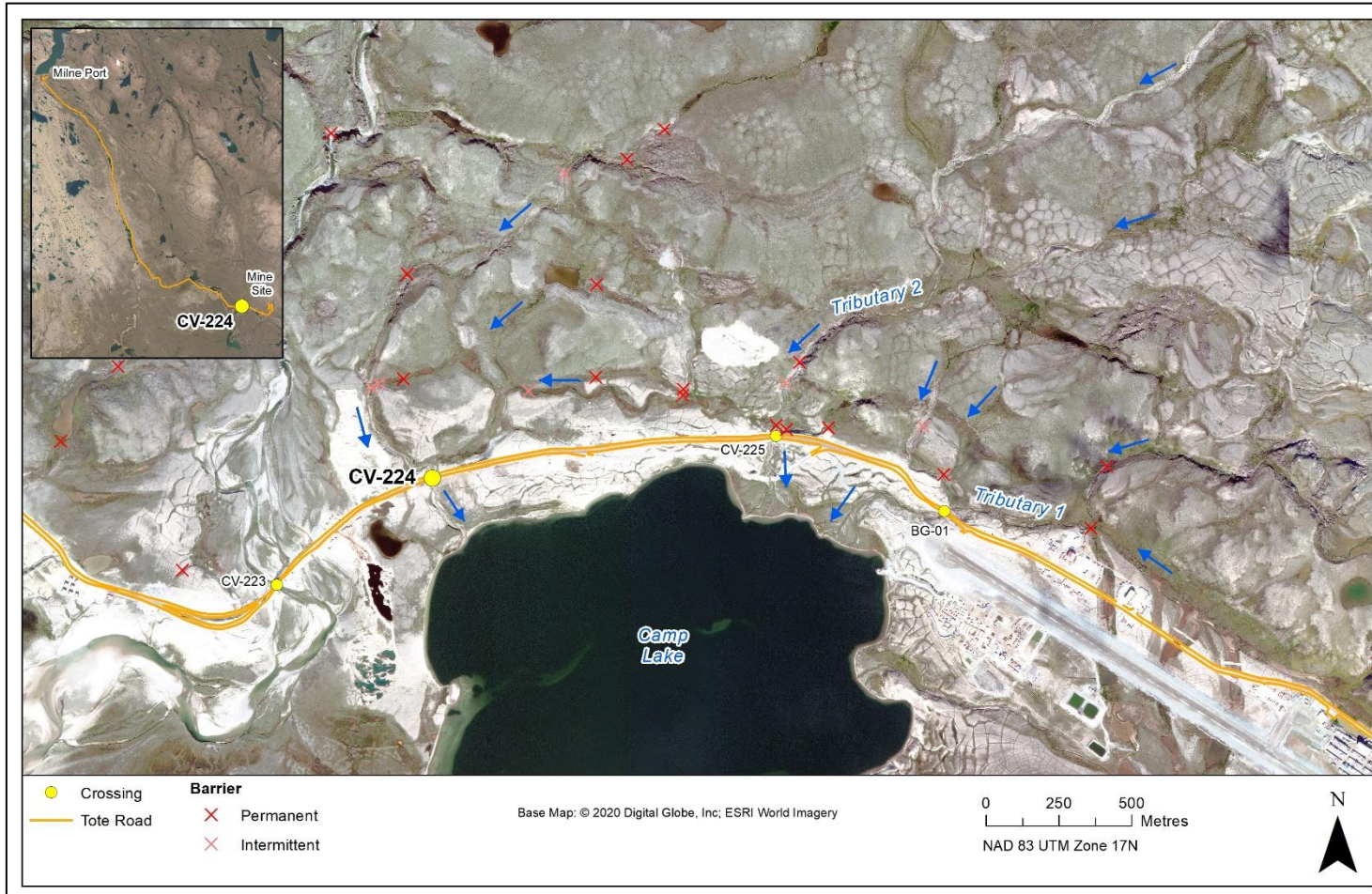
TOTE ROAD BG-01

LOCATION AND CROSSING DESCRIPTION

Site ID:	BG-01	Dates Surveyed:	16-Jul-24	Waterbody Type:	Stream
Project Interaction:	Tote Road Culvert	UTM Coordinates:	17W 558000 E 7914928 N		

GENERAL PHYSICAL CHARACTERISTICS

Flow Regime: Seasonal **Stream Order:** 3+



BAFFINLAND IRON MINES
MARY RIVER PROJECT

 **North/South Consultants Inc.**
Aquatic Environment Specialists

FISH HABITAT:

ARCTIC CHAR - YES
NINESPINE STICKLEBACK - YES

TOTE ROAD BG-01

SITE SUMMARY

The Tote Road crosses an unnamed stream at site BG-01 that flows 500 m southwest into Camp Lake. Camp Lake has been extensively surveyed and is known to support char overwintering and spawning. This site has been identified for remediation.

