

Rail Alignment Watercourse Crossing Assessments

Crossing ID: 106**UTM:** 17W 599076 / 7875790**Latitude / Longitude:** 70°57'56.289" N / 78°16'38.296" W**Date / Time Surveyed:** 11-Aug-07 / 23:10

Figure 1: View upstream of crossing 106

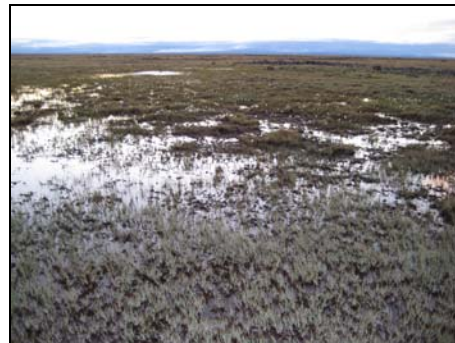


Figure 2: View across crossing 106 from right bank



Figure 3: View downstream of crossing 106

Watercourse Characteristics

Tributary Status: 3rd order trib of large lake

Channel Pattern: flooded terrestrial

Crossing Site

Bankfull Width (m): undefined

Wetted Width (m): undefined (FT)

Depth Profile (25%, 50%, 75%; m): N/A

Max. Depth (m): N/M

Flow Regime: ephemeral

Gradient (°): 1

Upstream

Wetted / Bankfull Width (m): no water

Max. Depth (m): N/A

Downstream

Wetted / Bankfull Width (m): N/M

Max. Depth (m): N/M

Notes

The large, unnamed lake is ~4 km downstream. Low water downstream of the crossing site acts as a barrier.

Rail Alignment Watercourse Crossing Assessments

Crossing ID: 107

UTM: 17W 599410 / 7874632

Latitude / Longitude: 70°57'18.468" N / 78°16'10.457" W

Date / Time Surveyed: 11-Aug-07 / 23:25



Figure 1: View upstream of crossing 107



Figure 2: View across crossing 107 from left bank



Figure 3: View downstream of crossing 107

Watercourse Characteristics

Tributary Status: 4th order trib of large lake

Channel Pattern: undefined

Crossing Site

Bankfull Width (m): 36.60

Wetted Width (m): no water

Depth Profile (25%, 50%, 75%; m): N/A

Max. Depth (m): N/A

Flow Regime: ephemeral

Gradient (°): N/M

Upstream

Wetted / Bankfull Width (m): isolated pond

Max. Depth (m): < 1.00

Downstream

Wetted / Bankfull Width (m): isolated pond

Max. Depth (m): < 1.00

Notes

A small lake is ~1.5 km downstream and a large, unnamed lake is ~6 km downstream.

Crossing ID: 108

UTM: 17W 599471 / 7874418

Latitude / Longitude: 70°57'11.480" N / 78°16'5.387" W

Date / Time Surveyed: 11-Aug-07 / 23:25



Figure 1: View upstream of crossing 108



Figure 2: View across crossing 108 from left bank



Figure 3: View downstream of crossing 108

Watercourse Characteristics

Tributary Status: 4th order trib of large lake

Channel Pattern: slightly meandering

Crossing Site

Bankfull Width (m): undefined (FT)

Wetted Width (m): 14.20

Depth Profile (25%, 50%, 75%; m): N/M

Max. Depth (m): 0.20

Flow Regime: persistent

Gradient (°): 1

Upstream

Wetted / Bankfull Width (m): ~300.00 (lake/pond)

Max. Depth (m): N/A

Downstream

Wetted / Bankfull Width (m): ~200.00 (lake/pond)

Max. Depth (m): N/A

Notes

A small lake is ~1.5 km downstream and the large, unnamed lake is ~6 km downstream.

Rail Alignment Watercourse Crossing Assessments

Crossing ID: 109

UTM: 17W 599262 / 7872425

Latitude / Longitude: 70°56'7.525" N / 78°16'34.869" W

Date / Time Surveyed: 11-Aug-07 / 23:25



Figure 1: View upstream of crossing 109



Figure 2: View across crossing 109 from left bank



Figure 3: View downstream of crossing 109

Watercourse Characteristics

Tributary Status: 4th order trib of large lake

Channel Pattern: sinuous

Crossing Site

Bankfull Width (m): 12.00

Wetted Width (m): 6.00

Depth Profile (25%, 50%, 75%; m): N/M

Max. Depth (m): 0.15

Flow Regime: intermittent – persistent

Gradient (°): 1

Upstream

Wetted / Bankfull Width (m): 8.00 / 12.00

Max. Depth (m): 0.10

Downstream

Wetted / Bankfull Width (m): 5.00-7.00 / > 10.00

Max. Depth (m): 0.10-0.30

Notes

There is a small lake ~2 km downstream and a large, unnamed lake ~10 km downstream. Low water downstream of the crossing site acts as a barrier.

Crossing ID: 110

UTM: 17W 599099 / 7872088

Latitude / Longitude: 70°55'56.896" N / 78°16'52.439" W

Date / Time Surveyed: 11-Aug-07 / 23:40



Figure 1: View upstream of crossing 110



Figure 2: View across crossing 110 from left bank



Figure 3: View downstream of crossing 110

Watercourse Characteristics

Tributary Status: 4th order trib of large lake

Channel Pattern: flooded terrestrial

Crossing Site

Bankfull Width (m): undefined

Wetted Width (m): undefined (FT)

Depth Profile (25%, 50%, 75%; m): N/A

Max. Depth (m): N/M

Flow Regime: ephemeral

Gradient (°): 1

Upstream

Wetted / Bankfull Width (m): no water

Max. Depth (m): N/A

Downstream

Wetted / Bankfull Width (m): undefined

Max. Depth (m): N/M

Notes

There is a small lake ~2 km downstream and a large, unnamed lake ~10 km downstream. Low water downstream of the crossing site acts as a barrier.

Rail Alignment Watercourse Crossing Assessments

Crossing ID: 111**UTM:** 17W 598802 / 7871473**Latitude / Longitude:** 70°55'37.496" N / 78°17'24.444" W**Date / Time Surveyed:** 11-Aug-07 / 23:54

Figure 1: View upstream of crossing 111



Figure 2: View across crossing 111 from left bank



Figure 3: View downstream of crossing 111

Watercourse Characteristics

Tributary Status: 4th order trib of large lake

Channel Pattern: undefined

Crossing Site

Bankfull Width (m): undefined

Wetted Width (m): no water

Depth Profile (25%, 50%, 75%; m): N/A

Max. Depth (m): N/A

Flow Regime: ephemeral

Gradient (°): 1

Upstream

Wetted / Bankfull Width (m): no water

Max. Depth (m): N/A

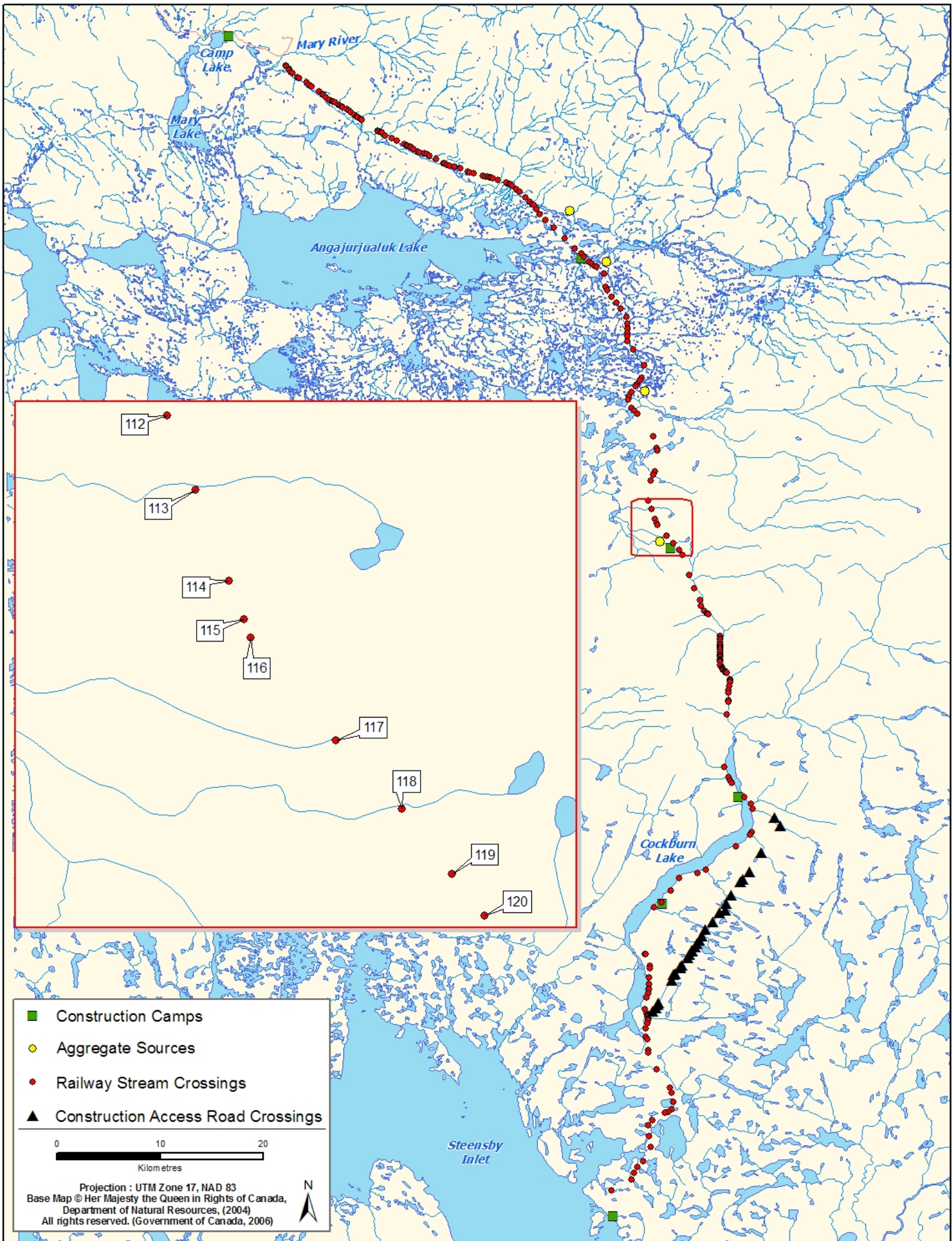
Downstream

Wetted / Bankfull Width (m): no water

Max. Depth (m): N/A

Notes

There is a small lake ~1.5 km downstream and a large, unnamed lake ~10 km downstream.



Rail Alignment Watercourse Crossing Assessments

Crossing ID: 112**UTM:** 17W 598586 / 7869549**Latitude / Longitude:** 70°54'35.772" N / 78°17'54.202" W**Date / Time Surveyed:** 12-Aug-07 / 00:30

Figure 1: View upstream of crossing 112



Figure 2: View across crossing 112 from left bank



Figure 3: View downstream of crossing 112

Watercourse Characteristics

Tributary Status: 2nd order trib of large river

Channel Pattern: sinuous

Crossing Site

Bankfull Width (m): 5.00

Wetted Width (m): 2.10

Depth Profile (25%, 50%, 75%; m): N/M

Max. Depth (m): 0.22

Flow Regime: persistent

Gradient (°): 1

Upstream

Wetted / Bankfull Width (m): ~2.00 / > 4.00

Max. Depth (m): < 0.30

Downstream

Wetted / Bankfull Width (m): > 2.00 / > 4.00

Max. Depth (m): < 0.50

Notes

The large, unnamed river is ~2.5 km downstream.

Rail Alignment Watercourse Crossing Assessments

Crossing ID: 113

UTM: 17W 598881 / 7868768

Latitude / Longitude: 70°54'10.165" N / 78°17'28.580" W

Date / Time Surveyed: 12-Aug-07 / 00:20



Figure 1: View north of crossing 113



Figure 2: View east of crossing 113



Figure 3: View south of crossing 113

Watercourse Characteristics

Tributary Status: 1st order trib of large river

Channel Pattern: flooded terrestrial

Crossing Site

Bankfull Width (m): undefined

Wetted Width (m): undefined (FT)

Depth Profile (25%, 50%, 75%; m): N/A

Max. Depth (m): N/M

Flow Regime: ephemeral

Gradient (°): 0.5

Upstream

Wetted / Bankfull Width (m): undefined (FT)

Max. Depth (m): N/A

Downstream

Wetted / Bankfull Width (m): undefined (FT)

Max. Depth (m): N/A

Notes

The large, unnamed river is ~2.5 km downstream. Low water downstream of the crossing site acts as a barrier.

Crossing ID: 114

UTM: 17W 599238 / 7867821

Latitude / Longitude: 70°53'39.116" N / 78°16'57.606" W

Date / Time Surveyed: 12-Aug-07 / 00:40



Figure 1: View upstream of crossing 114

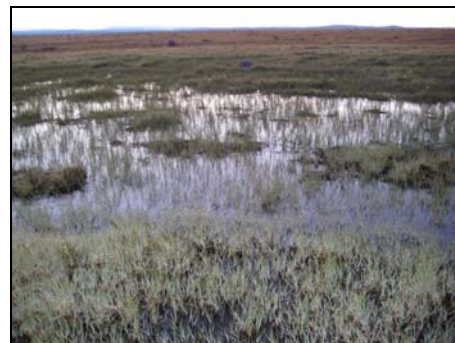


Figure 2: View across crossing 114 from right bank

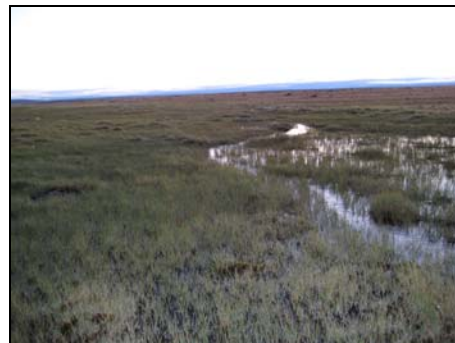


Figure 3: View downstream of crossing 114

Watercourse Characteristics

Tributary Status: 2nd order trib of large river

Channel Pattern: flooded terrestrial

Crossing Site

Bankfull Width (m): undefined

Wetted Width (m): 14.0

Depth Profile (25%, 50%, 75%; m): N/M

Max. Depth (m): 0.05

Flow Regime: intermittent – ephemeral

Gradient (°): 1

Upstream

Wetted / Bankfull Width (m): undefined (FT)

Max. Depth (m): < 0.05

Downstream

Wetted / Bankfull Width (m): undefined (FT)

Max. Depth (m): < 0.05

Notes

The large, unnamed river is ~3 km downstream. Low water downstream of the crossing site acts as a barrier.

Rail Alignment Watercourse Crossing Assessments

Crossing ID: 115

UTM: 17W 599391 / 7867415

Latitude / Longitude: 70°53'25.805" N / 78°16'44.340" W

Date / Time Surveyed: 12-Aug-07 / 00:45

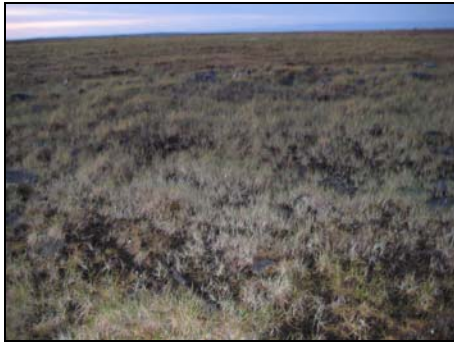


Figure 1: View upstream of crossing 115



Figure 2: View across crossing 115 from right bank



Figure 3: View downstream of crossing 115

Watercourse Characteristics

Tributary Status: 3rd order trib of large river

Channel Pattern: flooded terrestrial

Crossing Site

Bankfull Width (m): undefined

Wetted Width (m): undefined (FT)

Depth Profile (25%, 50%, 75%; m): N/A

Max. Depth (m): N/M

Flow Regime: ephemeral

Gradient (°): 1

Upstream

Wetted / Bankfull Width (m): undefined (FT)

Max. Depth (m): N/M

Downstream

Wetted / Bankfull Width (m): no water

Max. Depth (m): N/A

Notes

The large, unnamed river is ~3 km downstream. Low water downstream of the crossing site acts as a barrier.

Crossing ID: 116

UTM: 17W 599465 / 7867227

Latitude / Longitude: 70°53'19.636" N / 78°16'37.889" W

Date / Time Surveyed: 12-Aug-07 / 00:50



Figure 1: View upstream of crossing 116



Figure 2: View across crossing 116 from right bank



Figure 3: View downstream of crossing 116

Watercourse Characteristics

Tributary Status: 2nd order trib of large river

Channel Pattern: undefined

Crossing Site

Bankfull Width (m): undefined

Wetted Width (m): no water

Depth Profile (25%, 50%, 75%; m): N/A

Max. Depth (m): N/A

Flow Regime: ephemeral

Gradient (°): 1

Upstream

Wetted / Bankfull Width (m): no water

Max. Depth (m): N/A

Downstream

Wetted / Bankfull Width (m): no water

Max. Depth (m): N/A

Notes

The large, unnamed river is ~3.5 km downstream.

Rail Alignment Watercourse Crossing Assessments

Crossing ID: 117

UTM: 17W 600353 / 7866153

Latitude / Longitude: 70°52'43.716" N / 78°15'15.293" W

Date / Time Surveyed: 12-Aug-07 / 00:35



Figure 1: View upstream of crossing 117



Figure 2: View across crossing 117 from left bank



Figure 3: View downstream of crossing 117

Watercourse Characteristics

Tributary Status: 1st order trib of large river

Channel Pattern: flooded terrestrial

Crossing Site

Bankfull Width (m): undefined

Wetted Width (m): undefined (FT)

Depth Profile (25%, 50%, 75%; m): N/A

Max. Depth (m): N/M

Flow Regime: ephemeral

Gradient (°): 0.5

Upstream

Wetted / Bankfull Width (m): pond

Max. Depth (m): N/A

Downstream

Wetted / Bankfull Width (m): undefined (FT)

Max. Depth (m): N/M

Notes

The large, unnamed river is ~4.5 km downstream. Low water downstream of the crossing site acts as a barrier.

Crossing ID: 118

UTM: 17W 601043 / 7865435

Latitude / Longitude: 70°52'19.555" N / 78°14'10.649" W

Date / Time Surveyed: 12-Aug-07 / 01:01



Figure 1: View upstream of crossing 118



Figure 2: View across crossing 118 from right bank



Figure 3: View downstream of crossing 118

Watercourse Characteristics

Tributary Status: 1st order trib of large river

Channel Pattern: flooded terrestrial

Crossing Site

Bankfull Width (m): undefined

Wetted Width (m): undefined (FT)

Depth Profile (25%, 50%, 75%; m): N/A

Max. Depth (m): N/M

Flow Regime: ephemeral

Gradient (°): 1

Upstream

Wetted / Bankfull Width (m): 50.00 (pond)

Max. Depth (m): < 1.00

Downstream

Wetted / Bankfull Width (m): 200.00 (pond)

Max. Depth (m): < 1.00

Notes

The large, unnamed river is ~4 km downstream. There is a small, unnamed pond immediately downstream of the crossing. Low water downstream of the crossing site acts as a barrier.

Rail Alignment Watercourse Crossing Assessments

Crossing ID: 119

UTM: 17W 601567 / 7864757

Latitude / Longitude: 70°51'56.923" N / 78°13'22.184" W

Date / Time Surveyed: 12-Aug-07 / 01:10



Figure 1: View upstream of crossing 119



Figure 2: View across crossing 119 from left bank

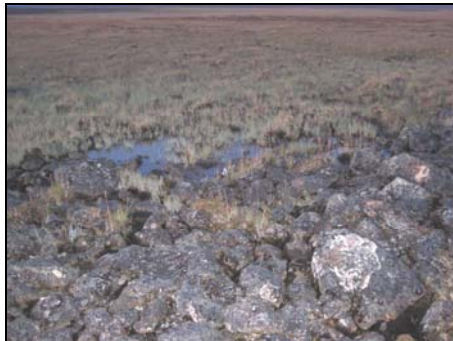


Figure 3: View downstream of crossing 119

Watercourse Characteristics

Tributary Status: 3rd order trib of large river

Channel Pattern: undefined

Crossing Site

Bankfull Width (m): undefined

Wetted Width (m): no water

Depth Profile (25%, 50%, 75%; m): N/A

Max. Depth (m): N/A

Flow Regime: ephemeral

Gradient (°): 1

Upstream

Wetted / Bankfull Width (m): no water

Max. Depth (m): N/A

Downstream

Wetted / Bankfull Width (m): no water

Max. Depth (m): N/A

Notes

The large, unnamed river is ~2 km downstream.

