



DWB Consulting Services Ltd.

# Post Construction Report

## Table FSR 21 km - Culvert Replacement and Streambed Reconstruction



**Prepared for: Canadian Forest Products Ltd.**

Attn: Ray Normandeau, Capital & Engineering Projects Coordinator

Deborah Thompson, RPF, Silviculture Superintendent



**Prepared by: DWB Consulting Services Ltd.**

Prince George Division

1579 – 9th Avenue Prince George BC V2L 3R8

[250.562.5541](http://www.dwbconsulting.ca) | [www.dwbconsulting.ca](http://www.dwbconsulting.ca)

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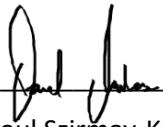
DWB Consulting Services Ltd. is pleased to submit this report for your review. This report has been prepared using sound technical and professional judgement, based on our knowledge and experience, applicable regulatory framework, industry best management practices, and current understanding of project conditions, design, and project setting.

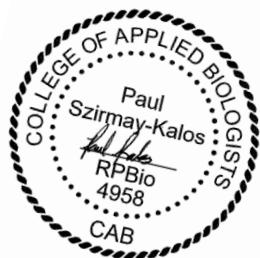
REPORT Post Construction Report – Table FSR 21km - Culvert Replacement and Streambed  
TITLE: Reconstruction  
PREPARED Canadian Forest Products Ltd.  
FOR:  
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WRITTEN BY: 

Leanne Matthews, BIT

REVIEWED  
BY:

  
Paul Szirmay-Kalos, RPBio, P.Biol



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<sup>1</sup> Editorial Review: Reviewed for formatting, grammar, spelling, etc.

Professional Review: Reviewed for content and professional signoff

Client Review: Reviewed by client

Regulatory Review: Reviewed by regulatory agency (i.e., DFO) if necessary

Peer Review: Reviewed for content and errors by peer

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We do not represent, warrant, undertake or guarantee:

- That all project environmental-related information has been received.
- That regulations and standards of practices shall remain constant through the duration of the Project.
- That the use of guidance in the report will lead to any particular outcome or result; or, in particular,
- That by using the guidance in the report, the client will be approved by the contract holder for the applied works.

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# 1.0 INTRODUCTION

DWB Consulting Services Ltd. (DWB) was retained by Canadian Forest Products Ltd. (Canfor) Prince George Division to prepare a Construction Environmental Management Plan (CEMP) for a culvert replacement and streambed reconstruction at Unnamed Creek, where perched culverts presented a fish barrier to upstream access and usage, at 21 km on the Table Forest Service Road (FSR) (referred to hereafter as “the Project”). Formula was contracted by Canfor to complete construction.

DWB prepared a Construction Environmental Management Plan (CEMP) to provide guidelines and recommendations for proposed works to occur in the summer of 2024 (DWB, 2023). The plan was prepared with input from professional biologists, engineers, and foresters and references applicable provincial standard environmental best management practices (BMPs). This Post Construction Report includes a summary of works completed and monitored by DWB personnel.

## 1.1 LOCATION

From PG, take Highway 97 North to the Firth-Hambone Road. Continue on the Firth-Hambone Road to the Parsnip Camp, before turning left onto the 800 Rd. Follow the 800 Rd to 851km and turn right onto the Table Forest Service Road (FSR) after crossing the Parsnip River bridge. Follow the Table FSR until 21 km. The Project site is located at 10 U 549980 m E 6065127 m N.

## 1.2 REGULATORY REQUIREMENTS

As the Project was compliant with the *Forest and Range Practices Act* (FRPA) and the Fish-stream Crossing Guidebook (MFLNRO, 2012), no permits under the *Water Sustainability Act* (WSA) were required.

The following permits were required for the Project:

- MOF Scientific Fish Collection Permit (PG24-850418); and
- MOF General Wildlife Permit for Amphibian Salvage (PG24-851068).

Copies of approved permits and authorizations were kept on the work site.