Detailed habitat data were collected in the crossing area in late spring 2024. Wetted widths ranged between 7.7 and 12.3 m. Measured depths ranged from 0.06 – 0.22 m. Measured velocities were variable and ranged from 0.10 to 0.86 m/s. Stream morphology was typically riffle and run with shallow pools more common immediately upstream of the crossing. The substrate was primarily composed of cobble/boulder with more fines present in the pool upstream of the culvert.

Similar numbers and size ranges of juvenile char were captured upstream and downstream of the crossing in spring 2024. Char use habitat in the stream for rearing and there is potential for adult use in the deeper areas near Camp Lake. There is no char spawning or overwintering habitat in the stream.

Ninespine Stickleback are abundant within Camp Lake and in the lowermost reaches of this stream near its confluence with the lake. The species has only rarely been captured near the road, including three downstream of the crossing in spring 2024. Relatively high velocities throughout the open-water period likely limit use of the crossing area by this species.

TOTE ROAD BG-01

FISH HABITAT POTENTIAL

Species	Spawning	Overwintering	Rearing	Adults Present
ARCH	N	N	Y	P
NNST	P	N	Y	Y

FISHERIES DATA

Location	Species	Survey Date	Temperature (°C)	Distance Fished (m)	Effort (Seconds)	# Fish Captured	# Fish Observed	CPUE (No. Fish/60 Seconds)	Length Range (mm)
Downstream	ARCH	16-Jul-24	5.0	50	222	28	0	7.568	71-200
	NNST					3	0	0.750	52-87
Upstream	ARCH			50	240	24	0	6.000	80-215
	NNST					0	0	0.00	-

OTHER NOTES / OBSERVATIONS

Similar numbers and size ranges of juvenile char were captured upstream and downstream of the crossing in spring 2024. CPUE in spring 2024 was the highest recorded since 2019. Char use habitat in the stream for rearing and there is potential for adult use in the deeper areas near Camp Lake. There is no char spawning or overwintering habitat in the stream. Relatively high velocities during the open-water period likely limit use of the crossing area by stickleback, though three were captured downstream in spring 2024.

TOTE ROAD BG-01

HYDROLOGY CHARACTERISTICS: 16-JUL-24

Wetted/Dry/Shallow (<0.02 m)/Unconnected Pools: Wetted

Stage: Moderate

Site	Channel Width (m)		Water Depth (m)				Water Velocity (m/s)			
	Bankfull	Wetted	25%	50%	75%	Max	25%	50%	75%	Max
20D	15.60	12.30	0.10	0.07	0.14	0.22	0.37	0.25	0.40	0.56
0 (Centreline)	UNDER TOTE ROAD									
20U	9.70	7.70	0.12	0.06	0.20	0.22	0.34	0.12	0.10	0.86

OTHER NOTES / OBSERVATIONS

Wetted widths ranged between 7.7 and 12.3 m. Measured depths ranged from 0.06 – 0.22 m. Measured velocities were variable and ranged from 0.10 to 0.86 m/s.

TOTE ROAD BG-01

HABITAT CHARACTERISTICS: 16-JUL-24

Wetted/Dry/Shallow (<0.02 m)/Unconnected Pools: Wetted

Stage: Moderate

Site	Stream Morphology Composition (%)							Substrate Composition (%)				
	Riffle	Pool (<0.2 m)	Pool (>0.2 m)	Run	Cascade	Rapids	Flat	Fines	Gravel	Small Cobble	Large Cobble	Boulders
20D	20	10	-	70	-	-	-	5	45	20	20	10
0 (Centreline)	UNDER TOTE ROAD											
20U	10	40	10	40	-	-	-	50	-	30	20	-

OTHER NOTES / OBSERVATIONS

Stream morphology was typically riffle and run with a large, shallow pool immediately upstream of the crossing. The substrate was primarily composed of cobble/boulder with more fines in the upstream pool.

TOTE ROAD BG-01

16-JUL-24



A



B



C



D



E



F

Photos 1-1. Photos taken 20 m downstream (top) and 20 m upstream (bottom) in spring 2024: (A,D) facing upstream; (B,E) facing downstream; and (C,F) across (left bank looking at right bank).

TOTE ROAD BG-01

16-JUL-24



A



B

Photos 1-2. Photos of the culverts in spring 2024: (A) downstream end; and (B) upstream end.

