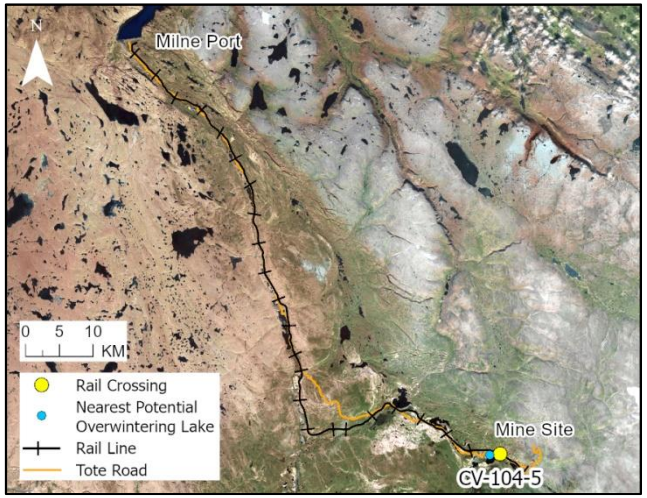
RAIL CV-104-5

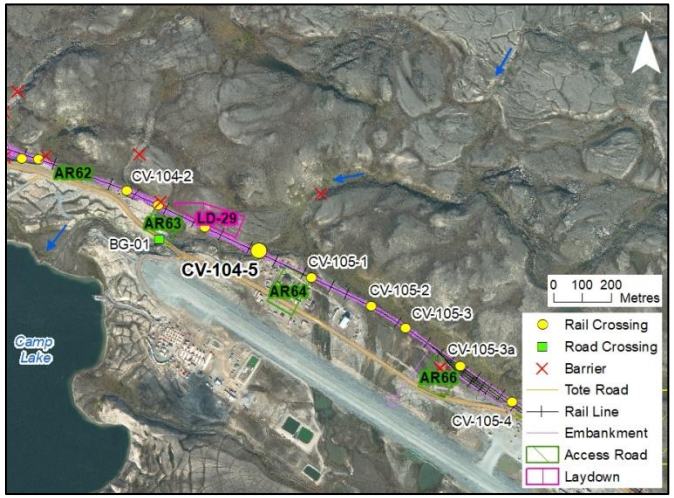
LOCATION AND CROSSING DESCRIPTION

Site ID:	CV-104-5	**Dates Surveyed:**	22-Jun-19; 19-Aug-19	**Waterbody Type:**	Stream
Project Interaction:	Rail Plate Arch Culvert	**Centreline UTM Coordinates:**	17W 558340 E 7914885 N	**Culvert Length (m):**	64
Number of Barrels:	1	**Culvert Diameter/Span (mm):**	6,990	**Slope (%):**	5

GENERAL PHYSICAL CHARACTERISTICS

Flow Regime: Seasonal **Stream Order:** 3 **Drainage Basin Area (km²):** 5.76





SUMMARY

The rail alignment crosses an unnamed seasonal stream at CV-104-5, which flows west towards the Tote Road crossing at BG-01 approximately 380 m downstream from the centreline. The system then drains southwest to Camp Lake another 530 m downstream from the Tote Road. This stream merges with another branch that includes rail crossings at CV-104-2 and 104-3 just upstream of the Tote Road crossing. The stream also receives flow from the CV-105-2 system approximately 200 m upstream from the centreline.

This stream is one of the larger tributaries to Camp Lake. In 2019, it had moderate depths with some deeper pool/run habitat over the surveyed reach at the rail crossing. Habitat is largely run/pool/riffle over cobble/boulder substrate within the rail survey area. The channel wetted width varied from 2.7-33.0 m.

An impassable vertical drop is located approximately 370 m upstream from the rail crossing. There are no natural downstream barriers to fish movement, though high velocities have been observed at the Tote Road culvert outflow during periods of high water.