All works followed BMPs for instream works, as outlined in the CEMP. In addition, the following applicable *DFO Measures to Protect Fish and Fish Habitat* were taken through BMPs (DFO, 2019):

- Prevent the death of fish;
- Maintain riparian vegetation;
- Maintain fish passage;
- Ensure proper sediment control; and
- Prevent deleterious substances (including sediment) from entering the watercourse.

As instream works were required during the Project, meeting the DFO measure to “carry out works, undertakings and activities from on land” was not achievable; however, clean rock was carefully placed on the flooded road prism under the supervision of the environmental monitor (EM). Water quality monitoring was conducted during the construction works and amphibian salvages were completed prior to and during the construction works.

## 1.3 WEATHER CONDITIONS

The weather over the duration of the Project varied from a low of 6 °C to a high of 34 °C. Conditions were generally very dry and dusty, with a brief period of light rain on the evening of the 19<sup>th</sup>. The rainfall was not significant enough to cause any impacts to the Project.

## **1.4 PROJECT SCHEDULE**

Construction activities occurred between July 16<sup>th</sup> and July 22<sup>nd</sup>, 2024, with the final inspection taking place on July 24<sup>th</sup>, 2024.

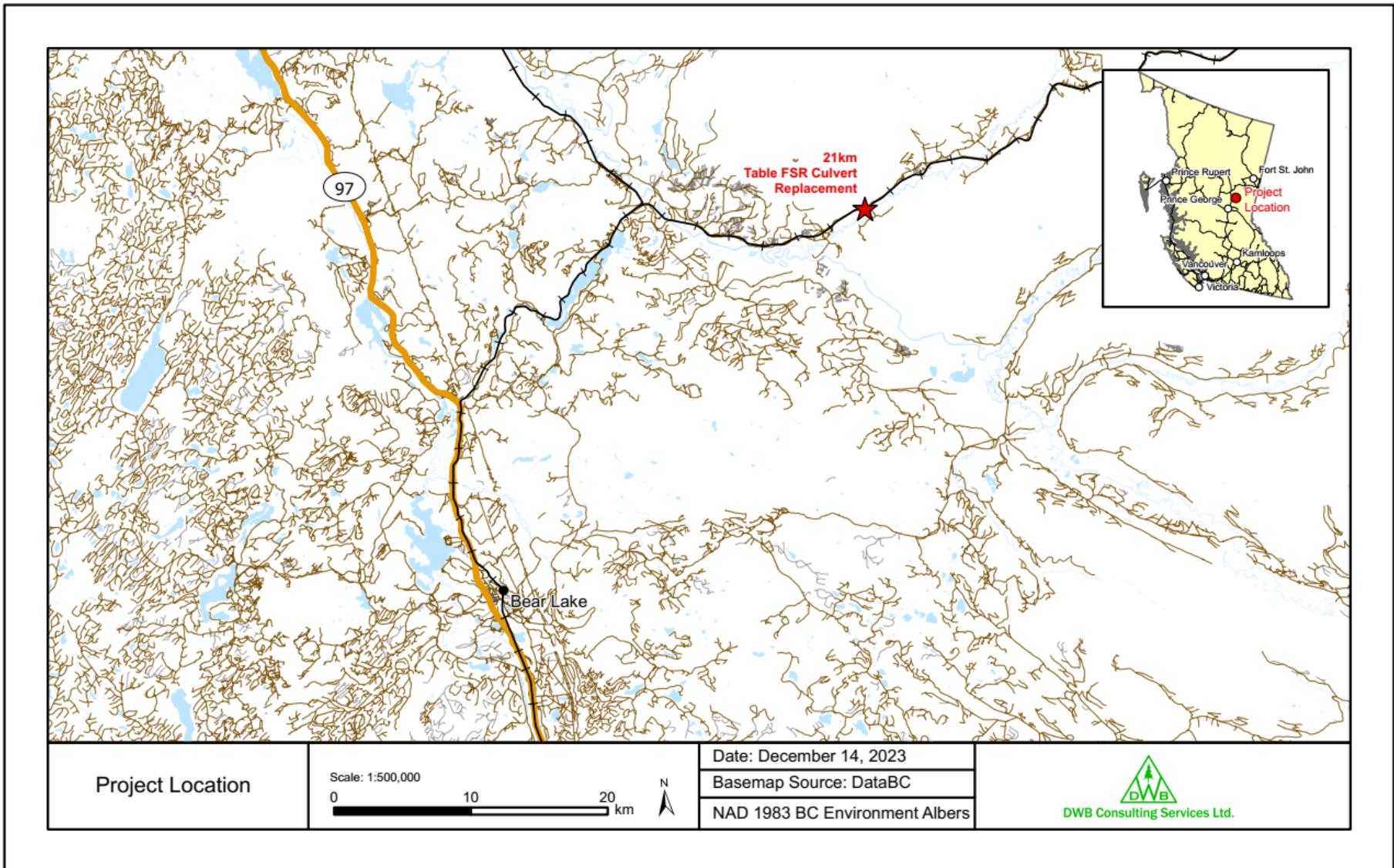


Figure 1. Project location map.

## 2.0 ENVIRONMENTAL MANAGEMENT

### 2.1 BIRD NEST SURVEY

As the Project was completed outside the August 20<sup>th</sup> to April 20<sup>th</sup> vegetation clearing window, a bird nest survey was conducted on July 16<sup>th</sup> and 17<sup>th</sup>. No active nests or suspicious bird activity was observed.

### 2.2 ENVIRONMENTAL MONITORING

The Environmental Monitor (EM) conducted an environmental orientation for all associated construction personnel on July 16, 2024. The EM was on throughout all works from July 16<sup>th</sup>-22<sup>nd</sup>. The EM provided inspections of equipment and advice on environmental matters.

### 2.3 WATER QUALITY MONITORING

Water quality monitoring was conducted regularly during the instream construction works; refer to the water quality monitoring sheet in Appendix B for details. There were several occurrences of spikes in turbidity above background levels that occurred during in stream works.