Crossing ID: 120

UTM: 17W 601901 / 7864318

Latitude / Longitude: 70°51'42.275" N / 78°12'51.339" W

Date / Time Surveyed: 12-Aug-07 / 01:20



Figure 1: View upstream of crossing 120

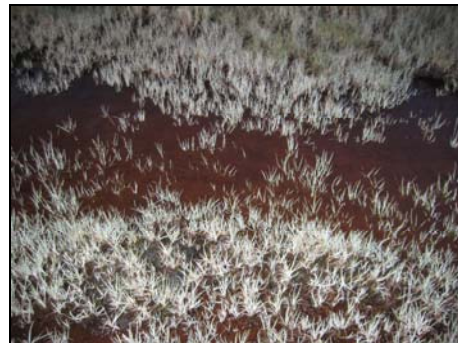


Figure 2: View across crossing 120 from right bank



Figure 3: View downstream of crossing 120

Watercourse Characteristics

Tributary Status: 1st order trib of large river

Channel Pattern: sinuous, flooded terrestrial

Crossing Site

Bankfull Width (m): 5.00

Wetted Width (m): 1.50

Depth Profile (25%, 50%, 75%; m): N/M

Max. Depth (m): 0.09

Flow Regime: intermittent

Gradient (°): 1

Upstream

Wetted / Bankfull Width (m): N/M

Max. Depth (m): N/M

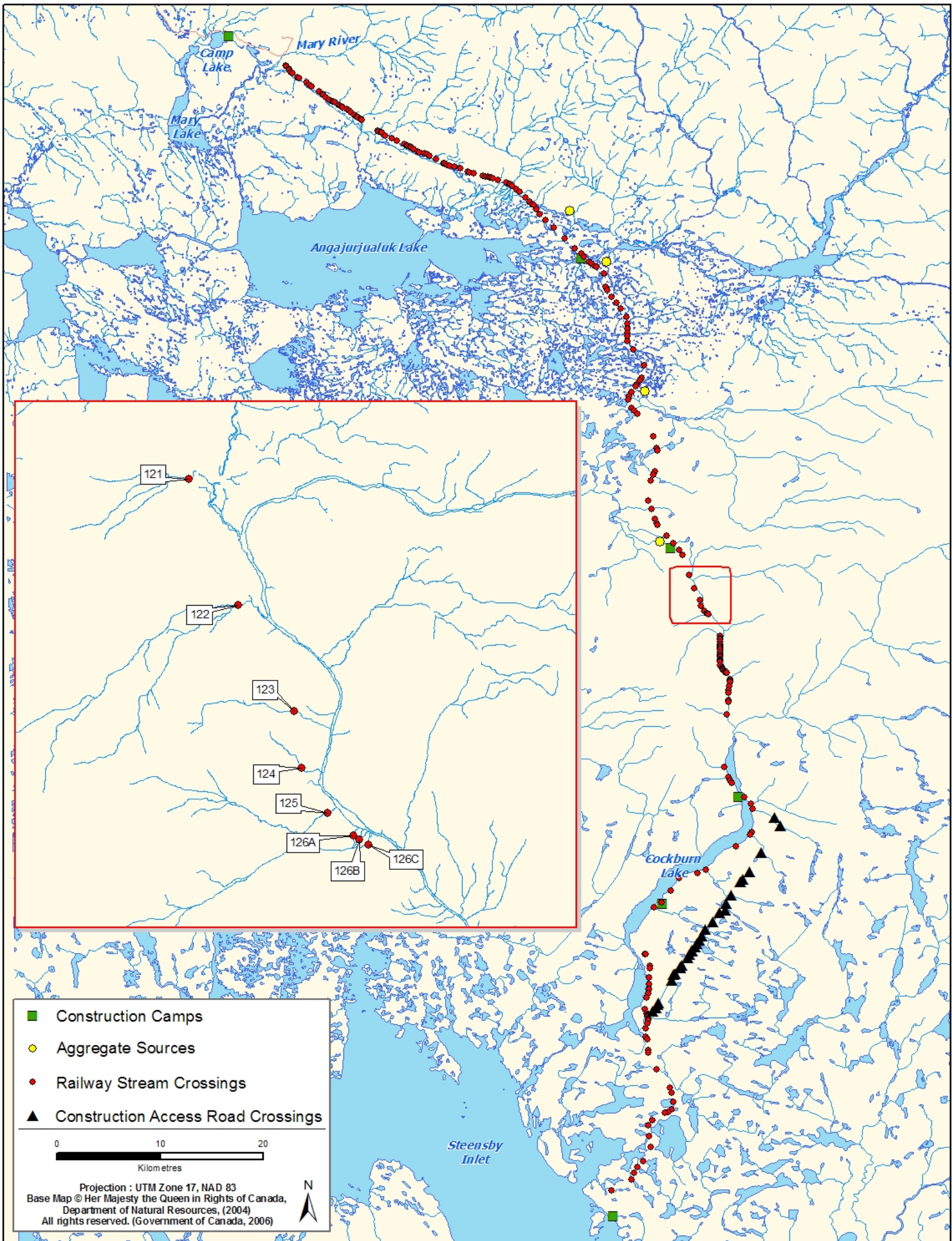
Downstream

Wetted / Bankfull Width (m): N/M

Max. Depth (m): N/M

Notes

The large, unnamed river is ~1.5 km downstream. Low water downstream of the crossing site acts as a barrier.



Rail Alignment Watercourse Crossing Assessments

Crossing ID: 121

UTM: 17W 602535 / 7862393

Latitude / Longitude: 70°50'39.270" N / 78°11'57.779" W

Date / Time Surveyed: 12-Aug-07 / 01:55



Figure 1: View upstream of crossing 121

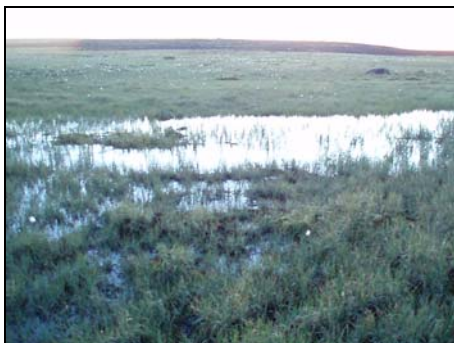


Figure 2: View across crossing 121 from right bank

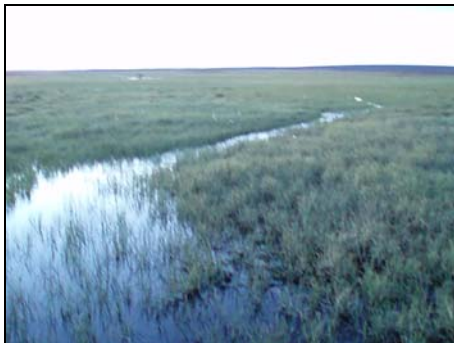


Figure 3: View downstream of crossing 121

Watercourse Characteristics

Tributary Status: 1st order trib of large river

Channel Pattern: flooded terrestrial

Crossing Site

Bankfull Width (m): undefined
Wetted Width (m): undefined (FT)
Depth Profile (25%, 50%, 75%; m): N/A
Max. Depth (m): 0.05
Flow Regime: intermittent – ephemeral
Gradient (°): 1

Upstream

Wetted / Bankfull Width (m): undefined
Max. Depth (m): ~0.05

Downstream

Wetted / Bankfull Width (m): undefined
Max. Depth (m): ~0.05

Notes

The large, unnamed river is ~400 m downstream.

Crossing ID: 122

UTM: 17W 603047 / 7861074

Latitude / Longitude: 70°49'55.981" N / 78°11'13.521" W

Date / Time Surveyed: 12-Aug-07 / 01:54



Figure 1: View upstream of crossing 122



Figure 2: View across crossing 122 from left bank

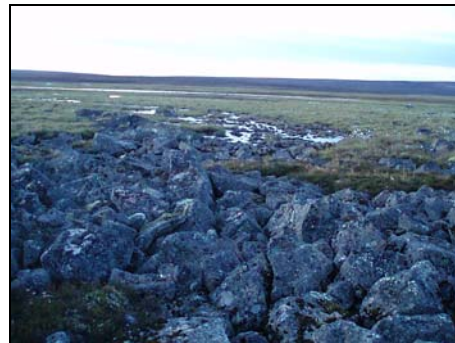


Figure 3: View downstream of crossing 122

Watercourse Characteristics

Tributary Status: 1st order trib of large river

Channel Pattern: undefined

Crossing Site

Bankfull Width (m): undefined (boulder field)
Wetted Width (m): undefined (under rocks)
Depth Profile (25%, 50%, 75%; m): N/A
Max Depth (m): N/A
Flow Regime: intermittent
Gradient (°): N/M

Upstream

Wetted / Bankfull Width (m): under rocks
Max. Depth (m): N/A

Downstream

Wetted / Bankfull Width (m): 4.80 / flooded terrestrial
Max. Depth (m): 0.15

Notes

The large, unnamed river is ~400 m downstream. The stream flows under boulders downstream of the crossing site, creating a barrier.

Rail Alignment Watercourse Crossing Assessments

Crossing ID: 123

UTM: 17W 603631 / 7859970

Latitude / Longitude: 70°49'19.512" N / 78°10'21.272" W

Date / Time Surveyed: 21-Aug-07 / 02:10

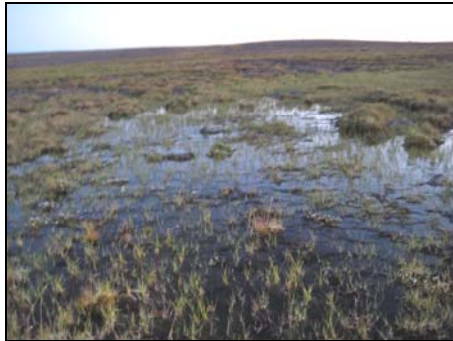


Figure 1: View upstream of crossing 123



Figure 2: View across crossing 123 from left bank

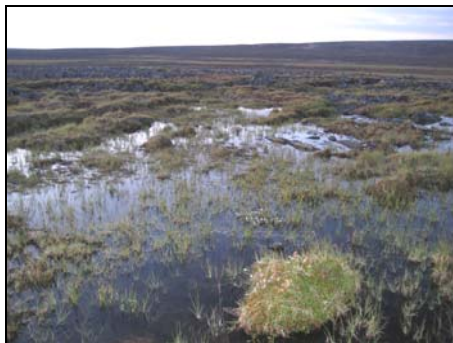


Figure 3: View downstream of crossing 123

Watercourse Characteristics

Tributary Status:	1 st order trib of large river
Channel Pattern:	flooded terrestrial
Crossing Site	
Bankfull Width (m):	undefined
Wetted Width (m):	undefined (FT)
Depth Profile (25%, 50%, 75%; m):	N/A
Max. Depth (m):	N/M
Flow Regime:	intermittent
Gradient (°):	1
Upstream	
Wetted / Bankfull Width (m):	undefined (FT)
Max. Depth (m):	N/M
Downstream	
Wetted / Bankfull Width (m):	undefined (FT)
Max. Depth (m):	N/M

Notes

The large, unnamed river is ~600 m downstream. Low water between the river and the crossing site acts as a barrier.

Crossing ID: 124

UTM: 17W 603710 / 7859376

Latitude / Longitude: 70°49'0.243" N / 78°10'16.243" W

Date / Time Surveyed: 12-Aug-07 / 02:25



Figure 1: View upstream of crossing 124



Figure 2: View across crossing 124 from left bank



Figure 3: View downstream of crossing 124

Watercourse Characteristics

Tributary Status:	1 st order trib of large river
Channel Pattern:	sinuous, flooded terrestrial
Crossing Site	
Bankfull Width (m):	undefined
Wetted Width (m):	0.90
Depth Profile (25%, 50%, 75%; m):	N/M
Max. Depth (m):	0.12
Flow Regime:	intermittent
Gradient (°):	1
Upstream	
Wetted / Bankfull Width (m):	N/M
Max. Depth (m):	N/M
Downstream	
Wetted / Bankfull Width (m):	N/M
Max. Depth (m):	N/M

Notes

The large, unnamed river is ~300 m downstream.

Rail Alignment Watercourse Crossing Assessments

Crossing ID: 125

UTM: 17W 603983 / 7858906

Latitude / Longitude: 70°48'44.679" N / 78°9'51.633" W

Date / Time Surveyed: 12-Aug-07 / 02:40



Figure 1: View upstream of crossing 125



Figure 2: View across crossing 125 from left bank



Figure 3: View downstream of crossing 125

Watercourse Characteristics

Tributary Status: 1st order trib of large river

Channel Pattern: sinuous

Crossing Site

Bankfull Width (m): 6.20

Wetted Width (m): 4.10

Depth Profile (25%, 50%, 75%; m): N/M

Max. Depth (m): 0.34

Flow Regime: persistent

Gradient (°): 2

Upstream

Wetted / Bankfull Width (m): under rocks / 7.00

Max. Depth (m): N/A

Downstream

Wetted / Bankfull Width (m): large river

Max. Depth (m): N/A

Notes

The large, unnamed river is ~100 m downstream. The stream flows underground downstream of the crossing site, creating a barrier.

Crossing ID: 126A

UTM: 17W 604250 / 7858671

Latitude / Longitude: 70°48'36.699" N / 78°9'26.541" W

Date / Time Surveyed: 12-Aug-07 / 02:55

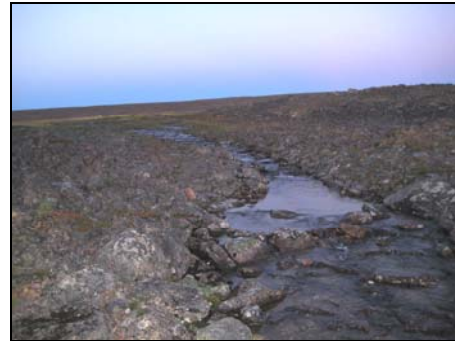


Figure 1: View upstream of crossing 126A



Figure 2: View across crossing 126A from left bank



Figure 3: View downstream of crossing 126A

Watercourse Characteristics

Tributary Status: 1st order trib of large river

Channel Pattern: sinuous

Crossing Site

Bankfull Width (m): 8.20

Wetted Width (m): 5.50

Depth Profile (25%, 50%, 75%; m): 0.21, 0.33, 0.15

Max. Depth (m): 0.35

Flow Regime: persistent

Gradient (°): 4

Upstream

Wetted / Bankfull Width (m): 4.00-5.00 / > 6.00

Max. Depth (m): 0.30-0.40

Downstream

Wetted / Bankfull Width (m): large river

Max. Depth (m): N/A

Notes

The large, unnamed river is ~100 m downstream.

Rail Alignment Watercourse Crossing Assessments

Crossing ID: 126B

UTM: 17W 604315 / 7858630

Latitude / Longitude: 70°48'35.279" N / 78°9'20.359" W

Date / Time Surveyed: 12-Aug-07 / 03:10



Figure 1: View upstream of crossing 126B



Figure 2: View across crossing 126B from right bank



Figure 3: View downstream of crossing 126B

Watercourse Characteristics

Tributary Status: 1st order trib of large river

Channel Pattern: braided, straight

Crossing Site

Bankfull Width (m): 20.00

Wetted Width (m): 8.00

Depth Profile (25%, 50%, 75%; m): N/M

Max. Depth (m): 0.22

Flow Regime: persistent

Gradient (°): N/M

Upstream

Wetted / Bankfull Width (m): 5.00-10.00 / >15.00

Max. Depth (m): 0.20-0.30

Downstream

Wetted / Bankfull Width (m): large river

Max. Depth (m): N/A

Notes

The large, unnamed river is ~100 m downstream.

A small cascade downstream of the crossing site acts as a partial barrier.

Crossing ID: 126C

UTM: 17W 604408 / 7858576

Latitude / Longitude: 70°48'33.398" N / 78°9'11.493" W

Date / Time Surveyed: 12-Aug-07 / 03:25



Figure 1: View upstream of crossing 126C



Figure 2: View across crossing 126C from right bank



Figure 3: View downstream of crossing 126C

Watercourse Characteristics

Tributary Status: 1st order trib of large river

Channel Pattern: sinuous

Crossing Site

Bankfull Width (m): 9.50

Wetted Width (m): 9.00

Depth Profile (25%, 50%, 75%; m): 0.11, 0.05, 0.13

Max. Depth (m): 0.15

Flow Regime: persistent

Gradient (°): 2

Upstream

Wetted / Bankfull Width (m): 7.00-10.00 / >9.00

Max. Depth (m): 0.10-0.20

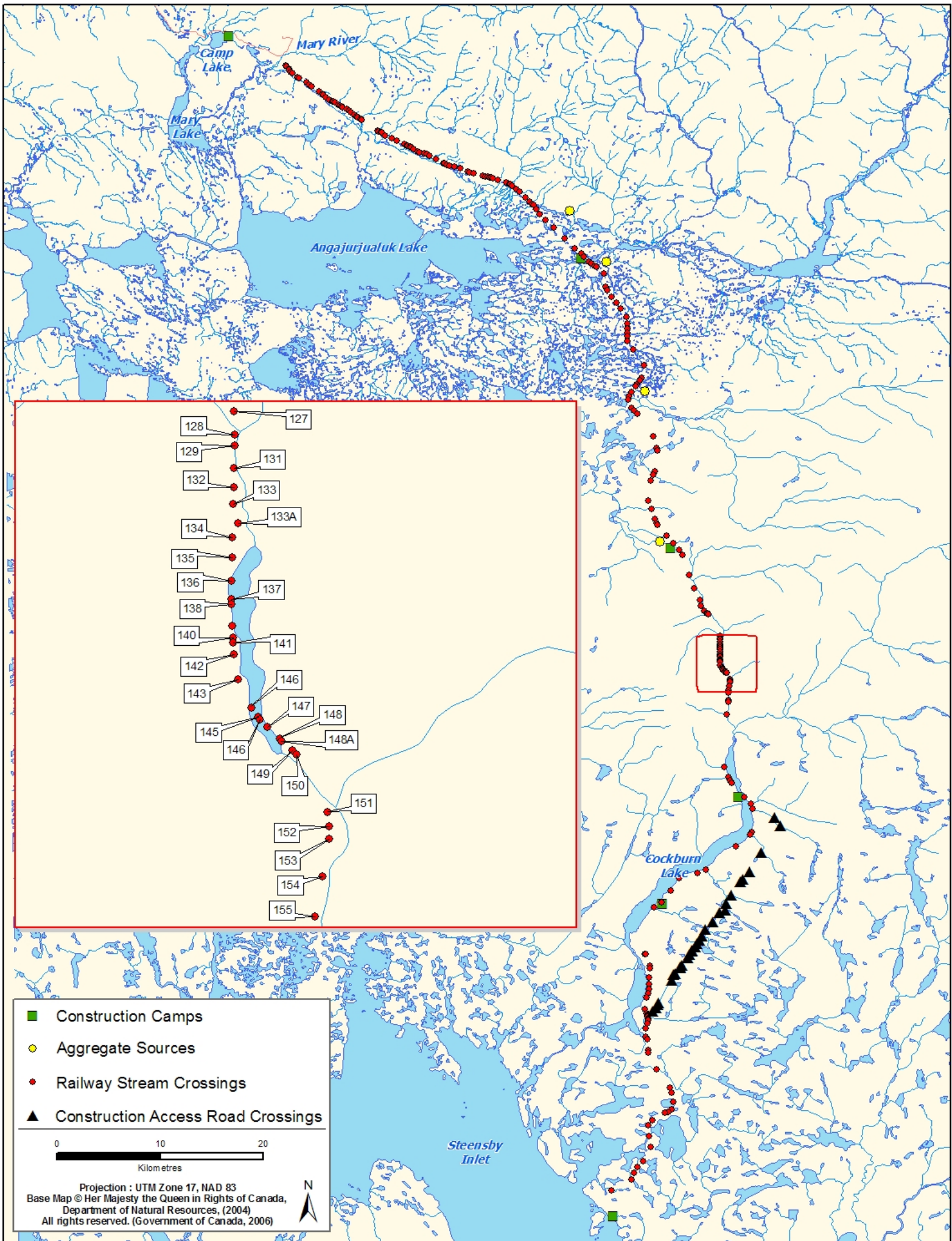
Downstream

Wetted / Bankfull Width (m): large river

Max. Depth (m): N/A

Notes

The large, unnamed river is ~100 m downstream.



Rail Alignment Watercourse Crossing Assessments

Crossing ID: 127

UTM: 17W 605534 / 7856461

Latitude / Longitude: 70°47'23.499" N / 78°7'30.971" W

Date / Time Surveyed: 12-Aug-07 / 04:05



Figure 1: View upstream of crossing 127



Figure 2: View across crossing 127 from left bank



Figure 3: View downstream of crossing 127

Watercourse Characteristics

Tributary Status: 1st order trib of large river

Channel Pattern: braided, sinuous

Crossing Site

Bankfull Width (m): 17.00
Wetted Width (m): 10.20
Depth Profile (25%, 50%, 75%; m): 0.15, 0.25, 0.30
Max. Depth (m): 0.40
Flow Regime: persistent
Gradient (°): 1

Upstream

Wetted / Bankfull Width (m): ~12.00 / 17.00
Max. Depth (m): ~0.40

Downstream

Wetted / Bankfull Width (m): ~8.00 / 17.00
Max. Depth (m): ~0.40

Notes

The large, unnamed river is ~300 m downstream.

Crossing ID: 128

UTM: 17W 605545 / 7856216

Latitude / Longitude: 70°47'15.584" N / 78°7'31.032" W

Date / Time Surveyed: 12-Aug-07 / 04:30



Figure 1: View upstream of crossing 128



Figure 2: View across crossing 128 from left bank



Figure 3: View downstream of crossing 128

Watercourse Characteristics

Tributary Status: 1st order trib of large river

Channel Pattern: braided, sinuous

Crossing Site

Bankfull Width (m): N/M (MSC)
Wetted Width (m): 1.00
Depth Profile (25%, 50%, 75%; m): 0.10, 0.10, 0.15
Max. Depth (m): 0.30
Flow Regime: intermittent – persistent
Gradient (°): 3

Upstream

Wetted / Bankfull Width (m): no water
Max. Depth (m): N/A

Downstream

Wetted / Bankfull Width (m): large river
Max. Depth (m): N/A

Notes

The large, unnamed river is ~100 m downstream. Barriers near the crossing site include a small cascade downstream and the point upstream where the stream goes underground.

Rail Alignment Watercourse Crossing Assessments

Crossing ID: 129

UTM: 17W 605542 / 7856101

Latitude / Longitude: 70°47'11.881" N / 78°7'31.859" W

Date / Time Surveyed: 12-Aug-07 / 04:52



Figure 1: View upstream of crossing 129



Figure 2: View across crossing 129 from left bank



Figure 3: View downstream of crossing 129

Watercourse Characteristics

Tributary Status: 1st order trib of large river

Channel Pattern: undefined

Crossing Site

Bankfull Width (m): undefined (boulder field)

Wetted Width (m): undefined (under rocks)

Depth Profile (25%, 50%, 75%; m): N/A

Max. Depth (m): N/A

Flow Regime: ephemeral

Gradient (°): 6

Upstream

Wetted / Bankfull Width (m): no water

Max. Depth (m): N/A

Downstream

Wetted / Bankfull Width (m): large river

Max. Depth (m): N/A

Notes

The large, unnamed river is ~100 m downstream.

Crossing ID: 130 & 131

UTM: 17W 605537 / 7855864

Latitude / Longitude: 70°47'4.248" N / 78°7'33.448" W

Date / Time Surveyed: 12-Aug-07 / 05:21



Figure 1: View upstream of crossings 130 & 131



Figure 2: View across crossings 130 & 131 from right bank



Figure 3: View downstream of crossings 130 & 131

Watercourse Characteristics

Tributary Status: 1st order trib of large river

Channel Pattern: straight

Crossing Site

Bankfull Width: 0.70

Wetted Width (m): 0.50

Depth Profile (25%, 50%, 75%; m): N/M

Max. Depth (m): 0.19

Flow Regime: intermittent

Gradient (°): 4

Upstream

Wetted / Bankfull Width (m): N/M

Max. Depth (m): N/M

Downstream

Wetted / Bankfull Width (m): large river

Max. Depth (m): N/A

Notes

The large, unnamed river is ~100 m downstream. Low water between the river and the crossing site acts as a barrier.

Rail Alignment Watercourse Crossing Assessments

Crossing ID: 132

UTM: 17W 605533 / 7855668

Latitude / Longitude: 70°46'57.936" N / 78°7'34.749" W

Date / Time Surveyed: 12-Aug-07 / 05:14



Figure 1: View upstream of crossing 132



Figure 2: View across crossing 132 from left bank



Figure 3: View downstream of crossing 132

Watercourse Characteristics

Tributary Status: 1st order trib of large river

Channel Pattern: braided, sinuous

Crossing Site

Bankfull Width (m): 12.00

Wetted Width (m): no water

Depth Profile (25%, 50%, 75%; m): N/A

Max. Depth (m): N/A

Flow Regime: intermittent

Gradient (°): >15

Upstream

Wetted / Bankfull Width (m): no water

Max. Depth (m): N/A

Downstream

Wetted / Bankfull Width (m): large river

Max. Depth (m): N/A

Notes

There is a large, unnamed river ~300 m downstream.