This stream provides open-water season rearing habitat for juvenile Arctic Char from Camp Lake upstream to the barrier. The stream does not provide overwintering or spawning habitat for char due to lack of flow and sufficient depth in winter. Ninespine Stickleback have been captured at the confluence with Camp Lake downstream of this site and in the CV-105-2 system, but not at or upstream of the Tote Road or rail crossings where habitat is unsuitable for the species. Stickleback could potentially use habitat at the confluence with the stream crossed by CV-105-2

RAIL CV-104-5

BARRIERS

Upstream/ Downstream	UTM		Barrier Type			Height (m)	Gradient (°)	Description	Site Label
	Easting	Northing	1	2	3				
Downstream	NO BARRIERS								
Upstream	558559	7915083	VD			>0.5		Permanent Barrier: Large vertical drop ~370 m upstream of crossing	A

A

RAIL CV-104-5

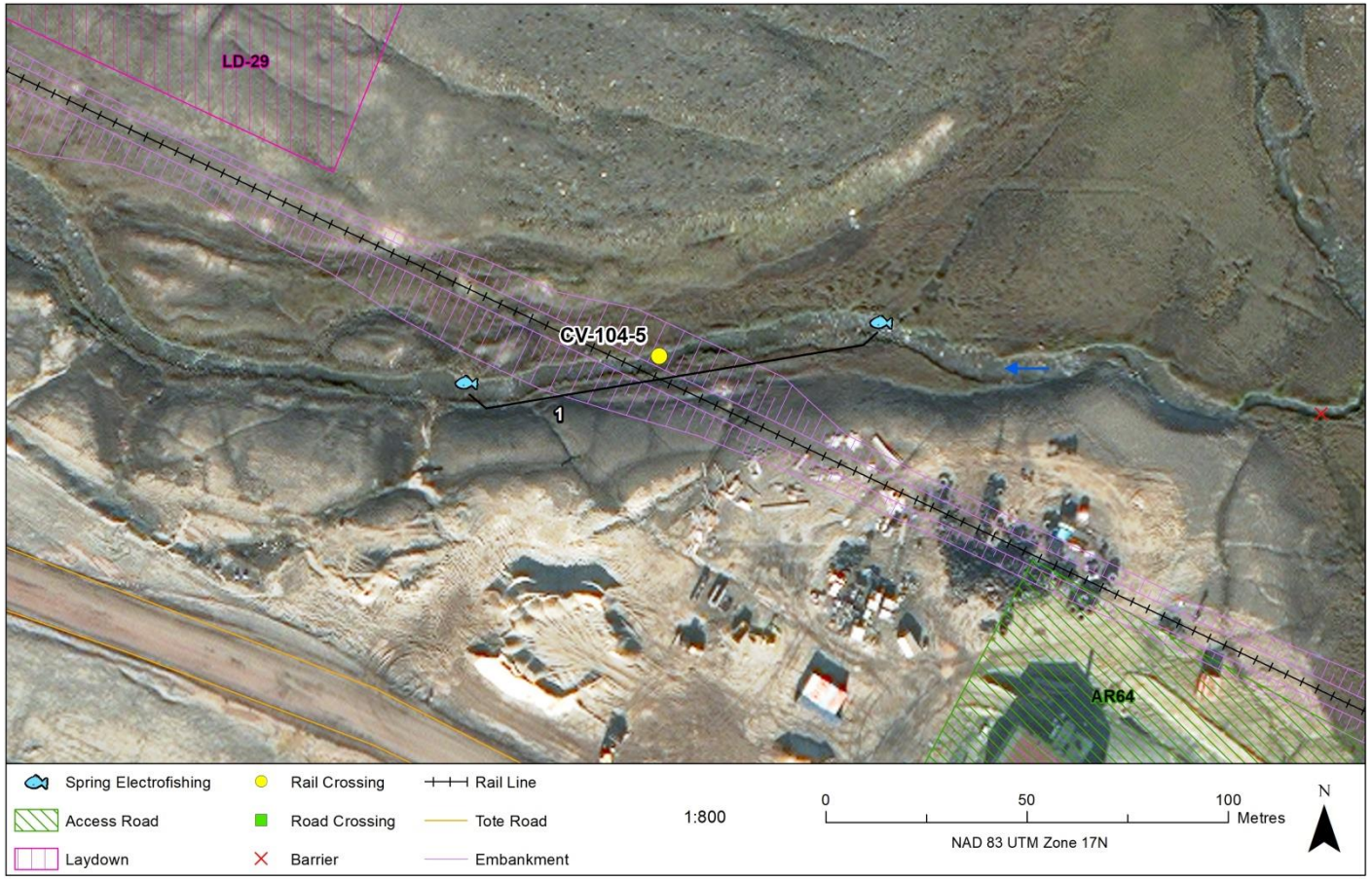
FISH HABITAT POTENTIAL

Nearest Potential Overwintering Habitat - ARCH: Camp Lake **Distance to Nearest Potential Overwintering Habitat - ARCH (km):** ~0.91

Overwintering Habitat Upstream of Site - ARCH (Y/N): CV-106-3 pond (juveniles only)

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

FISHING SITES



RAIL CV-104-5

FISHERIES DATA

