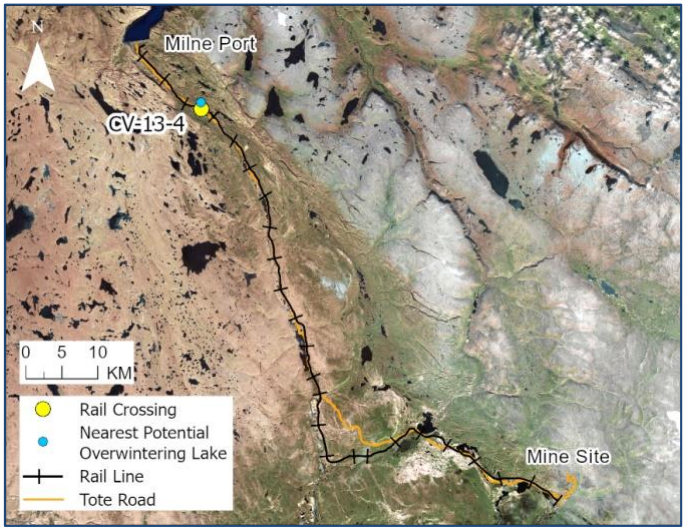
RAIL CV-13-4

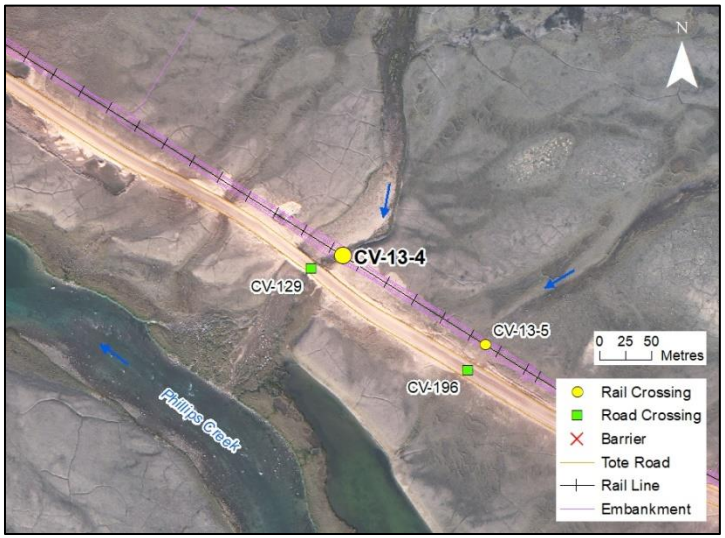
LOCATION AND CROSSING DESCRIPTION

Site ID:	CV-13-4	**Dates Surveyed:**	24-Jun-19; 14-Aug-19	**Waterbody Type:**	Stream
Project Interaction:	Rail Culvert	**Centreline UTM Coordinates:**	17W 512419 E 7966799 N	**Culvert Length (m):**	24
Number of Barrels:	5	**Culvert Diameter/Span (mm):**	1800	**Slope (%):**	1

GENERAL PHYSICAL CHARACTERISTICS

Flow Regime: Seasonal **Stream Order:** 3+ **Drainage Basin Area (km^2):** 10.87





SUMMARY

The rail alignment crosses an unnamed stream at culvert CV-13-4 that drains 180 m southwest to Phillips Creek. The creek is also crossed by the existing Tote Road (CV-129) approximately 25 m downstream of the CV-13-4 centreline.

There are no barriers to fish movement between this crossing and Phillips Creek downstream or an unnamed potential overwintering lake (CV-13-4-USL1) approximately 700 m upstream from the rail centreline. A bathymetry survey of this upstream lake completed in summer/fall 2019 indicated it had sufficient depth to support overwintering for both species.

A broad size range of Arctic Char (40-250 mm) were captured downstream and upstream of the rail centreline during spring and were observed all the way upstream to the confluence with the potential overwintering lake. Similar observations were made during the summer/fall survey. Juvenile land-locked char use this stream for rearing in the open-water season and potentially as a movement corridor between Phillips Creek and the upstream lake. The stream does not provide overwintering or spawning habitat for char as it freezes completely during winter.

