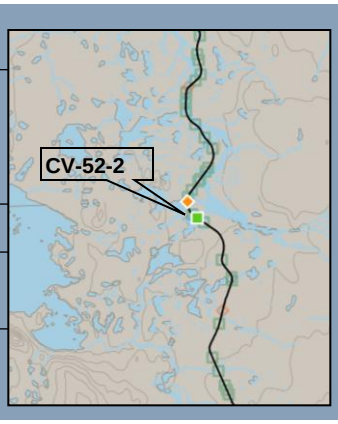
Mary River Iron Mine
Nunavut Water Board Water License
Application Section 9
Representative Crossing Summary Sheet

CV-52-2

Zone: 17W
Easting: 597273
Northing: 7878345
Station: 52+915

Fish Habitat	Important fish habitat
Structure Design	No. Barrels: 4 Diameter: 3m Length: 40m Slope: 0%
Drainage Area	7.3 km^2
Design Flow	10 yr 3 day delay = 1.82 m^3/s 200-yr = 19.8 m^3/s
Velocity per Barrel	10 yr 3 day delay = 0.61 m/s 200 yr = 1.01 m/s



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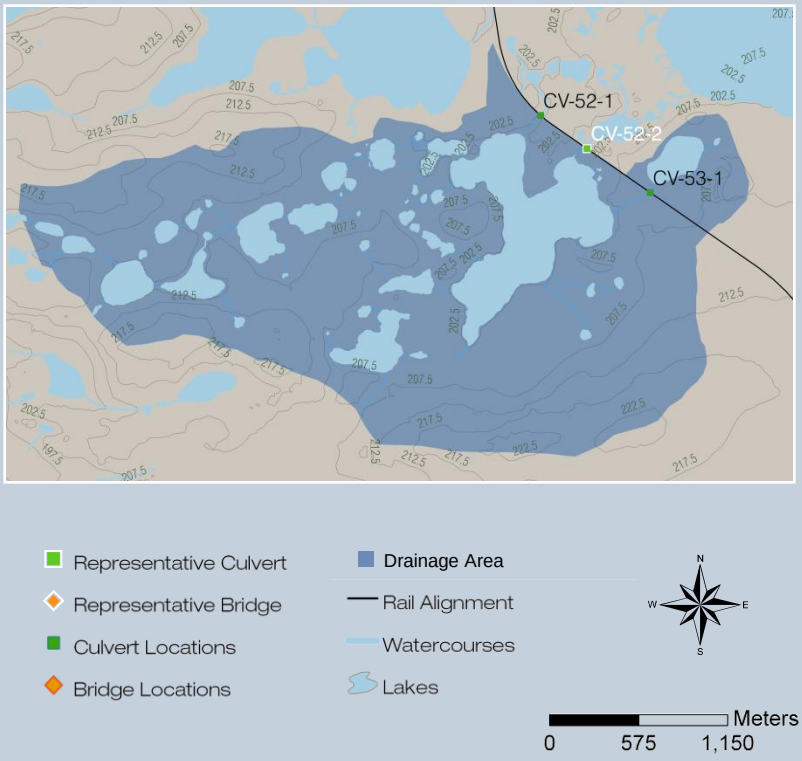
Description of Crossing Structure

The representative culvert CV-52-2 is located approximately 2.5 km northeast of the proposed Mid Rail camp location. CV-52-2 will use four 3 m diameter culverts and the total crossing length is approximately 40 m. The rail culvert crossing will be completely isolated from the access road culvert. The embankment slopes will be 1:2 with 4.9 m of fill over the culvert invert and projected settlement of 25 years is 0.1 m The culvert gradient will match the channel gradient of 0%



Crossing Construction

Machinery to be used for the construction includes trucks, crane, and backhoe (for spoils removal. Materials and machinery will be transported to and from the site on an access road or on the rail alignment.