There were spikes in turbidity on July 16<sup>th</sup>, downstream of site works, that were caused by the installation of the upstream culvert diversion. Turbidity readings reached 38.1 NTU, but was non-persisting and returned to within threshold (>8 NTU). On July 17<sup>th</sup>, boulders and fill was added to the downstream area below the culverts, causing a spike in turbidity of 45.7 NTU, dropping to 20.6 NTU, and within an hour, levels were back within threshold. On July 18<sup>th</sup>, no instream works were conducted, and all turbidity levels remained within threshold. On July 19<sup>th</sup>, removal of fill around the remaining culvert presented low risk for introducing turbidity to site. The reconstructed stream bed beside the remaining culvert was washed in 20-minute intervals, followed by a period of rest to allow turbidity spikes to return back to within threshold. Turbidity was at its peak reading 32.7 NTU, and another reading of 24.8 NTU. No further instream works occurred that day, and site remained within threshold with a final reading of 1.12 NTU. On July 20<sup>th</sup>, crews diverted stream flow into the reconstructed streambed. High readings of turbidity were expected during this event, reading at 208 NTU. Within three hours, turbidity returned to within threshold, at 6.86 NTU. Another spike in turbidity occurred in the afternoon, but returned to threshold within the hour. No further instream works were conducted. On July 21<sup>st</sup>, no instream works occurred, and all readings remained within threshold throughout construction activities. On July 22<sup>nd</sup>, a spike in turbidity was recorded at 77.2 NTU during the removal of the remaining half of culvert. Another series of turbidity spikes occurred as crews filled in the scour pool at the lower end of site, reconstructed the stream bed, and added boulder features. The levels were recorded at its highest at 237 NTU. The site returned within threshold at 12:45 pm, and no further spikes in turbidity were recorded.

### 2.4 EROSION AND SEDIMENT CONTROL

Site isolation was employed during the Project, since excavation below the wetted perimeter of the creek was required by design. Throughout the Project, sediment fences were kept on site as contingent erosion and sediment control (ESC) measures. Post construction, the exposed cut slopes of the new crossing will be seeded and mulched with straw by Canfor (or delegate) to mitigate erosion and sedimentation. No additional erosion and sediment control measures were required at the time of construction, due to the favourable weather conditions (i.e., dry) and clear span bridge design (**Photos 11, 33**. Appendix A).