Crossing ID: 133

UTM: 17W 605529 / 7855489

Latitude / Longitude: 70°46'52.171" N / 78°7'35.971" W

Date / Time Surveyed: 12-Aug-07 / 05:02



Figure 1: View upstream of crossing 133



Figure 2: View across crossing 133 from right bank



Figure 3: View downstream of crossing 133

Watercourse Characteristics

Tributary Status: 1st order trib of large river

Channel Pattern: sinuous

Crossing Site

Bankfull Width (m): 5.80

Wetted Width (m): 4.80

Depth Profile (25%, 50%, 75%; m): N/A

Max. Depth (m): 0.16

Flow Regime: intermittent

Gradient (°): 7

Upstream

Wetted / Bankfull Width (m): 3.00-4.00 / > 4.00

Max. Depth (m): < 0.15

Downstream

Wetted / Bankfull Width (m): large river

Max. Depth (m): N/A

Notes

There is a large, unnamed river ~300 m downstream. Cascades between the river and the crossing site act as a partial barrier.

Rail Alignment Watercourse Crossing Assessments

Crossing ID: 133A

UTM: 17W 605577 / 7855287

Latitude / Longitude: 70°46'45.586" N / 78°7'32.211" W

Date / Time Surveyed: 12-Aug-07 / 04:55



Figure 1: View upstream of crossing 133A



Figure 2: View across crossing 133A from left bank

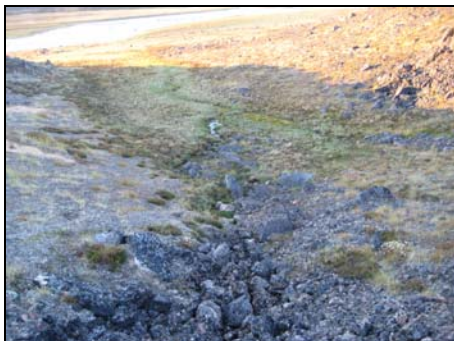


Figure 3: View downstream of crossing 133A

Watercourse Characteristics

Tributary Status: 1st order trib of large river

Channel Pattern: straight

Crossing Site

Bankfull Width (m): 0.50

Wetted Width (m): no water

Depth Profile (25%, 50%, 75%; m): N/A

Max. Depth (m): N/A

Flow Regime: intermittent

Gradient (°): >15

Upstream

Wetted / Bankfull Width (m): no water

Max. Depth (m): N/A

Downstream

Wetted / Bankfull Width (m): large river

Max. Depth (m): N/A

Notes

There is a large, unnamed river ~300 m downstream.

Crossing ID: 134

UTM: 17W 605521 / 7855138

Latitude / Longitude: 70°46'40.868" N / 78°7'38.382" W

Date / Time Surveyed: 12-Aug-07 / 04:50

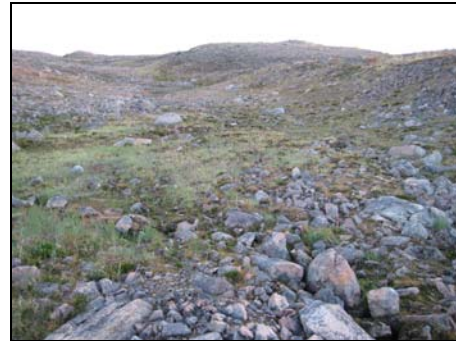


Figure 1: View upstream of crossing 134



Figure 2: View across crossing 134 from left bank



Figure 3: View downstream of crossing 134

Watercourse Characteristics

Tributary Status: 1st order trib of large river

Channel Pattern: sinuous to meandering

Crossing Site

Bankfull Width (m): 11.00

Wetted Width (m): no water

Depth Profile (25%, 50%, 75%; m): N/A

Max. Depth (m): N/A

Flow Regime: intermittent

Gradient (°): 5

Upstream

Wetted / Bankfull Width (m): no water

Max. Depth (m): N/A

Downstream

Wetted / Bankfull Width (m): no water

Max. Depth (m): N/A

Notes

There is a large, unnamed river ~500 m downstream. There is a steep set of cascades between the river and the crossing site that would act as a barrier even if water were present.

Rail Alignment Watercourse Crossing Assessments

Crossing ID: 135

UTM: 17W 605517 / 7854932

Latitude / Longitude: 70°46'34.233" N / 78°7'39.728" W

Date / Time Surveyed: 12-Aug-07 / 04:45



Figure 1: View upstream of crossing 135



Figure 2: View across crossing 135 from right bank



Figure 3: View downstream of crossing 135

Watercourse Characteristics

Tributary Status:	1 st order trib of large river
Channel Pattern:	sinuous to meandering
Crossing Site	
Bankfull Width (m):	20.00
Wetted Width (m):	no water
Depth Profile (25%, 50%, 75%; m):	N/A
Max. Depth (m):	N/A
Flow Regime:	intermittent
Gradient (°):	8
Upstream	
Wetted / Bankfull Width (m):	no water
Max. Depth (m):	N/A
Downstream	
Wetted / Bankfull Width (m):	large river
Max. Depth (m):	N/A

Notes

The large, unnamed river is ~200 m downstream. Barriers near the crossing include a steep gradient both upstream and downstream of the crossing.

Crossing ID: 136

UTM: 17W 605511 / 7854689

Latitude / Longitude: 70°46'26.408" N / 78°7'41.441" W

Date / Time Surveyed: 12-Aug-07 / 04:38



Figure 1: View upstream of crossing 136



Figure 2: View across crossing 136 from left bank

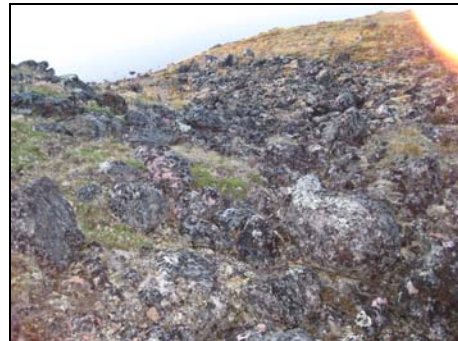


Figure 3: View downstream of crossing 136

Watercourse Characteristics

Tributary Status:	1 st order trib of large river
Channel Pattern:	sinuous
Crossing Site	
Bankfull Width (m):	2.00
Wetted Width (m):	no water
Depth Profile (25%, 50%, 75%; m):	N/A
Max. Depth (m):	N/A
Flow Regime:	intermittent
Gradient (°):	45
Upstream	
Wetted / Bankfull Width (m):	no water
Max. Depth (m):	N/A
Downstream	
Wetted / Bankfull Width (m):	large river
Max. Depth (m):	N/A

Notes

The large, unnamed river is ~50 m downstream. Barriers near the crossing include a very steep gradient both upstream and downstream of the crossing.

Rail Alignment Watercourse Crossing Assessments

Crossing ID: 137

UTM: 17W 605508 / 7854493

Latitude / Longitude: 70°46'20.094" N / 78°7'42.643" W

Date / Time Surveyed: 12-Aug-07 / 04:31



Figure 1: View upstream of crossing 137



Figure 2: View across crossing 137 from right bank

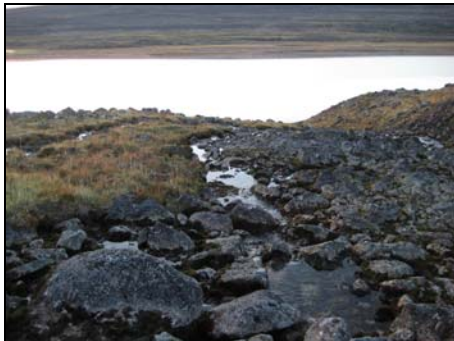


Figure 3: View downstream of crossing 137

Watercourse Characteristics

Tributary Status: 1st order trib of large river

Channel Pattern: sinuous

Crossing Site

Bankfull Width (m): 6.00

Wetted Width (m): 6.00

Depth Profile (25%, 50%, 75%; m): N/A

Max. Depth (m): 0.08

Flow Regime: intermittent

Gradient (°): >15

Upstream

Wetted / Bankfull Width (m): N/A

Max. Depth (m): N/A

Downstream

Wetted / Bankfull Width (m): large river

Max. Depth (m): N/A

Notes

The large, unnamed river is ~50 m downstream.

Barriers near the crossing include a steep gradient both upstream and downstream of the crossing.

Crossing ID: 138

UTM: 17W 605509 / 7854445

Latitude / Longitude: 70°46'18.545" N / 78°7'42.767" W

Date / Time Surveyed: 12-Aug-07 / 04:28



Figure 1: View upstream of crossing 138



Figure 2: View across crossing 138 from right bank

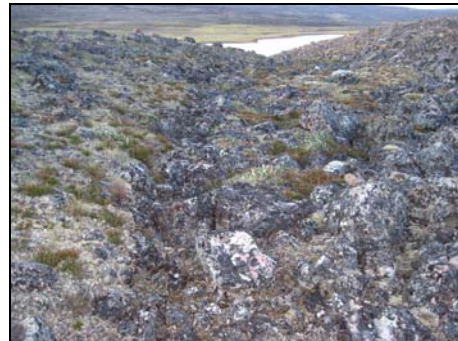


Figure 3: View downstream of crossing 138

Watercourse Characteristics

Tributary Status: 1st order trib of large river

Channel Pattern: sinuous

Crossing Site

Bankfull Width (m): 1.50

Wetted Width (m): no water

Depth Profile (25%, 50%, 75%; m): N/A

Max. Depth (m): N/A

Flow Regime: intermittent

Gradient (°): 10-15

Upstream

Wetted / Bankfull Width (m): no water

Max. Depth (m): N/A

Downstream

Wetted / Bankfull Width (m): large river

Max. Depth (m): N/A

Notes

The large, unnamed river is ~100 m downstream.

Barriers near the crossing include a steep gradient both upstream and downstream of the crossing.

Rail Alignment Watercourse Crossing Assessments

Crossing ID: 139

UTM: 17W 605519 / 7854217

Latitude / Longitude: 70°46'11.179" N / 78°7'42.845" W

Date / Time Surveyed: 12-Aug-07 / 04:23

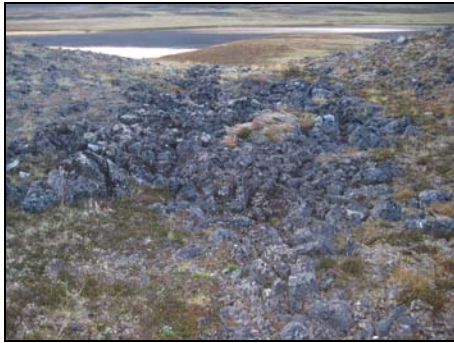


Figure 1: View upstream of crossing 139



Figure 2: View across crossing 139 from right bank



Figure 3: View downstream of crossing 139

Watercourse Characteristics

Tributary Status: 1st order trib of large river

Channel Pattern: sinuous

Crossing Site

Bankfull Width (m): 2.50

Wetted Width (m): no water

Depth Profile (25%, 50%, 75%; m): N/A

Max. Depth (m): N/A

Flow Regime: intermittent

Gradient (°): 15

Upstream

Wetted / Bankfull Width (m): no water

Max. Depth (m): N/A

Downstream

Wetted / Bankfull Width (m): large river

Max. Depth (m): N/A

Notes

The large, unnamed river is ~100 m downstream. Barriers near the crossing include a steep gradient both upstream and downstream of the crossing.

Crossing ID: 140

UTM: 17W 605524 / 7854093

Latitude / Longitude: 70°46'7.174" N / 78°7'42.931" W

Date / Time Surveyed: 12-Aug-07 / 04:20



Figure 1: View upstream of crossing 140



Figure 2: View across crossing 140 from right bank



Figure 3: View downstream of crossing 140

Watercourse Characteristics

Tributary Status: 2nd order trib of large river

Channel Pattern: undefined

Crossing Site

Bankfull Width (m): 0.90

Wetted Width (m): no water

Depth Profile (25%, 50%, 75%; m): N/A

Max. Depth (m): N/A

Flow Regime: intermittent

Gradient (°): >15

Upstream

Wetted / Bankfull Width (m): no water

Max. Depth (m): N/A

Downstream

Wetted / Bankfull Width (m): large river

Max. Depth (m): N/A

Notes

A large, unnamed river is ~200 m downstream. Barriers near the crossing include a steep gradient both upstream and downstream of the crossing.

Rail Alignment Watercourse Crossing Assessments

Crossing ID: 141

UTM: 17W 605526 / 7854046

Latitude / Longitude: 70°46'5.655" N / 78°7'42.953" W

Date / Time Surveyed: 12-Aug-07 / 04:15



Figure 1: View upstream of crossing 141



Figure 2: View across crossing 141 from left bank



Figure 3: View downstream of crossing 141

Watercourse Characteristics

Tributary Status: 1st order trib of large river

Channel Pattern: undefined

Crossing Site

Bankfull Width (m): 4.00

Wetted Width (m): 4.00

Depth Profile (25%, 50%, 75%; m): N/M

Max. Depth (m): nearly dry

Flow Regime: intermittent

Gradient (°): >15

Upstream

Wetted / Bankfull Width (m): N/M

Max. Depth (m): N/M

Downstream

Wetted / Bankfull Width (m): large river

Max. Depth (m): N/A

Notes

The large, unnamed river is ~200 m downstream. Barriers near the crossing include a steep gradient both upstream and downstream of the crossing.

Crossing ID: 142

UTM: 17W 605532 / 7853919

Latitude / Longitude: 70°46'1.552" N / 78°7'42.954" W

Date / Time Surveyed: 12-Aug-07 / 04:10



Figure 1: View upstream of crossing 142



Figure 2: View across crossing 142 from right bank

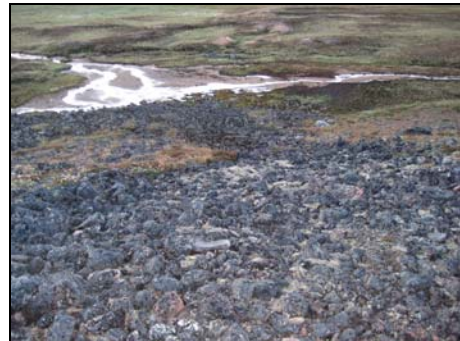


Figure 3: View downstream of crossing 142

Watercourse Characteristics

Tributary Status: 2nd order trib of large river

Channel Pattern: sinuous

Crossing Site

Bankfull Width (m): undefined

Wetted Width (m): no water

Depth Profile (25%, 50%, 75%; m): N/A

Max. Depth (m): N/A

Flow Regime: intermittent

Gradient (°): 12

Upstream

Wetted / Bankfull Width (m): no water

Max. Depth (m): N/A

Downstream

Wetted / Bankfull Width (m): large river

Max. Depth (m): N/A

Notes

The large, unnamed river is ~300 m downstream. Barriers near the crossing include a steep gradient both upstream and downstream of the crossing.

Rail Alignment Watercourse Crossing Assessments

Crossing ID: 143

UTM: 17W 605581 / 7853657

Latitude / Longitude: 70°45'53.031" N / 78°7'39.376" W

Date / Time Surveyed: 12-Aug-07 / 04:05



Figure 1: View upstream of crossing 143



Figure 2: View across crossing 143 from right bank



Figure 3: View downstream of crossing 143

Watercourse Characteristics

Tributary Status: 1st order trib of large river

Channel Pattern: slightly meandering

Crossing Site

Bankfull Width (m): 1.50

Wetted Width (m): 0.80

Depth Profile (25%, 50%, 75%; m): N/M

Max. Depth (m): 0.06

Flow Regime: intermittent – persistent

Gradient (°): N/M

Upstream

Wetted / Bankfull Width (m): < 1.00 / ~1.00

Max. Depth (m): < 0.10

Downstream

Wetted / Bankfull Width (m): large river

Max. Depth (m): N/A

Notes

The large, unnamed river is ~300 m downstream. Low water between the river and the crossing may act as a barrier.

Crossing ID: 144

UTM: 17W 605717 / 7853363

Latitude / Longitude: 70°45'43.345" N / 78°7'27.441" W

Date / Time Surveyed: 12-Aug-07 / 22:15



Figure 1: View upstream of crossing 144



Figure 2: View across crossing 144 from left bank



Figure 3: View downstream of crossing 144

Watercourse Characteristics

Tributary Status: 1st order trib of large river

Channel Pattern: meandering

Crossing Site

Bankfull Width (m): undefined (FT)

Wetted Width (m): 5.60

Depth Profile (25%, 50%, 75%; m): 0.05 on average

Max. Depth (m): 0.10

Flow Regime: persistent

Gradient (°): 1

Upstream

Wetted / Bankfull Width (m): 1.20 / undefined

Max. Depth (m): 0.50

Downstream

Wetted / Bankfull Width (m): large river

Max. Depth (m): N/A

Notes

The large, unnamed river is ~100 m downstream.

Rail Alignment Watercourse Crossing Assessments

Crossing ID: 145

UTM: 17W 605789 / 7853263

Latitude / Longitude: 70°45'40.011" N / 78°7'20.865" W

Date / Time Surveyed: 12-Aug-07 / 22:35



Figure 1: View upstream of crossing 145



Figure 2: View across crossing 145 from left bank

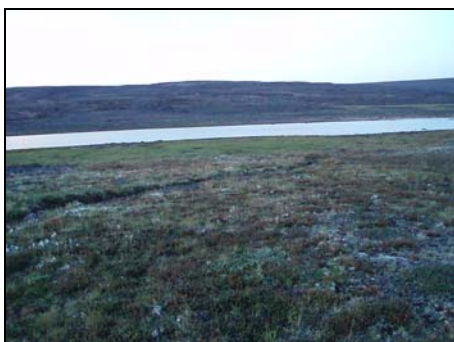


Figure 3: View downstream of crossing 145

Watercourse Characteristics

Tributary Status:	1 st order trib of large river
Channel Pattern:	braided
Crossing Site	
Bankfull Width (m):	11.40
Wetted Width (m):	no water
Depth Profile (25%, 50%, 75%; m):	N/A
Max. Depth (m):	N/A
Flow Regime:	ephemeral – intermittent
Gradient (°):	1
Upstream	
Wetted / Bankfull Width (m):	no water
Max. Depth (m):	N/A
Downstream	
Wetted / Bankfull Width (m):	large river
Max. Depth (m):	N/A

Notes

The large, unnamed river is ~100 m downstream.

Crossing ID: 146

UTM: 17W 605809 / 7853239

Latitude / Longitude: 70°45'39.206" N / 78°7'19.021" W

Date / Time Surveyed: 12-Aug-07 / 22:40

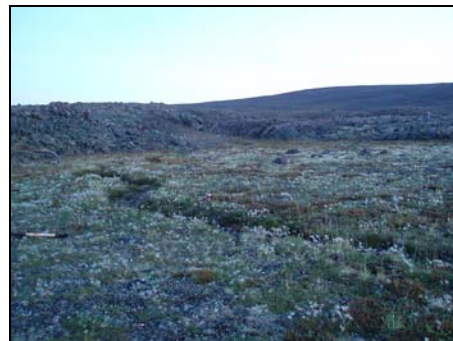


Figure 1: View upstream of crossing 146



Figure 2: View across crossing 146 from left bank



Figure 3: View downstream of crossing 146

Watercourse Characteristics

Tributary Status:	1 st order trib of large river
Channel Pattern:	Y-shaped
Crossing Site	
Bankfull Width (m):	0.50
Wetted Width (m):	no water
Depth Profile (25%, 50%, 75%; m):	N/A
Max. Depth (m):	N/A
Flow Regime:	ephemeral – intermittent
Gradient (°):	1
Upstream	
Wetted / Bankfull Width (m):	no water
Max. Depth (m):	N/A
Downstream	
Wetted / Bankfull Width (m):	large river
Max. Depth (m):	N/A

Notes

The large, unnamed river is ~100 m downstream.

Rail Alignment Watercourse Crossing Assessments

Crossing ID: 147

UTM: 17W 605884 / 7853158

Latitude / Longitude: 70°45'36.480" N / 78°7'12.065" W

Date / Time Surveyed: 12-Aug-07 / 22:54



Figure 1: View upstream of crossing 147



Figure 2: View across crossing 147 from left bank



Figure 3: View downstream of crossing 147

Watercourse Characteristics

Tributary Status: 1st order trib of large river

Channel Pattern: braided

Crossing Site

Bankfull Width (m): ~4.00

Wetted Width (m): no water

Depth Profile (25%, 50%, 75%; m): N/A

Max. Depth (m): N/A

Flow Regime: ephemeral – intermittent

Gradient (°): N/M

Upstream

Wetted / Bankfull Width (m): no water

Max. Depth (m): N/A

Downstream

Wetted / Bankfull Width (m): large river

Max. Depth (m): N/A

Notes

The large, unnamed river is ~50 m downstream.

Crossing ID: 148

UTM: 17W 606017 / 7853036

Latitude / Longitude: 70°45'32.343" N / 78°6'59.630" W

Date / Time Surveyed: 12-Aug-07 / 23:08



Figure 1: View upstream of crossing 148



Figure 2: View across crossing 148 from left bank



Figure 3: View downstream of crossing 148

Watercourse Characteristics

Tributary Status: 1st order trib of large river

Channel Pattern: braided

Crossing Site

Bankfull Width (m): undefined (MSC)

Wetted Width (m): nearly dry

Depth Profile (25%, 50%, 75%; m): N/M

Max. Depth (m): N/M

Flow Regime: ephemeral – intermittent

Gradient (°): 1

Upstream

Wetted / Bankfull Width (m): nearly dry

Max. Depth (m): N/M

Downstream

Wetted / Bankfull Width (m): large river

Max. Depth (m): N/A

Notes

The large, unnamed river is ~50 m downstream.

Rail Alignment Watercourse Crossing Assessments

Crossing ID: 148A

UTM: 17W 606029 / 7853015

Latitude / Longitude: 70°45'31.648" N / 78°6'58.555" W

Date / Time Surveyed: 12-Aug-07 / 23:20



Figure 1: View upstream of crossing 148 A



Figure 2: View across crossing 148 A from left bank



Figure 3: View downstream of crossing 148 A

Watercourse Characteristics

Tributary Status: 1st order trib of large river

Channel Pattern: braided

Crossing Site

Bankfull Width (m): undefined (FT)

Wetted Width (m): N/M (MSC)

Depth Profile (25%, 50%, 75%; m): N/M

Max. Depth (m): 0.10

Flow Regime: intermittent – persistent

Gradient (°): moderate

Upstream

Wetted / Bankfull Width (m): N/M

Max. Depth (m): N/M

Downstream

Wetted / Bankfull Width (m): large river

Max. Depth (m): N/A

Notes

The large, unnamed river is ~50 m downstream.