Ninespine Stickleback were not captured or observed in this stream in spring or summer/fall 2019, but have occasionally been captured in small numbers during Tote Road monitoring studies conducted in previous years (e.g., 2010-2012). The stream provides rearing habitat for stickleback, mostly downstream near the confluence with Phillips Creek but does not provide overwintering due to inadequate depths or spawning habitat for the species due to relatively high velocities.

RAIL CV-13-4

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: CV-13-4-USL1 **Distance to Nearest Potential Overwintering Habitat - ARCH (km):** 0.7

Overwintering Habitat Upstream of Site - ARCH (Y/N): Yes (CV-13-4-USL1)

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

FISHING SITES

RAIL CV-13-4

FISHERIES DATA

Date: 24-Jun-19 **Temperature (°C):** 5.0 **Gear Used:** Backpack Electrofisher/Visual

Distance Fished (m): 100 **Duration Fished (seconds):** 801

Species	Season	Pass	Effort (Seconds)	Fish Captured	Fish Observed	CPUE (No. Fish/60 Seconds)	Length Range (mm)
ARCH	Spring	1	-	12	0	-	40 - 250
NNST	Spring	1	-	0	0	-	-
ARCH	Spring	2	-	4	0	-	190 - 220
NNST	Spring	2	-	0	0	-	-
ARCH	Spring	Total	801	16	0	1.20	40 - 250
NNST	Spring	Total	801	0	0	-	-

Date: 14-Aug-19 **Temperature (°C):** 17 **Gear Used:** Visual

Distance Fished (m): - **Duration Fished (seconds):** -

Species	Season	Pass	Effort (Seconds)	Fish Captured	Fish Observed	CPUE (No. Fish/60 Seconds)	Length Range (mm)
ARCH	Summer/Fall	Total	-	0	Many	-	~100-150
NNST	Summer/Fall	Total	-	0	0	-	-

COMMENTS

Juvenile Arctic Char were captured throughout the surveyed reach, from downstream of the existing Tote Road and the proposed rail centreline all the way upstream to the potential overwintering lake CV-13-4-USL1 in both spring and summer/fall.

More char were captured downstream (Reach 1, n = 12) than upstream (Reach 2, n = 4) of the existing Tote Road culvert during spring. Those captured upstream were found at, and upstream of, the rail centreline. The smallest size classes of char were captured exclusively downstream of the road closer to Phillips Creek. During summer/fall, juvenile Arctic Char were observed from immediately downstream of the Tote Road to 120 m upstream from the rail centreline.

Ninespine Stickleback were not captured or observed in 2019, but have been captured in small numbers in the vicinity of the Tote Road in previous years.

