

GNWT Department of Transportation

**Environmental Management Plan –
Culvert Replacement, Km 146.8, Dempster
Highway (No. 8)**

Prepared by:

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Project Number:

60143840

Date:

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September 28, 2010

Helga Harlander
Land and Water Technician
Gwich'in Land and Water Board
P.O. Box 2018
Inuvik, NT X0E 0T0

Dear Ms Harlander;

Project No: 60141646

Regarding: Environmental Management Plan – Culvert Replacement, Km 146.8, Dempster Highway (No. 8)

Please find herein an Environmental Management Plan for the above noted proposed culvert replacement, to fulfill the requirements of the water license.

If you have any questions or comments regarding the report, please contact our office at your convenience.

Sincerely,

AECOM Canada Ltd.



Michel Lanteigne, P.Eng.,
NWT Manager

1. Introduction

This Environmental Management Plan (EMP) was prepared by AECOM Canada Ltd (AECOM), and represents the site-specific impact mitigation techniques that the Department of Transportation (DOT) proposes to impose on the successful Contractor to ensure that the requirements of the water License are met.

The performance of the proposed mitigation measures proposed herein, and general compliance with this EMP will be monitored during construction by the Department of Transportation's site representative.

Please note that construction is scheduled to occur in the fall after the creek has totally frozen. Therefore, the presence of fish and sedimentation during construction will not be an issue. This document focuses on sediment and erosion control after construction. A spill response plan to manage accidental hydrocarbon discharges has already been submitted,

2. Site Description

The proposed culvert replacement is located at KM 146.8 Dempster Highway (No. 8); at 67° 29.028' N and 133° 46.011' W.

The crossing consists of a single CMP culvert, 1830 mm diameter by 60 m in length located under 12 metres of embankment fill. This culvert has a substantial sag in the middle, and it was determined that it is in a state of failure. It will be replaced with two 1500 mm diameter pipe.

The existing culvert drains two small creeks, each with a defined channel. Riparian cover along the channel banks within the highway right-of-way is limited to low cut grasses, plants and shrubs.

Natural channel conditions and associated fish habitat in the immediate vicinity of the culvert location (if any) have been impacted from historical road construction, culvert placement and on-going culvert maintenance.

Although the presence of fish has not been confirmed, the design and construction of the replacement structure at this site is based on fish being present.

A site inspection carried out on August 19, 2010, and discussions with the DOT Regional Supervisor, indicate that the culvert is often plugged by ice during spring run-off and as a result, the water level upstream of the culvert rises to near the top of the road embankment. At that point the water flows across the access road to the DOT quarry located immediately adjacent to the culvert site, as the top elevation of the access road is slightly lower than the highway surface, and causes a washout across the access. Site observations will be carried out after construction to confirm the validity of this assumption.

3. Proposed Construction Method

Culvert installation details are provided in the attached drawing. Because of the height of the embankment at this site it is proposed to install two 1500mm pipes using horizontal augering. Therefore, construction will not interfere with traffic and a detour will not be required.

The work will be carried out in early winter after the creek has totally frozen and therefore, the presence of fish or sedimentation during construction will not be an issue. The work will not be allowed to proceed until the creeks have totally frozen.

The first pipe will be installed by drilling a straight hole through the existing deformed pipe. This pipe will be set so its invert is level with the current creek bottom elevation. Any voids between the old and the new pipe will be filled with grout. The second pipe will be set at an elevation $\frac{1}{2}$ a pipe diameter (750mm) higher than the first, and will act as an overflow pipe. Both pipes will be provided with a 0.5% grade.

Construction will require setting the drilling equipment in an excavation at the inlet end of each pipe, such that the drill head is level with the design pipe elevations. After construction the excavations will be backfilled with the material from the excavations. The inlet of the lower pipe will be provided with a channel approximately the width of the pipe in order to control water depth for fish access, as shown on the drawing detail. The channel at the inlet of the pipe will be lined with gravel. The channel at the outlet of each pipe will be protected from erosion with rip-rap.