Crossing ID: 149

UTM: 17W 606144 / 7852920

Latitude / Longitude: 70°45'28.409" N / 78°6'47.755" W

Date / Time Surveyed: 12-Aug-07 / 23:25

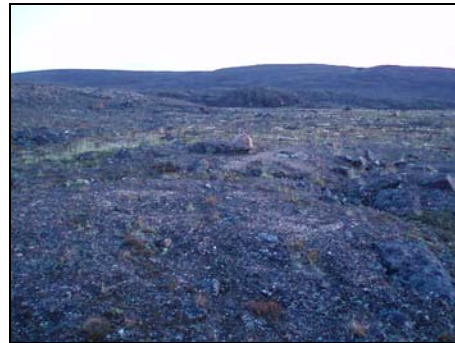


Figure 1: View upstream of crossing 149



Figure 2: View across crossing 149 from left bank



Figure 3: View downstream of crossing 149

Watercourse Characteristics

Tributary Status: 1st order trib of large river

Channel Pattern: undefined

Crossing Site

Bankfull Width (m): undefined (MSC)

Wetted Width (m): no water

Depth Profile (25%, 50%, 75%; m): N/A

Max. Depth (m): N/A

Flow Regime: ephemeral

Gradient (°): moderate

Upstream

Wetted / Bankfull Width (m): no water

Max. Depth (m): N/A

Downstream

Wetted / Bankfull Width (m): large river

Max. Depth (m): N/A

Notes

The large, unnamed river is ~50 m downstream.

Rail Alignment Watercourse Crossing Assessments

Crossing ID: 150

UTM: 17W 606194 / 7852876

Latitude / Longitude: 70°45'26.914" N / 78°6'43.072" W

Date / Time Surveyed: 12-Aug-07 / 23:44



Figure 1: View upstream of crossing 150



Figure 2: View across crossing 150 from left bank



Figure 3: View downstream of crossing 150

Watercourse Characteristics

Tributary Status:	1 st order trib of large river
Channel Pattern:	slightly meandering
Crossing Site	
Bankfull Width (m):	0.50
Wetted Width (m):	no water
Depth Profile (25%, 50%, 75%; m):	N/A
Max. Depth (m):	N/A
Flow Regime:	ephemeral – intermittent
Gradient (°):	5
Upstream	
Wetted / Bankfull Width (m):	no water
Max. Depth (m):	N/A
Downstream	
Wetted / Bankfull Width (m):	large river
Max. Depth (m):	N/A

Notes

The large, unnamed river is ~50 m downstream.

Crossing ID: 151

UTM: 17W 606509 / 7852269

Latitude / Longitude: 70°45'6.861" N / 78°6'15.115" W

Date / Time Surveyed: 12-Aug-07 / 23:31



Figure 1: View upstream of crossing 151



Figure 2: View across crossing 151 from left bank



Figure 3: View downstream of crossing 151

Watercourse Characteristics

Tributary Status:	1 st order trib of large river
Channel Pattern:	sinuous to meandering
Crossing Site	
Bankfull Width (m):	2.50
Wetted Width (m):	2.00
Depth Profile (25%, 50%, 75%; m):	N/M
Max. Depth (m):	N/M
Flow Regime:	ephemeral – intermittent
Gradient (°):	9
Upstream	
Wetted / Bankfull Width (m):	N/M
Max. Depth (m):	N/M
Downstream	
Wetted / Bankfull Width (m):	N/M
Max. Depth (m):	N/M

Notes

The large, unnamed river is ~500 m downstream. Low water between the river and the crossing acts as a barrier.

Rail Alignment Watercourse Crossing Assessments

Crossing ID: 152

UTM: 17W 606528 / 7852123

Latitude / Longitude: 70°45'2.125" N / 78°6'13.940" W

Date / Time Surveyed: 12-Aug-07 / 23:27



Figure 1: View upstream of crossing 152



Figure 2: View across crossing 152 from left bank



Figure 3: View downstream of crossing 152

Watercourse Characteristics

Tributary Status: 1st order trib of large river

Channel Pattern: undefined

Crossing Site

Bankfull Width (m): undefined

Wetted Width (m): no water

Depth Profile (25%, 50%, 75%; m): N/A

Max. Depth (m): N/A

Flow Regime: intermittent

Gradient (°): 8

Upstream

Wetted / Bankfull Width (m): no water

Max. Depth (m): N/A

Downstream

Wetted / Bankfull Width (m): no water

Max. Depth (m): N/A

Notes

The large, unnamed river is ~500 m downstream.

Crossing ID: 153

UTM: 17W 606531 / 7851992

Latitude / Longitude: 70°44'57.897" N / 78°6'14.258" W

Date / Time Surveyed: 12-Aug-07 / 23:21



Figure 1: View upstream of crossing 153



Figure 2: View across crossing 153 from right bank



Figure 3: View downstream of crossing 153

Watercourse Characteristics

Tributary Status: 1st order trib of large river

Channel Pattern: sinuous to meandering

Crossing Site

Bankfull Width (m): 2.40

Wetted Width (m): no water

Depth Profile (25%, 50%, 75%; m): N/A

Max. Depth (m): N/A

Flow Regime: intermittent

Gradient (°): 7

Upstream

Wetted / Bankfull Width (m): no water

Max. Depth (m): N/A

Downstream

Wetted / Bankfull Width (m): no water

Max. Depth (m): N/A

Notes

The large, unnamed river is ~600 m downstream.

Rail Alignment Watercourse Crossing Assessments

Crossing ID: 154

UTM: 17W 606463 / 7851596

Latitude / Longitude: 70°44'45.235" N / 78°6'22.749" W

Date / Time Surveyed: 12-Aug-07 / 23:13



Figure 1: View upstream of crossing 154



Figure 2: View across crossing 154 from left bank



Figure 3: View downstream of crossing 154

Watercourse Characteristics

Tributary Status:	1 st order trib of large river
Channel Pattern:	sinuous to meandering
Crossing Site	
Bankfull Width (m):	2.80
Wetted Width (m):	no water
Depth Profile (25%, 50%, 75%; m):	N/A
Max. Depth (m):	N/A
Flow Regime:	ephemeral - intermittent
Gradient (°):	10
Upstream	
Wetted / Bankfull Width (m):	no water
Max. Depth (m):	N/A
Downstream	
Wetted / Bankfull Width (m):	large river
Max. Depth (m):	N/A

Notes

The large, unnamed river is ~100 m downstream.

Crossing ID: 155

UTM: 17W 606378 / 7851181

Latitude / Longitude: 70°44'31.987" N / 78°6'32.985" W

Date / Time Surveyed: 12-Aug-07 / 23:04

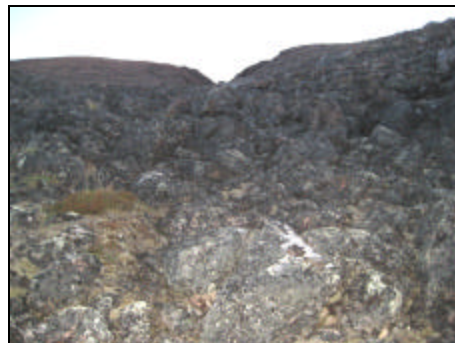


Figure 1: View upstream of crossing 155

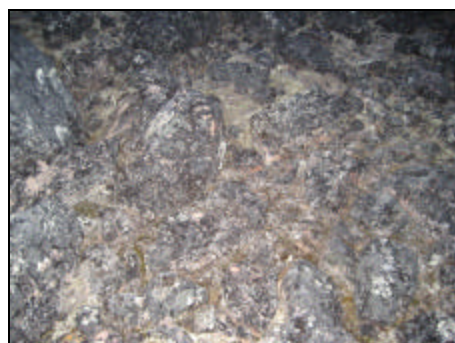


Figure 2: View across crossing 155 from left bank



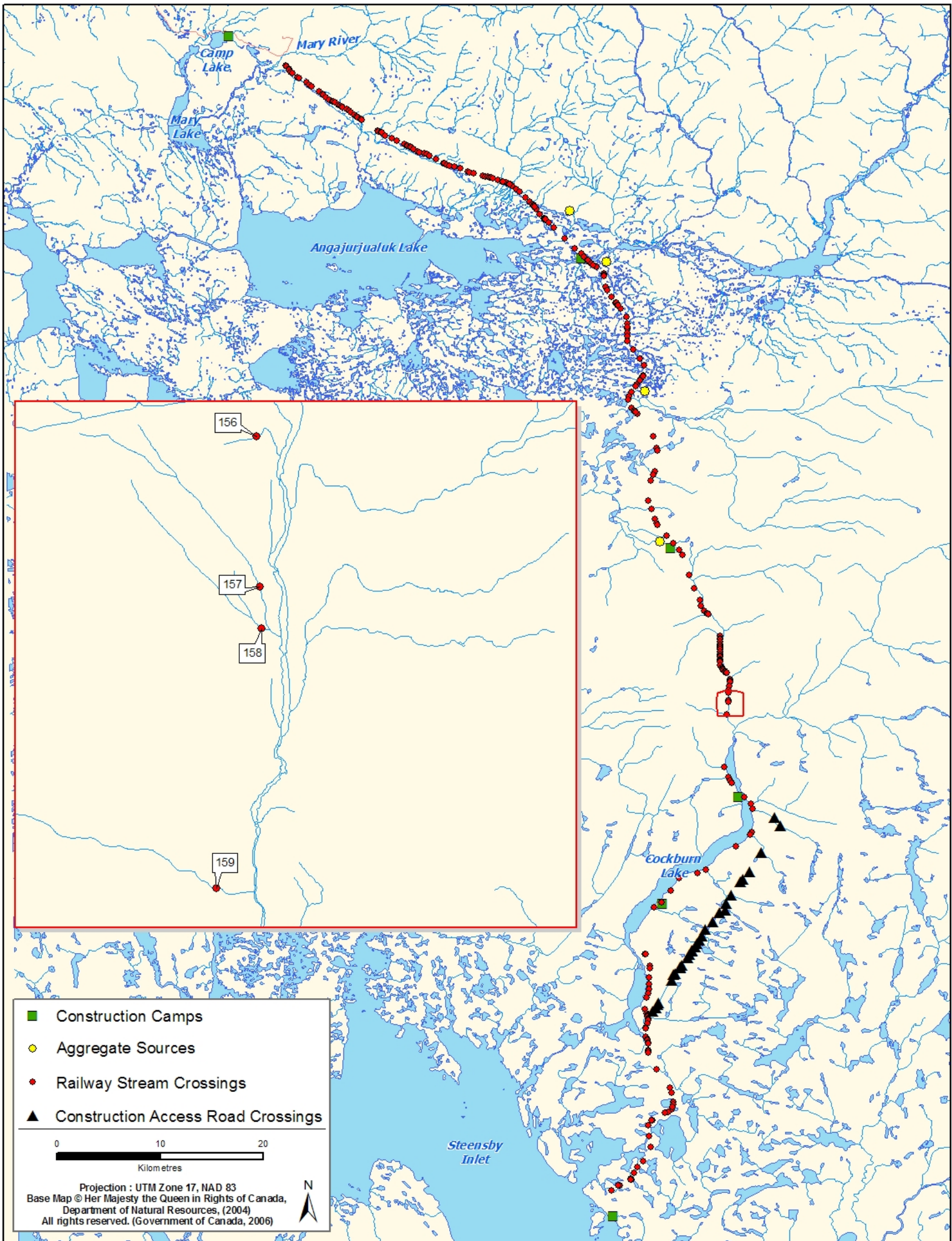
Figure 3: View downstream of crossing 155

Watercourse Characteristics

Tributary Status:	1 st order trib of large river
Channel Pattern:	straight
Crossing Site	
Bankfull Width (m):	0.80
Wetted Width (m):	no water
Depth Profile (25%, 50%, 75%; m):	N/A
Max. Depth (m):	N/A
Flow Regime:	intermittent
Gradient (°):	30-40
Upstream	
Wetted / Bankfull Width (m):	no water
Max. Depth (m):	N/A
Downstream	
Wetted / Bankfull Width (m):	large river
Max. Depth (m):	N/A

Notes

The large, unnamed river is ~50 m downstream. The steep gradient between the river and the crossing acts as a barrier.



Rail Alignment Watercourse Crossing Assessments

Crossing ID: 156

UTM: 17W 606363 / 7850947

Latitude / Longitude: 70°44'24.467" N / 78°6'35.540" W

Date / Time Surveyed: 12-Aug-07 / 22:57



Figure 1: View upstream of crossing 156



Figure 2: View across crossing 156 from left bank



Figure 3: View downstream of crossing 156

Watercourse Characteristics

Tributary Status:	1 st order trib of large river
Channel Pattern:	slightly meandering
Crossing Site	
Bankfull Width (m):	1.50
Wetted Width (m):	no water
Depth Profile (25%, 50%, 75%; m):	N/A
Max. Depth (m):	N/A
Flow Regime:	ephemeral – intermittent
Gradient (°):	20-30
Upstream	
Wetted / Bankfull Width (m):	no water
Max. Depth (m):	N/A
Downstream	
Wetted / Bankfull Width (m):	large river
Max. Depth (m):	N/A

Notes

The large, unnamed river is ~200 m downstream. The steep gradient between the river and the crossing acts as a barrier.

Crossing ID: 157

UTM: 17W 606380 / 7850253

Latitude / Longitude: 70°44'2.067" N / 78°6'37.109" W

Date / Time Surveyed: 12-Aug-07 / 22:45



Figure 1: View upstream of crossing 157



Figure 2: View across crossing 157 from right bank

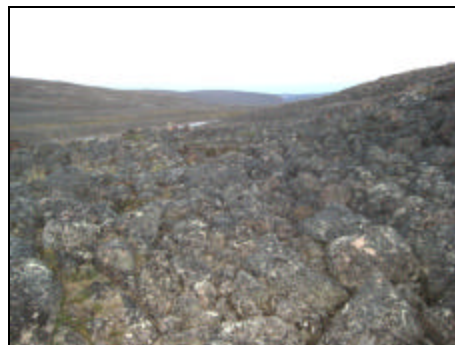


Figure 3: View downstream of crossing 157

Watercourse Characteristics

Tributary Status:	2 nd order trib of large river
Channel Pattern:	undefined
Crossing Site	
Bankfull Width (m):	undefined
Wetted Width (m):	no water
Depth Profile (25%, 50%, 75%; m):	N/A
Max. Depth (m):	N/A
Flow Regime:	ephemeral – intermittent
Gradient (°):	12
Upstream	
Wetted / Bankfull Width (m):	no water
Max. Depth (m):	N/A
Downstream	
Wetted / Bankfull Width (m):	large river
Max. Depth (m):	N/A

Notes

The large, unnamed river is ~300 m downstream. The steep gradient between the river and the crossing acts as a barrier.

Rail Alignment Watercourse Crossing Assessments

Crossing ID: 158

UTM: 17W 606385 / 7850060

Latitude / Longitude: 70°43'55.837" N / 78°6'37.519" W

Date / Time Surveyed: 12-Aug-07 / 22:40



Figure 1: View upstream of crossing 158



Figure 2: View across crossing 158 from left bank



Figure 3: View downstream of crossing 158

Watercourse Characteristics

Tributary Status:	1 st order trib of large river
Channel Pattern:	slightly meandering
Crossing Site	
Bankfull Width (m):	undefined
Wetted Width (m):	no water
Depth Profile (25%, 50%, 75%; m):	N/A
Max. Depth (m):	N/A
Flow Regime:	ephemeral – intermittent
Gradient (°):	N/M
Upstream	
Wetted / Bankfull Width (m):	no water
Max. Depth (m):	N/A
Downstream	
Wetted / Bankfull Width (m):	large river
Max. Depth (m):	N/A

Notes

The large, unnamed river is ~100 m downstream. The steep gradient between the river and the crossing acts as a barrier.

Crossing ID: 159

UTM: 17W 606178 / 7848859

Latitude / Longitude: 70°43'17.437" N / 78°7'3.300" W

Date / Time Surveyed: 12-Aug-07 / 22:15



Figure 1: View upstream of crossing 159



Figure 2: View across crossing 159 from left bank



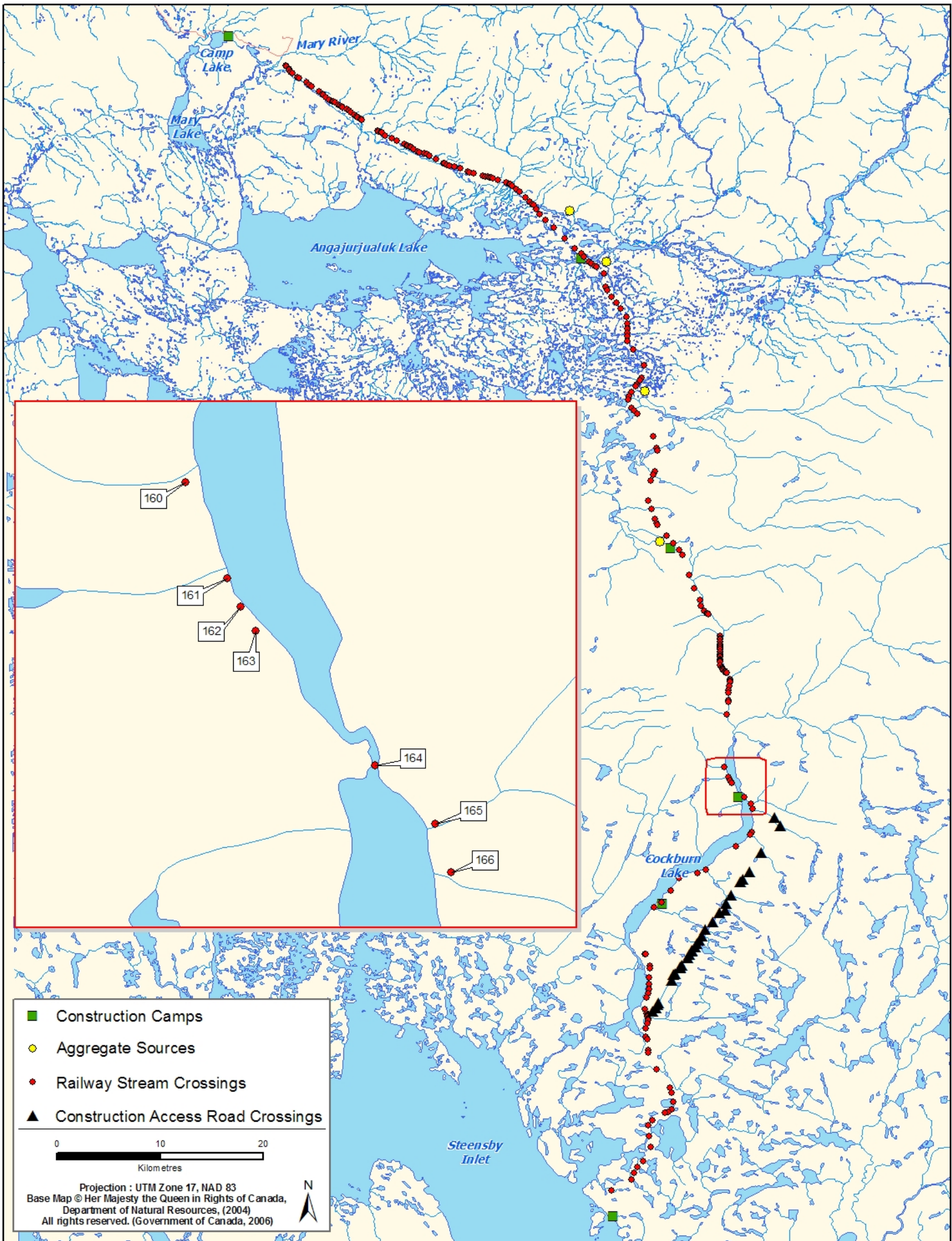
Figure 3: View downstream of crossing 159

Watercourse Characteristics

Tributary Status:	1 st order trib of large river
Channel Pattern:	sinuous to meandering
Crossing Site	
Bankfull Width (m):	8.00
Wetted Width (m):	7.50
Depth Profile (25%, 50%, 75%; m):	N/M
Max. Depth (m):	0.28
Flow Regime:	persistent
Gradient (°):	15
Upstream	
Wetted / Bankfull Width (m):	N/M
Max. Depth (m):	N/M
Downstream	
Wetted / Bankfull Width (m):	large river
Max. Depth (m):	N/A

Notes

The large, unnamed river is ~200 m downstream. Falls between the river and the crossing site act as barriers.



Rail Alignment Watercourse Crossing Assessments

Crossing ID: 160

UTM: 17W 605935 / 7843777

Latitude / Longitude: 70°40'33.971" N / 78°7'50.467" W

Date / Time Surveyed: 13-Aug-07 / 21:10



Figure 1: Aerial view of area near crossing 160



Figure 2: Another aerial view of area near crossing 160

Watercourse Characteristics

Tributary Status: 1st order trib of large river

Channel Pattern: straight

Crossing Site

Bankfull Width (m): N/M

Wetted Width (m): N/M

Depth Profile (25%, 50%, 75%; m): N/M

Max. Depth (m): < 0.20

Flow Regime: persistent

Gradient (°): high

Upstream

Wetted / Bankfull Width (m): N/M

Max. Depth (m): < 0.20

Downstream

Wetted / Bankfull Width (m): Cockburn River/Lake

Max. Depth (m): N/A

Notes

Cockburn River/Lake is ~200 m downstream. Steep, shallow cascades between Cockburn Lake and the crossing act as barriers.

Crossing ID: 161

UTM: 17W 606371 / 7842771

Latitude / Longitude: 70°40'0.872" N / 78°7'12.670" W

Date / Time Surveyed: 13-Aug-07 / 21:11



Figure 1: Aerial view of area near crossing 161



Figure 2: Another aerial view of area near crossing 161

Watercourse Characteristics

Tributary Status: 1st order trib of large river

Channel Pattern: straight

Crossing Site

Bankfull Width (m): N/M

Wetted Width (m): N/M

Depth Profile (25%, 50%, 75%; m): N/M

Max. Depth (m): < 0.10

Flow Regime: persistent – intermittent

Gradient (°): high

Upstream

Wetted / Bankfull Width (m): N/M

Max. Depth (m): < 0.10

Downstream

Wetted / Bankfull Width (m): Cockburn River/Lake

Max. Depth (m): N/A

Notes

Cockburn River/Lake is ~100 m downstream. Steep, shallow cascades between Cockburn Lake and the crossing act as barriers.

Rail Alignment Watercourse Crossing Assessments

Crossing ID: 162

UTM: 17W 606508 / 7842476

Latitude / Longitude: 70°39'51.152" N / 78°7'0.703" W

Date / Time Surveyed: 13-Aug-07 / 21:12



Figure 1: Aerial view of area near crossing 162



Figure 2: Another aerial view of area near crossing 162

Watercourse Characteristics

Tributary Status: 1st order trib of large river

Channel Pattern: straight

Crossing Site

Bankfull Width (m): N/M

Wetted Width (m): N/M

Depth Profile (25%, 50%, 75%; m): N/M

Max. Depth (m): < 0.10

Flow Regime: persistent – intermittent

Gradient (°): high

Upstream

Wetted / Bankfull Width (m): N/M

Max. Depth (m): < 0.10

Downstream

Wetted / Bankfull Width (m): Cockburn River/Lake

Max. Depth (m): N/A

Notes

Cockburn River/Lake is ~200 m downstream. Steep, shallow cascades between Cockburn Lake and the crossing act as barriers.