Date: 22-Jun-19 **Temperature (°C):** NR **Gear Used:** Backpack Electrofisher/Visual

Distance Fished (m): 100 **Duration Fished (seconds):** 471

Species	Season	Pass	Effort (Seconds)	Fish Captured	Fish Observed	CPUE (No. Fish/60 Seconds)	Length Range (mm)
ARCH	Spring	1	471	20	several	2.55	72 – 155 (measured)
NNST	Spring	1	471	0	0	-	-

Date: 19-Aug-19 **Temperature (°C):** 12.0 **Gear Used:** Visual

Distance Fished (m): N/A **Duration Fished (seconds):** N/A

Species	Season	Pass	Effort (Seconds)	Fish Captured	Fish Observed	CPUE (No. Fish/60 Seconds)	Length Range (mm)
ARCH	Summer/Fall	-	-	0	dozens	-	150 – 200 (estimated)
NNST	Summer/Fall	-	-	0	0	-	-

COMMENTS

During spring, char were captured throughout the surveyed reach and observed as far upstream as the barrier. During summer/fall, char were observed in the habitat survey reach (100 m downstream to 200 m upstream) and were generally larger than those observed during spring. Stickleback were not captured or observed in the survey area. Results for both species are consistent with previous surveys of this stream since annual monitoring began in 2006.

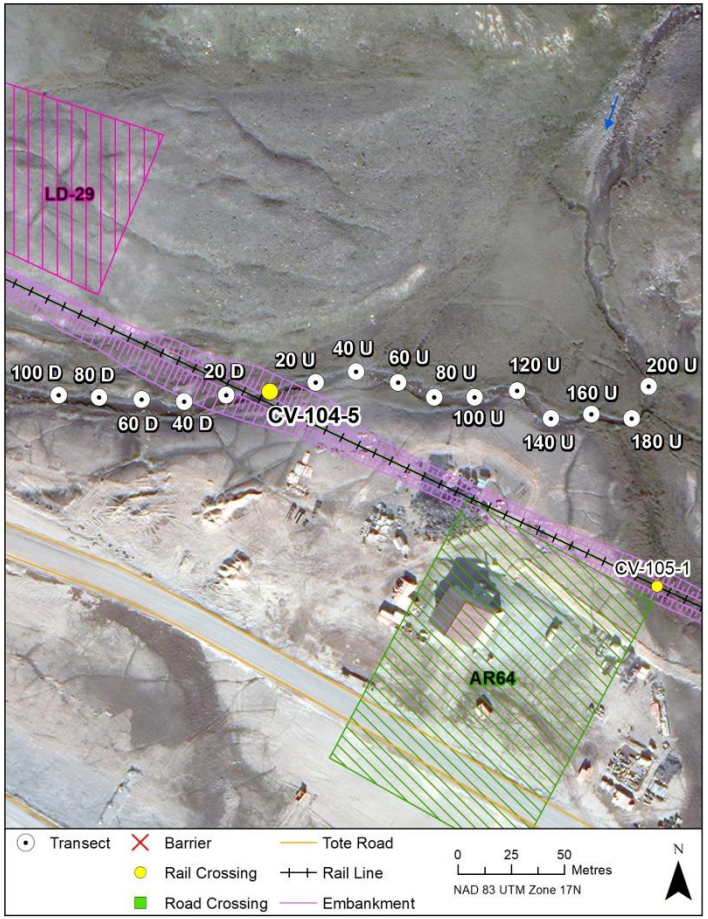
RAIL CV-104-5

GENERAL HABITAT CHARACTERISTICS

Channel Confinement: PC **Stream Morphology:** Meandering **Riparian Vegetation Type (%):** Grass 70, Willow 20, Other 10