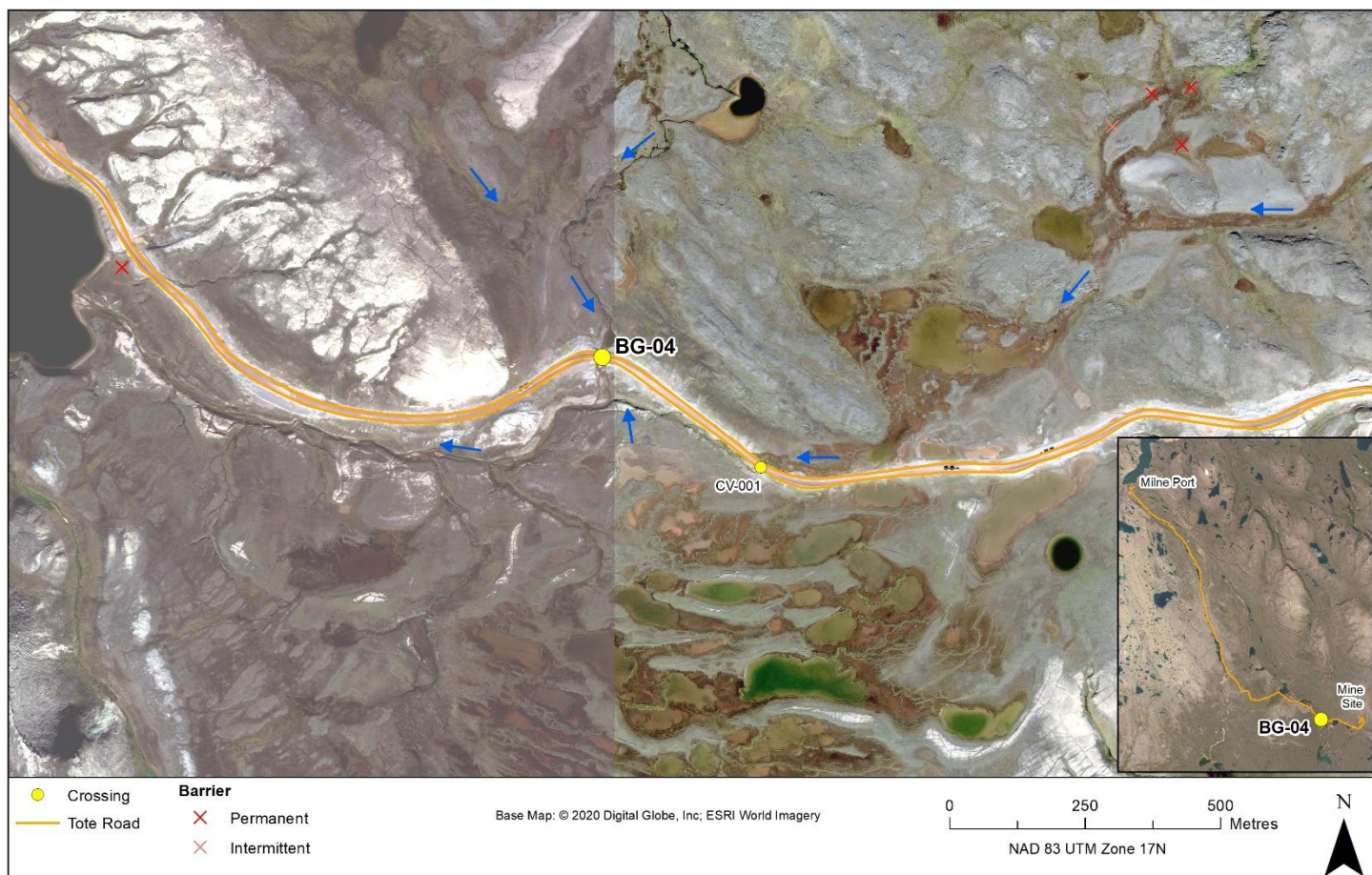
TOTE ROAD BG-04

LOCATION AND CROSSING DESCRIPTION

Site ID:	BG-04	Date Surveyed:	15-Jul-24	Waterbody Type:	Stream
Project Interaction:	Tote Road Culvert	UTM Coordinates:	17W 553250 E 7915100 N		

GENERAL PHYSICAL CHARACTERISTICS

Flow Regime: Seasonal **Stream Order:** 3+



BAFFINLAND IRON MINES
MARY RIVER PROJECT

 **North/South Consultants Inc.**
Aquatic Environment Specialists

FISH HABITAT:

ARCTIC CHAR - YES

NINESPINE STICKLEBACK - YES

TOTE ROAD BG-04

SITE SUMMARY

The Tote Road crosses a small, unnamed stream at site BG-04 that flows south into a stream that then flows west into an unnamed lake 1.3 km downstream of the culvert. A bathymetry and substrate survey was conducted in the lake which demonstrated it is of sufficient depth to support overwintering for both species. Bathymetric surveys have also confirmed that several additional upstream lakes in this drainage are of sufficient depths for overwintering. Due to the presence of potential overwintering habitat upstream and downstream of the crossing, fish using the crossing habitat may originate from the upstream or downstream drainage. A small tributary of this stream is also crossed by the Tote Road at site CV-001.

This crossing was remediated in winter 2023/2024. There are now two large, embedded culverts that allow unimpeded fish passage. There are no current issues with the crossing.

Detailed habitat data were collected in the crossing area in late spring 2024. Wetted widths over the surveyed area ranged between 4.2 and 18.5 m. Measured depths were shallow to moderate, not exceeding 0.50 m, with a range of 0.02-0.50 m. Measured velocities were low, rarely exceeding 0.5 m/s, with higher values in constricted runs and riffles between the wider, slower-flowing pools. Stream morphology was typically pool with some riffles downstream and mostly run/pool upstream. The substrate downstream of the crossing was primarily composed of finer materials, while substrate in areas upstream from the culvert was composed mainly of cobble-boulder.