An access to the inlet side of the pipe will be required for the drilling equipment and for bringing the pipe and supplies. The access will be constructed along the toe of the embankment. The access may be built with snow if a sufficient amount of snow is available, otherwise gravel will be used. As the ground will be frozen it is expected that a minor amount of fill will be required for the access.

A layer of geotextile will be placed under the access road and under stockpile sites to protect the native ground and facilitate clean-up at the end of construction.

The DOT quarry located immediately adjacent to the site will provide material for access construction and will be used to stage the Contractor's equipment during construction. The access road to the culvert will originate from the quarry access road and therefore, direct access to the quarry will be available from the work areas without having to make use of the highway.

At the end of construction, materials on the ground surface near the creeks that were disturbed by construction activities will be covered with straw mats to prevent sediments from entering the creek in spring. In addition, silt fencing will be installed too prevent silt from disturbed areas from entering the creek. It is expected that as a minimum straw mats will be required over the excavation at the culvert inlets. The site will be left in a condition that satisfies DFO requirements.

All construction materials and equipment will be removed from the site upon project completion. All garbage generated by personnel and construction waste material will be hauled away. It is anticipated that the Town of Inuvik will provide authorization to the Contractor to dispose of various waste at the Town's facilities, except for contaminated waste. If gravel was used for access construction, it will have been placed over geotextile, which will facilitate its removal to expose the native organic material. Any gravel used during construction, so as excess excavated material and snow used for construction of the access will be stored at the quarry.

As augering is a dry process requiring no fluid, no waste will be generated from the drilling process. Pieces of old culvert removed will be taken to the solid waste facility in Inuvik. Embankment material removed by the auger will be stockpiled in DOT's quarry.


Any contaminated waste generated on site will be collected in sealed drums and transported to the Contractor's facilities in Inuvik. If contaminated waste is generated DOT will need to implement a plan describing how to dispose of this material, as there are currently no facilities in Inuvik that will accept contaminated waste. For example, the Board may agree that if only a small volume is generated from this project, it may make sense to store it properly along with other such waste, until a full load is available for shipment south.

Environmental monitoring by the DOT site representative will include:

1. Ensure that a copy of the spill contingency plan is available on site at all times and that the Contractor's site supervisor is familiar with the plan; review the content of the plan with site personnel at the onset of the project; ensure the spill response equipment listed in the plan is available on site; ensure that proper procedures are used during re-fuelling; inspect for spills around re-fuelling areas and around equipment on a regular basis; ensure that contaminated material is collected and stored in sealed containers; report spills immediately.
2. Maintain an inventory of the nature and destination of all waste generated on a specifically prepared form.
3. Make a daily entry on the daily report form related to environmental issues.
4. Verify that silt fencing and straw mats are appropriately placed around the work areas at the end of construction.

After freshet the site will be inspected to assess the performance of the erosion protection measures, and to determine whether other measures should be implemented. DOT inspects all its structures on an annual basis. This inspection at this site for the next several years will pay particular attention to the continued performance of these mitigating measures.