## 2.5 SPILL PREVENTION AND RESPONSE

Spill response materials were brought to site by the Contractor, including, and standard spill kits. Prior to commencement of construction activities, the EM visually inspected all equipment on site. All equipment used was equipped with bio-degradable hydraulic fluid and free of leaks, sediment build-up, and excess grease. Fuelling, maintenance, and overnight parking occurred in a cleared area next to the road, which was 30m away from any watercourse or water body. No spills or leaks were observed or reported throughout the duration of the Project.

# 3.0 CONSTRUCTION ACTIVITIES AS RELATED TO THE CEMP

## 3.1 SITE ACCESS MANAGEMENT AND STAGING

As the Table FSR is an existing road system, access to the Project site was along the existing roadway. Construction equipment stayed on the existing roadway while completing the works. The FSR was closed to traffic at the site during construction until the road elevation works were completed. All machines were free from leaks of fluid or fuel, and sediment buildup. During access, the following BMPs were followed:

- Minimize disturbance while accessing the Project site.
- Minimize clearing and grubbing around the crossing.
- Any temporary access detour, haul road, or staging area was constructed to accommodate all required uses and maintained throughout construction in an environmentally sound manner.

## 3.2 START-UP AND ENVIRONMENTAL BRIEFING

An initial kick-off meeting was held prior to the start of any construction on July 16<sup>th</sup>, 2024. Items discussed included: review of the CEMP; review of project execution methods; review of mitigation measures and a review of other environmental management issues which could arise while completing work adjacent to the stream. All team members present at the start up and environmental briefing signed-off on the environmental orientation record form. Any new employees arriving to site after the initial meeting were briefed on the CEMP on an as needed basis by the EM (or delegate).

## 3.3 CLEARING AND GRUBBING

Minimal vegetation clearing was required on the approaches as the road was established prior to the start of the Project. Since works were scheduled outside the vegetation clearing window (August 20<sup>th</sup> to April 20<sup>th</sup>), an active bird nest survey was completed on July 16<sup>th</sup> and 17<sup>th</sup>, 2024 (Section 2.1).

## 3.4 SITE ISOLATION AND SALVAGES

Amphibian salvages were carried out prior to and during construction works, as chance encounters were anticipated throughout works. Amphibian surveys were conducted throughout works, and were required on July 17<sup>th</sup>, 19<sup>th</sup>, and 20<sup>th</sup> when amphibians were found within the work boundaries. A total of five adult Western toad (*Anaxyrus boreas*) were salvaged from work areas on throughout these days (**Photos 15, 27**) Appendix A) and were relocated approximately 30m on either the upstream or downstream side where they were originally located. The salvages were conducted adhering to the *Best Management Practices for Amphibian and Reptile Salvages in British Columbia* (MFLNRORD, 2016). Table 1 summarize the species, lifestage and total number of individuals captured during the Project Works.

**Table 1. Amphibian Salvage Summary Table**

DATE (DD/MM/YY), TIME	COORDINATES	STAGE	SVL / SUL	RELOCATION SITE ID	SPECIES	TOTAL # OF INDIVIDUALS CAUGHT
17/07/2024 08:00	10 U 549971 6065137	A	5.3	Upstream Site	Western toad	1
19/07/2024 11:45	10 U 549972 6065132	A	6.0	Downstream Site	Western toad	1
20/07/2024 09:22, 12:13, 14:30	10 U 549971 6065134	A	4.2-8.5	Downstream Site	Western toad	3
22/07/2024 N/A	10 U 549971 6065134	J	2.0	Downstream site	Western toad	2

A fish salvage was conducted on July 16th and 19th, 2024 (**Photos 1-4**). The salvage was conducted utilizing a backpack electrofisher and dipnets. Fish were captured and released on the same side of the culvert they were salvaged on. Fish salvaged on the downstream side of the culvert were released downstream, and fish salvaged on the upstream side of the culvert were released upstream. The salvaged conducted on July 19<sup>th</sup> was due to a breach in the downstream isolation fence. The salvage results are summarized in Table 2.

