

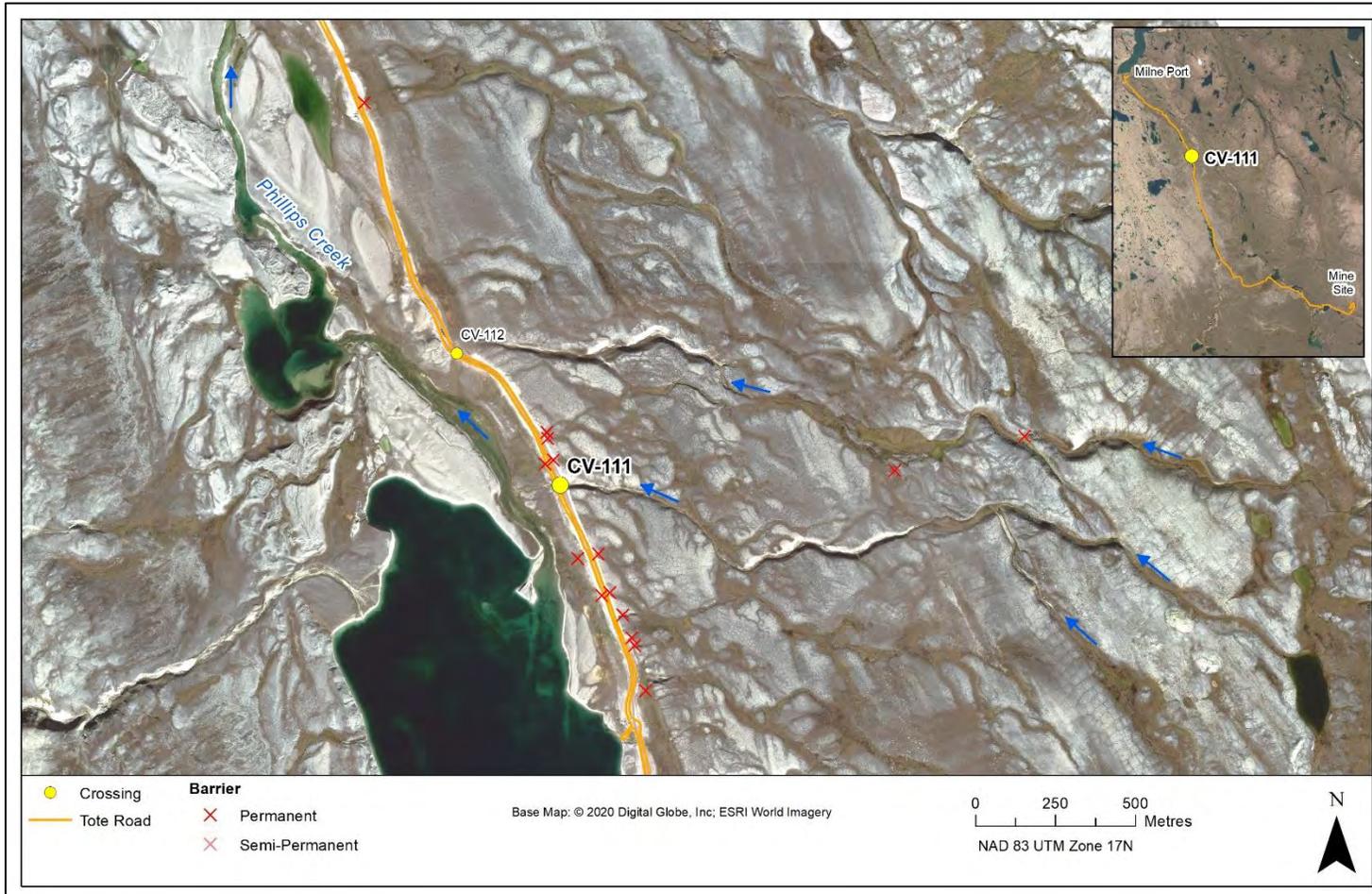
TOTE ROAD CV-111

LOCATION AND CROSSING DESCRIPTION

Site ID:	CV-111	Dates Surveyed:	2-Jul-23	Waterbody Type:	Stream
Project Interaction:	Tote Road Culvert	UTM Coordinates:	17W 521355 E 7954524 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 - POTENTIAL

TOTE ROAD CV-111

SITE SUMMARY

The Tote Road crosses a small, unnamed stream at site CV-111 that flows 120 m west into Phillips Creek near its outflow from Km 32 Lake. The lake is of sufficient depth to support overwintering of both species. In addition, there are two small lakes >2.5 km upstream from the crossing, one of which has been confirmed to be of sufficient depth to support overwintering. Although a bathymetric survey of the second lake has not been conducted it is also believed to be of sufficient depth to support overwintering. Juvenile char were captured along the shorelines of both upstream lakes in 2019.

Detailed habitat data were collected in the crossing area in spring 2023. The stream was narrow and shallow, with moderate to high water velocities. Wetted widths ranged from 1.8 to 9.1 m. Water depths were typically <0.30 m, with a maximum of 0.37 m. Velocities were generally >0.40 m/s and often exceeded 1.00 m/s. Stream morphology was mostly riffle and run throughout and substrate was primarily cobble.

Juvenile Arctic Char use habitat in the vicinity of the Tote Road crossing at CV-111 for rearing/feeding when water levels are sufficient. There is no char spawning or overwintering habitat in this stream. The culvert is currently perched and is likely preventing fish access to upstream areas. There is potential for fish from the upstream lakes to also use habitat near the road crossing.

Ninespine Stickleback were not captured in spring 2023 and have not been captured or observed in this stream during previous site surveys. It is unknown if the species is present in the watershed.

TOTE ROAD CV-111

FISH HABITAT POTENTIAL

Species	Spawning	Overwintering	Rearing	Adults Present
ARCH	N	N	Y	N
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	2-Jul-23	1.0	50	86	0	0	0.00	-
	NNST					0	0	0.00	-
Upstream	ARCH			50	62	0	0	0.00	-
	NNST					0	0	0.00	-

OTHER NOTES / OBSERVATIONS

No fish were captured/observed in spring 2023. High flows and low water temperatures likely restricted fish movements into the stream from overwintering habitat. Char have frequently been captured in this stream in previous years, using habitat for rearing. Stickleback have never been captured in this stream and it is unknown if they are present in the watershed.

TOTE ROAD CV-111

HYDROLOGY CHARACTERISTICS: 2-JUL-23

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

Stage: High

Site	Channel Width (m)		Water Depth (m)				Water Velocity (m/s)			
	Bankfull	Wetted	25%	50%	75%	Max	25%	50%	75%	Max
100D	24.3	4.6	0.12	0.10	0.09	0.26	0.55	0.63	0.12	1.42
60D	8.8	1.8	0.20	0.15	0.21	0.37	0.88	1.43	0.58	1.52
20D	24.0	8.2	0.08	0.06	0.07	0.24	0.23	0.78	1.35	1.56
0 (Centreline)	UNDER TOTE ROAD									
20U	20.0	9.1	0.11	0.03	0.22	0.26	-	0.41	0.89	1.47
60U	-	-	0.12	-	-	-	0.44	-	-	-
100U	-	-	-	-	-	-	-	-	-	-

OTHER NOTES / OBSERVATIONS

The stream was narrow and shallow, with moderate to high water velocities. Wetted widths ranged from 1.8 to 9.1 m. Water depths were typically <0.30 m, with a maximum of 0.37 m. Velocities were generally >0.40 m/s and often exceeded 1.00 m/s.

TOTE ROAD CV-111

HABITAT CHARACTERISTICS: 2-JUL-23

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

Stage: High

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	85	5	-	10	-	-	-	10	20	50	30	-
60D	90	5	-	5	-	-	-	5	10	60	25	-
20D	75	5	-	20	-	-	-	5	25	50	20	-
0 (Centreline)	UNDER TOTE ROAD											
20U	60	-	30	10	-	-	-	15	15	50	20	-
60U	90	5	-	5	-	-	-	5	5	50	40	-
100U	-	-	-	-	-	-	-	-	-	-	-	-

OTHER NOTES / OBSERVATIONS

Stream morphology was mostly riffle and run throughout. Substrate was primarily cobble.

