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Building Nunavut Together
Nunavuliuqatigiingniq
Bâtir le Nunavut ensemble

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Department of Community and Government Services
Nunalingni Kavamatkunnilu Pivikhaqautikkut
Ministère des Services Communautaires et gouvernementaux

July 23, 2018

Modification Notice

Project: Airplane Lake Culvert Replacement - Baker Lake
Water Licence 3BM-BAK1526

Attention: Richard Dwyer
Manager of Licensing
Nunavut Water Board (NWB)
licensing@nwb-oen.ca

Dear Mr. Dwyer,

The Government of Nunavut, Department of Community and Government Services (GN-CGS), on behalf of the Hamlet of Baker Lake, is submitting the following modification notice for Water Licence 3BM-BAK1526 in accordance with Licence Condition Part E, Item 2a.

Two larger culverts are planned to be installed to replace a single culvert located prior to the inlet into Airplane Lake. Replacement of the Airplane Lake culvert is tentatively scheduled for October 2018. Airplane Lake is part of the sewage wetlands area and a sampling location is located prior the existing culvert (monitoring program station BAK-2). The inlet stream into Airplane Lake originates from Finger Lake, where the sewage facility effluent compliance point is located (monitoring program station BAK-5). The Airplane Lake culvert had been installed for drainage purposes with the roadway, prior to the 2011 sewage system improvement project. The culvert replacement project is intended for the improvement of the roadway and to prevent reoccurring road washouts. The "Airplane Lake Culvert Replacement Project" report is attached with more information and the engineering drawing of the culvert replacement. In accordance with Licence Condition Part E, Item 4, as-built drawings of the modification will be submitted to the NWB within ninety (90) days of completion of the modification.

Please contact Chelsea Dubiel at (867)645-8127 if there are any questions or further information is required.

P.O. Box 490 Government of Nunavut, Rankin Inlet, NU. X0C 0G0
☎ (867) 645-8119 (867) 645-8141

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Department of Community and Government Services
Nunalingni Kavamatkunnilu Pivikhaqautikkut
Ministère des Services Communautaires et gouvernementaux

Sincerely,

Chelsea Dubiel
Municipal Engineering Student
Community and Government Services
Government of Nunavut

cc: Megan Lusty, Manager of Municipal Works, GN-CGS
Sheldon Dory, Senior Administrative Officer, Hamlet of Baker Lake
Atuat Shouldice, Water Resources Officer, Indigenous and Northern Affairs (INAC)

Enclosure:
Agnico Eagle, Airplane Lake Culvert Replacement Project

P.O. Box 490 Government of Nunavut, Rankin Inlet, NU. X0C 0G0
(867) 645-8119 (867) 645-8141

Airplane Lake Culvert Replacement Project

Prepared on behalf of the Hamlet of Baker Lake

1.0 INTRODUCTION AND METHODS

A Pathways of Effects (PoE) analysis was undertaken for the proposed "Airplane Lake culvert replacement project" requested by the hamlet of Baker Lake, using the PoEs identified by Fisheries and Oceans Canada (DFO; http://www.dfo-mpo.gc.ca/pnw-ppe/pathways-sequences/index-eng.html) to identify residual effects on fish and fish habitat. The table of standard mitigation measures provided during DFO Fisheries Act information sessions in the spring of 2015 was modified/annotated to reflect the specifics of the culvert replacement project. The relevant PoEs were identified for both land-based and water-based activities based on the undertaking. The individual PoEs were examined to determine which branches applied to the project. The mitigation measures were then applied to the applicable pathways and a determination was made as to which pathways were broken and where residual effects remained. The results of the analyses are discussed and are illustrated using the DFO PoE diagrams. The pathways where relevant mitigation measures apply are indicated on the diagrams using the DFO alpha-numeric codes. A red X indicates that a particular path is not relevant, or that it has been effectively broken by the mitigation measures that were applied. Residual effects are outlined in red.

2.0 OVERVIEW OF CONSTRUCTION PLANS AND SCHEDULE

Refer to Figure 1, which provides the replacement culvert design for Airplane Lake (complete design, including flow calculations is presented in Appendix B). The construction schedule is presented in Table 1.

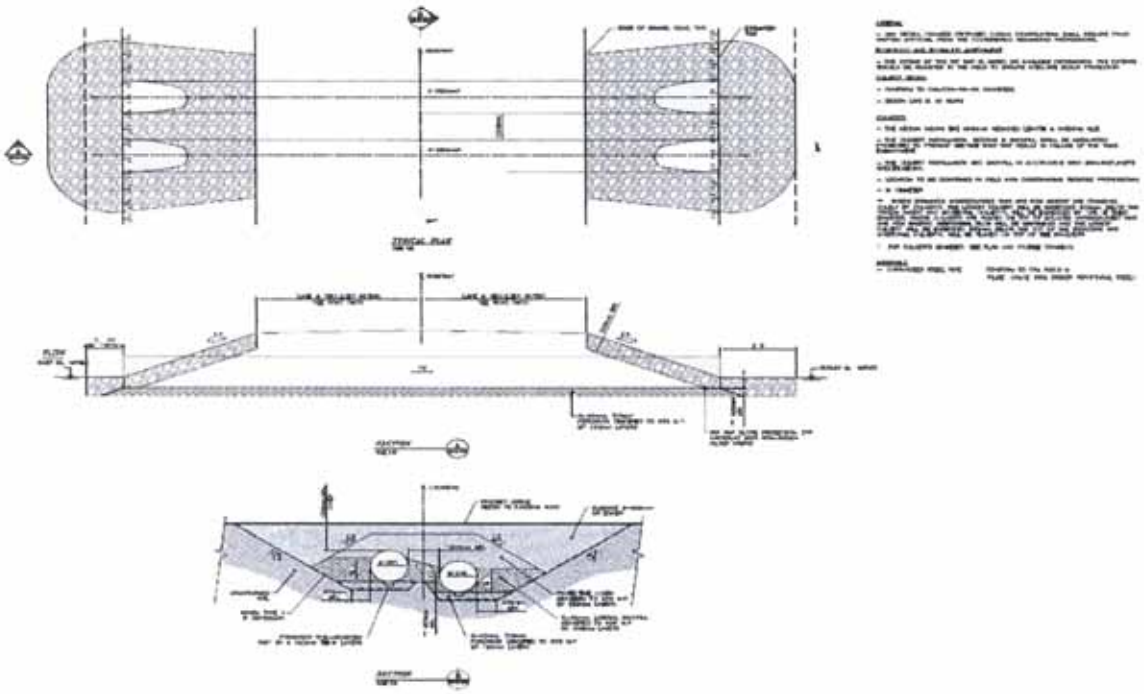


Figure 1: Hamlet of Baker Lake – Airplane Lake culvert design.

Table 1: Timelines for construction of the Airplane Lake Culvert Replacement

Activity or Milestone	Details	Approximate Date[a]
Equipment mobilization, maintenance and construction material preparation	The construction team will be lodged in Baker Lake.	~~October 2017~~ October 2018
Receive Final Approval from the Hamlet of Baker Lake and DFO	N/A	~~October 15, 2017~~ ~October 15, 2018
Culvert replacement project	Under frozen conditions without flow, complete the replacement using loaders and excavators. The construction will occur during winter when the stream is under frozen conditions. Construction will follow the DFO Nunavut in-water construction timing windows for the protection of fisheries (as this stream has Arctic grayling)	~~October 20th to 31st, 2017~~ October 20th to 31st, 2018

[a] dates are projections only and are dependent on receipt of all of the regulatory authorizations and approvals from the authorizing agencies.

3.0 DETERMINATION OF RELEVANT PATHWAYS

The PoEs for land-based activities are shown in Figure 1 and those for water-based activities are shown in Figure 2. The land-based PoEs that are applicable to the project are vegetation clearing (1), grading (2), excavation (3), explosives (4) and industrial equipment (5). The water-based PoEs that are applicable to the project are explosives (4), industrial equipment (5), placement of material (10), and fish passage (17). The PoEs for explosives (4) and industrial equipment (5) are common to both land-based and water-based activities, so a total of seven unique PoEs were evaluated.