Crossing ID: 163

UTM: 17W 606663 / 7842226

Latitude / Longitude: 70°39'42.855" N / 78°6'46.780" W

Date / Time Surveyed: 13-Aug-07 / 21:12



Figure 1: Aerial view of area near crossing 163



Figure 2: Another aerial view of area near crossing 163

Watercourse Characteristics

Tributary Status: 1st order trib of large river

Channel Pattern: straight, braided

Crossing Site

Bankfull Width (m): N/M

Wetted Width (m): N/M

Depth Profile (25%, 50%, 75%; m): N/M

Max. Depth (m): < 0.10 - nearly dry

Flow Regime: persistent – intermittent

Gradient (°): high

Upstream

Wetted / Bankfull Width (m): N/M

Max. Depth (m): < 0.10

Downstream

Wetted / Bankfull Width (m): Cockburn River/Lake

Max. Depth (m): N/A

Notes

Cockburn River/Lake is ~200 m downstream. Steep, shallow cascades between Cockburn Lake and the crossing act as barriers.

Rail Alignment Watercourse Crossing Assessments

Crossing ID: 164

UTM: 17W 607916 / 7840822

Latitude / Longitude: 70°38'55.660" N / 78°4'51.458" W

Date / Time Surveyed: 13-Aug-07 / 03:59



Figure 1: View upstream of crossing 164

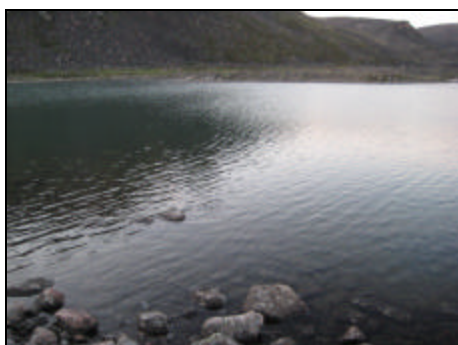


Figure 2: View across crossing 164 from left bank



Figure 3: View downstream of crossing 164

Watercourse Characteristics

Tributary Status: Cockburn Lake

Channel Pattern: sinuous

Crossing Site

Bankfull Width (m): 146.30

Wetted Width (m): 138.10

Depth Profile (25%, 50%, 75%; m): N/M

Max. Depth (m): > 1.00

Flow Regime: persistent

Gradient (°): 1

Upstream

Wetted / Bankfull Width (m): Cockburn Lake

Max. Depth (m): N/A

Downstream

Wetted / Bankfull Width (m): Cockburn Lake

Max. Depth (m): N/A

Notes

This is the site where the proposed rail route will cross Cockburn Lake itself.

Crossing ID: 165

UTM: 17W 608545 / 7840211

Latitude / Longitude: 70°38'34.984" N / 78°3'53.182" W

Date / Time Surveyed: 13-Aug-07 / 03:10



Figure 1: View upstream of crossing 165

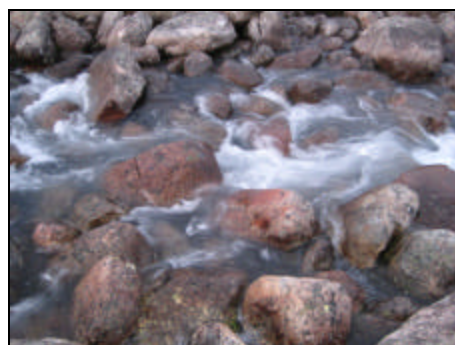


Figure 2: View across crossing 165 from left bank



Figure 3: View downstream of crossing 165

Watercourse Characteristics

Tributary Status: 1st order trib of Cockburn

Channel Pattern: sinuous

Crossing Site

Bankfull Width (m): 8.00

Wetted Width (m): 7.00

Depth Profile (25%, 50%, 75%; m): N/M

Max. Depth (m): ~0.40

Flow Regime: persistent

Gradient (°): 8-10

Upstream

Wetted / Bankfull Width (m): 4.00-8.00 / 5.00-10.00

Max. Depth (m): N/A

Downstream

Wetted / Bankfull Width (m): Cockburn Lake

Max. Depth (m): N/A

Notes

Cockburn Lake is located ~100 m downstream of the crossing. Cascades upstream and downstream of the crossing act as partial barriers.

Rail Alignment Watercourse Crossing Assessments

Crossing ID: 166**UTM:** 17W 608709 / 7839705**Latitude / Longitude:** 70°38'18.416" N / 78°3'39.625" W**Date / Time Surveyed:** 12-Aug-07 / 03:02

Figure 1: View upstream of crossing 166



Figure 2: View across crossing 166 from left bank



Figure 3: View downstream of crossing 166

Watercourse Characteristics

Tributary Status: 1st order trib of Cockburn

Channel Pattern: sinuous

Crossing Site

Bankfull Width (m): 12.80

Wetted Width (m): 11.00

Depth Profile (25%, 50%, 75%; m): 0.40, 0.40, 0.60

Max. Depth (m): 0.75

Flow Regime: persistent

Gradient (°): 5-8

Upstream

Wetted / Bankfull Width (m): 5.00-10.00 / 10.00-15.00

Max. Depth (m): < 0.50

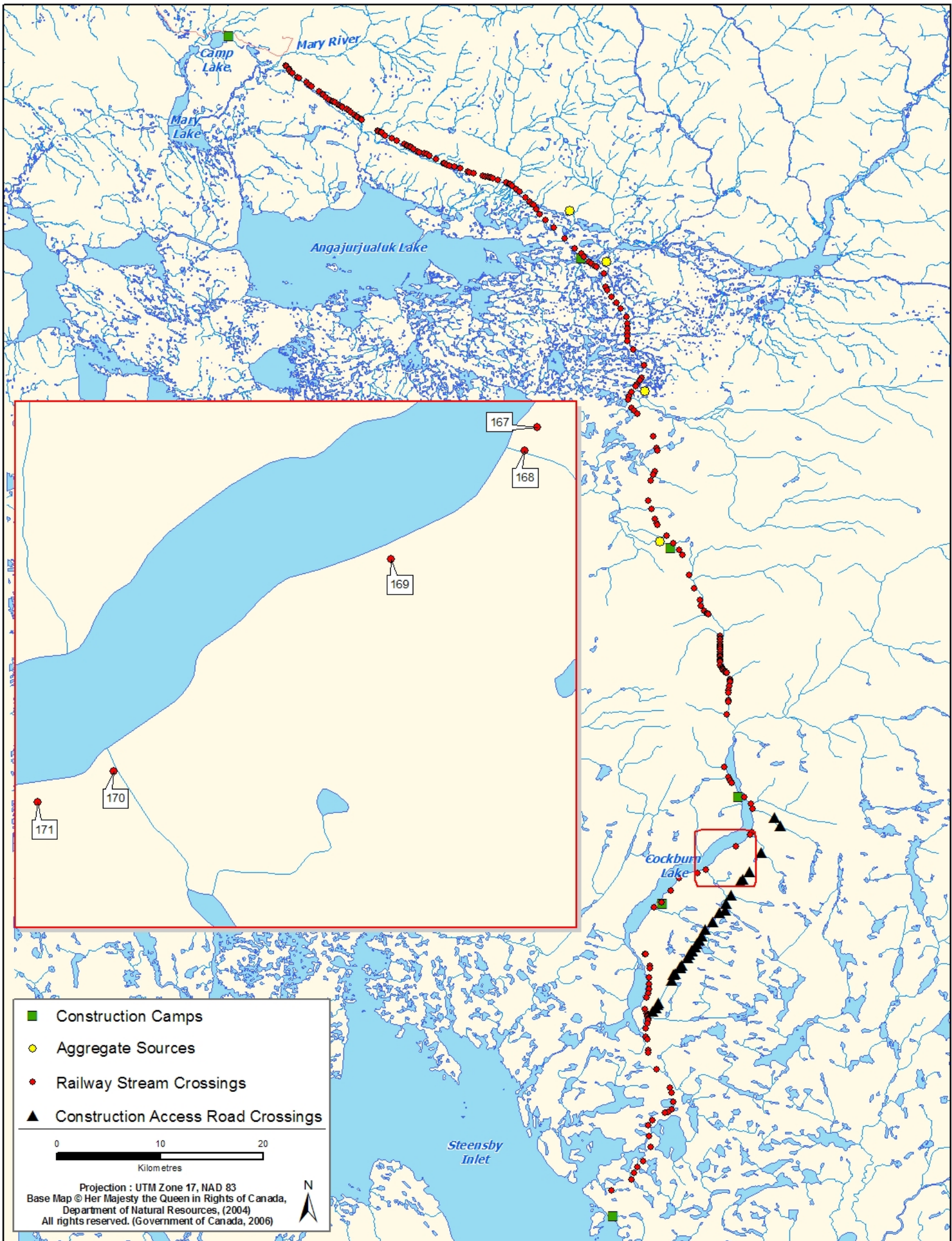
Downstream

Wetted / Bankfull Width (m): Cockburn Lake

Max. Depth (m): N/A

Notes

Cockburn Lake is located ~100 m downstream of the crossing. Cascades upstream and downstream of the crossing act as partial barriers.



Rail Alignment Watercourse Crossing Assessments

Crossing ID: 167

UTM: 17W 608594 / 7837414

Latitude / Longitude: 70°37'4.740" N / 78°4'1.559" W

Date / Time Surveyed: 13-Aug-07 / 21:30

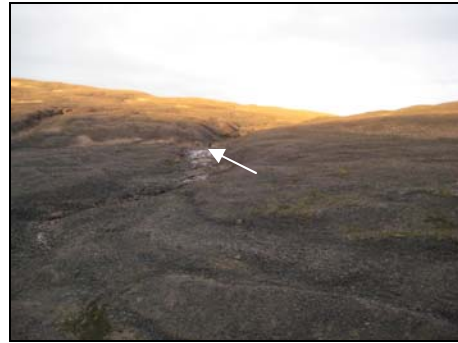


Figure 1: Aerial view of area near crossing 167 (white arrow)

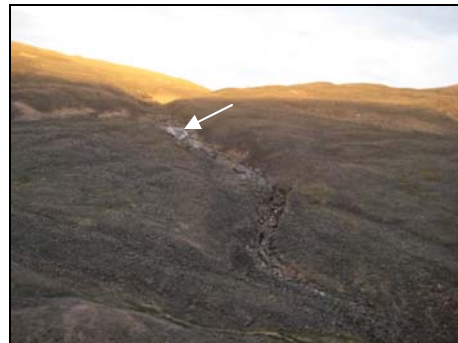


Figure 2: Another aerial view of area near crossing 167 (white arrow)

Watercourse Characteristics

Tributary Status:	1 st order trib of Cockburn
Channel Pattern:	straight
Crossing Site	
Bankfull Width (m):	N/M
Wetted Width (m):	no water or nearly none
Depth Profile (25%, 50%, 75%; m):	N/A
Max. Depth (m):	N/A
Flow Regime:	intermittent
Gradient (°):	high
Upstream	
Wetted / Bankfull Width (m):	no water
Max. Depth (m):	N/A
Downstream	
Wetted / Bankfull Width (m):	Cockburn Lake
Max. Depth (m):	N/A

Notes

Cockburn Lake is located ~100 m downstream of the crossing. The steep gradient and low water upstream and downstream of the crossing act as barriers.

Rail Alignment Watercourse Crossing Assessments

Crossing ID: 168

UTM: 17W 608459 / 7837169

Latitude / Longitude: 70°36'57.052" N / 78°4'15.811" W

Date / Time Surveyed: 13-Aug-07 / 21:30



Figure 1: Aerial view of area near crossing 168 (white arrow)

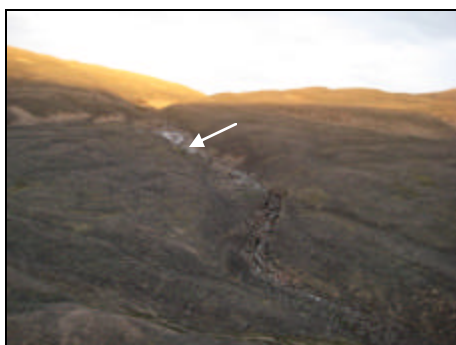


Figure 2: Another aerial view of area near crossing 168 (white arrow)

Watercourse Characteristics

Tributary Status:	1 st order trib of Cockburn
Channel Pattern:	slightly meandering
Crossing Site	
Bankfull Width (m):	N/M
Wetted Width (m):	N/M
Depth Profile (25%, 50%, 75%; m):	N/M
Max. Depth (m):	< 0.20
Flow Regime:	persistent - intermittent
Gradient (°):	high
Upstream	
Wetted / Bankfull Width (m):	N/M
Max. Depth (m):	< 0.20
Downstream	
Wetted / Bankfull Width (m):	Cockburn Lake
Max. Depth (m):	N/A

Notes

Cockburn Lake is located ~100 m downstream of the crossing. Steep, shallow cascades between Cockburn Lake and the crossing act as barriers.

Crossing ID: 169

UTM: 17W 607062 / 7836041

Latitude / Longitude: 70°36'22.846" N / 78°6'36.619" W

Date / Time Surveyed: 13-Aug-07 / 21:32



Figure 1: Aerial view of area near crossing 169

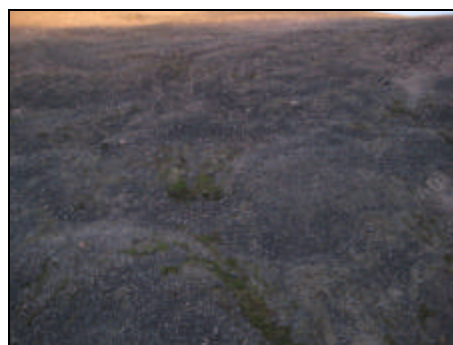


Figure 2: Another aerial view of area near crossing 169

Watercourse Characteristics

Tributary Status:	1 st order trib of Cockburn
Channel Pattern:	straight
Crossing Site	
Bankfull Width (m):	N/M
Wetted Width (m):	no water
Depth Profile (25%, 50%, 75%; m):	N/A
Max. Depth (m):	N/A
Flow Regime:	intermittent
Gradient (°):	high
Upstream	
Wetted / Bankfull Width (m):	no water
Max. Depth (m):	N/A
Downstream	
Wetted / Bankfull Width (m):	Cockburn Lake
Max. Depth (m):	N/A

Notes

Cockburn Lake is located ~100 m downstream of the crossing. The steep gradient and low water upstream and downstream of the crossing acts as a barrier.

Rail Alignment Watercourse Crossing Assessments

Crossing ID: 170

UTM: 17W 604171 / 7833818

Latitude / Longitude: 70°35'15.553" N / 78°11'27.092" W

Date / Time Surveyed: 13-Aug-07 / 21:34



Figure 1: Aerial view of area near crossing 170



Figure 2: Another aerial view of area near crossing 170

Watercourse Characteristics

Tributary Status:	1 st order trib of Cockburn
Channel Pattern:	braided
Crossing Site	
Bankfull Width (m):	N/M
Wetted Width (m):	no water or nearly none
Depth Profile (25%, 50%, 75%; m):	N/A
Max. Depth (m):	N/A
Flow Regime:	intermittent
Gradient (°):	high
Upstream	
Wetted / Bankfull Width (m):	no water
Max. Depth (m):	N/A
Downstream	
Wetted / Bankfull Width (m):	Cockburn Lake
Max. Depth (m):	N/A

Notes

Cockburn Lake is located ~100 m downstream of the crossing site. The steep gradient and low water upstream and downstream of the crossing act as barriers.

Crossing ID: 171

UTM: 17W 603373 / 7833494

Latitude / Longitude: 70°35'6.293" N / 78°12'45.888" W

Date / Time Surveyed: 13-Aug-07 / 21:34



Figure 1: Aerial view of area near crossing 171



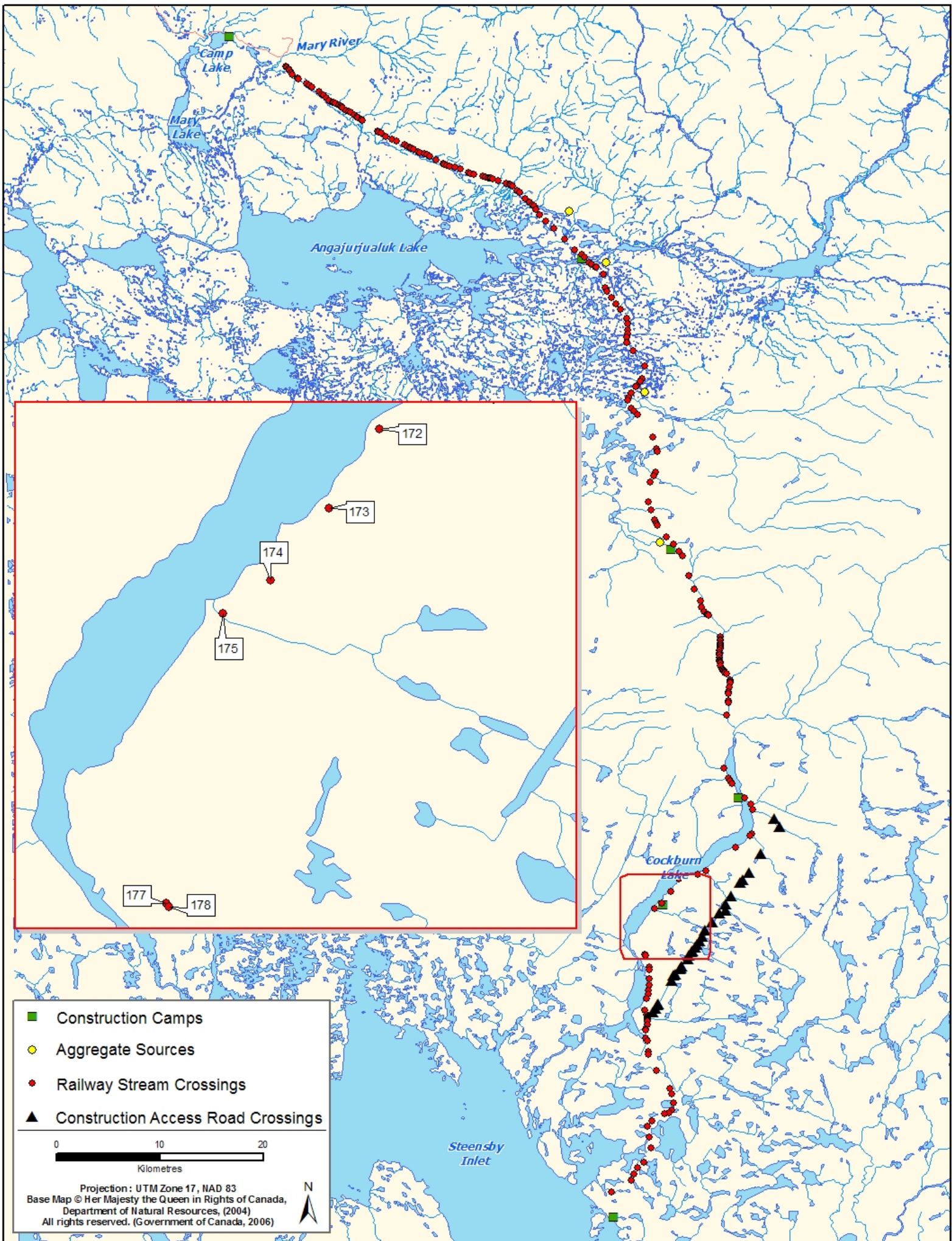
Figure 2: Another aerial view of area near crossing 171

Watercourse Characteristics

Tributary Status:	1 st order trib of Cockburn
Channel Pattern:	straight
Crossing Site	
Bankfull Width (m):	N/M
Wetted Width (m):	no water
Depth Profile (25%, 50%, 75%; m):	N/A
Max. Depth (m):	N/A
Flow Regime:	intermittent
Gradient (°):	high
Upstream	
Wetted / Bankfull Width (m):	no water
Max. Depth (m):	N/A
Downstream	
Wetted / Bankfull Width (m):	Cockburn Lake
Max. Depth (m):	N/A

Notes

Cockburn Lake is located ~100 m downstream of the crossing site. The steep gradient and low water upstream and downstream of the crossing act as barriers.



Rail Alignment Watercourse Crossing Assessments

Crossing ID: 172

UTM: 17W 601596 / 7833028

Latitude / Longitude: 70°34'53.876" N / 78°15'40.164" W

Date / Time Surveyed: 13-Aug-07 / 21:35



Figure 1: Aerial view of area near crossing 172



Figure 2: Another aerial view of area near crossing 172

Watercourse Characteristics

Tributary Status: 1st order trib of Cockburn

Channel Pattern: braided

Crossing Site

Bankfull Width (m): N/M

Wetted Width (m): no water

Depth Profile (25%, 50%, 75%; m): N/A

Max. Depth (m): N/A

Flow Regime: intermittent

Gradient (°): high

Upstream

Wetted / Bankfull Width (m): no water

Max. Depth (m): N/A

Downstream

Wetted / Bankfull Width (m): Cockburn Lake

Max. Depth (m): N/A

Notes

Cockburn Lake is located ~100 m downstream of the crossing site. The steep gradient and low water upstream and downstream of the crossing act as barriers.

Crossing ID: 173

UTM: 17W 600808 / 7831800

Latitude / Longitude: 70°34'15.422" N / 78°17'1.855" W

Date / Time Surveyed: 13-Aug-07 / 21:36



Figure 1: Aerial view of area near crossing 173

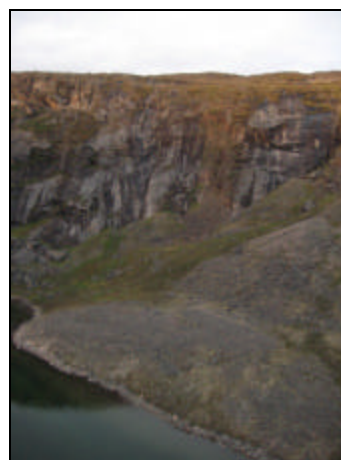


Figure 2: Another aerial view of area near crossing 173

Watercourse Characteristics

Tributary Status: 1st order trib of Cockburn

Channel Pattern: straight

Crossing Site

Bankfull Width (m): N/M

Wetted Width (m): no water or nearly none

Depth Profile (25%, 50%, 75%; m): N/A

Max. Depth (m): N/A

Flow Regime: intermittent

Gradient (°): high

Upstream

Wetted / Bankfull Width (m): no water

Max. Depth (m): N/A

Downstream

Wetted / Bankfull Width (m): Cockburn Lake

Max. Depth (m): N/A

Notes

Cockburn Lake is located ~100 m downstream of the crossing site. The steep gradient and low water upstream and downstream of the crossing act as barriers.