Both fish species have consistently been captured in this stream throughout the Tote Road monitoring program. Smaller numbers of each were captured in spring 2024 downstream and upstream of the road than most previous surveys. CPUE has been 9-40 times higher for char and 2-22 times higher for stickleback in recent years (2021-2023). The reason for the low CPUE in July 2024 is unknown, though similarly low CPUE was noted for both species in the CV-001 branch of this watershed. Both species use habitat in the vicinity of the Tote Road crossing at BG-04 for rearing/feeding. Stickleback may also use habitat near the crossing for spawning. There is no spawning habitat for char and no overwintering habitat in this stream for either species.

TOTE ROAD BG-04

FISH HABITAT POTENTIAL

Species	Spawning	Overwintering	Rearing	Adults Present
ARCH	N	N	Y	N
NNST	P	N	Y	Y

FISHERIES DATA

Location	Species	Survey Date	Temperature (°C)	Distance Fished (m)	Effort (Seconds)	# Fish Captured	# Fish Observed	CPUE (No. Fish/60 Seconds)	Length Range (mm)
Downstream	ARCH	15-Jul-24	8.0	50	284	1	0	0.211	84
	NNST					4	0	0.851	34-44
Upstream	ARCH			50	282	2	0	0.426	50-90
	NNST					1	0	0.213	55

OTHER NOTES / OBSERVATIONS

Small numbers of both species were captured downstream and upstream of the culvert. Only smaller juvenile char were observed near the culverts (upstream or downstream) in spring 2024 (<100 mm).

TOTE ROAD BG-04

HYDROLOGY CHARACTERISTICS: 15-JUL-24

Wetted/Dry/Shallow (<0.02 m)/Unconnected Pools: Wetted

Stage: Low-Moderate

Site	Channel Width (m)		Water Depth (m)				Water Velocity (m/s)			
	Bankfull	Wetted	25%	50%	75%	Max	25%	50%	75%	Max
100D	9.80	7.70	0.08	0.11	0.14	0.25	0.01	0.03	0.34	0.34
60D	5.30	4.50	0.05	0.14	0.04	0.20	0.54	0.10	0.11	0.54
20D	23.10	15.20	0.13	0.16	0.16	0.18	0.00	0.00	0.04	0.16
0 (Centreline)	UNDER TOTE ROAD									
20U	24.30	18.50	0.28	0.50	0.30	0.50	0.00	0.00	0.00	0.00
60U	15.20	13.30	0.05	0.02	0.03	0.18	0.19	0.07	0.36	0.43
100U	4.60	4.20	0.15	0.05	0.12	0.24	0.98	0.09	0.15	0.98

OTHER NOTES / OBSERVATIONS

Wetted stream widths in spring 2024 ranged between 4.2 and 18.5 m. Measured depths ranged from 0.02 – 0.50 m. Measured velocities at each transect ranged between 0.00 (in a large pool immediately upstream of the culvert) and 0.98 m/s.

TOTE ROAD BG-04

HABITAT CHARACTERISTICS: 15-JUL-24

Wetted/Dry/Shallow (<0.02 m)/Unconnected Pools: Wetted

Stage: Low-Moderate

Site	Stream Morphology Composition (%)							Substrate Composition (%)				
	Riffle	Pool (<0.2 m)	Pool (>0.2 m)	Run	Cascade	Rapids	Flat	Fines	Gravel	Small Cobble	Large Cobble	Boulders
100D	-	80	-	20	-	-	-	80	10	10	-	-
60D	-	70	-	30	-	-	-	30	40	25	5	-
20D	-	90	10	-	-	-	-	60	20	10	5	5
0 (Centreline)	UNDER TOTE ROAD											
20U	-	70	30	-	-	-	-	50	20	20	5	5
60U	10	30	-	60	-	-	-	-	5	25	40	30
100U	20	20	-	60	-	-	-	-	-	20	30	50

OTHER NOTES / OBSERVATIONS

Stream morphology was typically shallow pool downstream with some runs and mostly run/pool upstream. The substrate was primarily composed of fines downstream of the culvert and cobble/boulder upstream of the culvert.

TOTE ROAD BG-04

15-JUL-24



A



B



C



D



E



F

Photos 1-1. Photos taken 20 m downstream (top) and 60 m downstream (bottom) in spring 2024: (A,D) facing upstream; (B,E) facing downstream; and (C,F) across (left bank looking at right bank).

TOTE ROAD BG-04

15-JUL-24



A



B



C

Photos 1-2. Photos taken 100 m downstream in spring 2024: (A) facing upstream; (B) facing downstream; and (C) across (left bank looking at right bank).