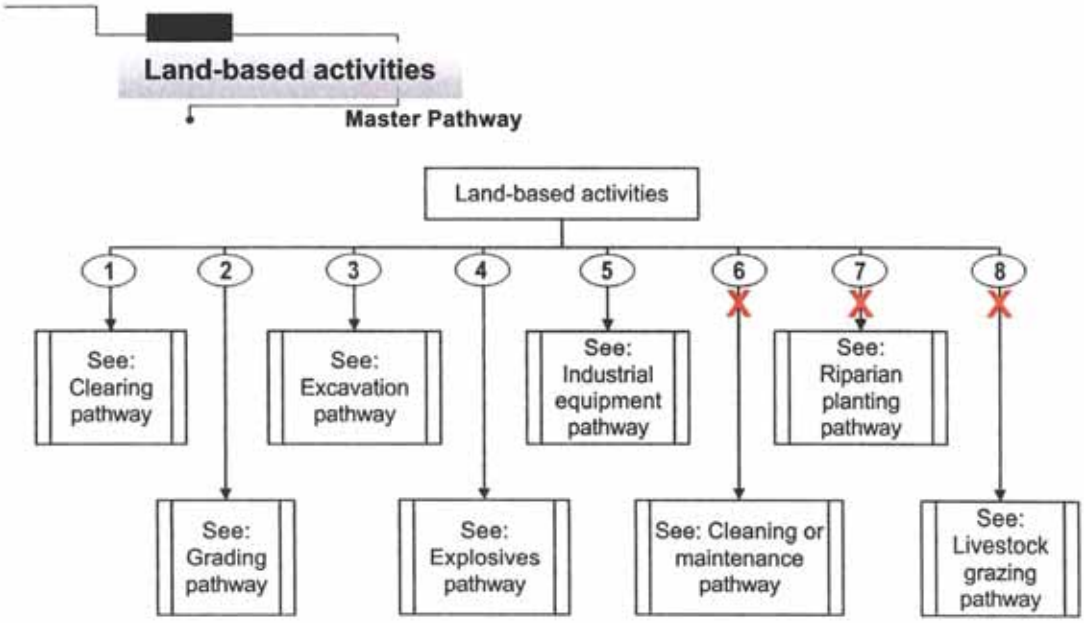


Figure 1. Pathways of effects for land-based activities. Pathways 1 through 5 are relevant to this project.

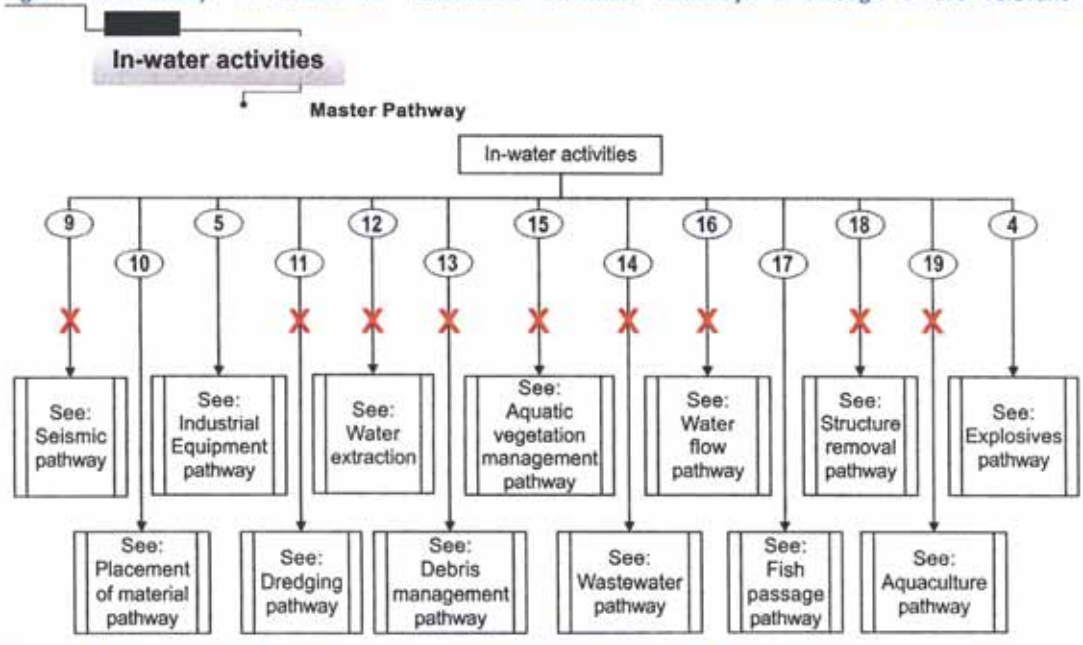


Figure 2. Pathways of effects for water-based activities. Pathways 10, 5, 17 and 4 are relevant to the project.

4.0 PATHWAY ANALYSIS

Vegetation Clearing (Pathway 1)

The low tundra vegetation in the project area does not interfere with construction activities. Effects on riparian vegetation are limited to the area of disturbance at the identified crossing and the area of disturbance will be minimized to the distance necessary to install embedded culverts and perched culverts. Areas of exposed soil will be stabilized with clean rip rap. No herbicides will be used. There is very little organic material in the watercourses, as the vegetation contributes almost no woody debris or leaf litter. The only removal of organic material will be where the culverts are installed (see pathway for placement of materials or structures in water (Pathway 10). The short tundra vegetation provides little shade and consequently has little effect on water temperature. The possible residual effects are a small reduction in external nutrient/energy input to streams where the culverts are installed, resulting in a commensurately small change in food supply and nutrient concentrations.

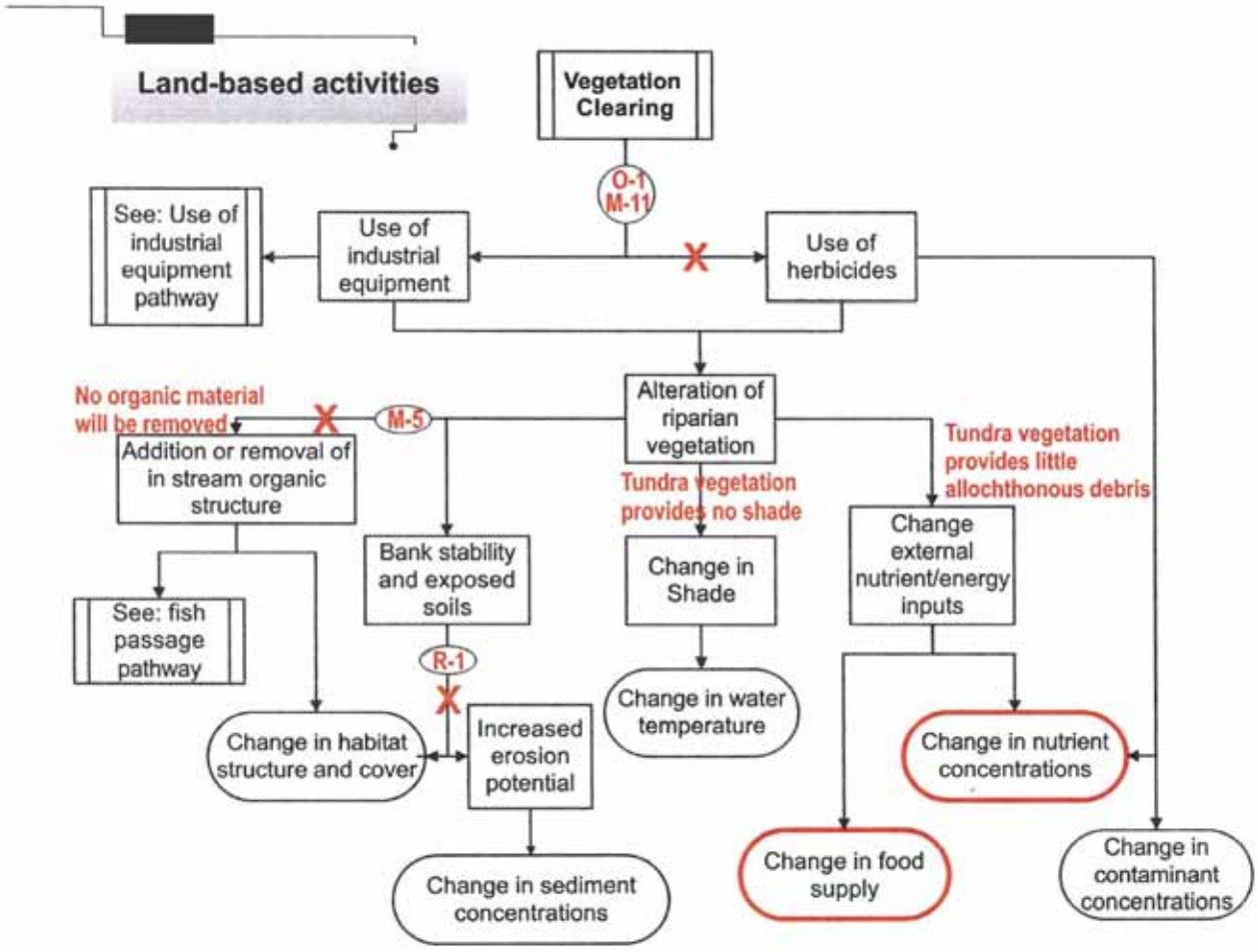


Figure 3. PoE diagram for vegetation clearing.