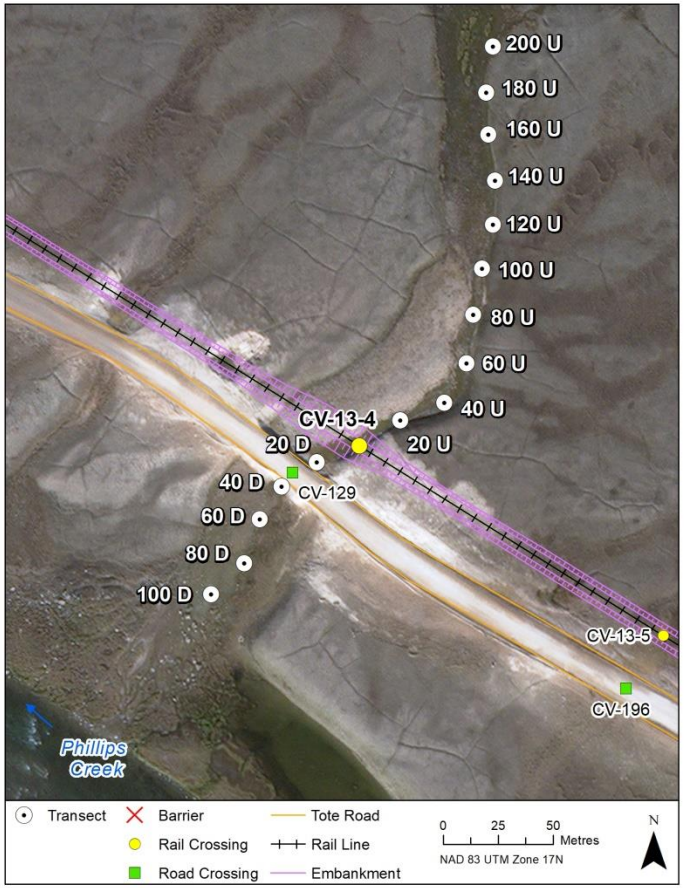
RAIL CV-13-4

GENERAL HABITAT CHARACTERISTICS

Channel Confinement: PC **Stream Morphology:** Meandering **Riparian Vegetation Type (%):** Willow 100

Centreline	Height (m)	Stability	Materials (%)	Shape
LHB	Undefined (loose cobble)	High	Boulder 10, CGS 90	Sloping
RHB	0.6	High	Boulder 10, CGS 90	Sloping

HABITAT SURVEY SITES



RAIL CV-13-4

HYDROLOGY & HABITAT CHARACTERISTICS: 24-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	42.0	36.0	0.07	0.07	0.08	0.25	0.20	0.24	0.53	0.53
80D	35.0	30.0	0.23	0.04	0.07	0.26	0.33	0.25	0.20	0.36
60D	27.0	22.0	0.12	0.03	0.01	0.12	0.26	0.18	0.14	0.34
40D	9.0	8.0	0.40	0.66	0.30	0.75	0.00	0.28	0.00	1.10
20D	32.0	5.0	0.20	0.17	0.19	0.41	0.12	0.09	0.07	1.09
0 (Centreline)	30.0	4.0	0.16	0.21	0.09	0.21	0.03	0.16	0.03	0.82
20U	34.0	3.2	0.12	0.13	0.11	0.14	0.14	0.15	0.13	0.57
40U	40.0	7.5	0.03	0.08	0.05	0.14	0.07	0.42	0.35	0.63
60U	40.0	3.2	0.09	0.08	0.08	0.26	0.35	0.62	0.36	0.68
80U	34.0	4.3	0.09	0.13	0.08	0.21	0.05	0.28	0.05	0.40
100U	19.0	4.6	0.02	0.08	0.13	0.20	0.21	0.78	0.31	0.62

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	90	5	5	-	-	-	-	-	10	50	30	10
80D	100	-	-	-	-	-	-	-	40	40	20	-
60D	95	5	-	-	-	-	-	20	20	50	10	-
40D	30	20	50	-	-	-	-	30	40	20	10	-
20D	-	-	30	70	-	-	-	35	30	25	8	2
0 (Centreline)	30	10	10	50	-	-	-	10	25	45	19	1
20U	45	20	-	35	-	-	-	10	35	35	18	2
40U	70	20	-	10	-	-	-	5	30	25	30	10
60U	30	10	10	30	20	-	-	5	20	20	50	5
80U	60	10	-	15	15	-	-	-	35	25	35	5
100U	55	25	-	-	20	-	-	5	15	30	40	10

OTHER NOTES / OBSERVATIONS

Stream discharges to Phillips Creek approximately 180 m downstream of the rail crossing centreline. Habitat is relatively consistent throughout the surveyed reach, but slope increases with more cascades upstream of the rail centreline.

RAIL CV-13-4

HYDROLOGY & HABITAT CHARACTERISTICS: 14-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	35.3	27.4	0.07	0.15	0.07	0.15	0.10	0.06	0.08	0.56
80D	29.4	23.8	0.05	0.07	0.06	0.08	0.20	0.39	0.21	0.39
60D	25.1	21.2	0.03	0.09	0.08	0.10	0.19	0.17	0.08	0.39
40D	25.2	6.6	0.17	0.46	0.34	0.80	0.00	0.32	0.09	1.22
20D	11.6	3.9	0.30	0.30	0.14	0.35	0.06	0.21	0.12	0.72
0 (Centreline)	6.4	4.1	0.21	0.21	0.21	0.25	0.01	0.01	0.34	0.39
20U	8.4	4.3	0.09	0.10	0.13	0.15	0.11	0.36	0.43	0.45
40U	14.7	9.2	0.03	0.08	0.15	0.17	0.10	0.34	0.45	0.45
60U	9.3	3.8	0.14	0.21	0.10	0.21	0.11	0.47	0.23	0.81
80U	9.4	5.9	0.09	0.11	0.15	0.15	0.03	0.25	0.48	0.56
100U	9.2	4.2	0.05	0.20	0.17	0.20	0.34	0.37	0.76	0.76