TOTE ROAD BG-04

15-JUL-24



A



B



C



D



E



F

Photos 1-3. Photos taken 20 m upstream (top) and 60 m upstream (bottom) in spring 2024: (A,D) facing upstream; (B,E) facing downstream; and (C,F) across (left bank looking at right bank).

TOTE ROAD BG-04

15-JUL-24



A



B



C

Photos 1-4. Photos taken 100 m upstream in spring 2024: (A) facing upstream; (B) facing downstream; and (C) across (left bank looking at right bank).

TOTE ROAD BG-04

15-JUL-24



A



B



C



D



E



F

Photos 1-5. Photos taken of the culverts in spring 2024: (A-C) downstream end; and (D-F) upstream end.

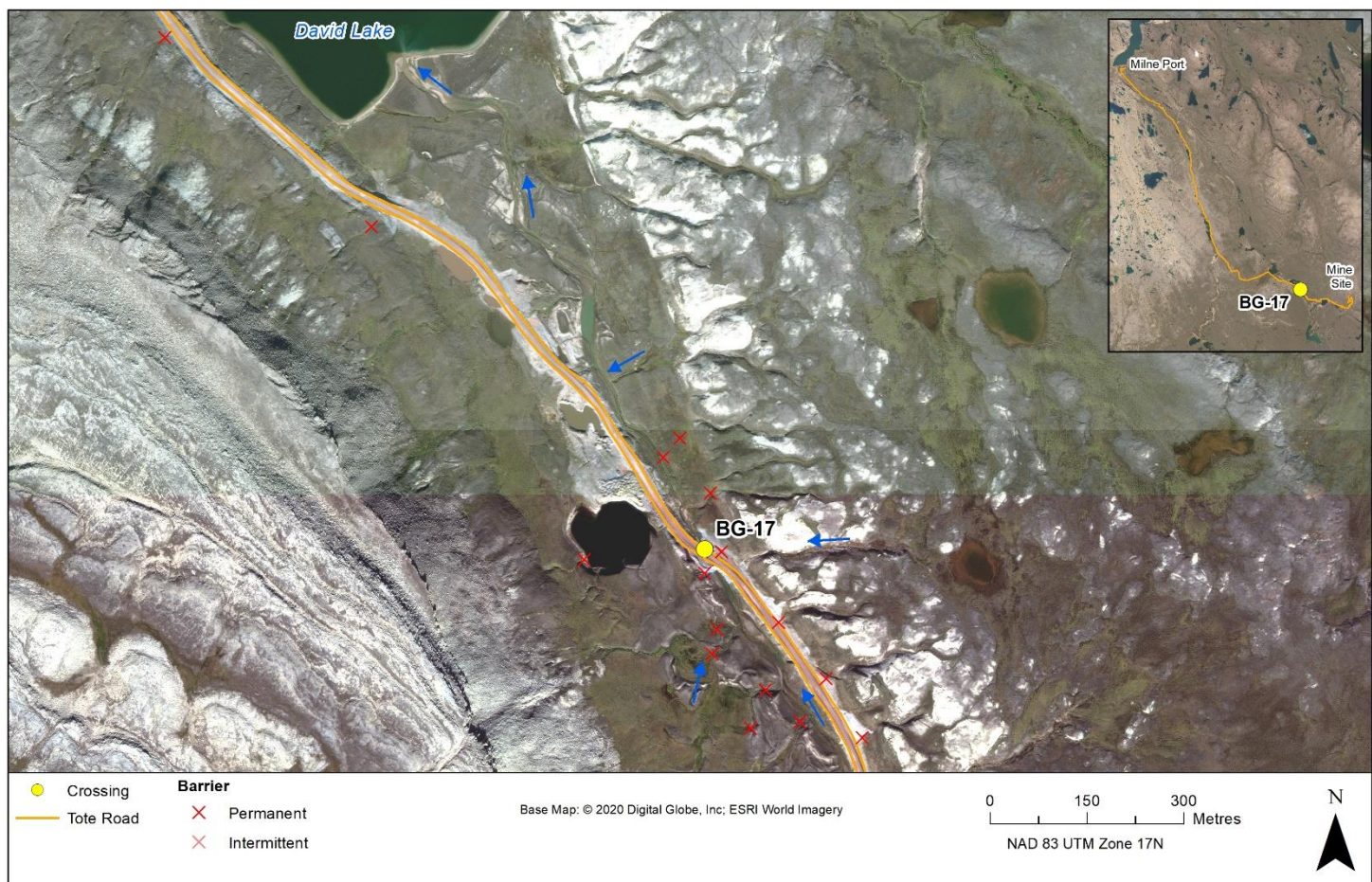
TOTE ROAD BG-17

LOCATION AND CROSSING DESCRIPTION

Site ID:	BG-17	Dates Surveyed:	15-Jul-24	Waterbody Type:	Stream
Project Interaction:	Tote Road Culvert	UTM Coordinates:	17W 550703 E 7917643 N		

GENERAL PHYSICAL CHARACTERISTICS

Flow Regime: Seasonal **Stream Order:** 3+



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Aquatic Environment Specialists

FISH HABITAT:

ARCTIC CHAR - YES

NINESPINE STICKLEBACK - YES

TOTE ROAD BG-17

SITE SUMMARY

The Tote Road crosses a small, unnamed stream at site BG-17 that flows from a small, unnamed lake 920 m to the southeast towards David Lake, 940 m northwest of the crossing. A bathymetry survey conducted in the lake demonstrated it is of sufficient depth to support overwintering of both species. Although a bathymetric survey has not been undertaken at David Lake, it is a large lake that is also expected to support overwintering. Fish accessing the crossing area could originate from either lake. This crossing is scheduled for future remediation.