Grading (Pathway 2)

Grading will occur at the culvert replacement location. The existing road has been built on top of the land surface without grading or pre-stripping of the landscape. Localized changes in slope will occur as a consequence of cuts along the road but no significant changes in land drainage patterns will occur due to this replacement project. Where there is potential for exposed soils to be conveyed to waterbodies or watercourses the soils will be stabilized with clean rip rap. No residual impacts will occur as a result of grading.

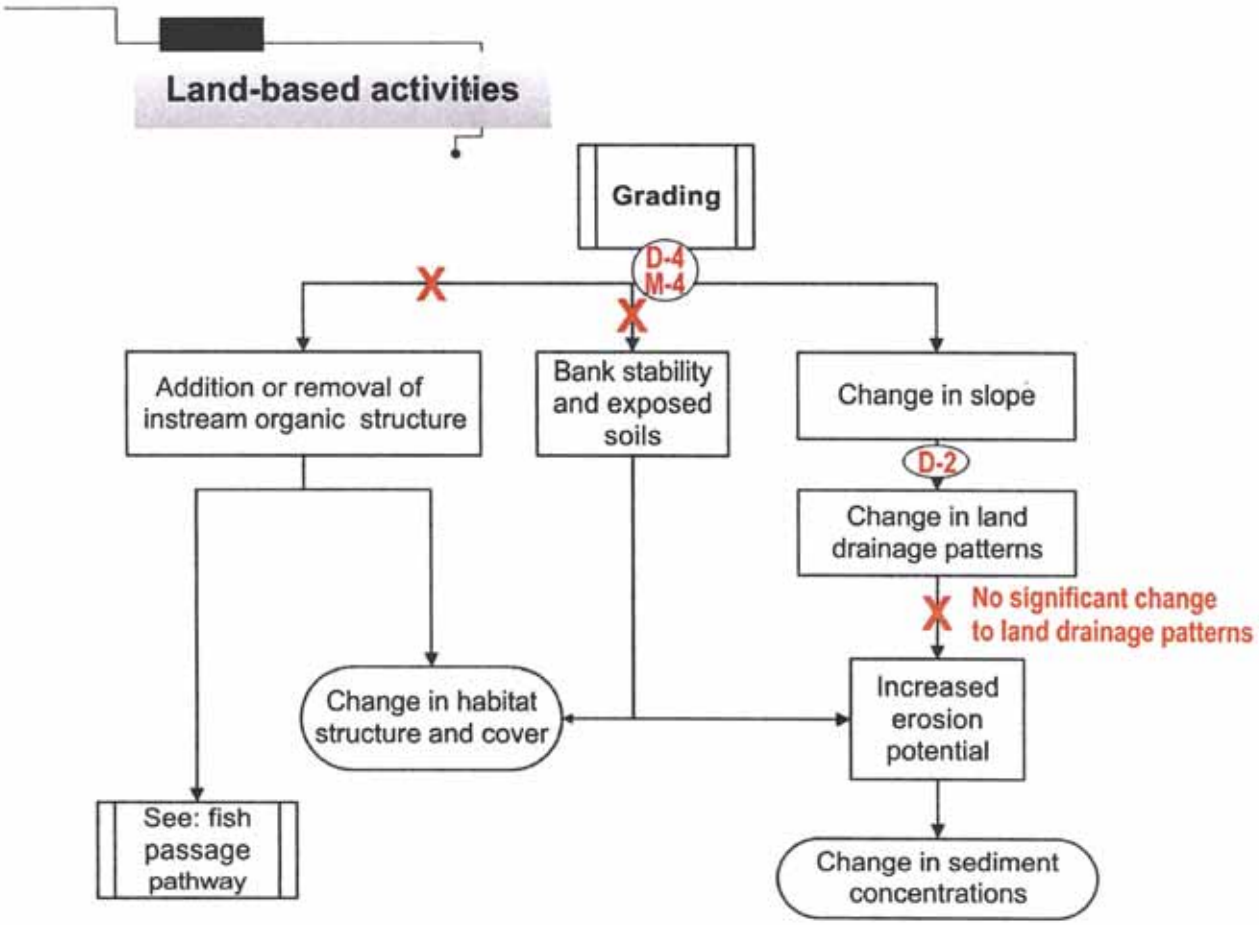


Figure 4. PoE diagram for grading.

Excavation (Pathway 3)

Excavation activities will be limited to the removal and installation of embedded culverts. During the construction of embedded culverts, excavation of stream bed material may be required. Dewatering will not be required as the work is planned under frozen conditions. Stripped material will be stored at least 31 m from any watercourse or water body and if there is potential for erosion of the material to a watercourse or waterbody it will be isolated with erosion control measures (M-5). Following construction, potential sediment generating materials will be stabilized with clean rip rap (R-3).

No residual impacts will result from excavation.

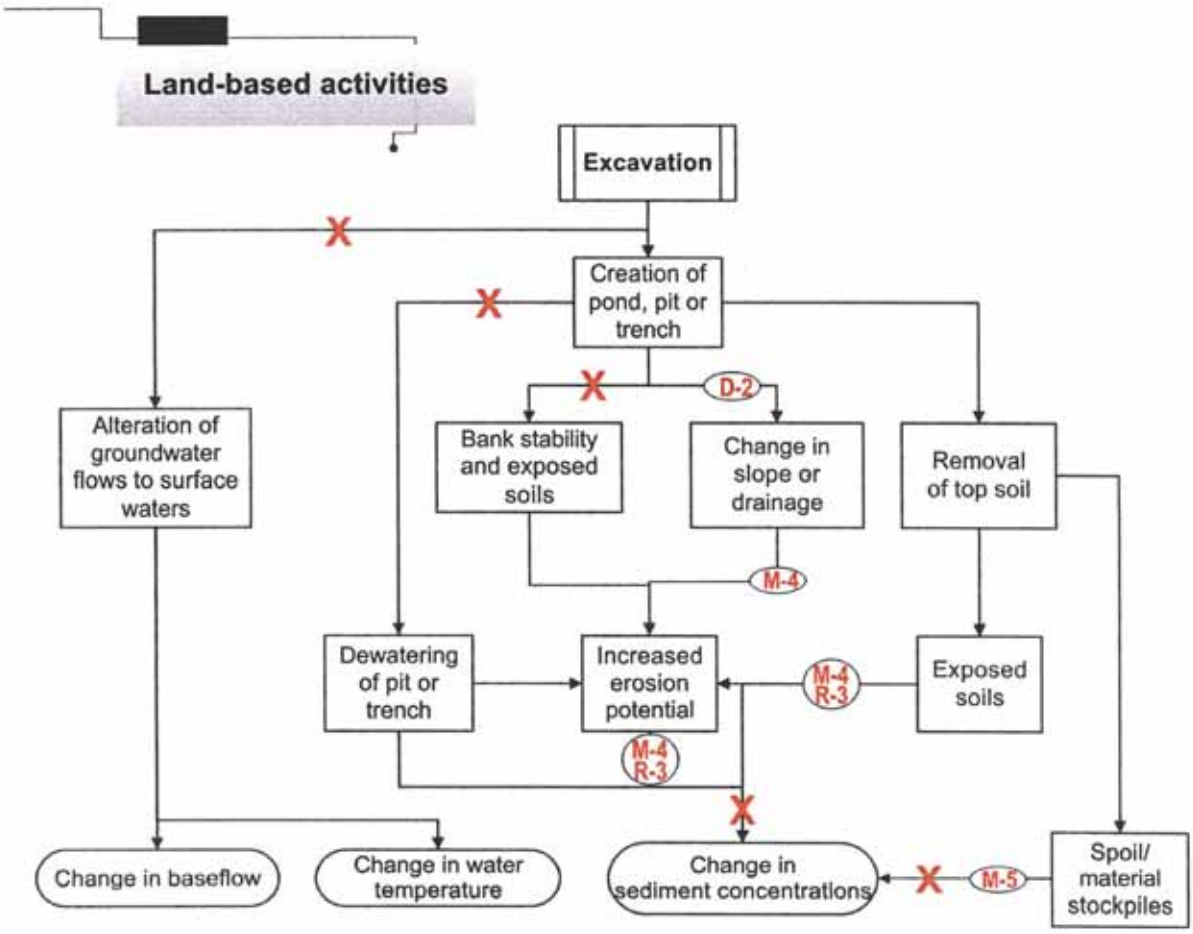


Figure 5. PoE diagram for excavation.