Rail Alignment Watercourse Crossing Assessments

Crossing ID: 174

UTM: 17W 599902 / 7830688

Latitude / Longitude: 70°33'40.868" N / 78°18'34.385" W

Date / Time Surveyed: 13-Aug-07 / 21:37



Figure 1: Aerial view of area near crossing 174



Figure 2: Another aerial view of area near crossing 174

Watercourse Characteristics

Tributary Status:	1 st order trib of Cockburn
Channel Pattern:	straight – slightly meandering
Crossing Site	
Bankfull Width (m):	N/M
Wetted Width (m):	N/M
Depth Profile (25%, 50%, 75%; m):	N/M
Max. Depth (m):	< 0.20
Flow Regime:	persistent
Gradient (°):	moderate - high
Upstream	
Wetted / Bankfull Width (m):	N/M
Max. Depth (m):	< 0.20
Downstream	
Wetted / Bankfull Width (m):	Cockburn Lake
Max. Depth (m):	N/A

Notes

Cockburn Lake is located ~300 m downstream of the crossing site.

Crossing ID: 175

UTM: 17W 599167 / 7830161

Latitude / Longitude: 70°33'24.921" N / 78°19'47.791" W

Date / Time Surveyed: 13-Aug-07 / 21:37



Figure 1: Aerial view of area near crossing 175

Watercourse Characteristics

Tributary Status:	1 st order trib of Cockburn
Channel Pattern:	straight
Crossing Site	
Bankfull Width (m):	N/M
Wetted Width (m):	N/M
Depth Profile (25%, 50%, 75%; m):	N/M
Max. Depth (m):	< 0.20
Flow Regime:	persistent
Gradient (°):	high
Upstream	
Wetted / Bankfull Width (m):	N/M
Max. Depth (m):	< 0.20
Downstream	
Wetted / Bankfull Width (m):	Cockburn Lake
Max. Depth (m):	N/A

Notes

Cockburn Lake is located ~200 m downstream of the crossing site. Steep, shallow cascades between Cockburn Lake and the crossing act as barriers.

Rail Alignment Watercourse Crossing Assessments

Crossing ID: 177

UTM: 17W 598287 / 7825670

Latitude / Longitude: 70°31'1.348" N / 78°21'31.881" W

Date / Time Surveyed: 13-Aug-07 / 21:40



Figure 1: Aerial view of area near crossing 177 (white arrow)



Figure 2: Another aerial view of area near crossing 177 (white arrow)

Watercourse Characteristics

Tributary Status: 1st order trib of Cockburn

Channel Pattern: braided

Crossing Site

Bankfull Width: N/M

Wetted Width (m): N/M

Depth Profile (25%, 50%, 75%; m): N/M

Max. Depth (m): < 0.20

Flow Regime: intermittent

Gradient (°): high

Upstream

Wetted / Bankfull Width (m): N/M

Max. Depth (m): < 0.20

Downstream

Wetted / Bankfull Width (m): N/M

Max. Depth (m): < 0.20

Notes

Cockburn Lake is located ~1 km downstream of the crossing site.

Crossing ID: 178

UTM: 17W 598325 / 7825610

Latitude / Longitude: 70°30'59.360" N / 78°21'28.462" W

Date / Time Surveyed: 13-Aug-07 / 21:40



Figure 1: Aerial view of area near crossing 178 (white arrow)



Figure 2: Another aerial view of area near crossing 178 (white arrow)

Watercourse Characteristics

Tributary Status: 1st order trib of Cockburn

Channel Pattern: braided

Crossing Site

Bankfull Width: N/M

Wetted Width (m): N/M

Depth Profile (25%, 50%, 75%; m): N/M

Max. Depth (m): < 0.20

Flow Regime: intermittent

Gradient (°): high

Upstream

Wetted / Bankfull Width (m): N/M

Max. Depth (m): < 0.20

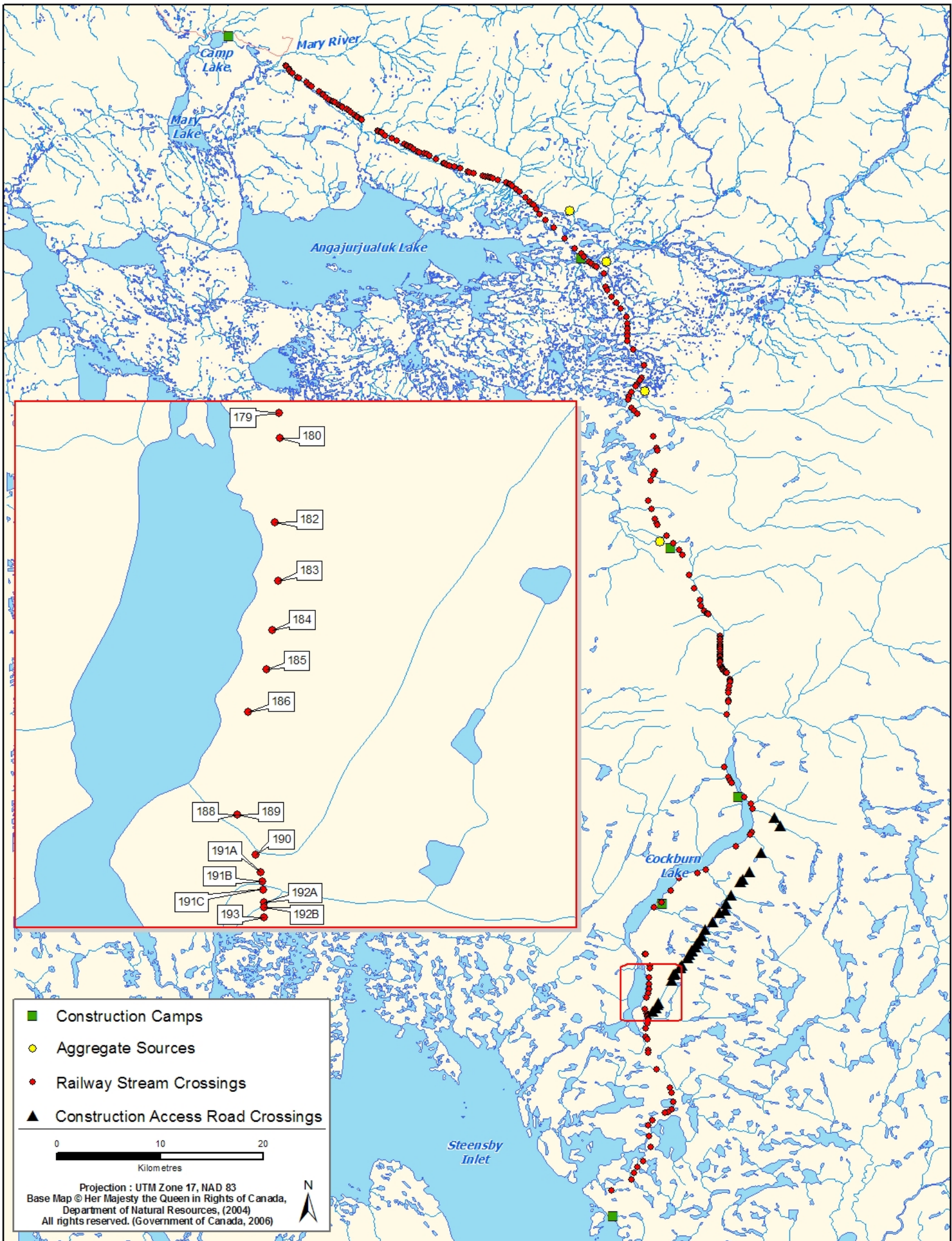
Downstream

Wetted / Bankfull Width (m): N/M

Max. Depth (m): < 0.20

Notes

Cockburn Lake is located ~1 km downstream of the crossing site.



Rail Alignment Watercourse Crossing Assessments

Crossing ID: 179

UTM: 17W 598713 / 7824513

Latitude / Longitude: 70°30'23.441" N / 78°20'55.606" W

Date / Time Surveyed: 13-Aug-07 / 21:41



Figure 1: Aerial view of area near crossing 179

Watercourse Characteristics

Tributary Status: 1st order trib of Cockburn

Channel Pattern: straight

Crossing Site

Bankfull Width: N/M

Wetted Width (m): N/M

Depth Profile (25%, 50%, 75%; m): N/M

Max. Depth (m): < 0.10

Flow Regime: persistent – intermittent

Gradient (°): high

Upstream

Wetted / Bankfull Width (m): N/M

Max. Depth (m): < 0.10

Downstream

Wetted / Bankfull Width (m): N/M

Max. Depth (m): < 0.10

Notes

Cockburn Lake is located ~800 m downstream of the crossing site. Steep, shallow cascades between Cockburn Lake and the crossing act as barriers.

Crossing ID: 180

UTM: 17W 598720 / 7824251

Latitude / Longitude: 70°30'14.983" N / 78°20'56.034" W

Date / Time Surveyed: 13-Aug-07 / 21:42



Figure 1: Aerial view of area near crossing 180

Watercourse Characteristics

Tributary Status: 1st order trib of Cockburn

Channel Pattern: braided

Crossing Site

Bankfull Width: N/M

Wetted Width (m): N/M

Depth Profile (25%, 50%, 75%; m): N/M

Max. Depth (m): < 0.10

Flow Regime: persistent – intermittent

Gradient (°): high

Upstream

Wetted / Bankfull Width (m): N/M

Max. Depth (m): < 0.10

Downstream

Wetted / Bankfull Width (m): N/M

Max. Depth (m): < 0.10

Notes

Cockburn Lake is located ~800 m downstream of the crossing site.

Rail Alignment Watercourse Crossing Assessments

Crossing ID: 182

UTM: 17W 598665 / 7823373

Latitude / Longitude: 70°29'46.749" N / 78°21'5.041" W

Date / Time Surveyed: 13-Aug-07 / 21:42

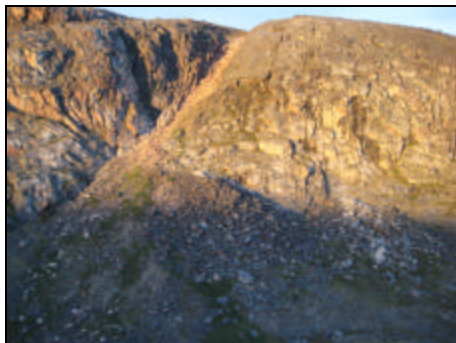


Figure 1: Aerial view of area near crossing 182

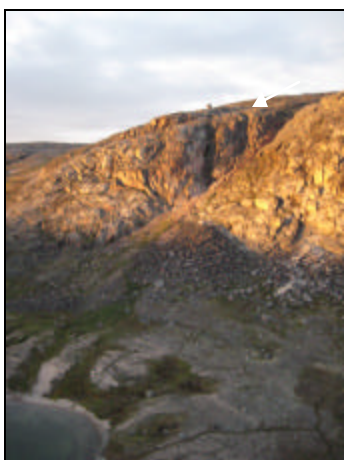


Figure 2: Another aerial view of area near crossing 182

Watercourse Characteristics

Tributary Status: 1st order trib of Cockburn

Channel Pattern: straight

Crossing Site

Bankfull Width (m): N/M
Wetted Width (m): no water or nearly none
Depth Profile (25%, 50%, 75%; m): N/A
Max. Depth (m): N/A
Flow Regime: intermittent
Gradient (°): high

Upstream

Wetted / Bankfull Width (m): no water
Max. Depth (m): N/A

Downstream

Wetted / Bankfull Width (m): Cockburn Lake
Max. Depth (m): N/A

Notes

Cockburn Lake is located ~200 m downstream of the crossing site. The steep gradient and low water upstream and downstream of the crossing act as barriers.

Crossing ID: 183

UTM: 17W 598703 / 7822764

Latitude / Longitude: 70°29'27.058" N / 78°21'3.936" W

Date / Time Surveyed: 13-Aug-07 / 21:43



Figure 1: Aerial view of area near crossing 183



Figure 2: Another aerial view of area near crossing 183

Watercourse Characteristics

Tributary Status: 1st order trib of Cockburn

Channel Pattern: braided

Crossing Site

Bankfull Width (m): N/M
Wetted Width (m): N/M
Depth Profile (25%, 50%, 75%; m): N/M
Max. Depth (m): < 0.10
Flow Regime: persistent – intermittent
Gradient (°): high

Upstream

Wetted / Bankfull Width (m): N/M
Max. Depth (m): < 0.10

Downstream

Wetted / Bankfull Width (m): Cockburn Lake
Max. Depth (m): N/A

Notes

Cockburn Lake is located ~300 m downstream of the crossing site. The steep gradient and low water upstream and downstream of the crossing act as barriers.

Rail Alignment Watercourse Crossing Assessments

Crossing ID: 184

UTM: 17W 598641 / 7822251

Latitude / Longitude: 70°29'10.603" N / 78°21'12.075" W

Date / Time Surveyed: 13-Aug-07 / 21:43



Figure 1: Aerial view of area near crossing 184

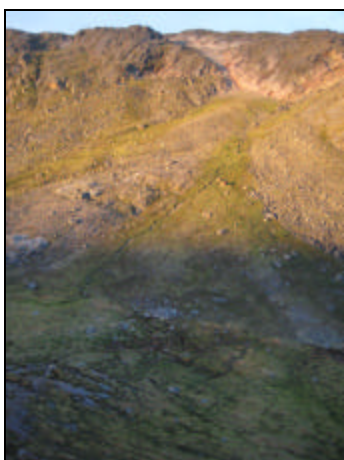


Figure 2: Another aerial view of area near crossing 184

Watercourse Characteristics

Tributary Status: 1st order trib of Cockburn

Channel Pattern: straight

Crossing Site

Bankfull Width (m): N/M

Wetted Width (m): N/M

Depth Profile (25%, 50%, 75%; m): N/M

Max. Depth (m): < 0.10

Flow Regime: persistent – intermittent

Gradient (°): high

Upstream

Wetted / Bankfull Width (m): N/M

Max. Depth (m): < 0.10

Downstream

Wetted / Bankfull Width (m): Cockburn Lake

Max. Depth (m): N/A

Notes

Cockburn Lake is located ~400 m downstream of the crossing site. The steep gradient downstream of the crossing acts as a barrier.

Crossing ID: 185

UTM: 17W 598584 / 7821841

Latitude / Longitude: 70°28'57.462" N / 78°21'19.295" W

Date / Time Surveyed: 13-Aug-07 / 21:43



Figure 1: Aerial view of area near crossing 185

Watercourse Characteristics

Tributary Status: 1st order trib of Cockburn

Channel Pattern: slightly meandering

Crossing Site

Bankfull Width (m): N/M

Wetted Width (m): no water or nearly none

Depth Profile (25%, 50%, 75%; m): N/A

Max. Depth (m): N/A

Flow Regime: intermittent

Gradient (°): high

Upstream

Wetted / Bankfull Width (m): no water

Max. Depth (m): N/A

Downstream

Wetted / Bankfull Width (m): Cockburn Lake

Max. Depth (m): N/A

Notes

Cockburn Lake is located ~300 m downstream of the crossing site. The steep gradient and low water upstream and downstream of the crossing act as barriers.

Rail Alignment Watercourse Crossing Assessments

Crossing ID: 186

UTM: 17W 598393 / 7821396

Latitude / Longitude: 70°28'43.381" N / 78°21'39.581" W

Date / Time Surveyed: 13-Aug-07 / 21:44



Figure 1: Aerial view of area near crossing 186

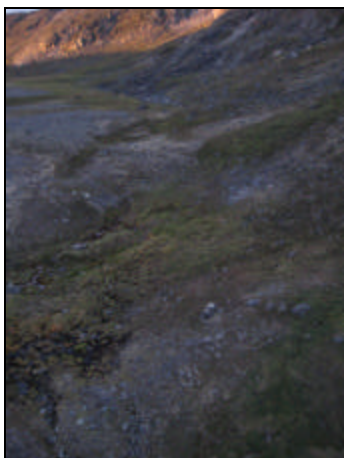


Figure 2: Another aerial view of area near crossing 186

Watercourse Characteristics

Tributary Status: 1st order trib of Cockburn

Channel Pattern: braided

Crossing Site

Bankfull Width (m): N/M

Wetted Width (m): N/M

Depth Profile (25%, 50%, 75%; m): N/M

Max. Depth (m): < 0.20

Flow Regime: persistent

Gradient (°): moderate - high

Upstream

Wetted / Bankfull Width (m): N/M

Max. Depth (m): < 0.20

Downstream

Wetted / Bankfull Width (m): Cockburn Lake

Max. Depth (m): N/A

Notes

Cockburn Lake is located ~300 m downstream of the crossing site.

Crossing ID: 188 & 189

UTM: 17W 598274 / 7820321

Latitude / Longitude: 70°28'8.883" N / 78°21'55.551" W

Date / Time Surveyed: 13-Aug-07 / 00:26

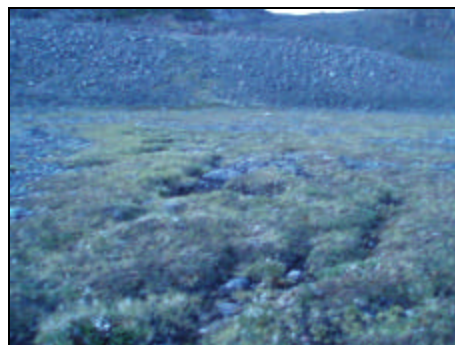


Figure 1: View upstream of crossings 188 & 189



Figure 2: View across crossings 188 & 189 from right bank



Figure 3: View downstream of crossing 188 & 189

Watercourse Characteristics

Tributary Status: 2nd order trib of Cockburn

Channel Pattern: braided

Crossing Site

Bankfull Width (m): 1.40

Wetted Width (m): no water

Depth Profile (25%, 50%, 75%; m): N/A

Max. Depth (m): N/A

Flow Regime: ephemeral

Gradient (°): 1

Upstream

Wetted / Bankfull Width (m): no water

Max. Depth (m): N/A

Downstream

Wetted / Bankfull Width (m): isolated pools

Max. Depth (m): N/M

Notes

Cockburn Lake is located ~600 m downstream of the crossing. A dry stretch between Cockburn Lake and the crossing acts as a barrier.

Rail Alignment Watercourse Crossing Assessments

Crossing ID: 190

UTM: 17W 598465 / 7819900

Latitude / Longitude: 70°27'55.040" N / 78°21'38.905" W

Date / Time Surveyed: 13-Aug-07 / 01:09



Figure 1: View upstream of crossing 190



Figure 2: View across crossing 190 from left bank



Figure 3: View downstream of crossing 190

Watercourse Characteristics

Tributary Status:	1 st order trib of Cockburn
Channel Pattern:	braided
Crossing Site	
Bankfull Width (m):	4.60
Wetted Width (m):	4.60
Depth Profile (25%, 50%, 75%; m):	0.09, 0.20, 0.15
Max. Depth (m):	0.25
Flow Regime:	persistent
Gradient (°):	1
Upstream	
Wetted / Bankfull Width (m):	4.60 / 4.60
Max. Depth (m):	0.25
Downstream	
Wetted / Bankfull Width (m):	5.00-7.00 / >100.00
Max. Depth (m):	0.15

Notes

Cockburn Lake is ~1 km downstream of the crossing site.

Crossing ID: 191A

UTM: 17W 598516 / 7819717

Latitude / Longitude: 70°27'49.067" N / 78°21'34.757" W

Date / Time Surveyed: 13-Aug-07 / 01:30



Figure 1: View upstream of crossing 191A



Figure 2: View across crossing 191A from right bank



Figure 3: View downstream of crossing 191A

Watercourse Characteristics

Tributary Status:	1 st order trib of Cockburn
Channel Pattern:	braided
Crossing Site	
Bankfull Width (m):	N/M (MSC)
Wetted Width (m):	13.30
Depth Profile (25%, 50%, 75%; m):	N/M
Max. Depth (m):	0.25
Flow Regime:	persistent
Gradient (°):	1
Upstream	
Wetted / Bankfull Width (m):	1.00 / 30.00
Max. Depth (m):	N/M
Downstream	
Wetted / Bankfull Width (m):	N/M / >100.00
Max. Depth (m):	0.15

Notes

Cockburn Lake is ~2 km downstream of the crossing site.

Rail Alignment Watercourse Crossing Assessments

Crossing ID: 191B

UTM: 17W 598534 / 7819622

Latitude / Longitude: 70°27'45.979" N / 78°21'33.420" W

Date / Time Surveyed: 13-Aug-07 / 01:50



Figure 1: View upstream of crossing 191B

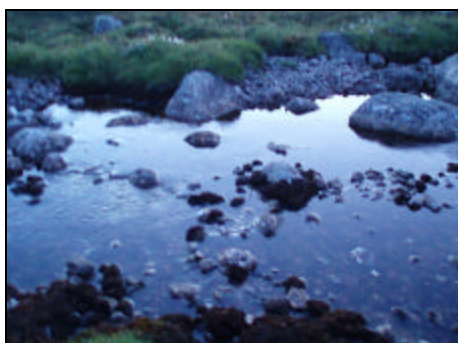


Figure 2: View across crossing 191B from right bank



Figure 3: View downstream of crossing 191B

Watercourse Characteristics

Tributary Status:	2 nd order trib of Cockburn
Channel Pattern:	straight
Crossing Site	
Bankfull Width (m):	3.90
Wetted Width (m):	3.90
Depth Profile (25%, 50%, 75%; m):	N/M
Max. Depth (m):	0.25
Flow Regime:	persistent
Gradient (°):	1
Upstream	
Wetted / Bankfull Width (m):	~1.00 / ~30.00
Max. Depth (m):	~0.25
Downstream	
Wetted / Bankfull Width (m):	N/M / >100.00
Max. Depth (m):	0.15

Notes

Cockburn Lake is ~2 km downstream of the crossing site.

Crossing ID: 191C

UTM: 17W 598546 / 7819533

Latitude / Longitude: 70°27'43.092" N / 78°21'32.637" W

Date / Time Surveyed: 13-Aug-07 / 01:56



Figure 1: View upstream of crossing 191C



Figure 2: View across crossing 191C from left bank



Figure 3: View downstream of crossing 191C

Watercourse Characteristics

Tributary Status:	2 nd order trib of Cockburn
Channel Pattern:	braided
Crossing Site	
Bankfull Width (m):	N/M (MSC)
Wetted Width (m):	2.70
Depth Profile (25%, 50%, 75%; m):	0.05, 0.10, 0.05
Max. Depth (m):	0.15
Flow Regime:	intermittent – persistent
Gradient (°):	1
Upstream	
Wetted / Bankfull Width (m):	< 2.00 / < 2.00
Max. Depth (m):	< 0.15
Downstream	
Wetted / Bankfull Width (m):	N/M
Max. Depth (m):	N/M

Notes

Cockburn Lake is ~2 km downstream of the crossing site.