Detailed habitat data were collected in the crossing area in late spring 2024. Wetted widths over the surveyed area ranged between 7.4 and 9.3 m. Measured depths ranged from 0.13 to an estimated 0.50 m in an inaccessible deep run upstream. Measured velocities were low, typically <0.25 m/s. Stream morphology was largely run and pool throughout with some riffles downstream. Substrate was composed mainly of fines upstream and gravel/cobble downstream.

Both fish species have consistently been captured in this stream throughout the Tote Road monitoring program, including in spring 2024, and use habitat in the vicinity of the Tote Road crossing at BG-17 for rearing/feeding. Stickleback may also use habitat near the crossing for spawning. There is no spawning habitat for char and no overwintering habitat in this stream for either species.

TOTE ROAD BG-17

FISH HABITAT POTENTIAL

Species	Spawning	Overwintering	Rearing	Adults Present
ARCH	N	N	Y	P
NNST	P	N	Y	Y

FISHERIES DATA

Location	Species	Survey Date	Temperature (°C)	Distance Fished (m)	Effort (Seconds)	# Fish Captured	# Fish Observed	CPUE (No. Fish/60 Seconds)	Length Range (mm)
Downstream	ARCH	15-Jul-24	3.0	50	216	5	0	1.389	56-90
	NNST					0	0	0.00	-
Upstream	ARCH			50	179	1	0	0.335	60
	NNST					1	0	0.335	40

OTHER NOTES / OBSERVATIONS

Small numbers of each species were captured upstream and downstream of the crossing in spring 2024. More fish were likely present, but deep turbid water, especially upstream, negatively affects catchability.

TOTE ROAD BG-17

HYDROLOGY CHARACTERISTICS: 15-JUL-24

Wetted/Dry/Shallow (<0.02 m)/Unconnected Pools: Wetted

Stage: Moderate

Site	Channel Width (m)		Water Depth (m)				Water Velocity (m/s)			
	Bankfull	Wetted	25%	50%	75%	Max	25%	50%	75%	Max
20D	12.00	9.30	0.13	0.16	0.16	0.46	0.24	0.12	0.22	0.63
0 (Centreline)	UNDER TOTE ROAD									
20U	10.60	7.40	-	-	0.31	~0.5	-	-	0.11	~0.15

OTHER NOTES / OBSERVATIONS

Wetted widths over the surveyed area ranged between 7.4 and 9.3 m. Measured depths ranged from 0.13 to an estimated 0.50 m in an inaccessible deep run upstream. Measured velocities were low, typically <0.25 m/s.

TOTE ROAD BG-17

HABITAT CHARACTERISTICS: 15-JUL-24

Wetted/Dry/Shallow (<0.02 m)/Unconnected Pools:

Wetted

Stage:

Moderate

Site	Stream Morphology Composition (%)							Substrate Composition (%)				
	Riffle	Pool (<0.2 m)	Pool (>0.2 m)	Run	Cascade	Rapids	Flat	Fines	Gravel	Small Cobble	Large Cobble	Boulders
20D	10	20	30	40	-	-	-	10	40	40	10	-
0 (Centreline)	UNDER TOTE ROAD											
20U	-	20	20	60	-	-	-	80	-	10	5	5

OTHER NOTES / OBSERVATIONS

Stream morphology was largely run and pool throughout with some riffles downstream. Substrate was composed mainly of fines upstream and gravel/cobble downstream.

TOTE ROAD BG-17

15-JUL-24



A



B



C



D



E



F

Photos 1-1. Photos taken 20 m downstream (top) and 20 m upstream (bottom) in spring 2024: (A,D) facing upstream; (B,E) facing downstream; and (C,F) across (right bank looking at left bank).

TOTE ROAD BG-17

15-JUL-24



A



B

Photos 1-2. Photos taken of the culverts in spring 2024: (A) downstream end; and (B) upstream end.

TOTE ROAD BG-24

LOCATION AND CROSSING DESCRIPTION

Site ID:	BG-24	Dates Surveyed:	15-Jul-24	Waterbody Type:	Stream
Project Interaction:	Tote Road Culvert	UTM Coordinates:	17W 548766 E 7918878 N		

GENERAL PHYSICAL CHARACTERISTICS

Flow Regime: Seasonal **Stream Order:** 3



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FISH HABITAT:

ARCTIC CHAR - YES

NINESPINE STICKLEBACK - POTENTIAL

TOTE ROAD BG-24

SITE SUMMARY

The Tote Road crosses a small, unnamed stream at site BG-24 that flows 110 m north into David Lake. Although a bathymetric survey has not been conducted, David Lake is expected to be of sufficient depth to support overwintering of both species. This crossing is scheduled for future remediation.