TOTE ROAD CV-111

2-JUL-23



A



B



C



D



E



F

Photos 1-1. Photos taken 20 m downstream (top) and 60 m downstream (bottom) in spring 2023: (A,D) facing upstream; (B,E) facing downstream; and (C,F) across (right bank looking at left bank).

TOTE ROAD CV-111

2-JUL-23



A



B



C

Photos 1-2. Photos taken 100 m downstream in spring 2023: (A) facing upstream; (B) facing downstream; and (C) across (right bank looking at left bank).

TOTE ROAD CV-111

2-JUL-23



A



B



C



D



E



F

Photos 1-3. Photos taken 20 m upstream (top) and 60 m upstream (bottom) in spring 2023: (A,D) facing upstream; (B,E) facing downstream; and (C,F) across (left bank looking at right bank).

TOTE ROAD CV-111

2-JUL-23



A



B



C

Photos 1-4. Photos taken 100 m upstream in spring 2023: (A) facing upstream; (B) facing downstream; and (C) across (left bank looking at right bank).

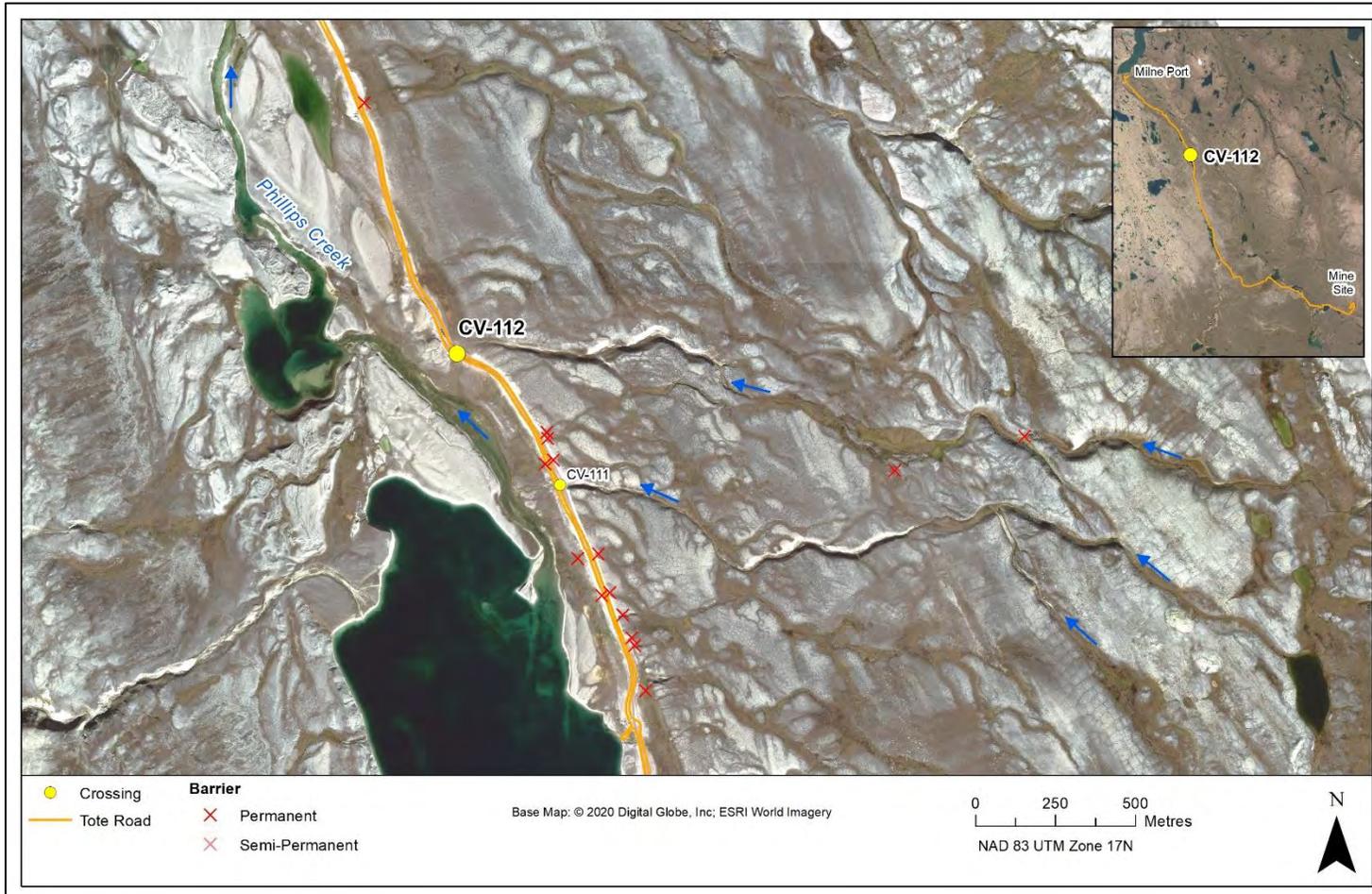
TOTE ROAD CV-112

LOCATION AND CROSSING DESCRIPTION

Site ID:	CV-112	Dates Surveyed:	1-Jul-23	Waterbody Type:	Stream
Project Interaction:	Tote Road Culvert	UTM Coordinates:	17W 521033 E 7954935 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 - POTENTIAL

TOTE ROAD CV-112

SITE SUMMARY

The Tote Road crosses a small, unnamed stream at site CV-112 that flows 120 m west into Phillips Creek, approximately 600 m downstream from Km 32 Lake and 300 m upstream from a smaller, unnamed lake. Km 32 Lake has sufficient depth to support overwintering of both species. It is unknown if the smaller lake is of sufficient depth to support overwintering.

Detailed habitat data were collected in the crossing area in spring 2023. Stream wetted widths ranged from 3.5-9.9 m and water depths typically ranged from 0.05-0.20 m. Velocities were moderate to high, often exceeding 1.00 m/s, especially in the main thalweg of the stream. Stream morphology was predominantly riffle throughout. The substrate was primarily gravel/cobble.

Although no fish were captured or observed in spring 2023, juvenile Arctic Char are known to use habitat in the vicinity of the Tote Road crossing at CV-112 for rearing/feeding throughout the open-water period. There is no char spawning or overwintering habitat in this stream.

Ninespine Stickleback were not captured in spring 2023 and have not been captured or observed in this stream during previous site surveys. It is unknown if the species is present in the watershed.

TOTE ROAD CV-112

FISH HABITAT POTENTIAL

Species	Spawning	Overwintering	Rearing	Adults Present
ARCH	N	N	Y	N
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	1-Jul-23	4.0	50	145	0	0	0.00	-
	NNST					0	0	0.00	-
Upstream	ARCH			50	129	0	0	0.00	-
	NNST					0	0	0.00	-

OTHER NOTES / OBSERVATIONS

No fish were captured/observed in spring 2023. High flows and low water temperatures likely restricted fish movements into the stream from overwintering habitat. Char have frequently been captured in this stream in previous years, using habitat for rearing. Stickleback have never been captured in this stream and it is unknown if they are present in the watershed.

TOTE ROAD CV-112

HYDROLOGY CHARACTERISTICS: 1-JUL-23

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

Stage: High

Site	Channel Width (m)		Water Depth (m)				Water Velocity (m/s)			
	Bankfull	Wetted	25%	50%	75%	Max	25%	50%	75%	Max
100D	85	3.5	0.05	0.10	0.13	0.20	0.20	0.67	1.00	1.51
60D	31.3	6.6	0.12	0.08	0.08	0.24	0.57	0.64	0.56	1.48
20D	37.1	7.8	0.15	0.17	0.08	0.18	1.02	0.61	0.78	1.11
0 (Centreline)	UNDER TOTE ROAD									
20U	40.5	9.9	0.10	0.10	0.09	0.25	0.79	0.66	0.99	1.30
60U	40.7	5.0	0.15	0.13	0.13	0.17	1.16	1.51	0.62	1.51
100U	7.6	4.4	0.07	0.15	0.14	0.15	0.66	0.57	0.79	1.21

OTHER NOTES / OBSERVATIONS

Stream wetted widths on July 1 ranged from 3.5-9.9 m. Measured depths were typically 0.05-0.20 m. Velocities were moderate to high, exceeding 1.00 m/s at some locations, notably in the main thalweg of the stream.