Crossing construction will occur in frozen conditions and thus there will be no water flow during construction and fish passage will not be interrupted Temporary crossing of the watercourse will be required and will be constructed using a snow fill or ice bridge in accordance with applicable DFO Nunavut Operation Statement. The temporary watercourse crossing will remain in place for the duration of the culvert construction only and will be removed as soon as possible The temporary crossing will not impact water flow as it will be removed prior to the spring melt.

DILLON CONSULTING

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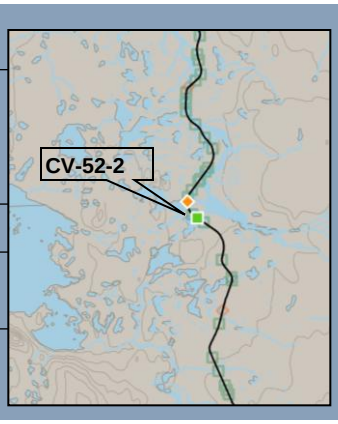

Site Photos

1

2

3

Photo 1 is an aerial view of the crossing area; Photo 2 is taken on the ground near the crossing area. Photo 3 is a photo looking at the streambed at the crossing location.

Existing Conditions at Crossing Site

The stream at crossing CV-52-2 is a single sinuous channel that connects two lakes. The surrounding terrain is relatively flat and characterized by numerous lakes and large ponds. The substrate of the channel through CV-52-2 is composed entirely of fines. CV-52-2 was assessed as marginal to important fish habitat potential; it has low to moderate potential for Arctic char for rearing and migration, respectively and moderate spawning and migration potential and high rearing potential for ninespine stickleback.

Navigability	Navigable	
Width and Depth	Bankfull width = 1.7 m Wetted width = 1.2 m Maximum Depth = 0.04 m	
Substrate and Vegetation	Channel Morphology: 80% Pool, 20% Riffle Substrate Composition: 70% sand, 30% small cobble Stream Cover: None	
Channel Meander Pattern	Floodplain Width (m): > 200 m Channel Pattern: sinuous Channel Confinement: Unconfined Channel Gradient: <0.25o	Bank Height (L/R; m): 0.40/0.40 Bank Shape (L/R): 5% undercut/25% undefined-flooded Bank Stability: low
Fish Habitat	The stream at the crossing site connects two large ponds that may contain fish. Water levels in the stream are very low, but ninespine stickleback may inhabit the crossing site during the spring when water levels are higher.	

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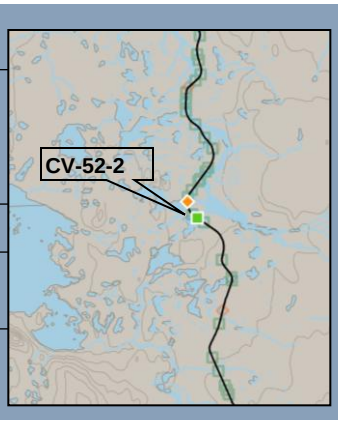

Predicted Environmental Impact	Proposed Mitigation
Direct loss of fish habitat from structure installation.	• If construction of the culvert crossings is determined to result in a Harmful Alteration, Disruption or Destruction (HADD) of fish habitat, DFO will determine appropriate measures to ensure "no 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. • Culvert will be monitored for blockages and cleaned when necessary. This will ensure passage of juvenile and adult fish • If construction occurs during open water season, withdrawal of any water will not exceed 10 % of the instantaneous flow, in order to maintain existing fish habitat
Potential for barriers to fish passage Long culverts (e.g. > 50 m) may impede fish passage due to the lack of light inside the culvert.	• Meet DFO requirements for fish passage in culvert design • The contractor will work with DFO to indentify means of providing as much light as possible in long culverts.
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 habitat (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 trees, shrubs or grasses and areas with be covered by mulch to prevent erosion and to help seeds germinate. The site will be maintained until site is 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 (i.e. polar bears)	• Solid waste generated at the crossing site will be removed from the site and disposed of in accordance with applicable Nunavut regulations