Rail Alignment Watercourse Crossing Assessments

Crossing ID: 192A

UTM: 17W 598556 / 7819405

Latitude / Longitude: 70°27'38.950" N / 78°21'32.209" W

Date / Time Surveyed: 13-Aug-07 / 02:12



Figure 1: View upstream of crossing 192A



Figure 2: View across crossing 192A from left bank



Figure 3: View downstream of crossing 192A

Watercourse Characteristics

Tributary Status:	3 rd order trib of Cockburn
Channel Pattern:	sinuous
Crossing Site	
Bankfull Width (m):	22.90
Wetted Width (m):	no water
Depth Profile (25%, 50%, 75%; m):	N/A
Max. Depth (m):	N/A
Flow Regime:	ephemeral – intermittent
Gradient (°):	2
Upstream	
Wetted / Bankfull Width (m):	no water
Max. Depth (m):	N/A
Downstream	
Wetted / Bankfull Width (m):	N/M
Max. Depth (m):	N/M

Notes

Cockburn Lake is ~2 km downstream of the crossing site. A dry stretch between the crossing and Cockburn Lake acts as a barrier.

Crossing ID: 192B

UTM: 17W 598556 / 7819348

Latitude / Longitude: 70°27'37.112" N / 78°21'32.448" W

Date / Time Surveyed: 13-Aug-07 / 02:05



Figure 1: View upstream of crossing 192B



Figure 2: View across crossing 192B from left bank



Figure 3: View downstream of crossing 192B

Watercourse Characteristics

Tributary Status:	4 th order trib of Cockburn
Channel Pattern:	braided
Crossing Site	
Bankfull Width (m):	5.00
Wetted Width (m):	5.00
Depth Profile (25%, 50%, 75%; m):	N/M
Max. Depth (m):	0.20
Flow Regime:	persistent
Gradient (°):	3
Upstream	
Wetted / Bankfull Width (m):	< 5.00 / < 5.00
Max. Depth (m):	< 0.20
Downstream	
Wetted / Bankfull Width (m):	5.00-10.00 / 5.00-10.00
Max. Depth (m):	0.20-0.40

Notes

Cockburn Lake is ~2 km downstream of the crossing site.

Rail Alignment Watercourse Crossing Assessments

Crossing ID: 193

UTM: 17W 598554 / 7819244

Latitude / Longitude: 70°27'33.762" N / 78°21'33.076" W

Date / Time Surveyed: 13-Aug-07 / 01:53



Figure 1: View upstream of crossing 193



Figure 2: View across crossing 193 from right bank



Figure 3: View downstream of crossing 193

Watercourse Characteristics

Tributary Status: 2nd order trib of Cockburn

Channel Pattern: sinuous

Crossing Site

Bankfull Width(m): 15.50

Wetted Width (m): 11.90

Depth Profile (25%, 50%, 75%; m): 0.15, 0.05, 0.17

Max. Depth (m): 0.20

Flow Regime: persistent

Gradient (°): 5

Upstream

Wetted / Bankfull Width (m): 8.00-12.00 / > 10.00

Max. Depth (m): 0.15-0.30

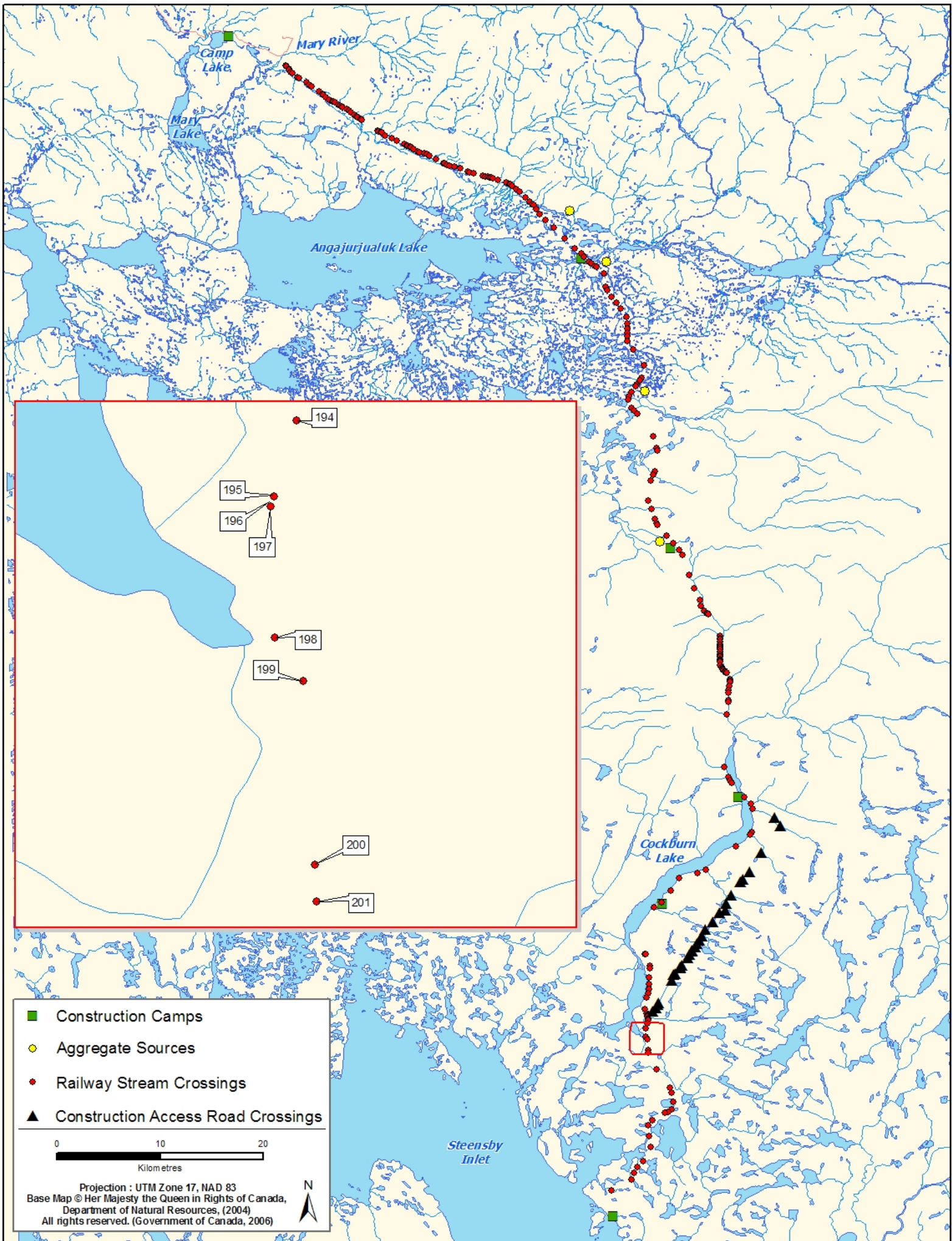
Downstream

Wetted / Bankfull Width (m): 10.00-15.00 / >10.00

Max. Depth (m): 0.20-0.50

Notes

Cockburn Lake is ~2 km downstream of the crossing site.



Rail Alignment Watercourse Crossing Assessments

Crossing ID: 194

UTM: 17W 598501 / 7818905

Latitude / Longitude: 70°27'22.905" N / 78°21'39.601" W

Date / Time Surveyed: 13-Aug-07 / 01:43



Figure 1: View upstream of crossing 194



Figure 2: View across crossing 194 from right bank



Figure 3: View downstream of crossing 194

Watercourse Characteristics

Tributary Status:	2 nd order trib of Cockburn
Channel Pattern:	meandering
Crossing Site	
Bankfull Width (m):	5.00
Wetted Width (m):	4.80
Depth Profile (25%, 50%, 75%; m):	N/M
Max. Depth (m):	0.08
Flow Regime:	persistent – intermittent
Gradient (°):	3
Upstream	
Wetted / Bankfull Width (m):	N/M
Max. Depth (m):	N/M
Downstream	
Wetted / Bankfull Width (m):	N/M
Max. Depth (m):	N/M

Notes

Cockburn Lake is ~1.5 km downstream of the crossing site. Low water and steep stretch downstream of the crossing site acts as a barrier.

Rail Alignment Watercourse Crossing Assessments

Crossing ID: 195

UTM: 17W 598370 / 7818460

Latitude / Longitude: 70°27'8.738" N / 78°21'54.078" W

Date / Time Surveyed: 13-Aug-07 / 01:35



Figure 1: View upstream of crossing 195



Figure 2: View across crossing 195 from right bank



Figure 3: View downstream of crossing 195

Watercourse Characteristics

Tributary Status:	1 st order trib of Cockburn
Channel Pattern:	slightly meandering
Crossing Site	
Bankfull Width (m):	N/M
Wetted Width (m):	11.00
Depth Profile (25%, 50%, 75%; m):	N/M
Max. Depth (m):	N/M
Flow Regime:	persistent
Gradient (°):	1
Upstream	
Wetted / Bankfull Width (m):	N/M
Max. Depth (m):	N/M
Downstream	
Wetted / Bankfull Width (m):	N/M
Max. Depth (m):	N/M

Notes

Cockburn Lake is ~800 m downstream of the crossing site. Low water between the crossing site and the lake acts as a barrier.

Crossing ID: 196 & 197

UTM: 17W 598352 / 7818400

Latitude / Longitude: 70°27'6.829" N / 78°21'56.062" W

Date / Time Surveyed: 13-Aug-07 / 01:27



Figure 1: View upstream of crossings 196 & 197

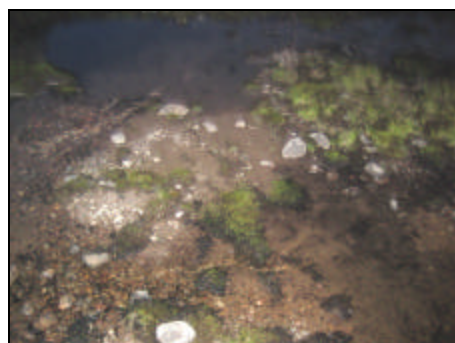


Figure 2: View across crossings 196 & 197 from left bank



Figure 3: View downstream of crossing 196 & 197

Watercourse Characteristics

Tributary Status:	1 st order trib of Cockburn
Channel Pattern:	flooded terrestrial
Crossing Site	
Bankfull Width (m):	undefined (FT)
Wetted Width (m):	2.50
Depth Profile (25%, 50%, 75%; m):	N/M
Max. Depth (m):	0.03
Flow Regime:	ephemeral – intermittent
Gradient (°):	4
Upstream	
Wetted / Bankfull Width (m):	N/M
Max. Depth (m):	N/M
Downstream	
Wetted / Bankfull Width (m):	N/M
Max. Depth (m):	N/M

Notes

Cockburn Lake is ~800 m downstream of the crossing site. A steep drop between the lake and the crossing site acts as a barrier.

Rail Alignment Watercourse Crossing Assessments

Crossing ID: 198

UTM: 17W 598373 / 7817632

Latitude / Longitude: 70°26'42.034" N / 78°21'57.246" W

Date / Time Surveyed: 13-Aug-07 / 01:10



Figure 1: View upstream of crossing 198



Figure 2: View across crossing 198 from left bank



Figure 3: View downstream of crossing 198

Watercourse Characteristics

Tributary Status:	1 st order trib of Cockburn
Channel Pattern:	sinuous
Crossing Site	
Bankfull Width (m):	0.40
Wetted Width (m):	no water
Depth Profile (25%, 50%, 75%; m):	N/A
Max. Depth (m):	N/A
Flow Regime:	N/A
Gradient (°):	10-12
Upstream	
Wetted / Bankfull Width (m):	no water
Max. Depth (m):	N/A
Downstream	
Wetted / Bankfull Width (m):	no water
Max. Depth (m):	N/A

Notes

Cockburn Lake is ~400 m downstream of the crossing site. The steep gradient downstream of the crossing site acts as a barrier.

Crossing ID: 199

UTM: 17W 598542 / 7817373

Latitude / Longitude: 70°26'33.446" N / 78°21'42.059" W

Date / Time Surveyed: 13-Aug-07 / 01:00



Figure 1: View upstream of crossing 199



Figure 2: View across crossing 199 from left bank



Figure 3: View downstream of crossing 199

Watercourse Characteristics

Tributary Status:	1 st order trib of Cockburn
Channel Pattern:	sinuous
Crossing Site	
Bankfull Width (m):	1.50
Wetted Width (m):	1.20
Depth Profile (25%, 50%, 75%; m):	N/M
Max. Depth (m):	0.05
Flow Regime:	intermittent – persistent
Gradient (°):	11
Upstream	
Wetted / Bankfull Width (m):	< 2.00 / < 2.00
Max. Depth (m):	< 0.10
Downstream	
Wetted / Bankfull Width (m):	1.00-2.00 / 1.00-2.00
Max. Depth (m):	0.10-0.20

Notes

A small, unnamed lake is ~100 m downstream and the Cockburn River is ~400 m downstream of the crossing site. Cascades between the lake and the crossing act as barriers.

Rail Alignment Watercourse Crossing Assessments

Crossing ID: 200

UTM: 17W 598611 / 7816294

Latitude / Longitude: 70°25'58.556" N / 78°21'39.928" W

Date / Time Surveyed: 13-Aug-07 / 00:44



Figure 1: View upstream of crossing 200

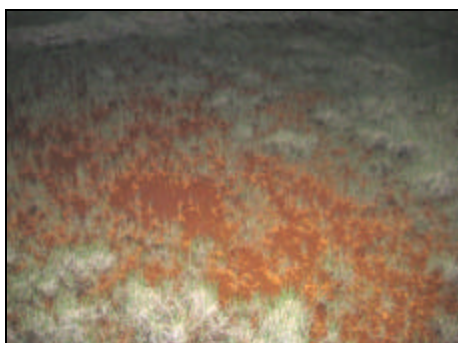


Figure 2: View across crossing 200 from right bank



Figure 3: View downstream of crossing 200

Watercourse Characteristics

Tributary Status:	3 rd order trib of large river
Channel Pattern:	flooded terrestrial
Crossing Site	
Bankfull Width (m):	22.90
Wetted Width (m):	no water
Depth Profile (25%, 50%, 75%; m):	N/A
Max. Depth (m):	N/A
Flow Regime:	ephemeral
Gradient (°):	N/M
Upstream	
Wetted / Bankfull Width (m):	no water
Max. Depth (m):	N/A
Downstream	
Wetted / Bankfull Width (m):	small lake/pond
Max. Depth (m):	N/M

Notes

The unnamed river is ~1 km downstream. There is a small lake immediately downstream of the crossing. A dry stretch between the lake and the crossing site acts as a barrier.

Crossing ID: 201

UTM: 17W 598620 / 7816078

Latitude / Longitude: 70°25'51.578" N / 78°21'39.965" W

Date / Time Surveyed: 13-Aug-07 / 00:38

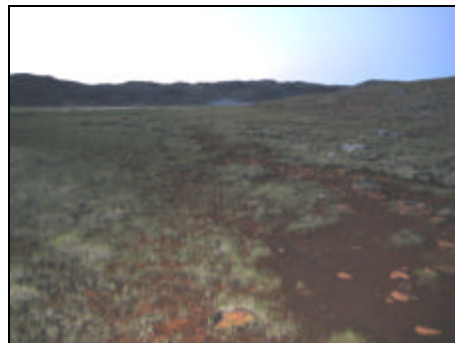


Figure 1: View upstream of crossing 201

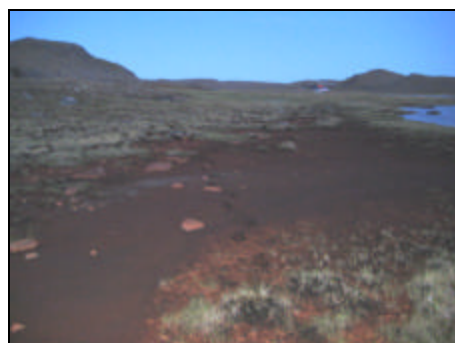


Figure 2: View across crossing 201 from left bank

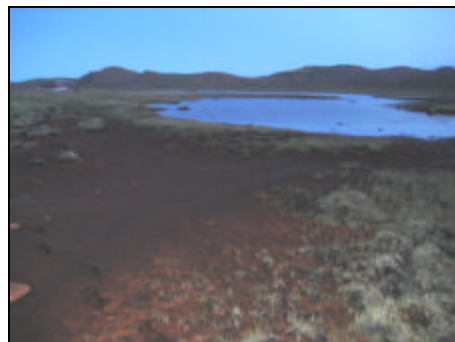


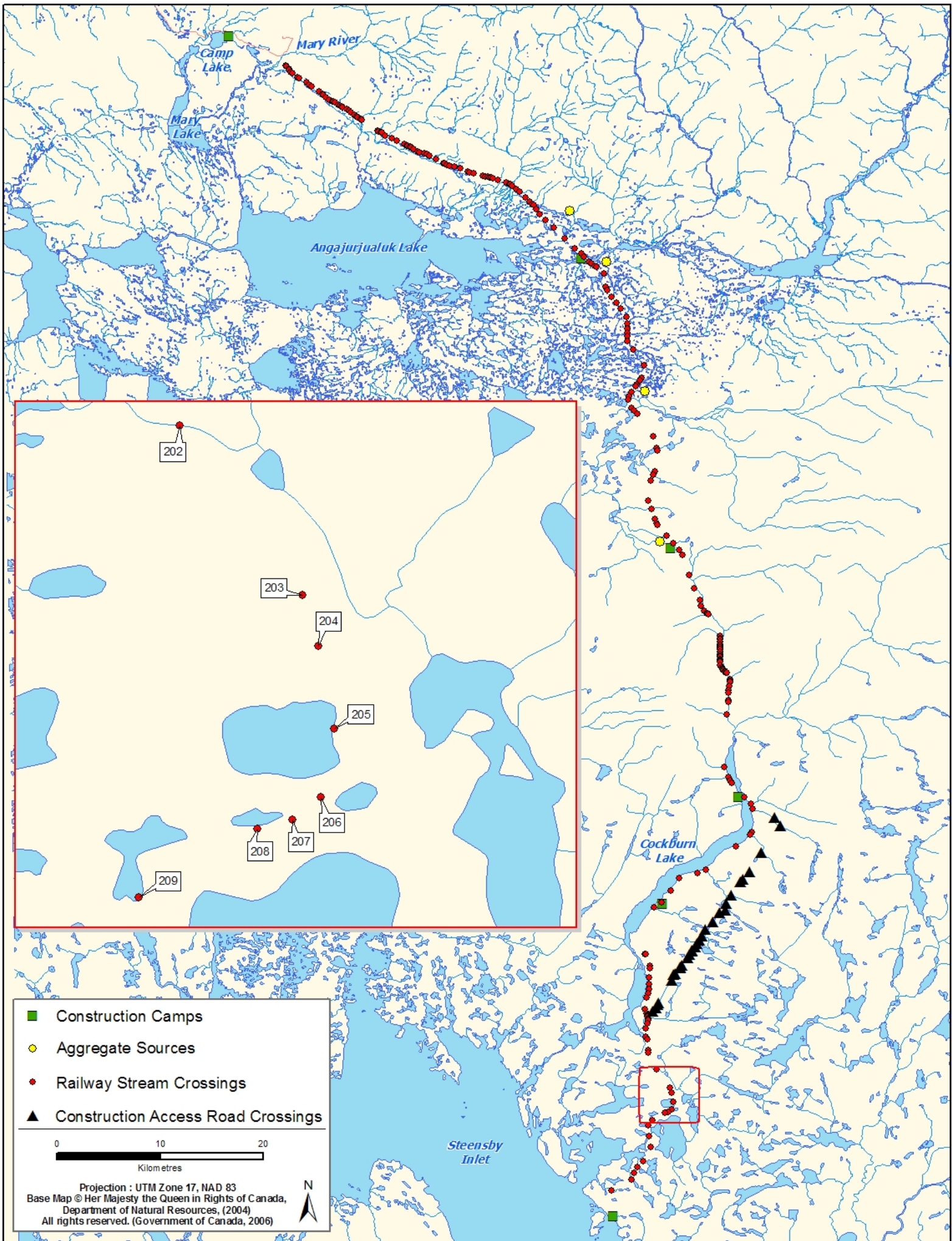
Figure 3: View downstream of crossing 201

Watercourse Characteristics

Tributary Status:	3 rd order trib of large river
Channel Pattern:	braided, flooded terrestrial
Crossing Site	
Bankfull Width (m):	20.10
Wetted Width (m):	no water
Depth Profile (25%, 50%, 75%; m):	N/A
Max. Depth (m):	N/A
Flow Regime:	ephemeral
Gradient (°):	1
Upstream	
Wetted / Bankfull Width (m):	no water
Max. Depth (m):	N/A
Downstream	
Wetted / Bankfull Width (m):	small lake/pond
Max. Depth (m):	N/M

Notes

The unnamed river is ~1 km downstream. There is a small lake immediately downstream of the crossing. A dry stretch between the lake and the crossing site acts as a barrier.



Rail Alignment Watercourse Crossing Assessments

Crossing ID: 202

UTM: 17W 599383 / 7814505

Latitude / Longitude: 70°24'59.783" N / 78°20'33.182" W

Date / Time Surveyed: 13-Aug-07 / 22:10



Figure 1: View upstream of crossing 202

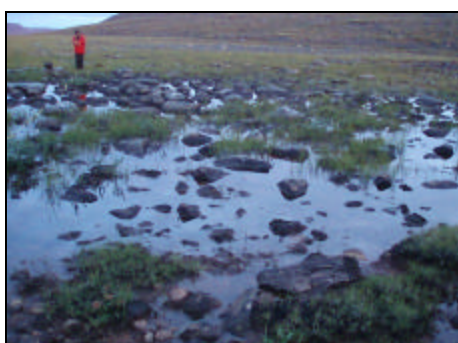


Figure 2: View across crossing 202 from right bank



Figure 3: View downstream of crossing 202

Watercourse Characteristics

Tributary Status:	1 st order trib of large river
Channel Pattern:	braided
Crossing Site	
Bankfull Width (m):	N/M (MSC)
Wetted Width (m):	21.70
Depth Profile (25%, 50%, 75%; m):	ave. depth of 0.15
Max. Depth (m):	0.40
Flow Regime:	persistent
Gradient (°):	< 1
Upstream	
Wetted / Bankfull Width (m):	small pond
Max. Depth (m):	< 2.00
Downstream	
Wetted / Bankfull Width (m):	4.0 / N/M
Max. Depth (m):	N/M

Notes

The unnamed river is ~1 km downstream. There is a small lake immediately downstream of the crossing.