**Table 2. Fish Salvage Summary Table**

FISH SPECIES (COMMON NAME)	FISH SPECIES (SCIENTIFIC NAME)	SPECIES CODE	LIFESTAGE	FISH LENGTH (MM)	TOTAL NUMBER CAUGHT
Rainbow Trout	<i>Oncorhynchus mykiss</i>	RB	J	Min length: 60 Max length: 124	26
Bull Trout	<i>Salvelinus confluentus</i>	BT	J	215	1

### 3.5 CULVERT REMOVAL AND STREAMBED RECONSTRUCTION

Works began on July 16<sup>th</sup>, when materials and equipment were hauled to site. In order to remove the western culvert, crews first installed a diversion that directed flow into the eastern culvert (**Photo 5**). Road material was pulled back from culvert, then removed. On July 17<sup>th</sup>, the excavator placed six large boulders on the downstream end according to the engineering drawings, and filled in the eastern pool with fill (**Photos 9, 10**). The eastern key was excavated and the banks were shaped, and geotextile cloth was added prior to riprap placement (**Photos 11-13**). On July 18<sup>th</sup>, a lowbed delivered the remaining bridge components to the staging site (**Photo 14**). Due to the large amount of excess fill excavated from site, a rock truck was brought in to transport it offsite. Welding, painting, and compaction activities were conducted throughout the day for bridge piling installation. On July 19<sup>th</sup>, grouting activities were performed in the morning while the weather remained cool. Grouting presented a very low risk to impacting the water course, as the works were completed several meters away (**Photo 16**). For 20-minute intervals, crews washed the partially reconstructed stream bed on the eastern side to aid in sealing the channel (**Photos 17, 18**). On July 20<sup>th</sup>, the remaining boulders were added to the stream bed in preparation for switching over the diversion. The diversion was directed into the stream bed to allow for the removal of the second culvert on the east side (**Photos 22, 28**). Sandbags were added to the sides of the reconstructed channel to prevent seepage into the western key. The bottom half of the second culvert

was removed, and the excavation of the eastern key commenced (**Photo 23**). Geotextile fabric was placed, and riprap was added overtop (**Photo 24, 25**). On July 21<sup>st</sup>, welding, painting, and compaction activities were conducted throughout the day (**Photo 30**). Grouting occurred in a very low risk location, with the EM on standby to measure pH. Some backfilling also occurred. On July 22<sup>nd</sup>, the final section of culvert was removed by excavator (**Photo 32**). Both excavators completed streambed restoration activities from both sides of the banks. Remaining rock material was used to ensure the correct gradient and width was applied to the reconstruction (**Photos 35, 36**).

The environmental monitor was present throughout all instream works, and no spills, or ESC issues were observed or reported.

### 3.6 REVEGETATION

Canfor (or their delegate) will seed the exposed soil areas along the new cut slopes of the crossing with a regionally appropriate seed mix and cover them with straw mulch.

## 4.0 SUMMARY

Overall, the Project proceeded with minimal environmental impact. Road works were conducted in careful manner that did not cause any impacts to the surrounding environment. The EM was present during all instream works and no incidents, spills or concerns were recorded. Water quality monitoring was conducted during construction works, and while some exceedances were recorded, works were temporarily stopped as needed for turbidity levels to return to normal, acceptable ranges. The fish and amphibian salvages were conducted prior to and during works, with a total of 27 fish and 5 toads captured, and relocated. The cleared staging area and other locations of exposed soils excluding the road surface will be seeded with a regionally appropriate seed mix and mulched with straw, by Canfor (or delegate).

## 5.0 REFERENCES

- BC Ministry of Forests, Lands and Natural Resource Operations. 2012. Fish-stream Crossing Guidebook.
- Department of Fisheries and Oceans Canada (DFO). 2019. Measures to protect fish and fish habitat. Government of Canada. Available from: <https://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures-eng.html>
- DWB Consulting Services Ltd (DWB). 2023. Construction Environmental Management Plan – 21 Km Table FSR – Culvert Replacement and Streambed Reconstruction. Prepared for Canfor Group Forest Products Ltd.