Detailed habitat data were collected in the crossing area in late spring 2024. Wetted widths over the surveyed area ranged from 1.7-1.8 m. High spring freshet flows typically create temporary ponding on the upstream side of the road embankment creating a large, wetted area. By the time of the 2024 survey, when water levels were generally low throughout the study area, the wetted area was reduced to the natural stream channel. The stream had measured depths ranging from 0.02-0.28 m and velocities from 0.08-1.22 m/s. Stream morphology was largely run/riffle with some shallow pools throughout. Substrates were mainly gravel/cobble downstream and cobble upstream.

Large numbers of juvenile char were captured downstream of the crossing in spring 2024. Fewer numbers were captured upstream, which is typical for this stream likely due to an increase in gradient upstream of the crossing. Juvenile char use habitat in the stream for rearing and there is potential for adult use in the deeper pools near David Lake. There is no char spawning or overwintering habitat in the stream.

Ninespine Stickleback have never been captured in this stream but are known to occur in other tributaries to David Lake (e.g., stream crossed by the road at BG-17). Habitat in this stream is likely unsuitable for the species.

TOTE ROAD BG-24

FISH HABITAT POTENTIAL

Species	Spawning	Overwintering	Rearing	Adults Present
ARCH	N	N	Y	P
NNST	P	N	P	P

FISHERIES DATA

Location	Species	Survey Date	Temperature (°C)	Distance Fished (m)	Effort (Seconds)	# Fish Captured	# Fish Observed	CPUE (No. Fish/60 Seconds)	Length Range (mm)
Downstream	ARCH	15-Jul-24	5.0	50	446	27	0	3.632	42-199
	NNST					0	0	0.00	-
Upstream	ARCH			50	185	4	0	1.297	135-210
	NNST					0	0	0.00	-

OTHER NOTES / OBSERVATIONS

Large numbers of juvenile char over a broad size range were captured downstream of BG-24. Only four larger juveniles were captured upstream. Stickleback have never been captured in this stream but are known to be present in other parts of the watershed.

TOTE ROAD BG-24

HYDROLOGY CHARACTERISTICS: 15-JUL-24

Wetted/Dry/Shallow (<0.02 m)/Unconnected Pools: Wetted

Stage: Low

Site	Channel Width (m)		Water Depth (m)				Water Velocity (m/s)			
	Bankfull	Wetted	25%	50%	75%	Max	25%	50%	75%	Max
20D	6.20	1.70	0.02	0.14	0.18	0.28	0.34	0.85	0.85	1.22
0 (Centreline)	UNDER TOTE ROAD									
20U	2.00	1.80	0.12	0.13	0.03	0.20	0.12	0.18	0.08	0.64

OTHER NOTES / OBSERVATIONS

Wetted widths over the surveyed area ranged from 1.7-1.8 m. High spring freshet flows typically lead to ponding on the upstream side of the road embankment creating a large, wetted area. By the time of the 2024 survey, when water levels were generally low throughout the study area, the wetted area was reduced to the natural stream channel. The stream had measured depths ranging from 0.02-0.28 m and velocities from 0.08-1.22 m/s.

TOTE ROAD BG-24

HABITAT CHARACTERISTICS: 15-JUL-24

Wetted/Dry/Shallow (<0.02 m)/Unconnected Pools: Wetted Stage: Low

Site	Stream Morphology Composition (%)							Substrate Composition (%)				
	Riffle	Pool (<0.2 m)	Pool (>0.2 m)	Run	Cascade	Rapids	Flat	Fines	Gravel	Small Cobble	Large Cobble	Boulders
20D	25	20	10	45	-	-	-	10	20	60	10	-
0 (Centreline)	UNDER TOTE ROAD											
20U	20	20	-	60	-	-	-	-	5	50	35	10

OTHER NOTES / OBSERVATIONS

Stream morphology was largely run/riffle with some shallow pools throughout. Substrates were mainly gravel/cobble downstream and cobble upstream.

TOTE ROAD BG-24

15-JUL-24



A



B



C



D



E



F

Photos 1-1. Photos taken 20 m downstream (top) and 20 m upstream (bottom) in spring 2024: (A,D) facing upstream; (B,E) facing downstream; and (C,F) across (left bank looking at right bank).

TOTE ROAD BG-24

15-JUL-24



A



B

Photos 1-2. Photos taken of the culvert in spring 2024: (A) downstream end; and (B) upstream end.