Use of Explosives (Pathway 4)

Construction will take place under frozen conditions when this small watercourse is frozen and do not contain fish. Therefore, this greatly reduces the potential exposure of fish to blasting effects and eliminates the potential for blasting to increase sediment concentrations (M-4). The DFO fish protection measures for use of explosives (O-2) will be adhered to in order to prevent lethal or sublethal effects to fish and to prevent nutrients or contaminants from entering fish-bearing waters. If blasting creates erodible banks, these will be stabilized with clean rip rap (R-1). No residual impacts will result from blasting.

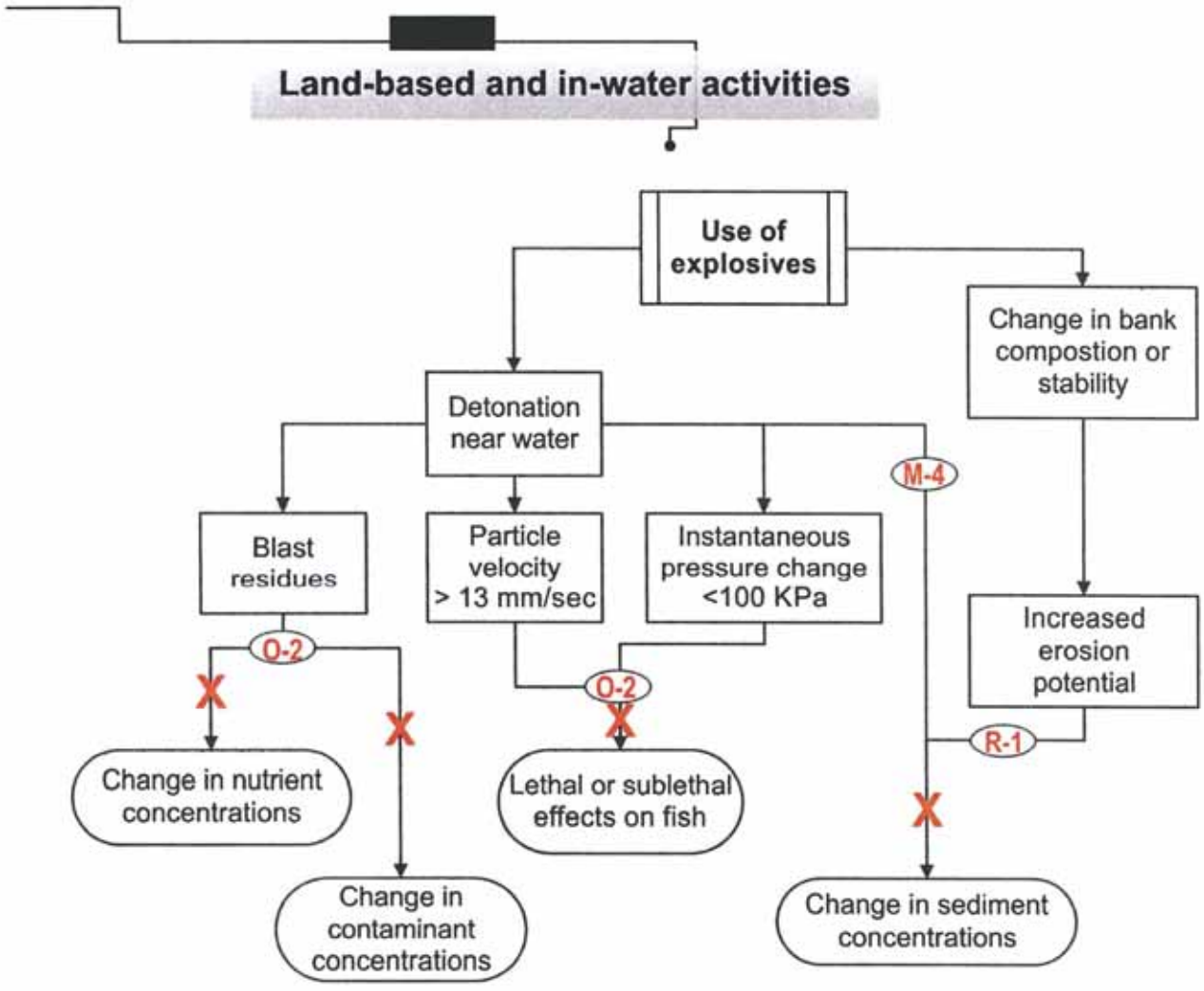


Figure 6. PoE diagram for use of explosives.

Placement of Materials or Structures in Water (Pathway 10)

This watercourse crossing contains fish moving seasonally between Airplane Lake and lakes upstream. As a result, the existing undersized culverts are proposed to be replaced with an adequately sized culvert, embedded 0.3 m below the existing stream invert to prevent the development of a perched culvert and allow native substrate material to accumulate within the culvert, thus ensuring that fish passage is maintained. Where additional culverts are required in order to convey high flows, secondary culverts may be installed at grade so that they provide routes of reduced velocity during those periods (D-1).

The proposed culvert replacement project was selected based on the need to maintain fish passage and to avoid or minimize, to the extent feasible, the alteration of fish habitat (D-1) due to commonly occurring road washouts. Since the existing corrugated steel pipes used to convey Airplane Lake watercourse alteration in habitat structure has already occurred, this is viewed as an enhancement to the existing conditions. As a result of the construction timing, design and enhancement, no residual harm to fish is expected.

