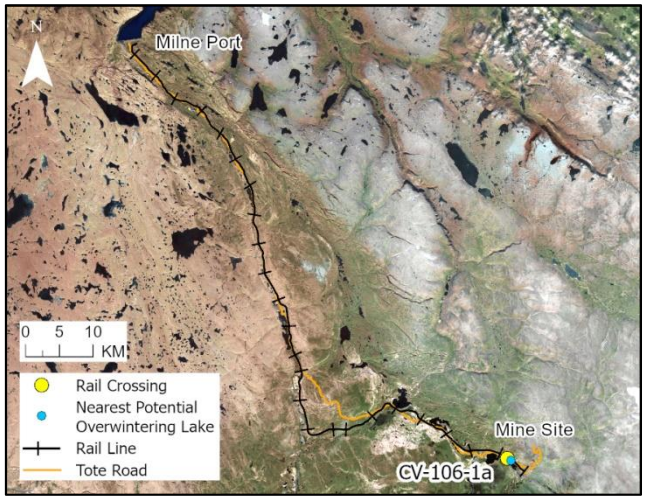
RAIL CV-106-1A

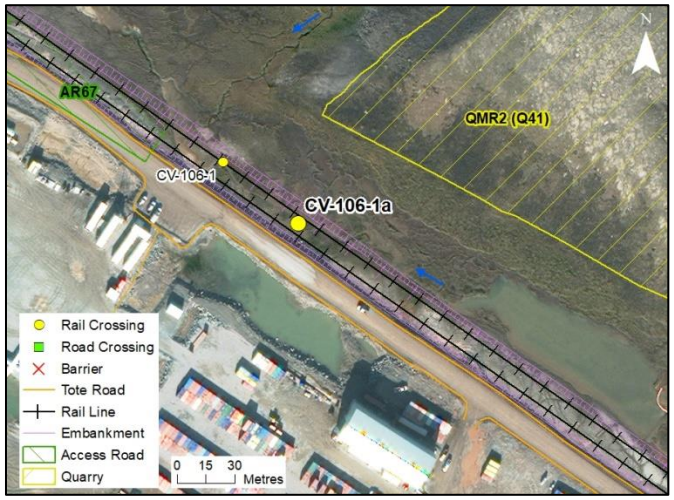
LOCATION AND CROSSING DESCRIPTION

Site ID:	CV-106-1a	**Dates Surveyed:**	22-Jun-19; 19-Aug-19	**Waterbody Type:**	Stream
Project Interaction:	Stream Infilling + Diversion	**Centreline UTM Coordinates:**	17W 559399 E 7914231 N	**Culvert Length (m):**	N/A
Number of Barrels:	N/A	**Culvert Diameter/Span (mm):**	N/A	**Slope (%):**	1

GENERAL PHYSICAL CHARACTERISTICS

Flow Regime: Seasonal **Stream Order:** 2 **Drainage Basin Area (km^2):** -





SUMMARY

The north rail will infill and divert a portion of an unnamed seasonal stream at site CV-106-1a, located upstream of CV-106-1. The rail will infill the portion of the stream from approximately 80 m upstream to 60 m downstream of the site CV-106-1a (corresponding to site CV-106-1); the stream will be diverted/reconstructed to the north of the rail. This system feeds into a larger stream that is crossed by the rail at CV-104-5 approximately 1.1 km downstream from the centreline. It then flows west to the Tote Road crossing BG-01 and then south to Camp Lake (approximately 2.2 km from CV-106-1a). The stream is also crossed by the rail at CV-105-2, 105-3, 105-4, 106-1,106-2, and 106-3.

There is a small lake (CV-106-3) with sufficient depth to provide overwintering for Ninespine Stickleback and possibly also juvenile char approximately 500 m upstream of the site. This stream is generally shallow and slow-moving pool/flat habitat over cobble/gravel/fines substrate throughout, interspersed with larger, connected ponds (e.g., the pond at CV-105-3). The infill area for CV-106-1a is mainly riffle/run with some shallow pools with moderate depths and velocities. There are no upstream or downstream barriers in this stream between the potential overwintering waterbodies.