TOTE ROAD CV-112

HABITAT CHARACTERISTICS: 1-JUL-23

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

Stage: High

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	5	-	5	10	-	-	10	20	50	10	10
60D	80	5	-	10	5	-	-	10	30	45	10	5
20D	80	10	-	10		-	-	15	35	45	5	-
0 (Centreline)	UNDER TOTE ROAD											
20U	70	15	-	15		-	-	20	30	40	10	-
60U	60	5	-	10	25	-	-	5	20	45	25	5
100U	70	5	-	5	10	-	-	5	15	50	25	5

OTHER NOTES / OBSERVATIONS

Spring 2023 stream morphology was predominantly riffle throughout. The substrate was primarily gravel/cobble.

TOTE ROAD CV-112

1-JUL-23



A



B



C



D



E



F

Photos 1-1. Photos taken 20 m downstream (top) and 60 m downstream (bottom) in spring 2023: (A,D) facing upstream; (B,E) facing downstream; and (C,F) across (left bank looking at right bank).

TOTE ROAD CV-112

1-JUL-23



A



B



C

Photos 1-2. Photos taken 100 m downstream in spring 2023: (A) facing upstream; (B) facing downstream; and (C) across (left bank looking at right bank).

TOTE ROAD CV-112

1-JUL-23



A



B



C



D



E



F

Photos 1-3. Photos taken 20 m upstream (top) and 60 m upstream (bottom) in spring 2023: (A,D) facing upstream; (B,E) facing downstream; and (C,F) across (left bank looking at right bank).

TOTE ROAD CV-112

1-JUL-23



A



B



C

Photos 1-4. Photos taken 100 m upstream in spring 2023: (A) facing upstream; (B) facing downstream; and (C) across (left bank looking at right bank).

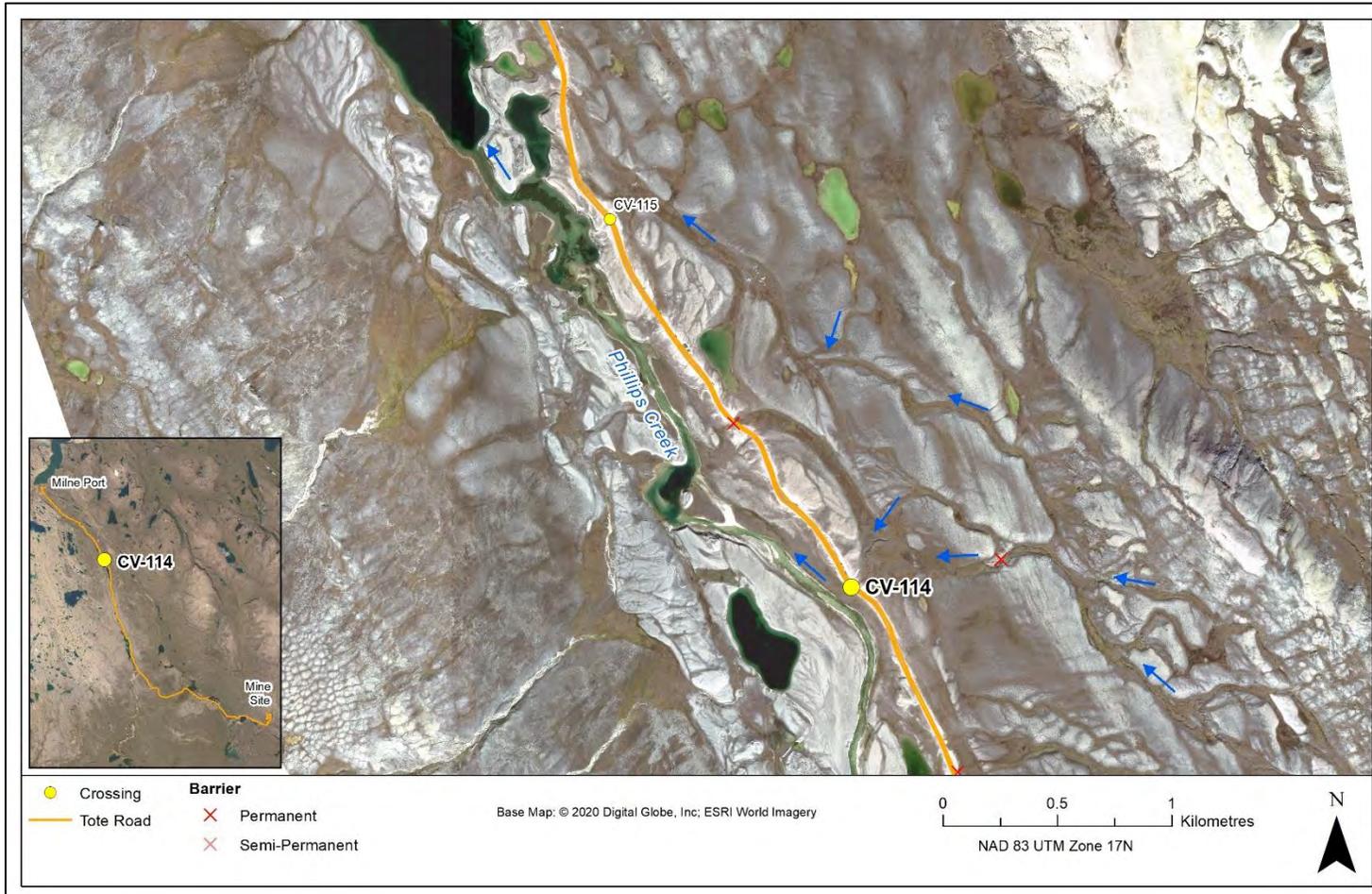
TOTE ROAD CV-114

LOCATION AND CROSSING DESCRIPTION

Site ID:	CV-114	Dates Surveyed:	1-Jul-23	Waterbody Type:	Stream
Project Interaction:	Tote Road Culvert	UTM Coordinates:	17W 520278 E 7956528 N		

GENERAL PHYSICAL CHARACTERISTICS

Flow Regime: Seasonal Stream Order: 2



BAFFINLAND IRON MINES
MARY RIVER PROJECT

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Aquatic Environment Specialists

FISH HABITAT:

ARCTIC CHAR - YES

NINESPINE STICKLEBACK - POTENTIAL

TOTE ROAD CV-114

SITE SUMMARY

The Tote Road crosses a small, unnamed stream at site CV-114 that flows 70 m west into Phillips Creek, approximately halfway (2.8 km in each direction) between two of the larger lakes in the Phillips Creek system: Km 32 and Km 26 lakes. Both lakes are of sufficient depth to support overwintering.

Detailed habitat data were collected in the crossing area in spring 2023. Stream wetted widths on July 1 ranged from 1.0-11.9 m. Measured depths were low, typically 0.05-0.20 m. Velocities were moderate to high exceeding 1.00 m/s at some locations. Stream morphology was predominantly riffle with some run and pool habitat. The substrate was primarily gravel/cobble with increased proportions of fines downstream of the crossing.

Juvenile Arctic Char use habitat in the vicinity of the Tote Road crossing at CV-114 for rearing/feeding throughout the open-water period. There is no char spawning or overwintering habitat in this stream.

Ninespine Stickleback were not captured in spring 2023 and have not been captured or observed in this stream during previous site surveys. It is unknown if the species is present in the watershed.

TOTE ROAD CV-114

FISH HABITAT POTENTIAL

Species	Spawning	Overwintering	Rearing	Adults Present
ARCH	N	N	Y	N
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	1-Jul-23	9.0	50	234	3	1	1.03	112-180
	NNST					0	0	0.00	-
Upstream	ARCH			50	112	0	0	0.00	-
	NNST					0	0	0.00	-

OTHER NOTES / OBSERVATIONS

Small numbers of juvenile char were captured downstream of the crossing in spring 2023. Char have frequently been captured in this stream in previous years, using habitat for rearing. Stickleback have never been captured in this stream and it is unknown if they are present in the watershed.

TOTE ROAD CV-114

HYDROLOGY CHARACTERISTICS: 1-JUL-23

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

Stage: High

Site	Channel Width (m)		Water Depth (m)				Water Velocity (m/s)			
	Bankfull	Wetted	25%	50%	75%	Max	25%	50%	75%	Max
100D	PHILLIPS CREEK									
60D	38.0	1.1	0.36	0.37	0.33	0.37	0.11	1.53	0.91	1.94
20D	21.7	11.9	0.12	0.10	0.08	0.20	0.56	0.57	0.52	1.41
0 (Centreline)	UNDER TOTE ROAD									
20U	17.4	8.8	0.11	0.08	0.05	0.18	0.47	0.20	0.06	1.39
60U	8.2	4.3	0.06	0.10	0.08	0.24	0.14	0.38	0.73	1.23
100U	9.9	1.8	0.24	0.18	0.15	0.24	1.24	0.83	0.35	1.50

OTHER NOTES / OBSERVATIONS

Stream wetted widths on July 1 ranged from 1.0-11.9 m. Measured depths were low, typically 0.05-0.20 m. Velocities were moderate to high and exceeded 1.00 m/s at some locations.