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	-	-	-	-	-	-	-	60	35	5
80D	50	50	-	-	-	-	-	-	15	60	20	5
60D	50	50	-	-	-	-	-	-	10	70	19	1
40D	35	35	30	-	-	-	-	25	10	50	14	1
20D	-	40	20	40	-	-	-	60	20	10	9	1
0 (Centreline)	30	65	5	-	-	-	-	10	30	30	25	5
20U	80	20	-	-	-	-	-	30	35	25	9	1
40U	50	5	25	20	-	-	-	-	15	60	20	5
60U	50	5	25	20	-	-	-	-	25	55	15	5
80U	80	10	-	10	-	-	-	-	20	60	15	5
100U	80	20	-	-	-	-	-	-	30	50	15	5

OTHER NOTES / OBSERVATIONS

No noticeable difference in habitat between seasons.

RAIL CV-13-4

24-JUN-19

A

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Photos 1. Photos taken at the rail crossing centreline (top) and 20 m downstream (bottom) in spring: (A,D) facing upstream; (B,E) facing downstream; (C,F) across (left bank looking at right bank). Note: in all photos field crew are positioned at the actual transect centreline.

RAIL CV-13-4

24-JUN-19

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Photos 2. Photos taken 40 m downstream (top) and 60 m downstream (bottom) in spring: (A,D) facing upstream; (B,E) facing downstream; (C,F) across (left bank looking at right bank). Note: in all photos field crew are positioned at the actual transect centreline.

RAIL CV-13-4

24-JUN-19

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Photos 3. Photos taken 80 m downstream (top) and 100 m downstream (bottom) in spring: (A,D) facing upstream; (B,E) facing downstream; (C,F) across (left bank looking at right bank). Note: in all photos field crew are positioned at the actual transect centreline.

RAIL CV-13-4

24-JUN-19

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Photos 4. Photos taken 20 m upstream (top) and 40 m upstream (bottom) in spring: (A,D) facing upstream; (B,E) facing downstream; (C,F) across (left bank looking at right bank). Note: in all photos field crew are positioned at the actual transect centreline.

RAIL CV-13-4

24-JUN-19

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Photos 5. Photos taken 60 m upstream (top) and 80 m upstream (bottom) in spring: (A,D) facing upstream; (B,E) facing downstream; (C,F) across (left bank looking at right bank). Note: in all photos field crew are positioned at the actual transect centreline.

RAIL CV-13-4

24-JUN-19

A

B

C

Photos 6. Photos taken 100 m upstream in spring: (A) facing upstream; (B) facing downstream; (C) across (left bank looking at right bank). Note: in all photos field crew are positioned at the actual transect centreline.

RAIL CV-13-4

14-AUG-19

A

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Photos 7. Photos taken at the rail crossing centreline while standing at the centreline (top) and from the right bank offset from the actual centreline (bottom) in summer/fall: (A,D) facing upstream; (B,E) facing downstream; (C,F) across (left bank looking at right bank).

RAIL CV-13-4

14-AUG-19

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

RAIL CV-13-4

14-AUG-19

A

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

RAIL CV-13-4

14-AUG-19

A

B

C

Photos 10. Photos taken 100 m downstream in summer/fall: (A,D) facing upstream; (B,E) facing downstream; (C,F) across (left bank looking at right bank). Note: all photos taken while standing at the transect centreline.

RAIL CV-13-4

14-AUG-19

A

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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; (C,F) across (left bank looking at right bank). Note: all photos taken while standing at the transect centreline.

RAIL CV-13-4

14-AUG-19

A

B

C

Photos 12. Photos taken 100 m upstream in summer/fall: (A,D) facing upstream; (B,E) facing downstream; (C,F) across (left bank looking at right bank). Note: all photos taken while standing at the transect centreline.