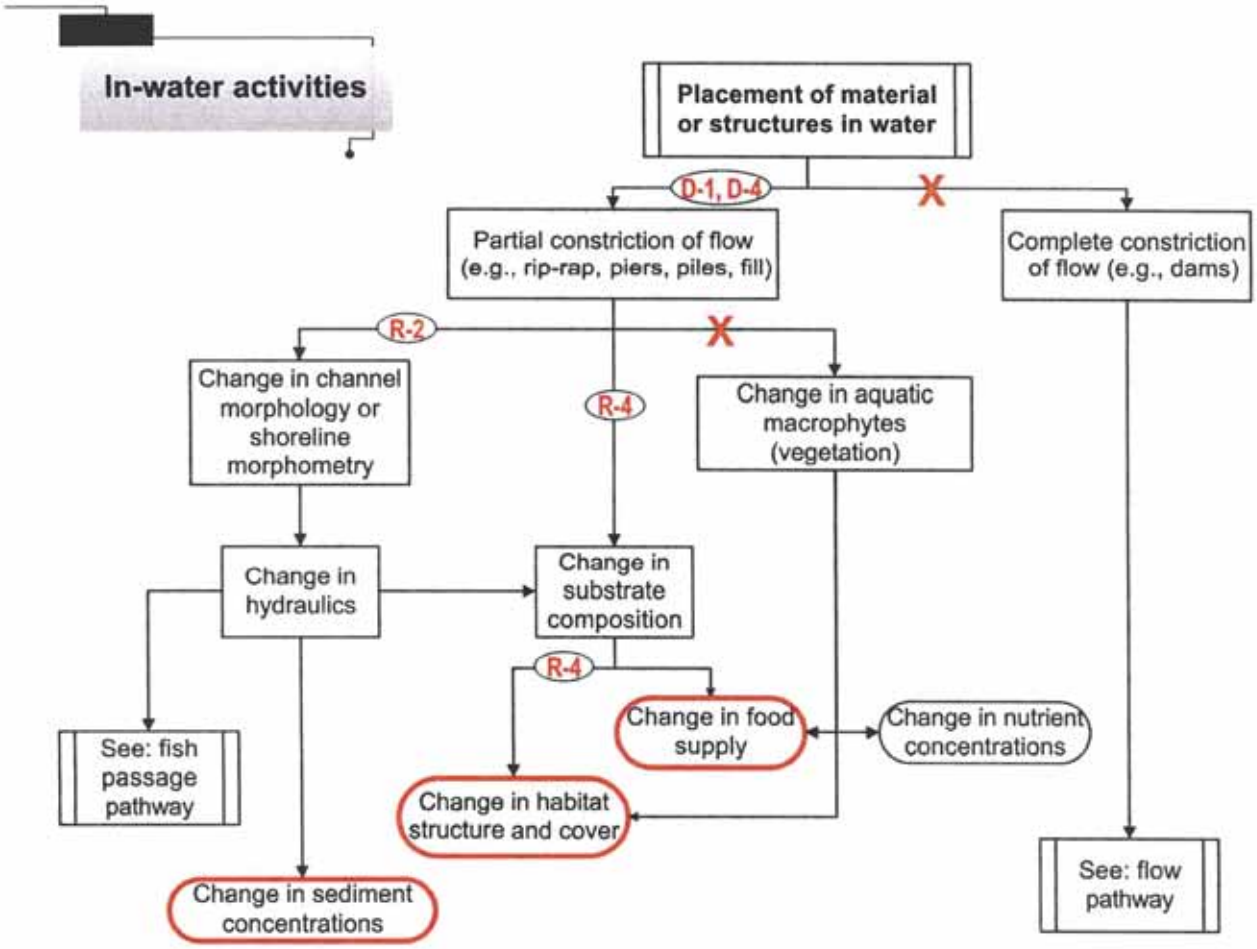


Figure 8. PoE diagram for placement of material or structures in water.

Fish Passage Issues (Pathway 17)

No changes in water chemistry, water temperature, or flow will result from the culvert replacement, nor will any diversions occur. Watercourse crossing structures/techniques have been selected to allow both upstream and downstream fish passage to be maintained to the extent that it currently exists.

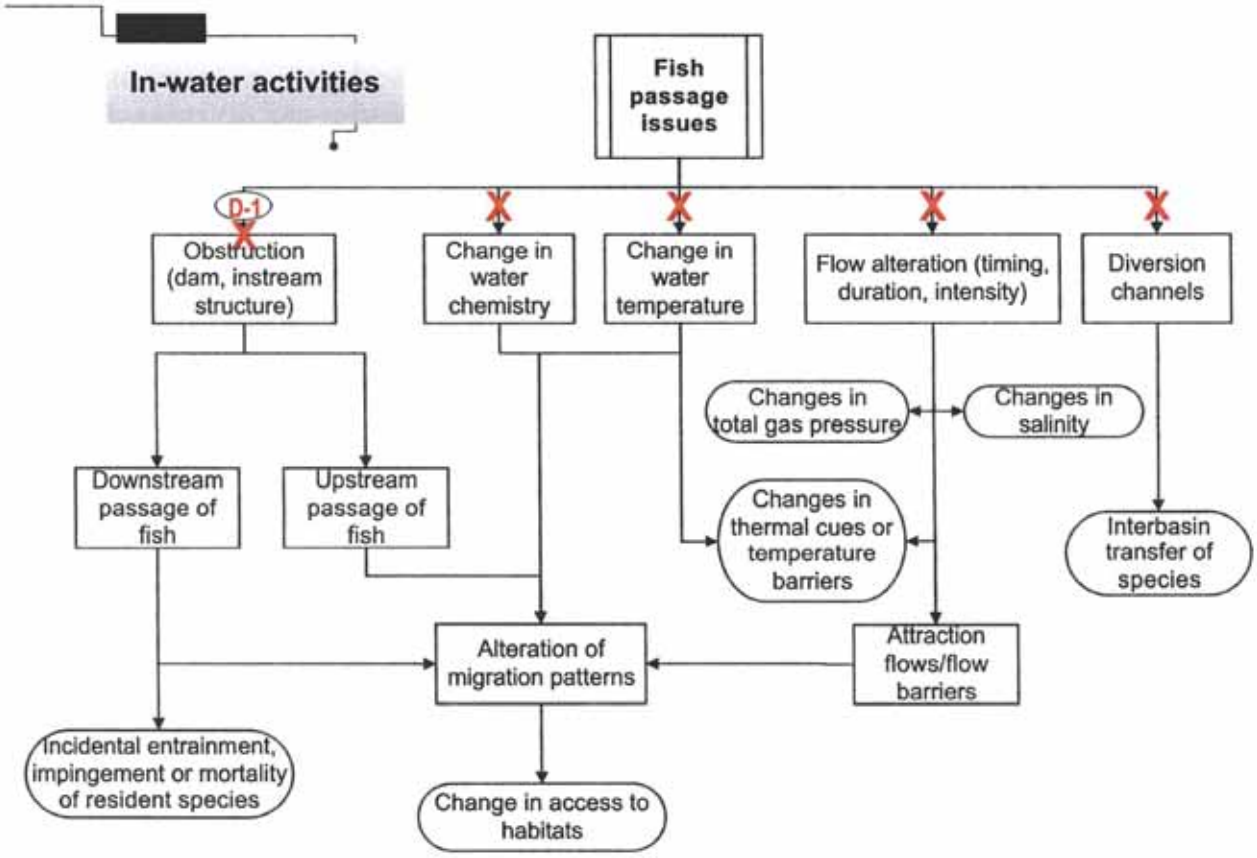


Figure 9. PoE diagram for fish passage.

5.0 CONCLUSIONS

The proposed culvert replacement project was selected based on the need to maintain fish passage and to avoid or minimize, to the extent feasible, the alteration of fish habitat (D-1) due to commonly occurring road washouts. Since the existing corrugated steel pipes used to convey Airplane Lake watercourse alteration in habitat structure has already occurred, this proposed design and replacement is viewed as an enhancement to the existing conditions.

In consideration of the construction timing (under frozen conditions or within the DFO timing window), design and enhancement or improvement from the existing culvert installation, our review of the PoEs for land-based activities and those for water-based activities have determined no residual harm to fish is expected.

APPENDIX A

DFO Standard Mitigation Measures Modified/Annotated to Reflect the Specifics of the Airplane Lake Culvert Replacement Project.

Design Considerations		
CODE	**MITIGATION MEASURE**	**DESCRIPTION**
D-1	Design - Culvert or Other In-water Structures	Culverts conveying the active channel of watercourses with more than interstitial flow and that are known to, or thought to contain fish seasonally. As a result, the existing undersized culverts are proposed to be replaced with an adequately sized culvert, embedded 0.3 m below the existing stream invert to prevent the development of a perched culvert and allow native substrate material to accumulate within the culvert, thus ensuring that fish passage is maintained. Where additional culverts are required in order to convey high flows, secondary culverts may be installed at grade so that they provide routes of reduced velocity during those periods (D-1).
D-2	Design – Drainage System	No drainage diversions will occur as a result of the proposed construction.
D-4	Design - Site Selection	The road alignment was originally selected to minimize the number of watercourse crossings and to maintain a minimum 31 m buffer between the road and borrow areas and waterbodies elsewhere. Wherever possible, crossings are at right angles to the watercourses. This crossing was originally field-fit to minimize disruption of fish habitat where possible.

Operational Constraints		
CODE	**MITIGATION MEASURE**	**DESCRIPTION**
0-1	Operational Constraint - Access	At watercourse crossings, the work area will be limited to the minimum bank length required to install structures. Construction will occur when the streams and their banks are frozen. Crossing of watercourses will be restricted to this period if possible.
0-2	Operational Constraint - Blasting	Adhere to DFO fish protection measures for use of explosives: http://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures/index-eng.html
0-3	Operational Constraint - Timing of In-Water Works	Most construction activity will occur when the ground and small streams are frozen. In-water work in the watercourse that may not freeze completely will be permitted according to the DFO timing windows.

Management Practices/Controls		
CODE	**MITIGATION MEASURE**	**DESCRIPTION**
M-1	Management - Chemicals	No herbicides or pesticides will be used during road construction or maintenance. Non-potentially-acid-generating waste rock will be used as building material. Chemical dust suppressants will be only used as a last resort and only in accordance with the Environmental Guidance for Dust Suppression published by the Government of Nunavut Department of Environment (GN 2014).
M-2	Management – Dewatering Discharge	Dewatering is not anticipated to be necessary during road construction. If dewatering is required, however, a settling basin or filter bag will be used to remove sediment prior to the water entering a watercourse or waterbody and energy dissipation measures will be implemented to prevent bed or bank erosion.
M-3	Management - Equipment	Construction activity will occur when the ground and small streams are frozen. Culvert installation in small watercourses will occur when these watercourses are frozen or as permitted according to the DFO timing windows. Equipment will be stored and maintained in a manner that prevents the entry of any deleterious substance from entering the water or being deposited on ice. Any part of equipment entering the water or operating on the bank shall be free of fluid leaks, and externally cleaned/degreased to prevent any deleterious substance from entering the water.