Centreline	Height (m)	Stability	Materials (%)	Shape
LHB	0.36	Moderate	Mineral Soil 50, Organic 50	Vertical
RHB	0.26	Moderate	Boulder 10, Mineral Soil 45, Organic 45	Vertical

HABITAT SURVEY SITES



RAIL CV-104-5

HYDROLOGY & HABITAT CHARACTERISTICS: 22-JUN-19

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
100D	3.4	3.4	0.15	0.22	0.09	0.25	0.42	0.30	0.62	0.85
80D	3.1	2.8	0.25	0.15	0.20	0.25	0.20	0.11	0.11	0.20
60D	6.3	5.3	0.11	0.13	0.20	0.40	0.26	0.71	0.30	0.75
40D	7.2	7.2	0.08	0.20	0.10	0.20	0.13	0.27	0.12	0.27
20D	4.4	4.0	0.15	0.18	0.20	0.25	0.42	0.35	0.37	0.50
0 (Centreline)	4.9	4.5	0.27	0.19	0.23	0.35	0.27	0.10	0.00	0.27
20U	4.9	4.9	0.10	0.26	0.20	0.35	0.70	0.10	0.46	0.70
40U	5.0	4.4	0.23	0.15	0.32	0.55	0.54	0.56	0.11	0.80
60U	5.3	4.8	0.26	0.15	0.10	0.30	0.25	0.98	0.27	1.10
80U	7.5	7.5	0.08	0.10	0.15	0.20	0.61	0.46	0.39	0.65
100U	4.9	4.0	0.10	0.17	0.15	0.25	0.83	0.36	0.18	0.95

Site	Stream Morphology Composition (%)							Substrate Composition (%)				
	Riffle	Pool (<0.2 m)	Pool (>0.2 m)	Run	Cascade	Flat	Rapids	Fines	Gravel	Small Cobble	Large Cobble	Boulders
100D	40	15	5	40	-	-	-	-	-	30	60	10
80D	20	15	15	50	-	-	-	-	-	40	60	-
60D	40	30	10	20	-	-	-	-	-	50	40	10
40D	60	30	10	-	-	-	-	-	10	40	45	5
20D	30	15	5	50	-	-	-	-		30	60	10
0 (Centreline)	40	30	20	10	-	-	-	-	10	50	40	-
20U	20	40	10	30	-	-	-	-	10	50	30	10
40U	20	30	10	20	20	-	-	-	10	30	50	10
60U	30	20	20	10	20	-	-	-	-	20	60	20
80U	40	30	-	30	-	-	-	10	20	40	20	10
100U	40	10	10	40	-	-	-	-	10	30	50	10

OTHER NOTES / OBSERVATIONS

This stream has generally moderate depths with some deeper pools and runs over mainly cobble/boulder substrate.

RAIL CV-104-5

HYDROLOGY & HABITAT CHARACTERISTICS: 19-AUG-19

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
100D	2.9	2.8	0.26	0.04	0.16	0.35	0.55	0.85	0.21	1.65
80D	2.8	2.6	0.12	0.22	0.25	0.30	0.30	0.32	0.21	0.43
60D	6.1	4.7	0.06	0.10	0.11	0.11	0.47	0.56	0.31	0.64
40D	5.5	4.0	0.15	0.11	0.17	0.17	0.56	1.01	0.43	1.01
20D	4.7	3.7	0.19	0.20	0.22	0.24	0.34	0.26	0.24	0.56
0 (Centreline)	3.1	2.7	0.14	0.16	0.13	0.28	0.35	0.18	0.18	0.39
20U	4.8	4.2	0.13	0.12	0.09	0.31	0.90	0.33	0.58	0.90
40U	6.2	4.2	0.21	0.23	0.19	0.30	0.27	0.60	0.50	0.90
60U	4.5	4.7	0.20	0.08	0.15	0.21	0.47	0.35	0.15	1.42
80U	7.3	7.3	0.05	0.10	0.15	0.21	0.18	0.10	0.28	0.67
100U	6.3	4.9	0.19	0.12	0.10	0.19	0.15	0.20	0.49	1.26