RAIL CV-13-4

HYDROLOGY & HABITAT CHARACTERISTICS: UPSTREAM SURVEY

Date: 14-Aug-19

Site	Channel Width (m)		Water Depth (m)				Water Velocity (m/s)			
	Bankfull	Wetted	25%	50%	75%	Max	25%	50%	75%	Max
120U	19.3	13.1	0.07	0.08	0.15	0.20	0.10	0.05	0.95	0.95
140U	24.3	15.1	0.07	0.07	0.13	0.15	0.02	0.03	0.51	0.63
160U	22.6	13.9	0.15	0.10	0.10	0.15	0.10	0.21	0.71	0.71
180U	20.2	16.7	0.20	0.06	0.10	0.10	0.33	0.06	0.57	0.60
200U	26.0	21.3	0.07	0.12	0.11	0.15	0.05	0.22	0.12	0.25

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	30	70	-	-	-	-	-	-	10	45	35	10
140U	50	50	-	-	-	-	-	-	10	60	25	5
160U	60	25	-	15	-	-	-	-	20	70	9	1
180U	60	30	-	10	-	-	-	-	30	50	15	5
200U	45	55	-	-	-	-	-	-	10	70	15	5

OTHER NOTES / OBSERVATIONS

Stream surveyed from the rail centreline to the upstream lake (approximately 700 m upstream) in spring and no barriers to fish movement were observed. Char were observed in spring and summer/fall from Phillips Creek up to the confluence with the upstream lake (CV-13-4-USL1).

RAIL CV-13-4

24-JUN-19: UPSTREAM SURVEY

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Photos 13. Photos taken 140 m upstream (top) and 180 m upstream (bottom) in spring: (A,D) facing upstream; (B,E) facing downstream; (C,F) across (left bank looking at right bank). Note: all photos taken while standing at the transect centreline.

RAIL CV-13-4

24-JUN-19: UPSTREAM SURVEY

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Photos 14. Photos taken 220 m upstream (top) and 260 m upstream (bottom) in spring: (A,D) facing upstream; (B,E) facing downstream; (C,F) across (left bank looking at right bank). Note: all photos taken while standing at the transect centreline.

RAIL CV-13-4

24-JUN-19: UPSTREAM SURVEY

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Photos 15. Photos taken 300 m upstream (top) and 340 m upstream (bottom) in spring: (A,D) facing upstream; (B,E) facing downstream; (C,F) across (left bank looking at right bank). Note: all photos taken while standing at the transect centreline.

RAIL CV-13-4

24-JUN-19: UPSTREAM SURVEY

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Photos 16. Photos taken 380 m upstream (top) and 420 m upstream (bottom) in spring: (A,D) facing upstream; (B,E) facing downstream; (C,F) across (left bank looking at right bank). Note: all photos taken while standing at the transect centreline.

RAIL CV-13-4

24-JUN-19: UPSTREAM SURVEY

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Photos 17. Photos taken 460 m upstream (top) and 500 m upstream (bottom) in spring: (A,D) facing upstream; (B,E) facing downstream; (C,F) across (left bank looking at right bank). Note: all photos taken while standing at the transect centreline.

RAIL CV-13-4

14-AUG-19: UPSTREAM SURVEY

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Photos 18. Photos taken 120 m upstream (top) and 140 m upstream (bottom) in summer/fall: (A,D) facing upstream; (B,E) facing downstream; (C,F) across (left bank looking at right bank). Note: all photos taken while standing at the transect centreline.

RAIL CV-13-4

14-AUG-19: UPSTREAM SURVEY

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Photos 19. Photos taken 160 m upstream (top) and 180 m upstream (bottom) in summer/fall: (A,D) facing upstream; (B,E) facing downstream; (C,F) across (left bank looking at right bank). Note: all photos taken while standing at the transect centreline.

RAIL CV-13-4

14-AUG-19: UPSTREAM SURVEY

A

B

C

Photos 20. Photos taken 200 m upstream in summer/fall: (A) facing upstream; (B) facing downstream; (C) across (left bank looking at right bank). Note: all photos taken while standing at the transect centreline.

RAIL CV-13-4

UPSTREAM LAKE BATHYMETRY