# **Appendix A**

## **Site Photos**



**Photo 1.** Fish exclusion netting setup for salvage (July 16, 2024).



**Photo 2.** Perched, downstream culverts, view of outlet. (July 16, 2024).



**Photo 3.** Rainbow trout captured during salvage. (July 16, 2024).



**Photo 4.** Bull trout captured during salvage. (July 16, 2024).



**Photo 5.** Diversion of stream into single culvert. (July 16, 2024).



**Photo 6.** Pump with spill tray used. (July 16, 2024).



**Photo 7.** Removal of western culvert. (July 16, 2024).



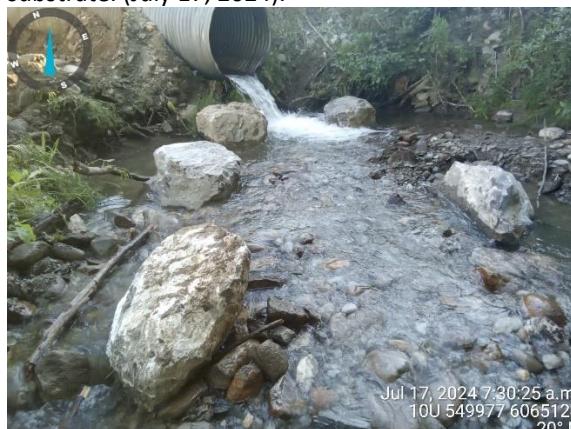
**Photo 9.** Addition of rock features to western side of stream. (July 17, 2024).



**Photo 11.** Fabric laid down prior to riprap placement in key. (July 17, 2024).



**Photo 8.** One of two downstream pools to be filled with substrate. (July 17, 2024).



**Photo 10.** Rock features finished downstream of culvert. (July 17, 2024).



**Photo 12.** Riprap placement on western bank. (July 17, 2024).



**Photo 13.** Excavation of material for bridge piling placement. (July 17, 2024).



**Photo 15.** Western toad relocated from site. (July 18, 2024).



**Photo 17.** Washing stream bed prior to flushing. (July 19, 2024).



**Photo 14.** Staging of materials delivered to site. (July 18, 2024).



**Photo 16.** Installation of piles/footings, with welding and grouting completed. (July 19, 2024).



**Photo 18.** Turbidity entering stream during washing. (July 19, 2024).



**Photo 19.** Overview of site works. (July 19, 2024).



**Photo 20.** Flow diversion and partially reconstructed right bank. (July 19, 2024).



**Photo 21.** Equipment staged with spill tray. (July 19, 2024).



**Photo 22.** Diversion to reconstructed stream bed at inlet side of crossing. (July 20, 2024).



**Photo 23.** Removal of the lower half of the eastern culvert. (July 20, 2024).



**Photo 24.** Commencement of the eastern key excavation. (July 20, 2024).



**Photo 25.** Excavator adding fill into key. (July 20, 2024).



**Photo 26.** Clear flow through stream bed after flushing. (July 20, 2024).



**Photo 27.** Western toad salvaged from area of riprap. (July 20, 2024).



**Photo 28.** Pump with spill tray at diversion. (July 20, 2024).



**Photo 29.** Footing placement in key. (July 21, 2024).



**Photo 30.** Installation of piles/footings, with welding and grouting completed. (July 21, 2024).



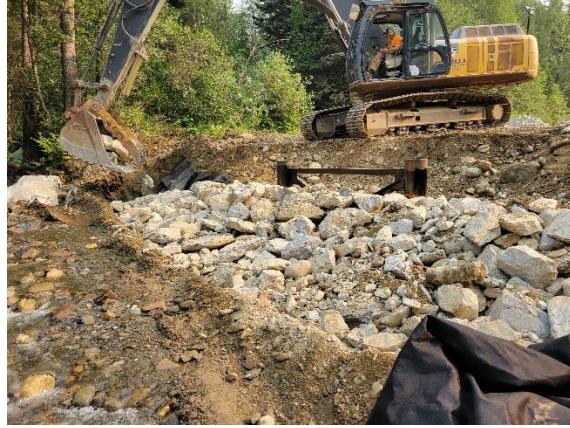
**Photo 31.** Backfilling of spread footings. (July 22, 2024).