This stream provides open-water season rearing habitat for juvenile Arctic Char, particularly in the deeper runs. The stream does not provide overwintering or spawning habitat for char due to lack of flow and sufficient depth in winter. This stream also provides open-water season rearing and spawning habitat for Ninespine Stickleback. Depths are insufficient to support overwintering for this species.

RAIL CV-106-1A

BARRIERS

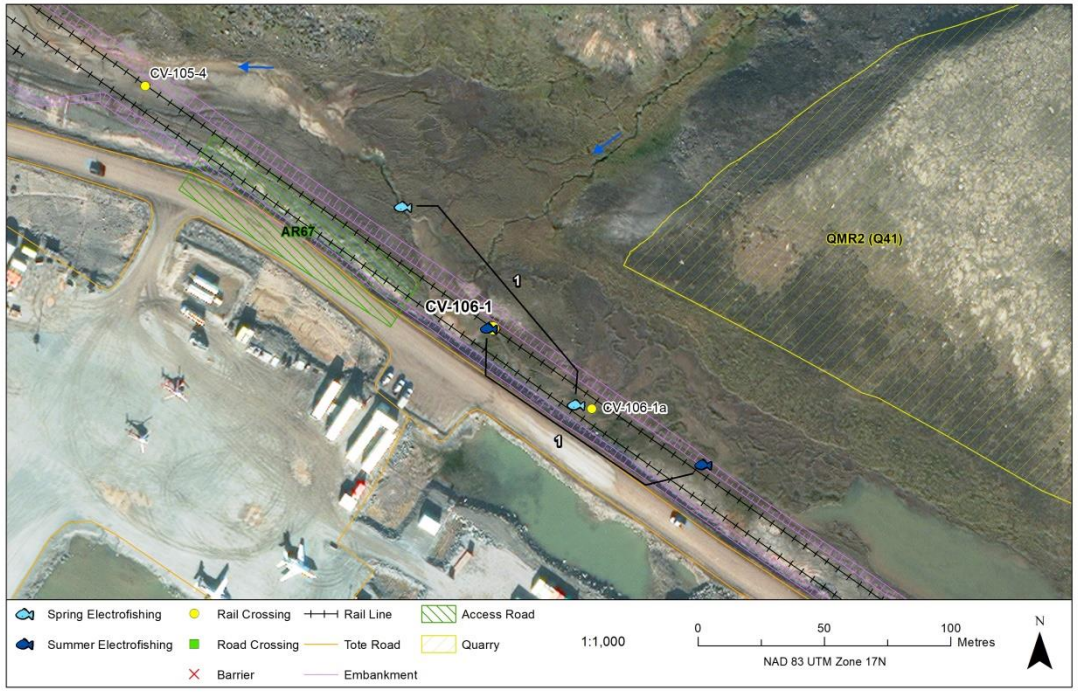
Upstream/ Downstream	UTM		Barrier Type			Height (m)	Gradient (°)	Description	Site Label
	Easting	Northing	1	2	3				
Downstream	NO BARRIERS								
Upstream	NO BARRIERS								

FISH HABITAT POTENTIAL

Nearest Potential Overwintering Habitat - ARCH: Unnamed Lake/Camp Lake **Distance to Nearest Potential Overwintering Habitat - ARCH (km):** 0.50/2.2

Overwintering Habitat Upstream of Site - ARCH (Y/N): Unnamed lake (at CV-106-3)

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



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FISHERIES DATA

Date: 22-Jun-19 **Temperature (°C):** 20.0 **Gear Used:** Backpack Electrofisher/Visual

Distance Fished (m): 100 **Duration Fished (seconds):** 196

Species	Season	Pass	Effort (Seconds)	Fish Captured	Fish Observed	CPUE (No. Fish/60 Seconds)	Length Range (mm)
ARCH	Spring	1	196	1	0	0.31	90 (measured)
NNST	Spring	1	196	12	0	3.67	33 – 51 (measured)

Date: 19-Aug-19 **Temperature (°C):** 13.0 **Gear Used:** Backpack Electrofisher/Visual

Distance Fished (m): 100 **Duration Fished (seconds):** 135

Species	Season	Pass	Effort (Seconds)	Fish Captured	Fish Observed	CPUE (No. Fish/60 Seconds)	Length Range (mm)
ARCH	Summer/Fall	1	135	3	0	1.33	89 – 200(measured)
NNST	Summer/Fall	1	135	13	0	5.78	28 – 66 (measured)

COMMENTS

Electrofishing in spring and summer/fall included both the pond at 106-1 and some of the stream habitat assessed by the CV-106-1a site. As both habitat types are covered, the data are shared between sites. In both seasons, stickleback were captured exclusively in pond habitat (shallow, silt/sand with vegetation) at CV-106-1 downstream while char were all captured/observed in the narrower, deeper runs found downstream and upstream of CV-106-1a.