TOTE ROAD CV-114

HABITAT CHARACTERISTICS: 1-JUL-23

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

Stage: High

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	PHILLIPS CREEK											
60D	50	30	-	10	10	-	-	50	10	35	5	-
20D	70	10	-	20	-	-	-	20	40	30	10	-
0 (Centreline)	UNDER TOTE ROAD											
20U	65	10	-	15	10	-	-	10	35	35	15	5
60U	55	10	-	15	20	-	-	-	35	30	25	10
100U	80	5	-	10	5	-	-	-	5	30	35	30

OTHER NOTES / OBSERVATIONS

Spring 2023 stream morphology was predominantly riffle with some run and pool habitat. The substrate was primarily gravel cobble with increased proportions of fines downstream of the culvert.

TOTE ROAD CV-114

1-JUL-23



A



B



C



D



E



F

Photos 1-1. Photos taken 20 m downstream (top) and 60 m downstream (bottom) in spring 2023: (A,D) facing upstream; (B,E) facing downstream; and (C,F) across (left bank looking at right bank).

TOTE ROAD CV-114

1-JUL-23



A



B



C



D



E



F

Photos 1-2. Photos taken 20 m upstream (top) and 60 m upstream (bottom) in spring 2023: (A,D) facing upstream; (B,E) facing downstream; and (C,F) across (left bank looking at right bank).

TOTE ROAD CV-114

1-JUL-23



A



B



C

Photos 1-3. Photos taken 100 m upstream in spring 2023: (A) facing upstream; (B) facing downstream; and (C) across (left bank looking at right bank).

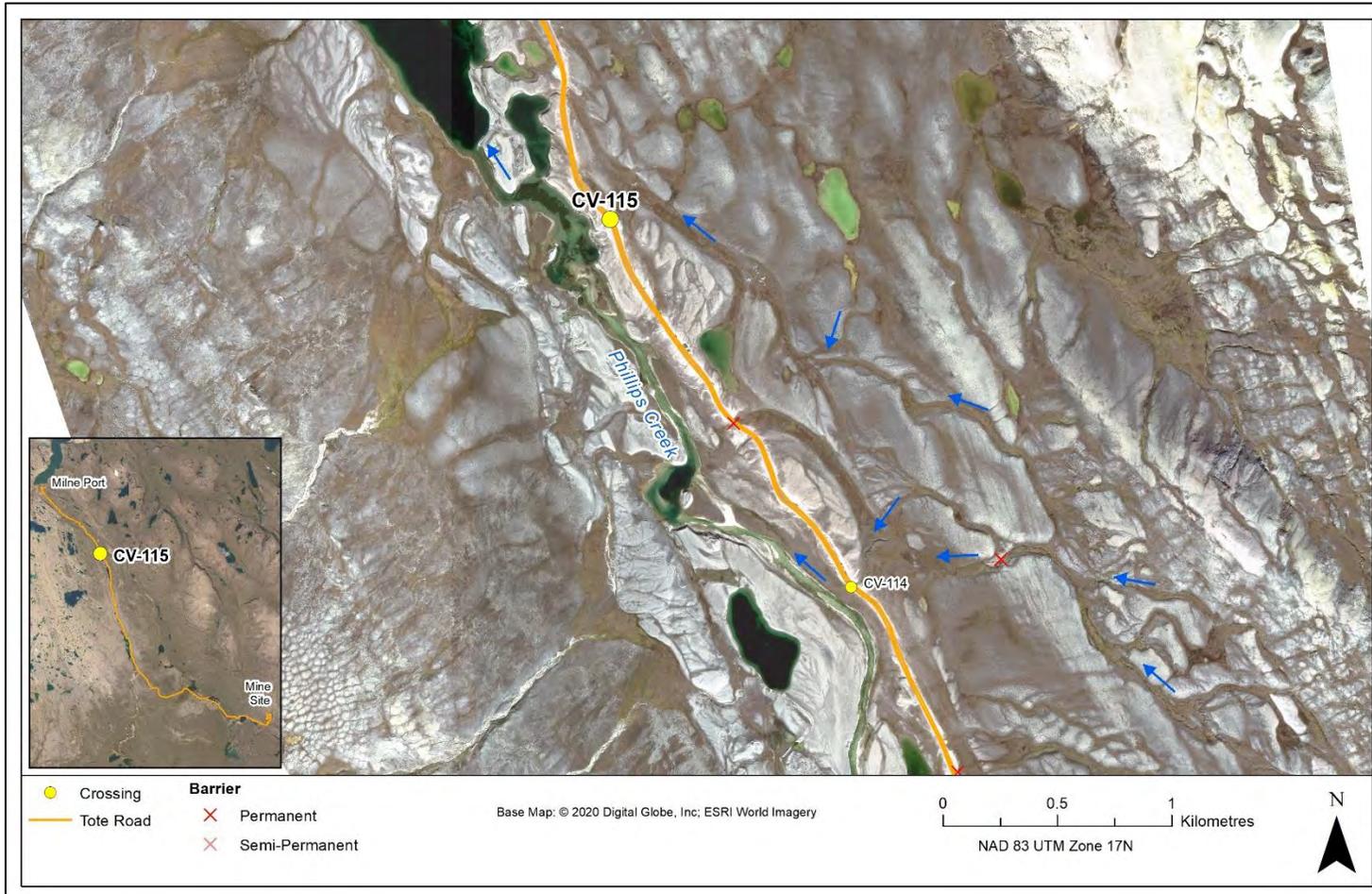
TOTE ROAD CV-115

LOCATION AND CROSSING DESCRIPTION

Site ID:	CV-115	Dates Surveyed:	1-Jul-23	Waterbody Type:	Stream
Project Interaction:	Tote Road Culvert	UTM Coordinates:	17W 519222 E 7958135 N		

GENERAL PHYSICAL CHARACTERISTICS

Flow Regime: Intermittent Stream Order: 1



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FISH HABITAT:

ARCTIC CHAR - YES

NINESPINE STICKLEBACK - POTENTIAL

TOTE ROAD CV-115

SITE SUMMARY

The Tote Road alignment crosses a small, unnamed stream at site CV-114 that flows 100 m west into Phillips Creek at a point 670 m upstream from KM26 Lake. Coarse bathymetry data have been collected from the lake and it has sufficient depths to support overwintering.

Detailed habitat data were collected in the crossing area in spring 2023. Stream wetted widths in spring 2023 ranged from 0.8-23.1 m. Water depths were low, rarely exceeding 0.05 m. Velocities were also low, typically <0.20 m/s. Stream morphology was predominantly riffle downstream and pool upstream. The substrate was primarily gravel downstream and fines upstream. This stream consistently dries up shortly after peak freshet limiting potential fish use to a very brief period in spring. There is a risk of fish stranding in the crossing area when water levels decrease.

Juvenile Arctic Char have only been captured on a single occasion in this stream (spring 2016) when two juveniles were found stranded in isolated pools (one downstream and one upstream of the crossing). When water levels are sufficient, char can use habitat in the vicinity of the Tote Road crossing at CV-115 for rearing/feeding. There is no char spawning or overwintering habitat in this stream.

Ninespine Stickleback were not captured in spring 2023 and have not been captured or observed in this stream during previous site surveys. It is unknown if the species is present in the watershed.

TOTE ROAD CV-115

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	1-Jul-23	16.0	50	106	0	0	0.00	-
	NNST					0	0	0.00	-
Upstream	ARCH			50	151	0	0	0.00	-
	NNST					0	0	0.00	-

OTHER NOTES / OBSERVATIONS

No fish were captured or observed in spring 2023. The stream consistently dries up in spring, and char have only been captured/observed on one occasion (two fish in 2016). Stickleback have never been captured in this stream and it is unknown if they are present in the watershed.