G10L8-001 EMP review comments - disposition table

			comments	DOT	
D F O	page 4	comment 1	This is incorrect. The water was coming from the access road to the quarry. That amount of water and pressure would have washed the entire road out. Mitigation should occur to stop gravel from being eroded from the access road. This is not a fish habitat issue however, but a road safety one	The assumption that the culvert plugs with ice and that meltwater backs up in the valley until it overflows the access road to the quarry is based on reports from DOT's local representatives, and on the adjacent photo illustrating a channel that has cut through the entire width of the access road to the quarry. The site will be monitored after construction to confirm the validity of this assumption.	
		comment 2	It will still be an issue due to the creation of any paths and the digging of the hole for the augering machine to sit in. Sediment and erosion control should be in place during construction to prevent sediment from entering the creek during freshet.	In the absence of flowing water it is expected that any sediment created by construction will remain in place until the end of construction. Geotextile will be used to protect the original ground and to facilitate clean-up at the end of construction. At which time all areas not protected from erosion by the natural vegetative cover, will be covered with straw mats and/or silt fencing, whichever is deemed more appropriate. The site will be left in a condition that satisfies DFO requirements.	
	page 5	comment 1	It should be backfilled and compacted. The banks that have been affected (ie have no riparian vegetation on them from the clearing of the area) should be protected from erosion. This is mentioned a couple of paragraphs down, but I wanted to emphasize that here.	see above	
		comment 2	clean and washed	OK	
		comment 3	Rip rap should be used at both ends of the culvert. Water can eat away at the inlet side of a culvert if it is not adequately protected.	OK	
		comment 4	Snow is recommended over gravel. Is there a plan to remove the gravel if the gravel burden is high? The gravel used should be free of fines (washed)	any snow and gravel used will be placed over geotextile to facilitate its complete removal at the end of construction	
		comment 5	including that which is contaminated with sediment.	OK	
page 6	comment 1	Monitoring needs to include post-construction monitoring, particularly before and after freshet and to assess further restoration needs for the site.	The site will be inspected after freshet to monitor the performance of erosion control measures and to assess the need for further restoration.		
G L W B	page 5	paragraph 2 sentence 2	'After construction the excavations will be backfilled with native material.' Does native material refer to the material that was originally removed or does it include something else?	to material that was originally removed.	
		paragraph 6 sentence 5	'Contaminated snow will be stored at the quarry.' Does this refer to snow contaminated with gravel, debris etc? I trust snow contaminated with fuel etc. will be treated as described in the spill contingency plan.	yes to all	
		paragraph 7 sentence 2	'Pieces of old culvert will be taken to the solid waste facility in Inuvik.' Please ensure to get permission from the Town prior to doing so.	OK	
I N A C	Erosion control measures		As project operations have been changed from summer to fall, the EMP is focusing on sediment and erosion control after construction. Erosion control measures will consist of straw mats and silt fencing to be placed on ground surface near the creek disturbed by fall construction to prevent sediment and silt from entering the creek (Section 3). Considering that the creek will be frozen at the time of the operations, please specify when these control measures are to be deployed and any other special considerations DoT may have to insure that the purposes of those erosion measures are maximized.	Control measures will be installed at the end of construction to DFO's satisfaction, and their performance monitored after freshet.	
			INAC assumes silt fencing will no longer be required adjacent to the detour, as the plan states that detour is no longer required as horizontal drilling technology will be used	Yes	
	Excavation and Earthworks		The access to the inlet side of the pipe may be built with gravel if no sufficient snow is available. If gravel is used instead of snow, DoT must insure that the gravel is completely removed before spring break up. INAC recommends the use of filter fabric (or equivalent) at the base of potential granular fills, particularly in erosion sensitive areas or where the ice thickness may not support the weight of the access construction. DoT should consider using filter fabric (or equivalent) beneath drilling and excavated materials if those materials are moved to/stored in a vegetated area where snow may be absent.	Geotextile will be used to protect the original ground and to facilitate clean-up at the end of construction. At which time all areas left unprotected from erosion by the natural vegetative cover, will be covered with straw mats and/or silt fencing, whichever is deemed more appropriate. The site will be left in a condition that satisfies DFO requirements.	
Spill Contingency Plan		As DoT culvert replacements is now planned to happen in the fall, the Spill Contingency Plan should be updated to include potential scenarios for Spills under the ice.	Attached are photos that show the 2 streams entering the culvert at this location. As you can see from the photos the streams are very small. The intent is to do the work after these streams have frozen to the bottom. In fact, it will not be technically feasible to proceed with the method of construction proposed in the presence of flowing water. Therefore, unless (or until) these streams have frozen completely and totally, the project as it is proposed will not be allowed to proceed.	