Management Practices/Controls (continued)		
CODE	**MITIGATION MEASURE**	**DESCRIPTION**
M-4	Management - Erosion and Sediment Controls	Construction when the ground is frozen reduces erosion potential. Areas with potential to generate erosion will be stabilized with rip rap. Any evidence of erosion will be repaired by placing rip rap over the affected area, and measures will be taken to reduce the velocity of the water with, for example, silt curtains and/or small dikes.
M-5	Management – Excess Materials	The road will be constructed without stripping of the native soils except where excavation is required on the road alignment and in borrow areas. Where soil is stripped or other material is generated it will be stored at least 31 m from any watercourse or waterbody. If there is potential for erosion of the material to a watercourse or waterbody it will be isolated with erosion control measures (i.e. silt fencing).
M-6	Management – Fish Screens	No pumping from fish bearing waters is anticipated as part of this project. If pumping from fish-bearing waters is required, DFO fish protection measures for design, installation and operation of fish screens will be adhered to: http://www.dfo-mgo.gc.ca/Qnw-QQe/measures-mesures/index-eng.html
M-7	Management – Fish Transfer	Installation of culverts on small streams will occur during winter when the streams are completely frozen and no fish are present. No isolation of fish habitat during the open-water period is anticipated. In the event that isolation is required, fish within the isolated area will be captured and relocated to outside of the enclosed area. Relocations will be conducted by a qualified environmental professional, with the necessary permits in place and using appropriate capture, handling and release techniques to prevent harm and minimize stress.
M-9	Management – Spills	The Spill Contingency Plan will be activated in the event of a spill. Spill kits will be on-site at all times and all employees and contract personnel will be trained and be responsible to report, mitigate and clean up small spills. In the case of a larger spill, spill response will be implemented by the Emergency Response Team based at Meadowbank and the environmental staff, who will advise, document, and report on initial response and clean-up actions.
M-10	Management – Temporary Flow	Crossings of the small watercourses will be constructed when the watercourses are frozen, effectively isolating the work zones.
M-11	Management - Vegetation	The tundra vegetation in the project area does not interfere with construction activities. Road fill material will be placed directly of the existing soil without cutting, stripping, or grubbing, except where excavation is necessary within the road footprint.

Rehabilitation Measures		
CODE	**MITIGATION MEASURE**	**DESCRIPTION**
R-1	Rehabilitation - Bank	Bank disturbance will be minimized. Where banks are disturbed and potential for erosion exists, they will be stabilized with clean riprap.
R-2	Rehabilitation - Bed and Substrate	Bed disturbance will be minimized, extending only as far as necessary to install embedded culverts. The bed will be restored to its pre-disturbance condition with respect to elevation and substrate using the native material that was removed.
R-3	Rehabilitation - Exposed Soils/Surfaces	Areas of disturbed soil that drain to a watercourse/waterbody will be stabilized with clean rip rap.
R-4	Rehabilitation - In-stream Cover	Removal of material from below the ordinary high water mark is anticipated for the installation of embedded culverts. In-stream structure will be re-established to pre-construction conditions using native materials that were removed, or comparable materials.
R-5	Rehabilitation – Riparian Vegetation Plantings	Tundra vegetation will not be re-planted. Bank areas with erosion potential will be stabilized with clean rip rap.

APPENDIX B

Hamlet of Baker Lake Airplane Lake Culvert engineering design and technical note

TECHNICAL NOTE

Project:	Culvert for fish habitat Baker road	**Date :**	2017-08-02
Title:	Hamlet Baker Lake : Airplane Lake culvert design		
Presented to:	Mr. Martin Archambault		

EXECUTIVE SUMMARY

- WSP was mandated by Martin Archambault to prepare a drawing and a hydraulic study;
- The technical note consists of a design flow assessment related to the culvert downstream located near Airplane lake;
- Considering that this culvert has fish habitat, the hydraulic study proves that 2 galvanized corrugated steel culverts (TTOG) with a diameter of 1200mm offers a sufficient performance to accommodate a recurrence rate of 25 years.

REFERENCE

- Topological data (from Google Earth software);
- Culvert Software (MTMDET) ;
- Culvert Design Manual (MTMDET);
- MTMDET Road Design Standard, Volume 2 and 3;

METHODOLOGY AND HYPOTHESIS:

This section summarizes the different steps and assumptions used in the calculations.

- Determination of the watershed.
- Determination of concentration time of the watershed.

Cp < 0.40

$$t_c = \frac{3.26\,(1.1 - C_p)\,L_c^{0.5}}{S_c^{0.33}} \qquad (3.5.2a)$$

où t_c : temps de concentration (min)
C_p : coefficient de ruissellement
L_c : longueur du cours d'eau (m)
S_c : pente « 85-10 » du cours d'eau (%)

si $C_p \leq 0.20$, $S_{c\,min} = 0.1\%$
si $0.20 < C_p < 0.40$, $S_{c\,min} = 0.5\%$
$t_{c\,min} = 10$ min

Cp > 0.40

$$t_c = \frac{0.057\,L_c}{S_c^{0.2}\,A_b^{0.1}} \qquad (3.5.2b)$$

où t_c : temps de concentration (min)
L_c : longueur du cours d'eau (m)
S_c : pente « 85-10 » du cours d'eau (%)
A_b : superficie du bassin versant (ha)

$t_{c\,min} = 10$ min

- The precipitation intensity used to calculate the design flow rate (I 25; 60)
- Flow calculation according to the Culvert Design Manual equation (3.5.1d), the rational method

$$Q25 = \frac{Cp \times (Fi.I) \times Ab}{360}$$

Where F_i is a correction factor applied to the intensity calculated using equations (3.5.1b) or (3.5.1c).

- Sizing of the projected culvert using the culvert software, for an entry control.

SUMMARY OF THE CULVERT HYDRAULIC STUDY

Hydrological characteristics of the environment

Watershed area (Ab) *	2.93	km²
Slope of the watershed (Sb) *	2.5	%
Length of stream (Lc) *	4.564	km
Slope of stream (Sc)*	0.47	%
Coefficient of runoff (Cp)	0.67	
Precipitation intensity (I25;60)	14	mm/h
Wetland Area *	0.30	km²
Percentage of lakes and swamps	10.31	%
Distribution of lakes and swamps ***	-	
Design flow	2.55	m³/s

Hydrological characteristics of the environment

C_p weighted = (Ab x Cp) / Ab
= (2.93 x 0.67) / 2.93

C_p weighted = 0.67

Detail of the slope of stream (Sc)

Length of stream = 4564 m

	Distance from culvert (m)	Elevation (m)
85 %	3879.4	67
10 %	456.4	51

Stream slope (SC) = $\frac{3879.4-456.4}{67-51} =$ **0,47 %**

Identification of the precipitation index (according to the Gumble method)

For a precipitation of 60 minutes and a period of recurrence of 25 years and a confidence interval of 95%

$I_{25:60}$=14 mm/h

Design flow

A recurrence rate of 25 years was used, namely:

Q_{25} = 2.55 m³/s **

Summary of the hydraulic calculation carried out by culvert software

INPUT DATA:

Elevation of upstream invert:	45 m
Elevation of downstream invert:	44.6 m
Elevation of the downstream water body:	44.6 m
Permissible elevation of upstream water body:	36.5 m
Length of culvert:	20 m
Design flow:	**2.55 m³/s**
Number of culvert in parallel:	2
Possibility of pouring under load?	No
Burying (m):	0.495
Manning coefficient of culvert:	0.024
Manning coefficient of burying:	0.05
Input coefficient (Ke):	0.9

Is the option to use polynomials from MTQ culvert manual selected? No

CULVERT CARACTERISTICS:

Geometric shape of section:	**Circular**
Manning coefficient of culvert:	**0.024**
Slope of the culvert:	**2.0 %**
Diameter:	**1.2 m**

RESULTS:

Control Type:	Input Control
Elevation (HW) upstream:	45.98m
Water level rise (TW) downstream:	45 m
Normal depth:	0.67 m
Critical depth:	0.49 m
Critical speed:	2.25 m/s
Speed at the culvert exit:	**2.25** m/s

General notes:

The permissible elevation of the upstream water body is determined so that the water depth does not exceed the top of the culvert. This way, you can ensure that the entrance of the culvert will not be submerged. Also, because we do not have a survey, we used arbitrary elevations.