**Photo 32.** Temporary turbidity spike upon removal of culvert and flushing of stagnant water. (July 22, 2024).



**Photo 33.** Riprap placement over geotextile fabric. (July 22, 2024).



**Photo 34.** Riprap installation along eastern bank. (July 22, 2024).



**Photo 35.** Streambed reconstruction with boulder placement. (July 22, 2024).



**Photo 36.** Reconstructed stream bed. (July 22, 2024).



**Photo 37.** Placement of steel girder. (July 22, 2024).



**Photo 38.** Girder launch. (July 22, 2024).



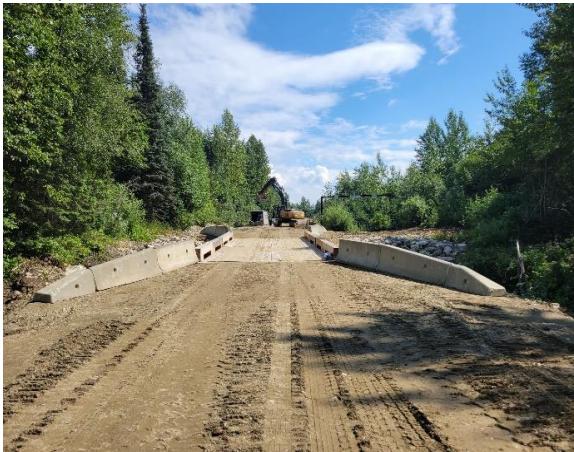
**Photo 39.** Bridge deck installation and final inspection. (July 24, 2024).



**Photo 40.** Reconstructed channel under bridge. (July 24, 2024).



**Photo 41.** Area of site to be seeded and mulched. (July 24, 2024).



**Photo 42.** Completed bridge. (July 24, 2024).

# **Appendix B**

## **Water Quality Monitoring Data**

DATE (DD/MM/YY), TIME	STATION LOCATION	STATION UTM	TURBIDITY (NTU)	COMMENTS
16/07/2024 13:05	Station 1: Upstream (US)	10 U 549972 6065144	0.46	~5 m upstream of upper fish isolation fence.
16/07/2024 13:10	Station 2: Downstream (DS)	10 U 549970 6065125	0.86	~5 m downstream of lower fish isolation fence.
16/07/2024 13:55	US	10 U 549972 6065144	0.49	
16/07/2024 14:00	DS	10 U 549970 6065125	<b>38.1</b>	Diversion at inlet installed. Small turbidity spike seen during isolation installation, but recorded to return to baseline by the end of the day.
16/07/2024 14:25	DS	10 U 549970 6065125	5.73	
16/07/2024 14:30	DS	10 U 549970 6065125	2.11	
16/07/2024 16:00	DS	10 U 549970 6065125	0.82	
16/07/2024 16:05	DS	10 U 549970 6065125	0.66	Culvert pulled. Little to no water flowing through isolated channel of removed culvert.
16/07/2024 16:20	DS	10 U 549970 6065125	0.36	No further instream works.
<hr/>				
17/07/2024 6:00	Station 1: Upstream (US)	10 U 549972 6065144	0.81	~5 m upstream of upper fish isolation fence.
17/07/2024 6:05	Station 2: Downstream (DS)	10 U 549970 6065125	0.47	~5 m downstream of lower fish isolation fence.
17/07/2024 7:20	DS	10 U 549970 6065125	<b>45.7</b>	Boulders added to DS section of streambed, below outlet. Pool below culvert filled.
17/07/2024 7:30	DS	10 U 549970 6065125	<b>20.6</b>	Installation of complexity boulders.
17/07/2024 8:30	DS	10 U 549970 6065125	1.43	
17/07/2024 21.1	DS	10 U 549970 6065125	<b>21.1</b>	Introduction of flows into new channel.
17/07/2024 1.66	DS	10 U 549970 6065125	1.66	No further instream works.
<hr/>				
18/07/2024 9:15	Station 1: Upstream (US)	10 U 549972 6065144	0.44	~5 m upstream of upper fish isolation fence.
18/07/2024 9:20	Station 2: Downstream (DS)	10 U 549970 6065125	0.63	~5 m downstream of lower fish isolation fence.
18/07/2024 12:15	US	10 U 549972 6065144	0.49	
18/07/2024 12:20	DS	10 U 549970 6065125	0.51	
18/07/2024	DS	10 U 549970 6065125	0.76	