TOTE ROAD CV-115

HYDROLOGY CHARACTERISTICS: 5-JUL-23

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

Stage: High

Site	Channel Width (m)		Water Depth (m)				Water Velocity (m/s)			
	Bankfull	Wetted	25%	50%	75%	Max	25%	50%	75%	Max
100D	34.1	2.7	0.03	0.03	0.04	0.05	0.07	0.23	0.21	0.25
60D	9.5	2.2	0.03	-	0.04	0.05	0.15	-	0.06	0.35
20D	9.1	7.0	0.02	0.02	0.02	0.03	0.1	0.11	0.03	0.18
0 (Centreline)	UNDER TOTE ROAD									
20U	14.4	2.1	0.04	0.05	0.03	0.06	0.11	0.12	0.18	0.29
60U	34.6	23.1	0.06	0.08	0.12	0.33	-	-	-	0.36
100U	29.1	0.8	-	0.07	-	0.62	-	0.08	-	0.34

OTHER NOTES / OBSERVATIONS

Stream wetted widths in spring 2023 ranged from 0.8-23.1 m. Measured depths were shallow, rarely exceeding 0.05 m. Velocities were also low, typically <0.20 m/s.

TOTE ROAD CV-115

HABITAT CHARACTERISTICS: 5-JUL-23

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

Stage: High

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	60	20	-	20	-	-	-	15	70	15	-	-
60D	85	5	-	10	-	-	-	5	75	20	-	-
20D	70	10	-	20	-	-	-	20	70	10	-	-
0 (Centreline)	UNDER TOTE ROAD											
20U	-	100	-	-	-	-	-	15	35	50	-	-
60U	10	50	20	20	-	-	-	100	-	-	-	-
100U	30	50	-	20	-	-	-	100	-	-	-	-

OTHER NOTES / OBSERVATIONS

Stream morphology was predominantly riffle downstream and pool upstream. The substrate was primarily gravel downstream and fines upstream.

TOTE ROAD CV-115

5-JUL-23



A



B



C



D



E



F

Photos 1-1. Photos taken 20 m downstream (top) and 60 m downstream (bottom) in spring 2023: (A,D) facing upstream; (B,E) facing downstream; and (C,F) across (right bank looking at left bank).

TOTE ROAD CV-115

5-JUL-23



A



B



C

Photos 1-2. Photos taken 100 m downstream in spring 2023: (A) facing upstream; (B) facing downstream; and (C) across (right bank looking at left bank).

TOTE ROAD CV-115

5-JUL-23



A



B



C



D



E



F

Photos 1-3. Photos taken 20 m upstream (top) and 60 m upstream (bottom) in spring 2023: (A,D) facing upstream; (B,E) facing downstream; and (C,F) across (left bank looking at right bank).

TOTE ROAD CV-115

5-JUL-23



A



B



C

Photos 1-4. Photos taken 100 m upstream in spring 2023: (A) facing upstream; (B) facing downstream; and (C) across (left bank looking at right bank).

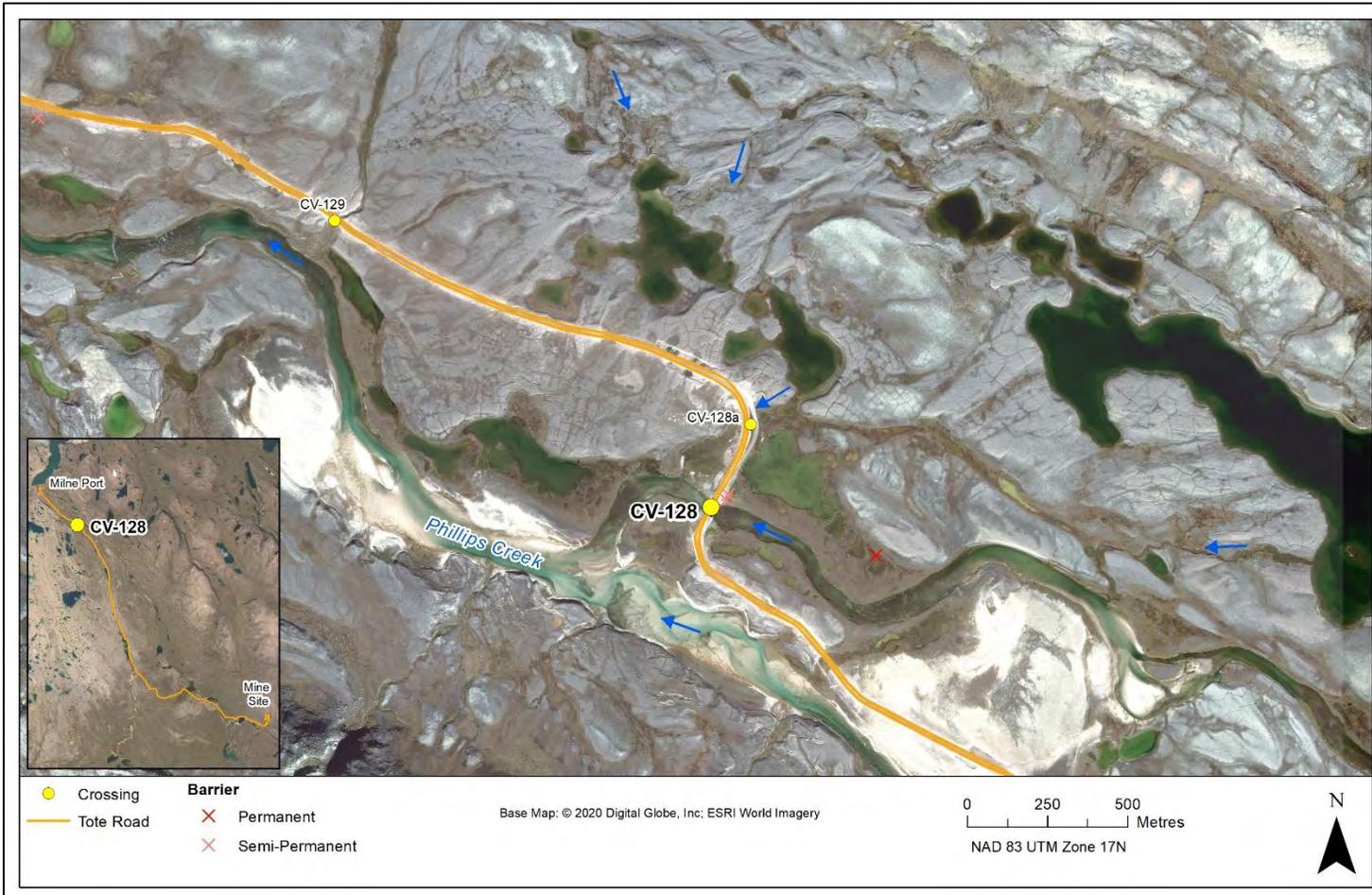
TOTE ROAD CV-128

LOCATION AND CROSSING DESCRIPTION

Site ID:	CV-128	Dates Surveyed:	1-Jul-23	Waterbody Type:	Stream
Project Interaction:	Tote Road Bridge	UTM Coordinates:	17W 513556 E 7965889 N		

GENERAL PHYSICAL CHARACTERISTICS

Flow Regime: Seasonal Stream Order: 3+



BAFFINLAND IRON MINES
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 **North/South Consultants Inc.**
Aquatic Environment Specialists

FISH HABITAT:

ARCTIC CHAR - YES

NINESPINE STICKLEBACK - YES

TOTE ROAD CV-128

SITE SUMMARY

The Tote Road crosses a large river at site CV-128 that flows 480 m southwest into Phillips Creek. The nearest potential overwintering lake is approximate 2.2 km upstream. Although a bathymetric survey has not been conducted, the lake is suspected to be of sufficient depth to support overwintering of both based on review of available imagery.

Detailed habitat data were collected for CV-128 in spring 2023. Stream wetted widths in ranged from 45.1-68.2 m. Due to the size and high flow in this river, water velocity and depth could only be measured from nearshore areas along the lefthand bank. Measured nearshore depths ranged from 0.37-0.74 m with offshore depths likely exceeding 2.0 m. Nearshore velocities were low to moderate, ranging from 0.04-0.70. Offshore velocities likely exceeded 2.00 m/s in some locations. Stream morphology was predominantly riffle/run with some deep pools throughout. The substrate was primarily cobble/boulder.