TOTE ROAD BG-27

LOCATION AND CROSSING DESCRIPTION

Site ID:	BG-27	Date Surveyed:	15-Jul-24	Waterbody Type:	Stream
Project Interaction:	Tote Road Culvert	UTM Coordinates:	17W 547876 E 7919355 N		

GENERAL PHYSICAL CHARACTERISTICS

Flow Regime: Seasonal **Stream Order:** 2



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Aquatic Environment Specialists

FISH HABITAT:

ARCTIC CHAR - YES

NINESPINE STICKLEBACK - POTENTIAL

TOTE ROAD BG-27

SITE SUMMARY

The Tote Road crosses a small, unnamed stream at site BG-27 that flows northeast into David Lake 50 m downstream of the culvert. Although a bathymetric survey has not been conducted, David Lake is believed to be of sufficient depth to support overwintering of both species. This crossing is scheduled for future remediation.

Detailed habitat data were collected in the crossing area in late spring 2024. The stream at BG-27 is generally narrow, shallow, and relatively fast moving with an increasing gradient at and upstream of the culvert. Measured wetted widths were 1.8 m downstream and upstream. Water levels were relatively low in July 2024 and measured depths were shallow (<0.20 m), with velocities ranging from 0.10-0.78 m/s. Stream morphology was relatively uniform, comprised mostly of riffle-run areas with shallow pooling near the banks. Substrate was mostly large and small cobble, interspersed with smaller amounts of fines, gravel, and boulders.

Large numbers of juvenile Arctic Char were captured downstream of the crossing in spring 2024, producing the highest CPUE (19.11 fish/minute) of any of the transects fished along the Tote Road in 2024. Char were captured upstream, indicating successful fish passage, though fewer in number. Fewer char are typically present upstream of the crossing likely due in whole or in part to the increase in natural gradient. Juvenile Arctic Char use habitat in the vicinity of the Tote Road crossing at BG-27 throughout the open-water period for rearing. There is no overwintering or spawning habitat for either species in this stream. Ninespine Stickleback have never been captured or observed in this stream but are present in other tributaries of David Lake (e.g., the stream crossed by the road at BG-17). The relatively high natural flows likely restrict stickleback use to rearing in the lowermost reach at the outflow to David Lake.

TOTE ROAD BG-27

FISH HABITAT POTENTIAL

Species	Spawning	Overwintering	Rearing	Adults Present
ARCH	N	N	Y	N
NNST	N	N	P	P

FISHERIES DATA

Location	Species	Survey Date	Temperature (°C)	Distance Fished (m)	Effort (Seconds)	# Fish Captured	# Fish Observed	CPUE (No. Fish/60 Seconds)	Length Range (mm)
Downstream	ARCH	15-Jul-24	5.0	50	179	57	0	19.106	44-131
	NNST					0	0	0.00	-
Upstream	ARCH			50	156	5	0	1.923	72-138
	NNST					0	0	0.00	-

OTHER NOTES / OBSERVATIONS

Large numbers of juvenile Arctic Char, across a broad size range, were captured downstream of the crossing in spring 2024, producing the highest CPUE (19.11 fish/minute) of any of transects fished along the Tote Road in 2024. Fewer and, on average, larger char were captured upstream, which is typical, likely due in whole or in part to the increase in natural gradient. Ninespine Stickleback have never been captured or observed in this stream but are present in other tributaries of David Lake (e.g., BG-17).

TOTE ROAD BG-27

HYDROLOGY CHARACTERISTICS: 15-JUL-24

Wetted/Dry/Shallow (<0.02 m)/Unconnected Pools: Wetted Stage: Low

Site	Channel Width (m)		Water Depth (m)				Water Velocity (m/s)			
	Bankfull	Wetted	25%	50%	75%	Max	25%	50%	75%	Max
20D	3.00	1.80	0.03	0.10	0.09	0.18	0.12	0.26	0.10	0.77
0 (Centreline)	UNDER TOTE ROAD									
20U	2.00	1.80	0.04	0.02	0.02	0.17	0.64	0.54	0.25	0.78

OTHER NOTES / OBSERVATIONS

Water levels were relatively low in July 2024. Measured wetted widths were 1.8 m downstream and upstream of the crossings. Measured depths were shallow (<0.20 m), with velocities ranging from 0.10-0.78 m/s.

TOTE ROAD BG-27

HABITAT CHARACTERISTICS: 15-JUL-24

Wetted/Dry/Shallow (<0.02 m)/Unconnected Pools: Wetted

Stage: Low

Site	Stream Morphology Composition (%)							Substrate Composition (%)				
	Riffle	Pool (<0.2 m)	Pool (>0.2 m)	Run	Cascade	Rapids	Flat	Fines	Gravel	Small Cobble	Large Cobble	Boulders
20D	20	20	-	60	-	-	-	10	20	40	30	-
0 (Centreline)	UNDER TOTE ROAD											
20U	20	30	-	40	10	-	-	5	10	40	40	5

OTHER NOTES / OBSERVATIONS

Stream morphology was relatively uniform, comprised mostly of riffle-run areas with shallow pooling near the banks. Substrate was mostly large and small cobble, interspersed with smaller amounts of fines, gravel and boulders.