14:00				
18/07/2024 16:00	DS	10 U 549970 6065125	0.90	No instream works.
<hr/>				
19/07/2024 7:15	Station 1: Upstream (US)	10 U 549972 6065144	1.31	~5 m upstream of upper fish isolation fence.
19/07/2024 7:20	Station 2: Downstream (DS)	10 U 549970 6065125	0.16	~5 m downstream of lower fish isolation fence.
19/07/2024 11:50	US	10 U 549972 6065144	1.01	Removal of fill around second culvert (low risk).
19/07/2024 11:55	DS	10 U 549970 6065125	2.23	
19/07/2024 12:06	DS	10 U 549970 6065125	<b>24.8</b>	Washing streambed (~20 mins).
19/07/2024 13:40	DS	10 U 549970 6065125	<b>32.7</b>	Washing streambed (~20 mins).
19/07/2024 14:30	DS	10 U 549970 6065125	1.12	No further instream works.
<hr/>				
20/07/2024 7:20	Station 1: Upstream (US)	10 U 549972 6065144	0.03	~5 m upstream of upper fish isolation fence.
20/07/2024 7:25	Station 2: Downstream (DS)	10 U 549970 6065125	0.41	~5 m downstream of lower fish isolation fence.
20/07/2024 9:40	DS	10 U 549970 6065125	<b>208</b>	Channel diversion/sediment flush through reconstructed western channel.
20/07/2024 10:50	DS	10 U 549970 6065125	<b>33.2</b>	
20/07/2024 11:40	DS	10 U 549970 6065125	<b>60.6</b>	Small turbidity spike seen during diversion installation, but recorded to return to baseline within 24 hours.
20/07/2024 12:40	DS	10 U 549970 6065125	<b>31.3</b>	
20/07/2024 13:40	DS	10 U 549970 6065125	6.86	Back within threshold.
20/07/2024 14:30	DS	10 U 549970 6065125	<b>21.4</b>	
20/07/2024 15:40	DS	10 U 549970 6065125	5.17	Back within threshold.
<hr/>				
21/07/2024 6:00	Station 1: Upstream (US)	10 U 549972 6065144	0.48	~5 m upstream of upper fish isolation fence.
21/07/2024 6:05	Station 2: Downstream (DS)	10 U 549970 6065125	0.07	~5 m downstream of lower fish isolation fence. No instream works.
<hr/>				
22/07/2024 7:00	Station 1: Upstream (US)	10 U 549972 6065144	0.04	~5 m upstream of upper fish isolation fence.
22/07/2024 7:05	Station 2: Downstream (DS)	10 U 549970 6065125	0.42	~5 m downstream of lower fish isolation fence.
22/07/2024 7:19	US	10 U 549972 6065144	0.03	

22/07/2024 7:22	DS	10 U 549970 6065125	<b>77.2</b>	Removal of culvert.
22/07/2024 8:19	US	10 U 549972 6065144	0.56	
22/07/2024 8:22	DS	10 U 549970 6065125	7.13	
22/07/2024 10:36	DS	10 U 549972 6065144	<b>237</b>	Introduction of flows into completed stream channel. Turbidity recorded to drop within acceptable range within 4 hours.
22/07/2024 12:06	DS	10 U 549970 6065125	<b>43.8</b>	
22/07/2024 12:22	DS	10 U 549972 6065144	<b>20.6</b>	
22/07/2024 12:45	DS	10 U 549970 6065125	5.06	Back within threshold. No further instream works.