Site	Stream Morphology Composition (%)							Substrate Composition (%)				
	Riffle	Pool (<0.2 m)	Pool (>0.2 m)	Run	Cascade	Flat	Rapids	Fines	Gravel	Small Cobble	Large Cobble	Boulders
100D	50	20	10	-	20	-	-	-	15	60	20	5
80D	60	10	5	20	5	-	-	5	35	50	9	1
60D	60	25	-	10	5	-	-	5	25	50	10	10
40D	20	40	10	20	10	-	-	-	10	65	15	10
20D	45	25	10	10	10	-	-	-	10	70	10	10
0 (Centreline)	20	-	25	55	-	-	-	-	35	25	20	20
20U	20	30	15	35	-	-	-	5	25	50	10	10
40U	15	35	10	10	30	-	-	-	20	45	20	15
60U	10	30	20	-	40	-	-	-	10	40	25	25
80U	30	40	5	-	25	-	-	-	20	50	15	15
100U	50	25	-	-	25	-	-	-	10	55	20	15

OTHER NOTES / OBSERVATIONS

Velocities were slightly higher during summer/fall; habitat was otherwise similar between seasons.

RAIL CV-104-5

22-JUN-19

A

B

C

D

E

F

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

RAIL CV-104-5

22-JUN-19

A

B

C

D

E

F

Photos 2. Photos taken 40 m downstream (top) and 60 m downstream (bottom) in spring: (A,D) facing upstream; (B,E) facing downstream; and (C,F) across (left bank looking at right bank).

RAIL CV-104-5

22-JUN-19

A

B

C

D

E

F

Photos 3. Photos taken 80 m downstream (top) and 100 m downstream (bottom) in spring: (A,D) facing upstream; (B,E) facing downstream; and (C,F) across (left bank looking at right bank).

RAIL CV-104-5

22-JUN-19

A

B

C

D

E

F

Photos 4. Photos taken 20 m upstream (top) and 40 m upstream (bottom) in spring: (A,D) facing upstream; (B,E) facing downstream; and (C,F) across (left bank looking at right bank).

RAIL CV-104-5

22-JUN-19

A

B

C

D

E

F

Photos 5. Photos taken 60 m upstream (top) and 80 m upstream (bottom) in spring: (A) facing upstream; (B) facing downstream; and (C) across (left bank looking at right bank).

RAIL CV-104-5

22-JUN-19

A

B

C

Photos 6. Photos taken 100 m upstream (top) in spring: (A) facing upstream; (B) facing downstream; and (C) across (left bank looking at right bank).

RAIL CV-104-5

19-AUG-19

A

B

C

D

E

F

Photos 7. Photos taken at the crossing centerline in summer/fall: (A) facing upstream; (B) facing downstream; (C) across (left bank looking at right bank); (D) diagonal from right bank above the centreline looking downstream; (E) across (right bank looking at left bank); and (F) diagonal from right bank below the centreline looking upstream.

RAIL CV-104-5

19-AUG-19

A

B

C

D

E

F

Photos 8. Photos taken 20 m downstream (top) and 40 downstream (bottom) in summer/fall: (A,D) facing upstream; (B,E) facing downstream; and (C,F) across (left bank looking at right bank).

RAIL CV-104-5

19-AUG-19

A

B

C

D

E

F

Photos 9. Photos taken 60 m downstream (top) and 80 downstream (bottom) in summer/fall: (A,D) facing upstream; (B,E) facing downstream; and (C,F) across (left bank looking at right bank).