DISCUSSION AND RECOMMANDATION:

1) The results obtained with the culvert software show that with 2 galvanized corrugated steel culverts (TTOG) of diameter 1200 mm and a slope s = 2.0%, the type of control is a control at the entrance . The ends of the culvert are not submerged, and the exit speed is 2.25 m / s. This is lower than the limit specified in the design manual.
2) We suggest to put a riprap (100-200) at each culvert ends in order to protect the river bed against erosion.
3) Even if we increase the diameter of the culvert (2x600mm: existing diameters), there will be no impact on the culvert downstream of the lake Airplane because the lake has an area of about 62.1 hectares. In order to increase the lake level by 10 millimeter, it will be necessary to accumulate an additional 62 100 cubic meters. This requires a much larger stream.

Prepared by:

Jason Bertrand Brochu, Jr Eng.
Project manager
Transportation and infrastructure
WSP

Verified by:

Stephan Dupuis, Eng.
Project manager
Transportation and infrastructure
WSP

ANNEXES

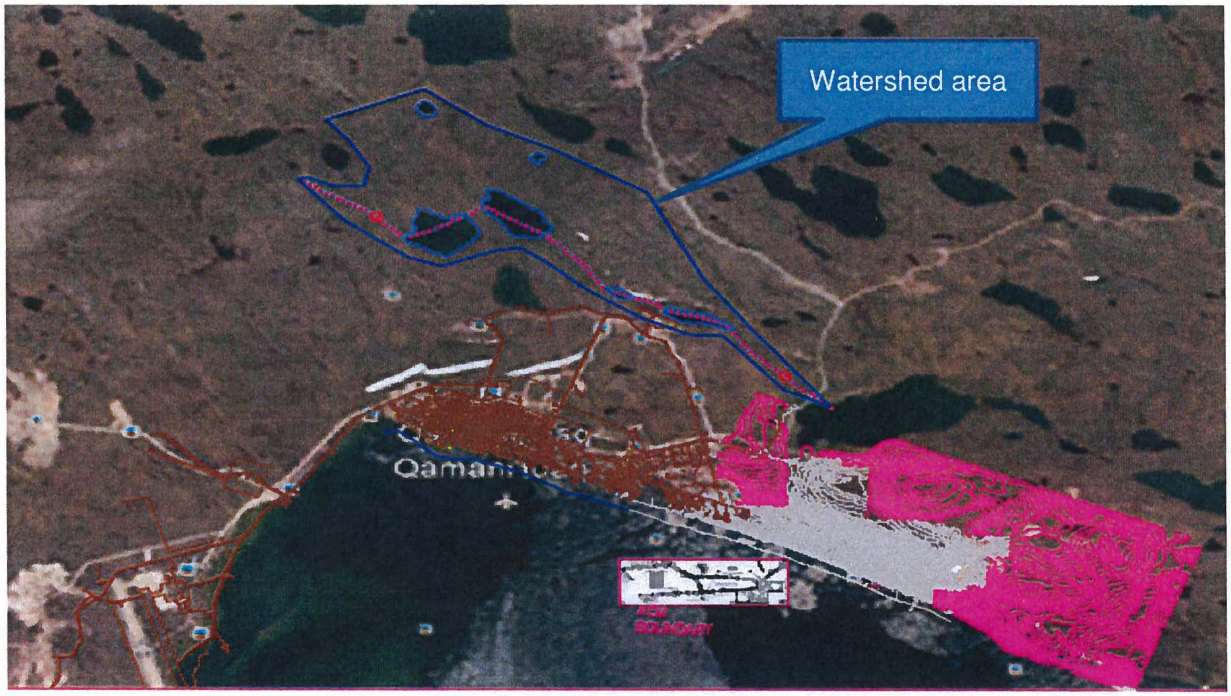


Figure 1: Watershed and water Stream

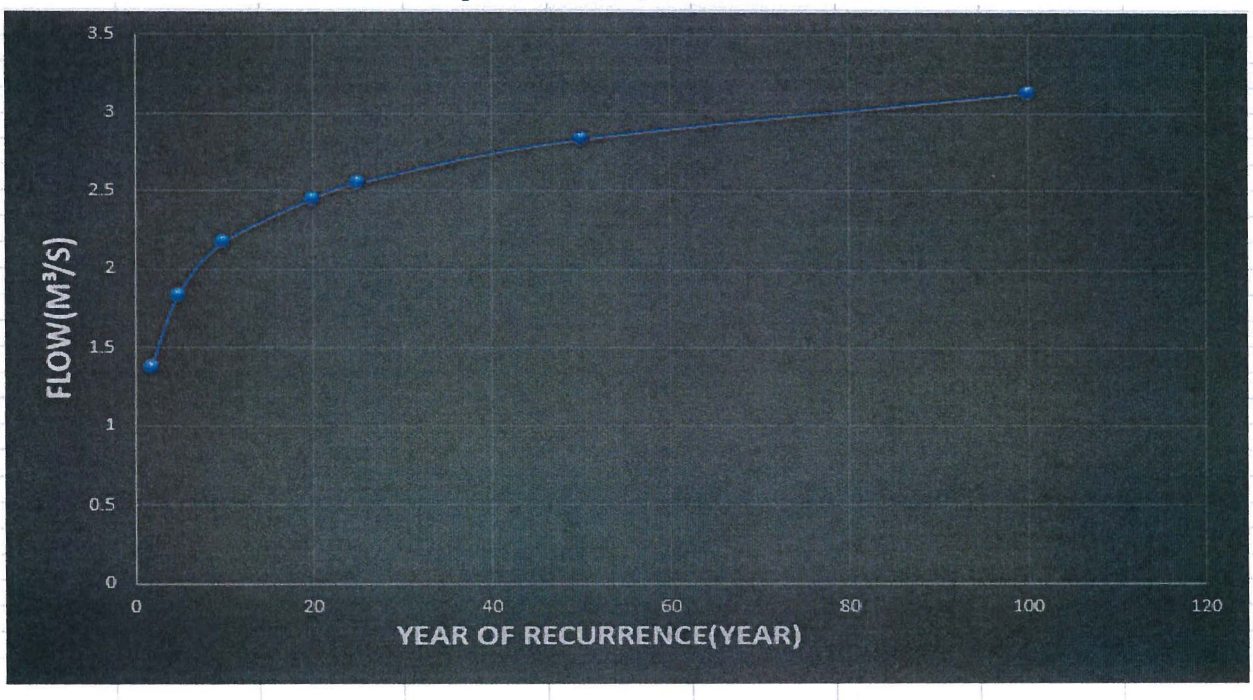


Figure 2: Flow graph

Élévation et hauteur de charge (Hw) à l'amont	45,98	0,98	m	Débit		
Élévation et hauteur d'eau (Tw) à l'aval	45,0	0,4	m	2,55	mcs	
Profondeur critique	0,49		m	Géométrie		
Profondeur normale	0,67		m	Circulaire		
Vitesse critique	2,25		m/s	Dimensions		
Vitesse à la sortie du ponceau	2,25		m/s	Diamètre	1,2	m
Vitesse sans structure	n/d		m/s			

Remarques :

