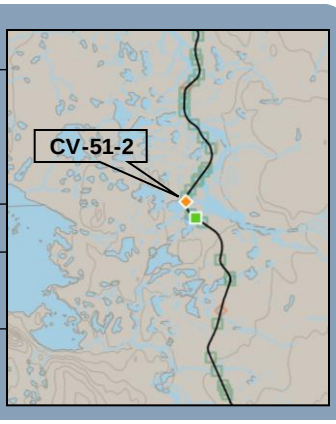
Mary River Iron Mine
Nunavut Water Board Water License
Application Section 9
Representative Crossing Summary Sheet

CV-51-2

Zone: 17W
Easting: 596622
Northing: 7879337
Station: 51+648

Fish Habitat	Marginal fish habitat
Structure Design	No. Spans: 3 Span Lengths: 15m-30m-30m Bridge Type: Through Plate Girder (TPG) Slope: 0.01%
Drainage Area	6.84 km^2
Design Flow	10 yr 3 day delay = 1.73 m^3/s 200-yr = 15.88 m^3/s
Downstream Velocity	10 yr 3 day delay = 0.31 m/s 200 yr = 0.68 m/s



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November 8/2011
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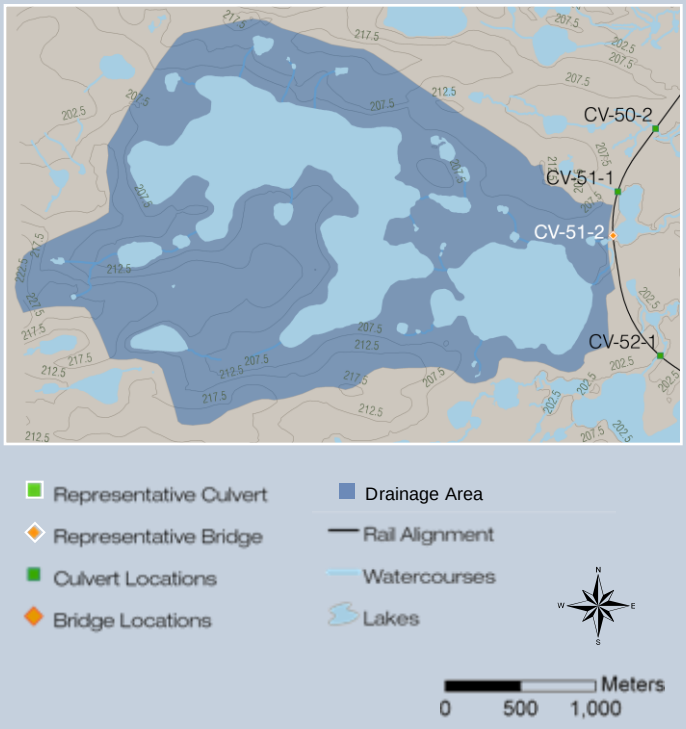
Description of Crossing Structure

The representative bridge CV-51-2 is located north-east of the Mid-rail Camp Lake. CV-51-2 consists of a three span structure utilizing steel girders with spans of 15-30-30 meters. Precast concrete abutments and pier caps support the superstructure. The bridge carries the railway over a low flow watercourse connecting two adjacent water bodies. The natural channelization of the watercourse is in direct conflict with the proposed rail alignment. After exhaustive attempts to realign or relocate the rail alignment, the crossing site selected represents the minimum impact to the area, avoiding significant in-filling of either of the water bodies or other watercourses. As a result of the final alignment, the natural channelization requires an engineered relocation/re-orientation to direct flow between pier supports.



Crossing Construction

The crossing utilizes a 3 span structure. While construction of the bridge structure is likely to be undertaken anytime, it may be preferred to initiate the engineered channel relocation during frozen conditions in order to minimize sediment generation. The new watercourse channel will be constructed to approximate natural occurring stream bed width and depth as well as bottom and bank characteristics. Construction of the foundation for the structure will involve the drilling or driving of piles into the permafrost for each of the abutments. Similar activities will be required for construction of the piers. Drilling spoils, if required, will be collected and either removed from the site or used for the railway embankment construction. No excavation of native material is anticipated for the piers or abutments. Pre-cast concrete abutments will be placed and secured over piles and steel girders will be placed onto the secure abutments. Silt fencing will be placed to prevent sediment from entering the watercourse throughout construction.

Anticipated machinery required for the construction includes trucks, crane, backhoe (for spoils removal), pile rig and cementitous mixers. Materials and machinery will be transported to and from the site on an access road or on the rail alignment. All construction activity will be restricted to the area within the identified construction right-of-way zone.

Temporary crossing of the watercourse will be required and will utilize snow fill or ice bridge in accordance with applicable DFO, Nunavut Operation Statement. The temporary watercourse crossing will remain in place during frozen conditions and will be rebuilt each winter. The temporary crossing will not impact water flow as it will be removed prior to the spring melt.

DILLON CONSULTING

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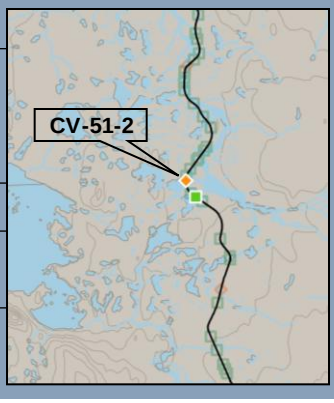

Site Photos

1

2

3

Photo 1 is an aerial image looking upstream of the crossing area. Photo 2 is looking upstream from the approximate crossing location, while Photo 3 was taken 20m downstream of the crossing.