Juvenile, and potentially adult, Arctic Char can use habitat in the vicinity of the Tote Road crossing at CV-128 for rearing/feeding throughout the open-water period. There is no char spawning or overwintering habitat in this stream.

Ninespine Stickleback were not captured in spring 2023 but are also known to use habitat near the crossing for feeding. The river may be too deep and fast for stickleback spawning and there is no overwintering habitat.

TOTE ROAD CV-128

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	1-Jul-23	N/A	-	-	0	1	0.00	-
	NNST					0	0	0.00	-
Upstream	ARCH			-	-	0	0	0.00	-
	NNST			-	-	0	0	0.00	-

OTHER NOTES / OBSERVATIONS

A single char was observed in this river downstream of the crossing in spring 2023. Both species use habitat in the river for feeding/rearing.

TOTE ROAD CV-128

HYDROLOGY CHARACTERISTICS: 1-JUL-23

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

Stage: High

Site	Channel Width (m)		Water Depth (m)				Water Velocity (m/s)			
	Bankfull	Wetted	25%	50%	75%	Max	25%	50%	75%	Max
100D	68.2	63.1	0.74	-	-	-	0.04	-	-	-
40D	46.9	45.1	0.37	-	-	-	0.04	-	-	-
20D	-	-	-	-	-	-	-	-	-	-
0 (Centreline)	UNDER TOTE ROAD									
20U	-	-	-	-	-	-	-	-	-	-
40U	60	59.0	0.47	-	-	-	0.21	-	-	-
100U	70	68.2	0.62	-	-	-	0.70	-	-	-

OTHER NOTES / OBSERVATIONS

Due to the size and high flow in this river, water velocity and depth could only be measured from nearshore areas along the lefthand bank. Stream wetted widths in spring 2023 ranged from 45.1-68.2 m. Measured nearshore depths ranged from 0.37-0.74 m with offshore depths likely exceeding 2.0 m. Nearshore velocities were low to moderate, ranging from 0.04-0.70. Offshore velocities likely exceeded 2.00 m/s in some locations.

TOTE ROAD CV-128

HABITAT CHARACTERISTICS: 1-JUL-23

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

Stage: High

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	50	10	20	20	-	-	-	20	-	70	10	-
40D	60	5	20	15	-	-	-	10	5	75	5	5
20D	-	-	-	-	-	-	-	-	-	-	-	-
0 (Centreline)	UNDER TOTE ROAD											
20U	-	-	-	-	-	-	-	-	-	-	-	-
40U	65	10	15	10	-	-	-	10	-	20	20	50
100U	60	1	14	20	-	5	-	10	-	15	20	55

OTHER NOTES / OBSERVATIONS

Stream morphology was predominantly riffle/run with some deep pools throughout. The substrate was primarily cobble/boulder.

TOTE ROAD CV-128

1-JUL-23



A



B



C



D



E



F

Photos 1-1. Photos taken 40 m downstream (top) and 100 m downstream (bottom) in spring 2023: (A,D) facing upstream; (B,E) facing downstream; and (C,F) across (left bank looking at right bank).

TOTE ROAD CV-128

1-JUL-23



A



B



C



D



E



F

Photos 1-2. Photos taken 40 m upstream (top) and 100 m upstream (bottom) in spring 2023: (A,D) facing upstream; (B,E) facing downstream; and (C,F) across (left bank looking at right bank).

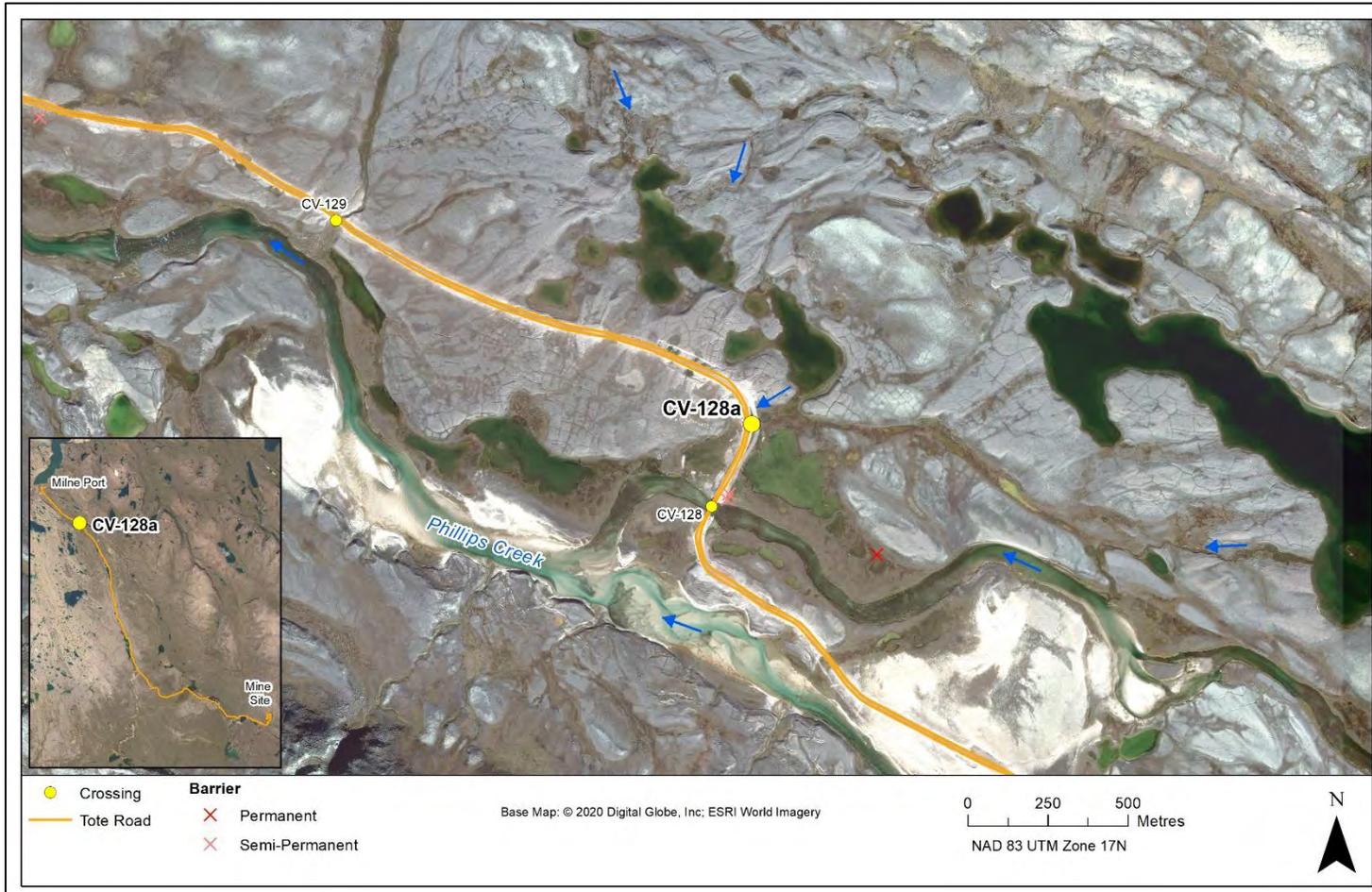
TOTE ROAD CV-128A

LOCATION AND CROSSING DESCRIPTION

Site ID:	CV-128a	Dates Surveyed:	1-Jul-23	Waterbody Type:	Stream
Project Interaction:	Tote Road Culvert	UTM Coordinates:	17W 513680 E 7966148 N		

GENERAL PHYSICAL CHARACTERISTICS

Flow Regime: Seasonal Stream Order: 2



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FISH HABITAT:

ARCTIC CHAR - YES

NINESPINE STICKLEBACK - YES

TOTE ROAD CV-128A

SITE SUMMARY

The Tote Road crosses a small, unnamed stream at site CV-128a that is immediately upstream of a pond connected to the large river crossed by the road at bridge site CV-128. In addition, there are two small lakes between 150 and 600 m upstream from the crossing and other nearby ponds that are all part of the same drainage. Some of the connections between these waterbodies are intermittent but the stream at the crossing maintains connectivity with the nearest upstream lake throughout the open-water period. Both of the upstream lakes are shallow but have areas with sufficient depth for to support Ninespine Stickleback overwintering. In addition to the culvert on the current road alignment, there is another culvert on the old road alignment that has not yet been completely removed. The two culverts are approximately 30 m apart with a small channel between them.