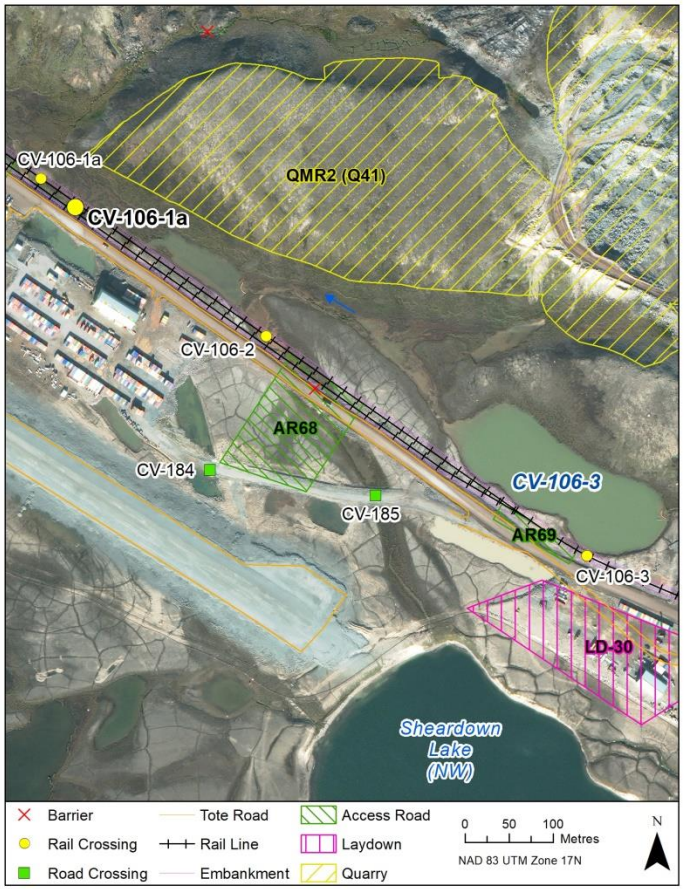
RAIL CV-106-1A

GENERAL HABITAT CHARACTERISTICS

Channel Confinement: UC **Stream Morphology:** Sinuous **Riparian Vegetation Type (%):** Grass 90, Other 10

Centreline	Height (m)	Stability	Materials (%)	Shape
LHB	0.15	Moderate	CGS 20, Organic 80	Sloping
RHB	0.15	Moderate	CGS 20, Organic 80	Sloping

HABITAT SURVEY SITES



RAIL CV-106-1A

HYDROLOGY & HABITAT CHARACTERISTICS: 22-JUN-19

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
100D	3.7	2.1	0.05	0.04	0.06	0.15	0.05	0.11	0.17	0.25
80D	17.7	14.6	0.13	0.03	0.07	0.25	0.00	0.00	0.10	0.12
60D	23.4	4.0	0.06	0.08	0.08	0.10	0.10	0.12	0.00	0.22
40D	2.7	1.4	0.03	0.03	0.02	0.40	0.07	0.11	0.12	0.30
20D	9.5	1.6	0.02	0.02	0.04	0.10	0.16	0.18	0.20	0.25
0 (Centreline)	18.0	2.1	0.09	0.14	0.07	0.10	0.14	0.10	0.07	0.20
20U	6.1	2.1	0.16	0.17	0.17	0.20	0.00	0.06	0.12	0.15
40U	13.1	5.4	0.03	0.03	0.03	0.10	0.32	0.43	0.18	0.85
60U	9.8	7.0	0.03	0.04	0.04	0.15	0.23	0.38	0.40	0.40
80U	1.2	1.1	0.22	0.22	0.22	0.45	0.00	0.00	0.00	0.36
100U	7.8	11.8	-	-	-	0.75	-	-	-	0.00