Existing Conditions at Crossing Site

The surrounding area is flat and pockmarked with lakes. The channel here is braided upstream, but narrows to a single channel before it discharges to the downstream lake. The substrate is organic muck, but the bottom of the downstream lake is sand. The sand is found in the channel just upstream of the lake. It is possible that some of it has been deposited through wave action. The entire area of the crossing was flooded at the time of the field visit. Field observations suggest high water was approximated 15 cm than levels observed. The channel at the approximate crossing is 2 – 3 m wide, and 0.8-1m deep. The velocity was noticeable but laminar. There is no sign of erosion.

Navigability	Not navigable	
Width and Depth	Bankfull width = undefined (flooded/terrestrial) Wetted width = 2.3 m Maximum Depth = 0.18 m	
Substrate and Vegetation	The channel has cobbled and fines substrate. Channel Morphology (20m downstream): 50% Riffle, 50% Pool (<0.2m) Substrate Composition: 95% fines, 5% cobble Stream Cover: none	
Channel Meander Pattern	Floodplain Width (m): > 183 Channel Pattern: Meandering, forked Channel Confinement: Unconfined Channel Gradient: almost 0	Bank Height (L/R; m): 0 – 0.1 Bank Shape (L/R): 10% UC, 90% Undefined-Flooded Bank Stability: not applicable
Fish Habitat	Fish habitat is marginal. Many adult and young-of-the-year Ninespine Stickeback observed during a 2007 assessment of this site, suggesting at least occasional use by both species. The downstream lake connects to a large downstream river, allowing extensive fish movement in the area.	

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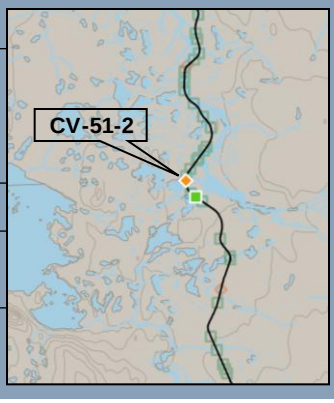

Predicted Environmental Impact	Proposed Mitigation
Direct loss of fish habitat from structure installation.	• If construction of the bridge crossings is determined to result in a Harmful Alteration, Disruption or Destruction (HADD) of fish habitat, DFO will determine appropriate measures to ensure "no net loss" • Watercourse channel will be restored to the original stream flow characteristics.
Potential for fish stranding or mortality during construction	• As no Arctic Char spawning habitat is present, construction can occur during winter season when watercourses are typically dry or frozen to bottom to avoid impacts to fish passage. • Temporary crossings required to work from an opposite bank will employ ice bridges or snow fills as conditions allow. • Temporary crossing culvert (if required) will be monitored for blockages and cleaned when necessary. This will ensure passage of juvenile and adult fish • The withdrawal of any water will not exceed 10 % of the instantaneous flow, in order to maintain existing fish habitat. • The watercourse will be checked regularly for eggs, juveniles, and adult fish through the section intersected by the crossing. Any stranded fish will be rescued. Banks should be monitored during the draw down period especially.
Potential for barriers to fish passage	• Meet DFO requirements for fish passage. • Following construction of the crossing and where it is safe to do so, a v-notch in the centre of the ice bridge will be created to allow it to melt from the centre and also to prevent blocking fish passage, channel erosion and flooding. Compacted snow will be removed from snow fills prior to the spring freshet.
Potential for loss of riparian habitat within the footprint	• Restoration of riparian habitat and provision of culvert pools as required.
Sediment effects and degradation of water quality due to sediment or other contaminants, both at the crossing and downstream	• Construction will follow practices outlined in the Section 9.6 and Project EMS (DEIS, Vol. 10) • Timing of works in and adjacent to watercourses during winter window to avoid potential impacts to water quality and potential fish habitat.
Damage to stream banks from construction equipment increases the potential for erosion	• Operate machinery on land (above the HWM) and in a manner that minimizes disturbance to the banks of the watercourse. • Install effective sediment and erosion control measures before starting work to prevent the entry of sediment into the watercourse. Inspect them regularly during the course of construction and make all necessary repairs if any damage occurs. • Banks and substrate will be restored to pre-construction condition.
Removal of vegetation at crossing locations.	• This removal should be kept to a minimum and within the right-of-way. • Approaches will be designed and constructed so that they are perpendicular to the watercourse to minimize loss or disturbance to riparian vegetation. • Any disturbed areas will be vegetated by planting and seeding native species and areas with be covered by mulch to prevent erosion and to help seeds germinate. The site will be maintained until it has been stabilized by vegetation.
Direct or indirect impact from blasting.	• If blasting is required near watercourse, DFO Blasting Guidelines (Wright and Hopky) will be met where possible.
Potential for spills of fuel or other fluid from construction vehicles	• Adhere to contingency plans identified in the project EMS (DEIS, Volume 10). • Machinery is to arrive on site in a clean condition and is to be maintained free of fluid leaks. • Wash, refuel and service machinery and store fuel and other materials for the machinery away from the water to prevent any deleterious substance from entering the water. • Keep an emergency spill kit on site in case of fluid leaks or spills from machinery. • Use snow berms (if possible) to prevent deleterious substances from entering the watercourse.
Solid waste could foul the local environment and attract scavengers	• Solid waste generated at the crossing site will be removed from the site and disposed of in accordance with applicable Nunavut regulations.