Detailed habitat data were collected in the crossing area in spring 2023. Most of the downstream and upstream habitat is pond/wetland with an extensive wetted area during freshet. There is a short, narrow, shallow, low-velocity channel that connects the upstream wetland to the downstream pond. Stream morphology was predominantly pond except for the short channel, which was riffle/pool/run in spring 2023. The substrate was primarily fines in the pond/wetland areas and a mix of fines and gravel in the short channel.

The culvert at the old road crossing can fill with sediment, causing the stream to overtop the old road and prevent fish from moving between the current road crossing and the upstream wetlands in spring. This has been observed in spring 2022 and 2023.

Although no fish were captured in spring 2023, juvenile Arctic Char have been observed in some upstream ponds during previous surveys and they can use habitat in the vicinity of the Tote Road crossing at CV-128a for rearing/feeding throughout the open-water period. There is no char spawning or overwintering habitat in this stream.

Ninespine Stickleback were not captured in spring 2023 but are known to be abundant near the crossing, using the habitat for feeding and likely spawning. There is no overwintering habitat at the crossing but is likely present in the nearby the upstream lakes.

TOTE ROAD CV-128A

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	1-Jul-23	8.0	50	202	0	0	0.00	-
	NNST					0	0	0.00	-
Upstream	ARCH			50	287	0	0	0.00	-
	NNST			50	287	0	0	0.00	-

OTHER NOTES / OBSERVATIONS

No fish were observed or captured in spring 2023 but both species have been noted in previous surveys. Char can use habitat near the crossing for rearing and stickleback for rearing and likely spawning.

TOTE ROAD CV-128A

HYDROLOGY CHARACTERISTICS: 1-JUL-23

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	-	-	-	-	-	-	-	-	-	-
60D	-	-	-	-	-	-	-	-	-	-
20D	POND									
0 (Centreline)	UNDER TOTE ROAD									
20U	11.8	10.4	0.03	0.14	0.02	0.21	0.05	0.03	0.00	0.66
60U	EXTENSIVE WETLAND									
100U	-	-	-	-	-	-	-	-	-	-

OTHER NOTES / OBSERVATIONS

Most of the downstream and upstream habitat is pond/wetland with an extensive wetted area during freshet. There was a short, narrow, shallow, low-velocity channel that connected the upstream wetland to the downstream pond.

TOTE ROAD CV-128A

HABITAT CHARACTERISTICS: 1-JUL-23

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

Stage: High

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	-	-	-	-	-	-	-	-	-	-	-	-
60D	-	-	-	-	-	-	-	-	-	-	-	-
20D	POND											
0 (Centreline)	UNDER TOTE ROAD											
20U	55	20	5	20	-	-	-	40	50	10	-	-
60U	EXTENSIVE WETLAND											
100U	-	-	-	-	-	-	-	-	-	-	-	-

OTHER NOTES / OBSERVATIONS

Stream morphology was predominantly pond except for the short channel, which was riffle/pool/run. The substrate was primarily fines in the pond/wetland areas and a mix of fines and gravel in the short channel.

TOTE ROAD CV-128A

1-JUL-23



A



B



C

Photos 1-1. Photos taken 20 m upstream in spring 2023: (A) facing upstream; (B) facing downstream; and (C) across (right bank looking at left bank).

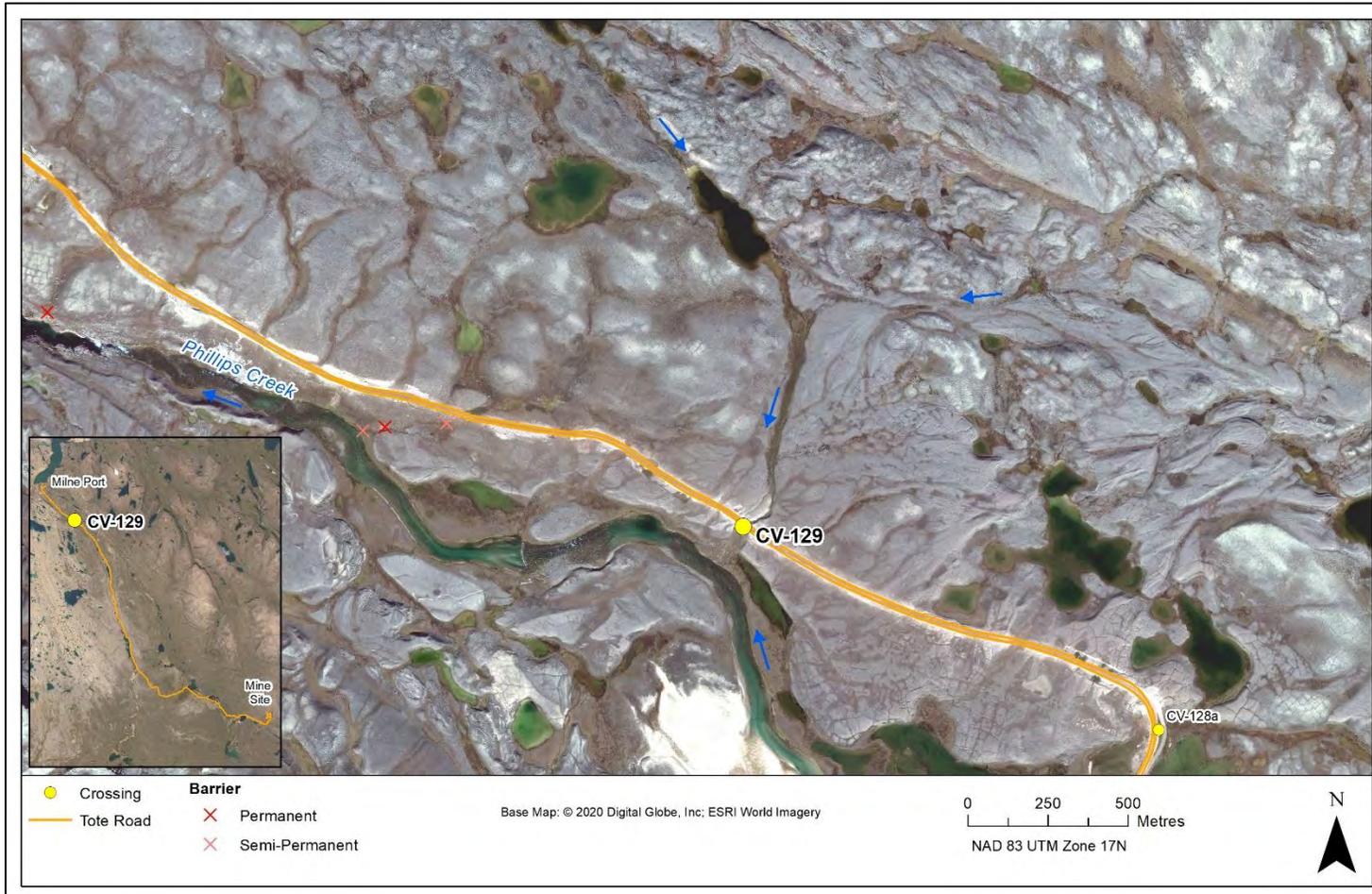
TOTE ROAD CV-129

LOCATION AND CROSSING DESCRIPTION

Site ID:	CV-129	Dates Surveyed:	1-Jul-23	Waterbody Type:	Stream
Project Interaction:	Tote Road Culvert	UTM Coordinates:	17W 512381 E 7966783 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 CV-129

SITE SUMMARY

The Tote Road crosses an unnamed stream at site CV-129 that flows 130 m south into Phillips Creek. There is an unnamed lake approximately 900 m upstream that is of sufficient depth to support overwintering.

Detailed habitat data were collected in the crossing area in spring 2023. Stream wetted widths ranged from 6.9-36.5 m with narrower widths upstream of the culvert. Measured depths were typically <0.30 m. Velocities were low to moderate, typically <0.50 m/s but occasionally exceeding 1.00 m/s. Stream morphology was predominantly riffle. The substrate was primarily gravel/cobble downstream and at the farthest upstream transect, and fines and gravel within 60 m upstream of the culvert where there was a large pool.

Although no fish were captured in spring 2023, juvenile Arctic Char are known to use habitat in the vicinity of the Tote Road crossing at CV-129 for rearing/feeding throughout the open-water period. There is no char spawning or overwintering habitat in this stream.