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	-	-	50	-	-	-	70	10	10	10	-
80D	-	50	-	50	-	-	-	70	10	10	10	-
60D	-	25	-	75	-	-	-	70	10	10	10	-
40D	50	-	-	50	-	-	-	70	15	15	-	-
20D	100	-	-	-	-	-	-	10	80	5	5	-
0 (Centreline)	-	20	-	80	-	-	-	100	-	-	-	-
20U	-	-	-	100	-	-	-	100	-	-	-	-
40U	100	-	-	-	-	-	-	50	25	25	-	-
60U	50	50	-	-	-	-	-	50	25	25	-	-
80U	50	-	50	-	-	-	-	80	10	10	-	-
100U	-	-	100	-	-	-	-	100	-	-	-	-

OTHER NOTES / OBSERVATIONS

There is a confluence with another pond 100 m upstream from this site; habitat was otherwise similar to other reaches on this system. The nearest potential overwintering lakes are either Camp Lake downstream, or the small, unnamed upstream lake at CV-106-3.

RAIL CV-106-1A

HYDROLOGY & HABITAT CHARACTERISTICS: 19-AUG-19

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
100D	10.1	4.6	0.10	0.05	0.06	0.12	0.21	0.15	0.05	0.28
80D	18.0	17.1	0.06	0.08	0.06	0.10	0.08	0.23	0.13	0.23
60D	25.0	1.9	0.20	0.16	0.15	0.20	0.04	0.16	0.05	0.53
40D	7.2	5.0	0.08	0.02	0.10	0.18	0.15	too shallow	0.86	0.86
20D	15.0	4.9	0.06	0.06	0.01	0.08	0.37	0.33	too shallow	0.37
0 (Centreline)	30.0	2.4	0.04	0.02	0.15	0.15	0.02	0.00	0.44	0.75
20U	25.0	2.9	0.03	0.01	0.22	0.22	0.10	too shallow	0.24	0.70
40U	24.0	6.8	0.03	0.04	0.07	0.16	0.22	0.20	0.65	0.65
60U	11.4	1.2	0.06	0.07	0.06	0.40	0.53	0.60	0.61	0.61
80U	3.6	2.0	0.25	0.19	0.19	0.35	0.07	0.22	0.00	0.44
100U	8.5	8.0	0.30	0.35	0.26	0.35	0.00	0.00	0.00	0.00

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	20	70	-	-	-	10	-	70	10	20	20	70
80D	10	20	10	60	-	-	-	10	20	70	10	20
60D	30	50	-	-	-	20	-	90	10	-	30	50
40D	30	40	-	-	-	30	-	70	25	5	30	40
20D	20	30	-	10	-	40	-	90	10	-	20	30
0 (Centreline)	20	20	-	20	-	40	-	90	5	5	20	20
20U	20	10	-	40	-	30	-	70	30	-	20	10
40U	30	30	10	20	-	10	-	40	50	10	30	30
60U	20	40	10	20	-	10	-	40	20	40	20	40
80U	-	40	60	-	-	-	-	95	-	5	-	40
100U	20	70	-	-	-	10	-	70	10	20	20	70

OTHER NOTES / OBSERVATIONS

Measured velocities were slightly higher during summer/fall than spring, but overall habitat was similar to spring.

RAIL CV-106-1A

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-106-1A

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-106-1A

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-106-1A

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-106-1A

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,D) facing upstream; (B,E) facing downstream; and (C,F) across (left bank looking at right bank).

RAIL CV-106-1A

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-106-1A

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-106-1A

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-106-1A

19-AUG-19

A

B

C

D

E

F

Photos 9. Photos taken 60 m downstream (top) and 80 m 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-106-1A

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-106-1A

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-106-1A

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-106-1A

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-106-1A

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	POND UPSTREAM FROM HERE									
140U										
160U										
180U										
200U										

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	POND UPSTREAM FROM HERE											
140U												
160U												
180U												
200U												

OTHER NOTES / OBSERVATIONS

There is a small (35 x 100 m) shallow (<1.0 m) pond on the stream system from approximately 100 to 200 m upstream of site CV-106-1a. Pond habitat is similar to other ponds in this system with fines dominant nearshore and offshore. See Photos 13 above for images of this pond.