Contrôle à l'entrée

OK

Résumé

Impression

Élévation admissible moins l'élévation du plan d'eau amont 0,223

Figure 3: Culvert software results

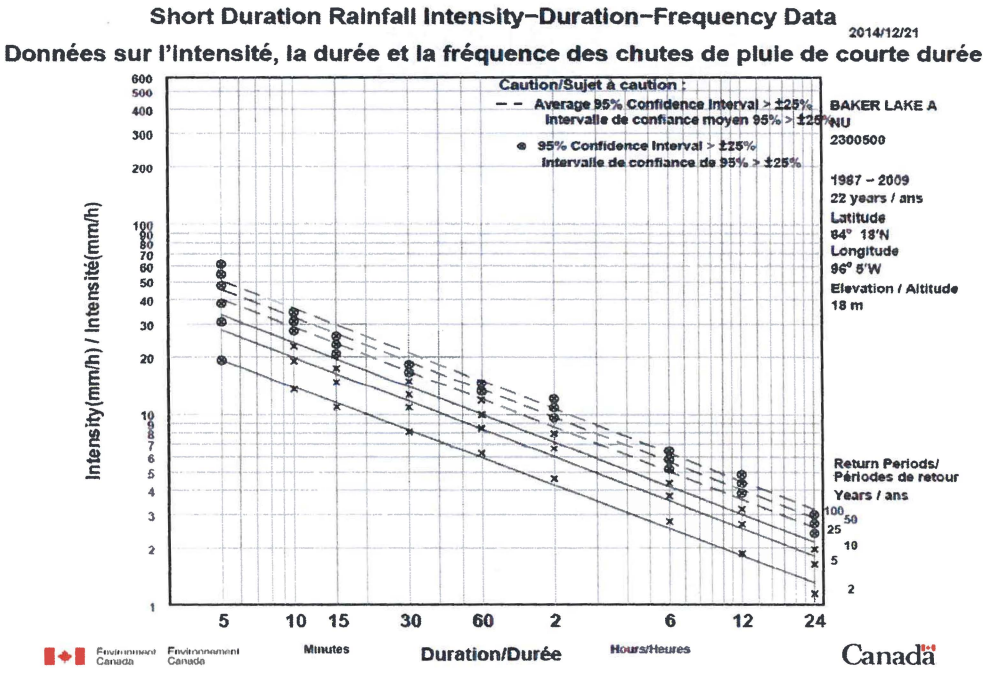


Figure 4: Environment Canada precipitation graph

Photography


2017/06/12

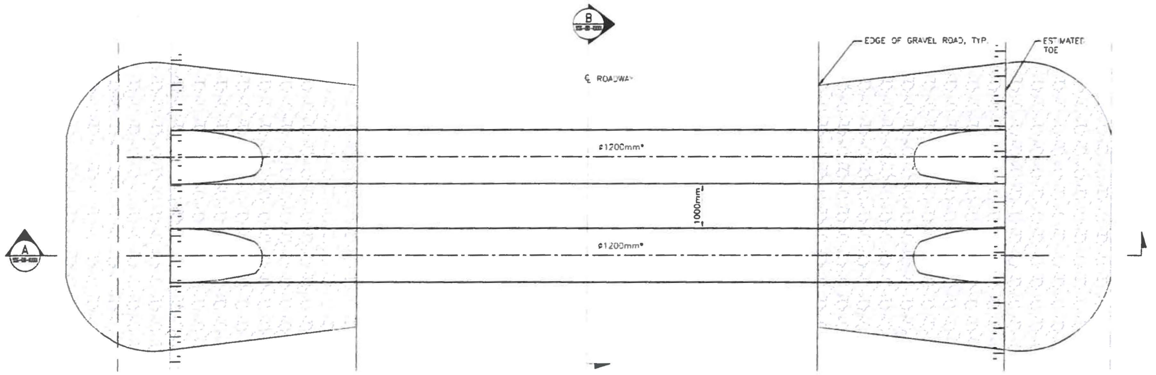

2017/06/12


2017/06/28

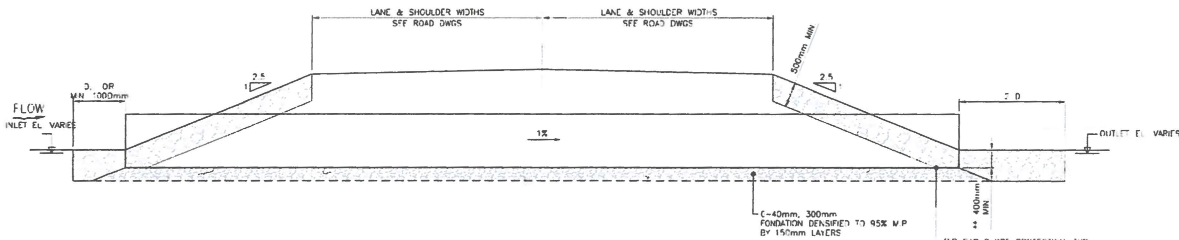

DANGEROUS
GOODS ROUTE
2017/06/28

NO DESSIN DRAWING NO MBK-CIV-001

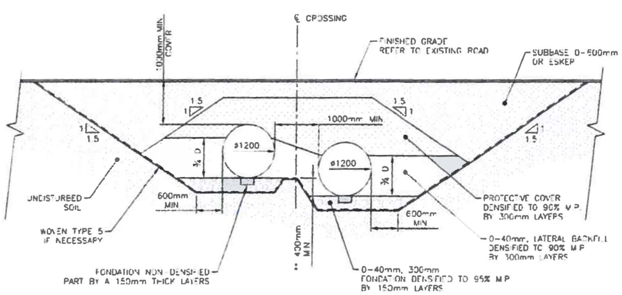
FORMAT ARCHD



TYPICAL PLAN
SCALE 1:50



SECTION A
SCALE 1:50



SECTION B
SCALE 1:50

GENERAL

- ANY DESIGN CHANGES PROPOSED DURING CONSTRUCTION SHALL REQUIRE PRIOR WRITTEN APPROVAL FROM THE COORDINATING REGISTERED PROFESSIONAL

HYDROLOGY AND HYDRAULIC ASSESSMENT

- THE EXTENT OF THE RIP RAP IS BASED ON AVAILABLE INFORMATION. THE EXTENTS SHOULD BE ADJUSTED IN THE FIELD TO ENSURE ADEQUATE SCOUR PROTECTION

CULVERT DESIGN

- CONFORM TO CAN/CSA-S6-06 (MODIFIED)
- DESIGN LIFE IS 45 YEARS

CULVERTS

- THE DESIGN SHOWS THE MINIMUM REQUIRED LENGTH & OPENING SIZE
- THE CULVERT INSTALLATION, BEDDING & BACKFILL SHALL BE ADEQUATELY PROTECTED TO PREVENT SEEPAGE THAT MAY RESULT IN FAILURE OF THE ROAD EMBANKMENT
- THE CULVERT INSTALLATION AND BACKFILL IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS
- LOCATION TO BE CONFIRMED IN FIELD WITH COORDINATING REGISTED PROFESSIONAL
- D DIAMETER

** WHERE GRAMINOID WATERCOURSES THAT ARE FISH HABITAT ARE CONVEYED SOLELY BY CULVERTS, THE LOWEST CULVERT WILL BE EMBEDDED 400mm BELOW THE STREAM INVERT AND ADDITIONAL CULVERTS, WILL BE EMBEDDED BY 10% OF THEIR DIAMETER. WHERE CULVERTS ARE PLACED ON TOP OF BOULDER WATERCOURSES THAT ARE FISH HABITAT, INTERSTITIAL FLOW WILL BE MAINTAINED AND THE LOWEST CULVERT WILL BE EMBEDDED 400mm BELOW THE TOP OF THE BOULDERS AND ADDITIONAL CULVERTS, WILL BE PLACED ON TOP OF THE BOULDERS

* FOR CULVERTS DIAMETER SEE PLAN AND PROFILE DRAWINGS

MATERIALS

- CORRUGATED STEEL PIPE	CONFORM TO CSA G40.21M	
	PLATE GRADE 350A (OTHER STRUCTURAL STEEL)	

PLAN CLÉ / KEY PLAN

wsp

3 RUE PRINCIPALE NORD SUITE 200 AMOS (QUÉBEC) CANADA J9T 2L5
TEL.: +1-819-732-0457 | TELEC.: +1-819-732-8498 | WWW.WSP.COM

NOTES GÉNÉRALES / GENERAL NOTES

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

TITRE / TITLE	# DWG
-	-
-	-
-	-
-	-
-	-

AGNICO EAGLE

REV	DATE	DESCRIPTION	PAR/BY	APP	CLIENT
A	2017-09-11	FOR CONSTRUCTION	J.B.-B.	S.D.	

REVISIONS

2017-09-13

TITRE / TITLE
AGNICO EAGLE - BAKER LAKE
GENERAL SURFACE INSTALLATION
CIVIL
PLAN AND PROFIL
HAMLET BAKER LAKE
AIRPLANE LAKE CULVERT DESING

DESSINÉ PAR / DRAWN BY	JASMINE BIBEAU, tech.	DATE 2017-09-11
VÉRIFIÉ PAR / CHECKED BY	JASON BERTRAND-BROCHU, ing. jr	2017-09-11
APPROUVÉ PAR / APPROVED BY	STÉPHAN DUPUIS, ing	2017-09-11
ÉCHELLE / SCALE 1:50	DATE	2017-09-11
NO DESSIN / DRAWING NO	MBK-CIV-001	
NO PROJET / PROJECT NO 171-10629-00	REVISION A	FEUILLE / SHT 1/1

FILE NO MBK-CIV-001.dwg