Ninespine Stickleback were not captured in spring 2023 but are known to use habitat near the crossing for feeding and potentially spawning. There is no overwintering habitat for the species.

TOTE ROAD CV-129

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	1-Jul-23	7.0	50	266	0	0	0.00	-
	NNST					0	0	0.00	-
Upstream	ARCH			50	145	0	0	0.00	-
	NNST					0	0	0.00	-

OTHER NOTES / OBSERVATIONS

No fish were observed or captured in spring 2023 but both species have been reported during previous surveys. Habitat near the crossing can be used for rearing/feeding. There is potential stickleback but no char spawning and no overwintering for either species.

TOTE ROAD CV-129

HYDROLOGY CHARACTERISTICS: 1-JUL-23

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

Stage: High

Site	Channel Width (m)		Water Depth (m)				Water Velocity (m/s)			
	Bankfull	Wetted	25%	50%	75%	Max	25%	50%	75%	Max
100D	62.4	28.5	0.08	0.09	0.08	0.52	0.13	0.43	0.41	1.13
60D	43.4	27.5	0.08	0.08	0.14	0.21	0.01	0.50	0.43	0.86
20D	38.6	36.5	0.05	0.12	0.08	0.17	0.40	0.40	0.38	0.99
0 (Centreline)	UNDER TOTE ROAD									
20U	34.4	29.5	0.18	0.22	0.59	0.64	0.00	0.23	0.06	0.34
60U	34.0	6.9	0.19	0.29	0.29	0.35	0.19	0.58	0.67	0.64
100U	35.0	8.8	0.07	0.19	0.28	0.38	0.11	0.24	0.55	1.63

OTHER NOTES / OBSERVATIONS

Stream wetted widths in spring 2023 ranged from 6.9-36.5 m with narrower widths upstream of the culvert. Measured depths were typically <0.30 m. Velocities were low to moderate, typically <0.50 m/s but occasionally exceeding 1.00 m/s.

TOTE ROAD CV-129

HABITAT CHARACTERISTICS: 1-JUL-23

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

Stage: High

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	60	20	5	15	-	-	-	5	15	30	40	20
60D	70	5	5	15	-	-	5	5	30	30	20	15
20D	75	10	-	10	-	-	5	5	40	40	10	5
0 (Centreline)	UNDER TOTE ROAD											
20U	10	10	50	30	-	-	-	50	30	15	5	-
60U	55	15	20	10	-	-	-	30	20	35	15	-
100U	55	15	10	20	-	-	-	5	20	50	15	10

OTHER NOTES / OBSERVATIONS

Stream morphology was predominantly riffle. The substrate was primarily gravel/cobble downstream and at the farthest upstream transect, and fines and gravel within 60 m upstream of the culvert where there was a large pool.

TOTE ROAD CV-129

1-JUL-23



A



B



C



D



E



F

Photos 1-1. Photos taken 20 m downstream (top) and 60 m downstream (bottom) in spring 2023: (A,D) facing upstream; (B,E) facing downstream; and (C,F) across (right bank looking at left bank).

TOTE ROAD CV-129

1-JUL-23



A



B



C

Photos 1-2. Photos taken 100 m downstream in spring 2023: (A) facing upstream; (B) facing downstream; and (C) across (right bank looking at left bank).

TOTE ROAD CV-129

1-JUL-23



A



B



C



D



E



F

Photos 1-3. Photos taken 20 m upstream (top) and 60 m upstream (bottom) in spring 2023: (A,D) facing upstream; (B,E) facing downstream; and (C,F) across (left bank looking at right bank).

TOTE ROAD CV-129

1-JUL-23



A



B



C

Photos 1-4. Photos taken 100 m upstream in spring 2023: (A) facing upstream; (B) facing downstream; and (C) across (left bank looking at right bank).

TOTE ROAD CV-186

LOCATION AND CROSSING DESCRIPTION

Site ID:	CV-186	Dates Surveyed:	30-Jun-23	Waterbody Type:	Stream
Project Interaction:	Tote Road Culvert	UTM Coordinates:	17W 560705 E 7913498 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 CV-186

SITE SUMMARY

The Tote Road crosses a small, unnamed stream at site CV-186 that flows 420 m west into Sheardown Lake. Sheardown Lake has been extensively surveyed and is known to support both overwintering and char spawning.

Detailed habitat data were collected for CV-186 in spring 2023. Wetted widths ranged between 6.4 and 10.9 m, with wider areas upstream of the culvert. Measured depths were generally shallow, typically <0.20 m. Measured velocities were typically <0.50 but exceeded 1.00 m/s at some downstream locations. Stream morphology was mostly riffle and run with small areas of shallow pools. The substrate was primarily composed of cobble, with some fine sediment immediately upstream of the culvert from road embankment erosion.

Juvenile Arctic Char were captured/observed downstream of the culvert in spring 2023. Large numbers of char are known to use this stream and have been observed swimming upstream in the culvert. The species used habitat in the vicinity of the Tote Road crossing at CV-186 for rearing/feeding throughout the open-water period. There is no char spawning or overwintering habitat in this stream.

Ninespine Stickleback were not captured in spring 2023 but are known to use habitat in the stream for feeding and potentially spawning, though they are more common in slower-flowing areas downstream near the confluence with Sheardown Lake. There is no overwintering habitat for the species.

TOTE ROAD CV-186

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	30-Jun-23	5.0	50	151	1	4	1.99	121
	NNST					0	0	0.00	-
Upstream	ARCH			50	163	0	0	0.00	-
	NNST					0	0	0.00	-

OTHER NOTES / OBSERVATIONS

Small numbers of chare were captured/observed downstream of the culvert in spring 2023. Both species use the stream habitat for rearing/feeding. There is potential for stickleback spawning. There is no char spawning and no overwintering habitat for either species.

TOTE ROAD CV-186

HYDROLOGY CHARACTERISTICS: 30-JUN-23

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

Stage: High

Site	Channel Width (m)		Water Depth (m)				Water Velocity (m/s)			
	Bankfull	Wetted	25%	50%	75%	Max	25%	50%	75%	Max
100D	17.6	6.4	0.18	0.19	0.14	0.27	0.74	0.53	0.39	1.22
60D	9.5	6.6	0.16	0.06	0.09	0.17	0.41	0.43	0.28	1.38
20D	15.0	5.0	0.20	0.10	0.11	0.48	0.35	0.59	0.78	1.17
0 (Centreline)	UNDER TOTE ROAD									
20U	7.0	7.0	0.24	0.28	0.33	0.33	0.08	0.27	0.30	0.35
60U	10.2	10.2	0.09	0.10	0.06	0.24	0.13	0.20	0.41	0.97
100U	24.1	10.9	0.15	0.12	0.08	0.19	0.15	0.30	0.35	0.60

OTHER NOTES / OBSERVATIONS

Wetted widths ranged between 6.4 and 10.9 m with wider areas upstream of the culvert. Measured depths were generally shallow, typically <0.20 m. Measured velocities were typically <0.50 but exceeded 1.00 m/s at some downstream locations.

TOTE ROAD CV-186

HABITAT CHARACTERISTICS: 30-JUN-23

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

Stage: High

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	40	30	-	30	-	-	-	5	15	50	30	-
60D	70	10	-	20	-	-	-	-	10	60	20	10
20D	60	5	5	30	-	-	-	10	20	60	10	-
0 (Centreline)	UNDER TOTE ROAD											
20U	10	30	20	40	-	-	-	40	30	20	10	-
60U	50	20	-	30	-	-	-	10	10	60	20	-
100U	50	20	-	30	-	-	-	-	10	65	20	5

OTHER NOTES / OBSERVATIONS

Stream morphology was mostly riffle and run with small areas of shallow pools. The substrate was primarily composed of cobble, with some fine sediment immediately upstream of the culvert from road embankment erosion.

TOTE ROAD CV-186

30-JUN-23



A



B



C



D



E



F

Photos 1-1. Photos taken 20 m downstream (top) and 60 m downstream (bottom) in spring 2023: (A,D) facing upstream; (B,E) facing downstream; and (C,F) across (left bank looking at right bank).

TOTE ROAD CV-186

30-JUN-23



A



B



C

Photos 1-2. Photos taken 100 m downstream in spring 2023: (A) facing upstream; (B) facing downstream; and (C) across (left bank looking at right bank).