Crossing ID: 203

UTM: 17W 600672 / 7812732

Latitude / Longitude: 70°24'0.784" N / 78°18'36.815" W

Date / Time Surveyed: 13-Aug-07 / 21:57



Figure 1: View upstream of crossing 203



Figure 2: View across crossing 203 from right bank



Figure 3: View downstream of crossing 203

Watercourse Characteristics

Tributary Status:	1 st order trib of large lake
Channel Pattern:	flooded terrestrial (oily)
Crossing Site	
Bankfull Width (m):	undefined (FT)
Wetted Width (m):	N/M
Depth Profile (25%, 50%, 75%; m):	N/M
Max. Depth (m):	0.05
Flow Regime:	ephemeral – persistent
Gradient (°):	1
Upstream	
Wetted / Bankfull Width (m):	undefined
Max. Depth (m):	< 0.10
Downstream	
Wetted / Bankfull Width (m):	undefined
Max. Depth (m):	< 0.10

Notes

The large, unnamed lake is ~1 km downstream. Low water downstream of the crossing site acts as a barrier.

Rail Alignment Watercourse Crossing Assessments

Crossing ID: 204

UTM: 17W 600838 / 7812200

Latitude / Longitude: 70°23'43.392" N / 78°18'23.135" W

Date / Time Surveyed: 13-Aug-07 / 22:09



Figure 1: View upstream of crossing 204



Figure 2: View across crossing 204 from left bank

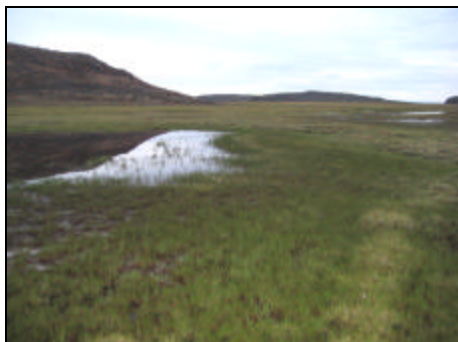


Figure 3: View downstream of crossing 204

Watercourse Characteristics

Tributary Status: 1st order trib of large lake

Channel Pattern: flooded terrestrial

Crossing Site

Bankfull Width (m): undefined (FT)

Wetted Width (m): 34.70

Depth Profile (25%, 50%, 75%; m): N/M

Max. Depth (m): 0.10

Flow Regime: ephemeral – persistent

Gradient (°): 1

Upstream

Wetted / Bankfull Width (m): undefined

Max. Depth (m): < 0.15

Downstream

Wetted / Bankfull Width (m): small lake

Max. Depth (m): N/A

Notes

There is a small lake downstream, and the large lake is ~500m downstream. Low water downstream of the crossing site acts as a barrier.

Crossing ID: 205

UTM: 17W 601003 / 7811332

Latitude / Longitude: 70°23'15.168" N / 78°18'10.989" W

Date / Time Surveyed: 13-Aug-07 / 22:36



Figure 1: View upstream of crossing 205



Figure 2: View across crossing 205 from right bank



Figure 3: View downstream of crossing 205

Watercourse Characteristics

Tributary Status: 2nd order trib of large lake

Channel Pattern: braided

Crossing Site

Bankfull Width (m): 1.00

Wetted Width (m): no water

Depth Profile (25%, 50%, 75%; m): N/A

Max. Depth (m): N/A

Flow Regime: intermittent

Gradient (°): 8

Upstream

Wetted / Bankfull Width (m): no water

Max. Depth (m): N/A

Downstream

Wetted / Bankfull Width (m): small lake

Max. Depth (m): N/A

Notes

The large, unnamed lake is ~1.5 km downstream. There is a lake immediately downstream of the crossing site. Low water between the lake and the crossing acts as a barrier.

Rail Alignment Watercourse Crossing Assessments

Crossing ID: 206

UTM: 17W 600856 / 7810619

Latitude / Longitude: 70°22'52.387" N / 78°18'28.131" W

Date / Time Surveyed: 13-Aug-07 / 22:24



Figure 1: View upstream of crossing 206



Figure 2: View across crossing 206 from left bank



Figure 3: View downstream of crossing 206

Watercourse Characteristics

Tributary Status:	2 nd order trib of large lake
Channel Pattern:	undefined
Crossing Site	
Bankfull Width (m):	N/M
Wetted Width (m):	no water
Depth Profile (25%, 50%, 75%; m):	N/A
Max. Depth (m):	N/A
Flow Regime:	ephemeral
Gradient (°):	N/M
Upstream	
Wetted / Bankfull Width (m):	no water
Max. Depth (m):	N/A
Downstream	
Wetted / Bankfull Width (m):	no water
Max. Depth (m):	N/A

Notes

The large, unnamed lake is ~500 m downstream. There is also a lake immediately downstream of the crossing site. A dry stretch between the lake and the crossing acts as a barrier.

Crossing ID: 207

UTM: 17W 600565 / 7810381

Latitude / Longitude: 70°22'45.128" N / 78°18'57.065" W

Date / Time Surveyed: 13-Aug-07 / 22:45



Figure 1: View upstream of crossing 207



Figure 2: View across crossing 207 from left bank



Figure 3: View downstream of crossing 207

Watercourse Characteristics

Tributary Status:	3 rd order trib of large lake
Channel Pattern:	braided
Crossing Site	
Bankfull Width (m):	N/M (MSC)
Wetted Width (m):	isolated pools
Depth Profile (25%, 50%, 75%; m):	N/A
Max. Depth (m):	N/M
Flow Regime:	ephemeral
Gradient (°):	1
Upstream	
Wetted / Bankfull Width (m):	isolated pools
Max. Depth (m):	N/M
Downstream	
Wetted / Bankfull Width (m):	no water
Max. Depth (m):	N/A

Notes

The large, unnamed lake is ~500 m downstream. Low water between the lake and the crossing acts as a barrier.

Rail Alignment Watercourse Crossing Assessments

Crossing ID: 208

UTM: 17W 600196 / 7810282

Latitude / Longitude: 70°22'42.460" N / 78°19'32.890" W

Date / Time Surveyed: 13-Aug-07 / 23:02



Figure 1: View upstream of crossing 208



Figure 2: View across crossing 208



Figure 3: View downstream of crossing 208

Watercourse Characteristics

Tributary Status:	3 rd order trib of large lake
Channel Pattern:	undefined
Crossing Site	
Bankfull Width (m):	undefined
Wetted Width (m):	no water
Depth Profile(25%, 50%, 75%; m):	N/A
Max. Depth (m):	N/A
Flow Regime:	ephemeral
Gradient (°):	N/M
Upstream	
Wetted / Bankfull Width (m):	no water
Max. Depth (m):	N/A
Downstream	
Wetted / Bankfull Width (m):	no water
Max. Depth (m):	N/A

Notes

The lake is ~1 km downstream. There is a small lake ~100 m downstream of the crossing site. A dry stretch between the lake and the crossing acts as a barrier.

Crossing ID: 209

UTM: 17W 598959 / 7809568

Latitude / Longitude: 70°22'21.180" N / 78°21'34.561" W

Date / Time Surveyed: 13-Aug-07 / 22:53



Figure 1: View upstream of crossing 209



Figure 2: View across crossing 209 from right bank

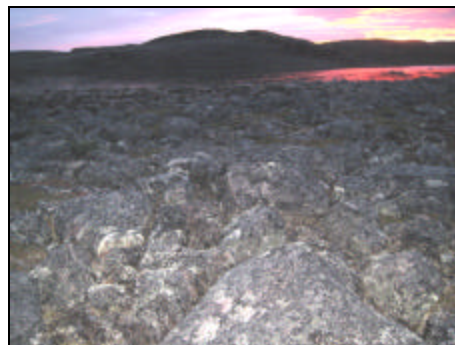


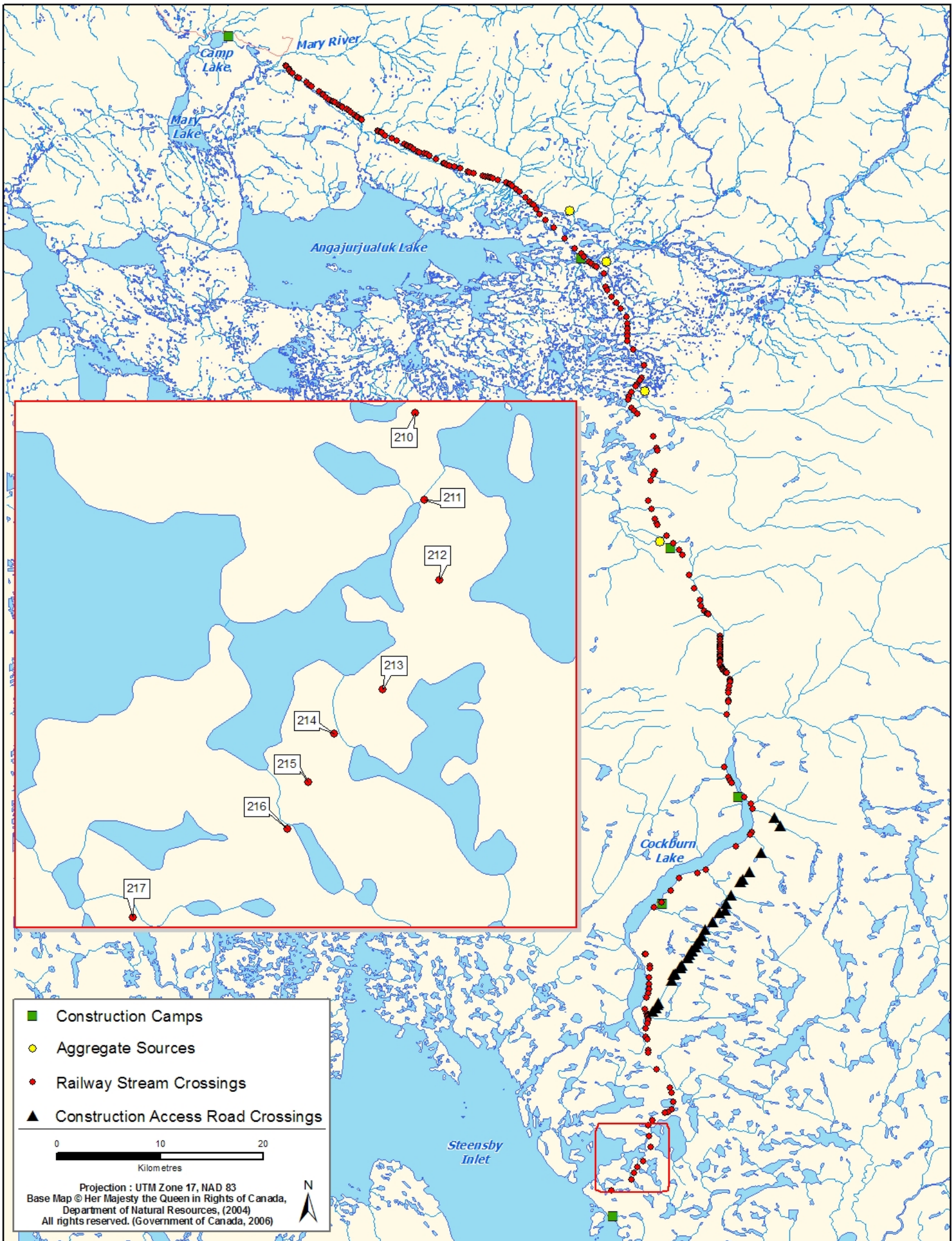
Figure 3: View downstream of crossing 209

Watercourse Characteristics

Tributary Status:	1 st order trib of large lake
Channel Pattern:	undefined
Crossing Site	
Bankfull Width (m):	undefined (rock field)
Wetted Width (m):	no water
Depth Profile (25%, 50%, 75%; m):	N/A
Max. Depth (m):	N/A
Flow Regime:	ephemeral
Gradient (°):	1
Upstream	
Wetted / Bankfull Width (m):	no water
Max. Depth (m):	N/A
Downstream	
Wetted / Bankfull Width (m):	no water
Max. Depth (m):	N/A

Notes

The lake is ~600 m downstream. A dry stretch between the lake and the crossing acts as a barrier.



Rail Alignment Watercourse Crossing Assessments

Crossing ID: 210

UTM: 17W 598552 / 7809073

Latitude / Longitude: 70°22'5.787" N / 78°22'15.657" W

Date / Time Surveyed: 13-Aug-07 / 23:09



Figure 1: View upstream of crossing 210



Figure 2: View across crossing 210 from right bank



Figure 3: View downstream of crossing 210

Watercourse Characteristics

Tributary Status: 1st order trib of large lake

Channel Pattern: flooded terrestrial

Crossing Site

Bankfull Width (m): undefined (FT)

Wetted Width (m): 0.30

Depth Profile (25%, 50%, 75%; m): N/M

Max. Depth (m): 0.02

Flow Regime: ephemeral – intermittent

Gradient (°): 3

Upstream

Wetted / Bankfull Width (m): undefined

Max. Depth (m): < 0.05

Downstream

Wetted / Bankfull Width (m): large lake

Max. Depth (m): N/A

Notes

The large, unnamed lake is ~300 m downstream. Low water downstream of the crossing site acts as a barrier.

Crossing ID: 211

UTM: 17W 598663 / 7807981

Latitude / Longitude: 70°21'30.419" N / 78°22'9.543" W

Date / Time Surveyed: 13-Aug-07 / 23:26



Figure 1: View upstream of crossing 211



Figure 2: View across crossing 211 from right bank



Figure 3: View downstream of crossing 211

Watercourse Characteristics

Tributary Status: 1st order trib of inlet

Channel Pattern: straight

Crossing Site

Bankfull Width (m): undefined (no banks)

Wetted Width (m): 105.20

Depth Profile (25%, 50%, 75%; m): average depth 0.20

Max. Depth (m): ~0.50

Flow Regime: persistent

Gradient (°): 1.5

Upstream

Wetted / Bankfull Width (m): small unnamed lake

Max. Depth (m): N/A

Downstream

Wetted / Bankfull Width (m): small unnamed lake

Max. Depth (m): N/A

Notes

Steensby Inlet is ~1 km downstream. A small, unnamed lake is between the crossing and Steensby Inlet.

Rail Alignment Watercourse Crossing Assessments

Crossing ID: 212

UTM: 17W 598855 / 7806964

Latitude / Longitude: 70°20'57.356" N / 78°21'55.363" W

Date / Time Surveyed: 13-Aug-07 / 23:37



Figure 1: View upstream of crossing 212



Figure 2: View across crossing 212 from right bank



Figure 3: View downstream of crossing 212

Watercourse Characteristics

Tributary Status: 1st order trib of inlet

Channel Pattern: flooded terrestrial

Crossing Site

Bankfull Width (m): undefined (FT)

Wetted Width (m): N/M (nearly dry)

Depth Profile (25%, 50%, 75%; m): N/A

Max. Depth (m): N/M

Flow Regime: ephemeral

Gradient (°): N/M

Upstream

Wetted / Bankfull Width (m): undefined

Max. Depth (m): N/M

Downstream

Wetted / Bankfull Width (m): small, unnamed lake

Max. Depth (m): N/A

Notes

Steensby Inlet is ~800 m downstream. A small, unnamed lake is between the crossing and Steensby Inlet. Low water between the inlet and the crossing acts as a barrier.

Crossing ID: 213

UTM: 17W 598138 / 7805588

Latitude / Longitude: 70°20'13.982" N / 78°23'9.733" W

Date / Time Surveyed: 13-Aug-07 / 23:51



Figure 1: View upstream of crossing 213



Figure 2: View across crossing 213 from right bank



Figure 3: View downstream of crossing 213

Watercourse Characteristics

Tributary Status: 1st order trib of inlet

Channel Pattern: braided

Crossing Site

Bankfull Width (m): 0.50

Wetted Width (m): 0.10

Depth Profile (25%, 50%, 75%; m): N/A

Max. Depth (m): 0.02

Flow Regime: intermittent – persistent

Gradient (°): 3

Upstream

Wetted / Bankfull Width (m): < 0.10 / < 0.50

Max. Depth (m): < 0.05

Downstream

Wetted / Bankfull Width (m): ~ 0.10 / ~0.50

Max. Depth (m): ~0.05

Notes

Steensby Inlet is ~500 m downstream. Low water between the inlet and the crossing acts as a barrier.

Rail Alignment Watercourse Crossing Assessments

Crossing ID: 214

UTM: 17W 597527 / 7805030

Latitude / Longitude: 70°19' 56.833" N / 78°24' 10.528" W

Date / Time Surveyed: 14-Aug-07 / 00:05



Figure 1: View upstream of crossing 214

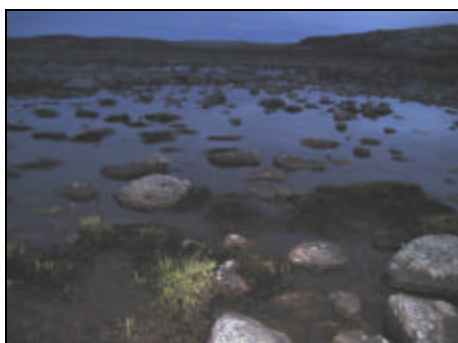


Figure 2: View across crossing 214 from right bank

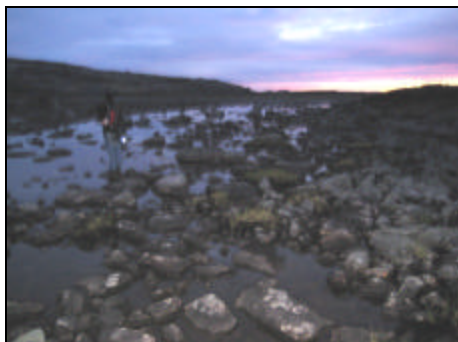


Figure 3: View downstream of crossing 214

Watercourse Characteristics

Tributary Status: 1st order trib of inlet

Channel Pattern: pond

Crossing Site

Bankfull Width (m): undefined

Wetted Width (m): 107.90

Depth Profile (25%, 50%, 75%; m): N/M

Max. Depth (m): 0.34

Flow Regime: N/A

Gradient (°): 1

Upstream

Wetted / Bankfull Width (m): undefined

Max. Depth (m): N/M

Downstream

Wetted / Bankfull Width (m): N/M

Max. Depth (m): N/M

Notes

Steensby Inlet is ~800 m downstream. There is a lake upstream of the crossing site.

Crossing ID: 215

UTM: 17W 597201 / 7804426

Latitude / Longitude: 70°19' 37.803" N / 78°24' 44.201" W

Date / Time Surveyed: 13-Aug-07 / 23:50

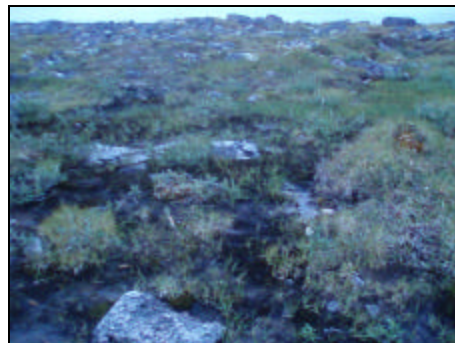


Figure 1: View upstream of crossing 215

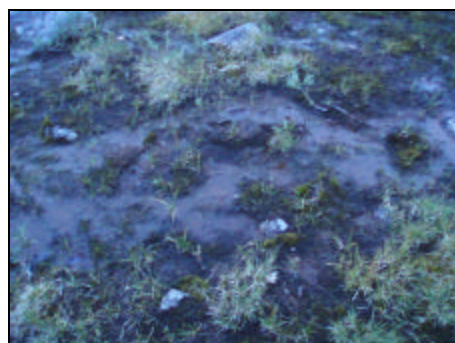


Figure 2: View across crossing 215 from right bank



Figure 3: View downstream of crossing 215

Watercourse Characteristics

Tributary Status: 2nd order trib of inlet

Channel Pattern: braided

Crossing Site

Bankfull Width (m): undefined (FT)

Wetted Width (m): nearly dry

Depth Profile (25%, 50%, 75%; m): N/A

Max. Depth (m): N/M

Flow Regime: ephemeral

Gradient (°): 4

Upstream

Wetted / Bankfull Width (m): no water

Max. Depth (m): N/A

Downstream

Wetted / Bankfull Width (m): flooded terrestrial

Max. Depth (m): N/M

Notes

Steensby Inlet is ~700 m downstream. There is a lake upstream of the crossing site. Low water upstream and downstream of the crossing site acts as a barrier.

Rail Alignment Watercourse Crossing Assessments

Crossing ID: 216

UTM: 17W 596936 / 7803830

Latitude / Longitude: 70°19'18.947" N / 78°25'11.986" W

Date / Time Surveyed: 14-Aug-07 / 00:14



Figure 1: View upstream of crossing 216



Figure 2: View across crossing 216 from right bank

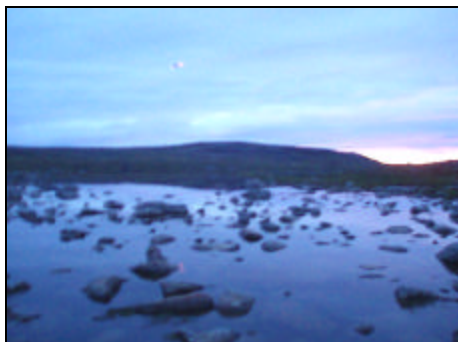


Figure 3: View downstream of crossing 216

Watercourse Characteristics

Tributary Status:	1 st order trib of inlet
Channel Pattern:	straight
Crossing Site	
Bankfull Width (m):	~20.00
Wetted Width (m):	14.60
Depth Profile (25%, 50%, 75%; m):	0.15, 0.20, 0.05
Max. Depth (m):	0.25
Flow Regime:	persistent
Gradient (°):	>1
Upstream	
Wetted / Bankfull Width (m):	small unnamed lake
Max. Depth (m):	N/A
Downstream	
Wetted / Bankfull Width (m):	small unnamed lake
Max. Depth (m):	N/A

Notes

Steensby Inlet is ~1 km downstream. There are lakes upstream and downstream of the crossing site.

Crossing ID: 217

UTM: 17W 594998 / 7802718

Latitude / Longitude: 70°18'45.710" N / 78°28'21.871" W

Date / Time Surveyed: 14-Aug-07 / 00:33



Figure 1: View upstream of crossing 217



Figure 2: View across crossing 217 from right bank



Figure 3: View downstream of crossing 217

Watercourse Characteristics

Tributary Status:	1 st order trib of inlet
Channel Pattern:	sinuous
Crossing Site	
Bankfull Width (m):	10.00
Wetted Width (m):	5.50
Depth Profile (25%, 50%, 75%; m):	N/M
Max. Depth (m):	0.10
Flow Regime:	persistent
Gradient (°):	1
Upstream	
Wetted / Bankfull Width (m):	N/M
Max. Depth (m):	N/M
Downstream	
Wetted / Bankfull Width (m):	small lake
Max. Depth (m):	N/A

Notes

Steensby Inlet is ~1.5 km downstream. There are lakes upstream and downstream of the crossing site.