RAIL CV-104-5

19-AUG-19

A

B

C

Photos 10. Photos taken 100 m downstream in summer/fall: (A) facing upstream; (B) facing downstream; and (C) across (left bank looking at right bank).

RAIL CV-104-5

19-AUG-19

A

B

C

D

E

F

Photos 11. Photos taken 20 m upstream (top) and 40 m upstream (bottom) in summer/fall: (A,D) facing upstream; (B,E) facing downstream; and (C,F) across (left bank looking at right bank).

RAIL CV-104-5

19-AUG-19

A

B

C

D

E

F

Photos 12. Photos taken 60 m upstream (top) and 80 m upstream (bottom) in summer/fall: (A,D) facing upstream; (B,E) facing downstream; and (C,F) across (left bank looking at right bank).

RAIL CV-104-5

19-AUG-19

A

B

C

Photos 13. Photos taken 100 m upstream in summer/fall: (A) facing upstream; (B) facing downstream; and (C) across (left bank looking at right bank).

RAIL CV-104-5

HYDROLOGY & HABITAT CHARACTERISTICS: UPSTREAM SURVEY

Date: 19-Aug-19

Site	Channel Width (m)		Water Depth (m)				Water Velocity (m/s)			
	Bankfull	Wetted	25%	50%	75%	Max	25%	50%	75%	Max
120U	3.8	3.6	0.09	0.09	0.12	0.36	0.40	0.43	0.60	0.89
140U	5.7	3.9	0.16	0.21	0.12	0.25	0.26	0.38	0.38	0.87
160U	2.5	2.5	0.14	0.15	0.19	0.70	0.93	0.78	0.71	1.03
180U	1.7	1.7	0.23	0.22	0.21	0.32	0.26	0.29	0.57	0.94
200U	6.7	3.2	0.20	0.12	0.12	0.46	0.47	0.48	0.34	0.80

Site	Stream Morphology Composition (%)							Substrate Composition (%)				
	Riffle	Pool (<0.2 m)	Pool (>0.2 m)	Run	Cascade	Flat	Rapids	Fines	Gravel	Small Cobble	Large Cobble	Boulders
120U	60	20	10	-	10	-	-	-	10	75	10	5
140U	50	35	-	10	5	-	-	-	15	65	15	5
160U	50	10	20	20	-	-	-	-	10	85	3	2
180U	70	10	-	10	10	-	-	-	20	65	10	5
200U	10	35	30	-	25	-	-	10	15	50	15	10

OTHER NOTES / OBSERVATIONS

Detailed habitat surveys were conducted from 100-200 m upstream in summer/fall. A reconnaissance survey of the upstream area was conducted in spring.

The stream splits into two channels over a distance of approximately 20 m, 200 m upstream from the rail centreline. At 280 m upstream, the habitat transitions to steeper cascades and ultimately vertical drops at approximately 360 m upstream. Habitat at the permanent barrier is primarily cascade/pool over cobble/boulder.

A

B

C

D

Photos 14. Photos of habitat taken during spring: (A) at 140 m upstream; (B) 220 m upstream; (C) 280 m upstream; and (D) 360 m upstream.

RAIL CV-104-5

19-AUG-19: UPSTREAM SURVEY

A

B

C

D

E

F

Photos 15. Photos taken 120 m upstream (top) and 140 m upstream (bottom) in summer/fall: (A,D) facing upstream; (B,E) facing downstream; and (C,F) across (left bank looking at right bank). Note: all photos taken while standing at the transect centreline.

RAIL CV-104-5

19-AUG-19: UPSTREAM SURVEY

A

B

C

D

E

F

Photos 16. Photos taken 160 m upstream (top) and 180 m upstream (bottom) in summer/fall: (A,D) facing upstream; (B,E) facing downstream; and (C,F) across (left bank looking at right bank). Note: all photos taken while standing at the transect centreline.

RAIL CV-104-5

19-AUG-19: UPSTREAM SURVEY

A

B

C

Photos 17. Photos taken 200 m upstream in summer/fall: (A) facing upstream; (B) facing downstream; and (C) across (left bank looking at right bank). Note: all photos taken while standing at the transect centreline.