



APPENDIX G.2.6

Tote Road Fish Habitat Monitoring Annual Report



**BAFFINLAND IRON MINES CORPORATION
MARY RIVER PROJECT**

**2023 TOTE ROAD FISH HABITAT MONITORING
ANNUAL REPORT**

April 30, 2024	0	C. Devereaux	L. Kamermans
			
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SECTION 1.0 - INTRODUCTION

1.1 MARY RIVER PROJECT

The Mary River Project (the Project) is an iron ore mining project operated by Baffinland Iron Mines Corporation (Baffinland) located in the North Baffin region of Baffin Island, Nunavut. Commercial open pit mining, including pit bench development, ore haulage, and ore stockpiling, as well as the crushing and screening of high-grade iron ore, commenced at the Project Mine Site in 2015. Ore from the Project Mine Site is transported in haul trucks along the Tote Road to Milne Port, located approximately 100 kilometres (km) north of the Mine Site, where it is stockpiled. At Milne Port, the ore is loaded onto bulk carrier ships for transport to international markets during the shipping season. Detailed descriptions of the Project and annual activities can be found in reports from Knight Piésold (2007b, 2008) and Baffinland (2009 to 2021, incl.).

The Tote Road was first established in the 1960s and extends approximately 100 kilometres between the Mary River Mine Site (Mine Site) and Milne Port. Currently, the Tote Road is used as a means of transport of iron ore, personnel, equipment, and supplies between the Mine Site and Milne Port. Since 2013, there have been ongoing upgrades to sections of the Tote Road as part of the construction and operation of the Early Revenue Phase (ERP) for the Project, to mitigate sedimentation and erosion concerns, and to safely and efficiently transport iron ore from the Mine Site to Milne Port. Tote Road upgrades and improvements have included the following activities:

- Several clear span bridges were constructed in 2014 replacing sea container crossings;
- Widening, straightening and realignment of sections of the Tote Road at strategic locations;
- Addition of protective armouring on several road embankments and erosion mitigation measures; and
- Continued installation, movement and/or extension of culverts at identified stream crossings to maintain and restore fish passage, improve transportation safety and minimize erosion/sedimentation.

Baffinland continues to work with the QIA and DFO to address outstanding issues and implement remedial works and upgrades at 20 priority culvert crossings along the Tote Road. Two permanent crossing plans have been developed in consultant with DFO to execute remedial works. Plans for 2023 - 2025 include the replacement and upgrade of 20 priority culverts that have been identified

by Fisheries and Oceans Canada, with the plans and authorizations handled in coordination with DFO outside of the scope of this annual report.

1.2 AUTHORIZATION FOR WORKS

Fisheries and Oceans Canada (DFO) (1998) defined Harmful Alteration, Disruption or Destruction (HADD) as: “any meaningful change in one or more habitat components that can reasonably be expected to cause a real reduction in the capacity of the habitat to support the life requisites of fish”. A HADD occurs when the physical, chemical, or biological features of a water body are sufficiently altered, such that habitat becomes less suitable for one or more life history processes of fish. Detailed descriptions of the 2007 HADD authorization and any related amendments and Letters of Advice can be found in previous annual reports (Knight Piésold 2007b, 2008; Baffinland 2009 to 2021, incl.) and the Fish Habitat No Net Loss and Monitoring Plan as described by Knight Piésold (2007a). Habitat compensation is defined by DFO (1998) as “the replacement of natural habitat, increase in the productivity of existing habitat, or maintenance of fish production by artificial means in circumstances dictated by social and economic conditions, where mitigation techniques and other measures are not adequate to maintain habitats for Canada’s fisheries resources”.

A total of thirty-seven (37) fish-bearing crossings were originally identified as potential HADD locations (August 2007 *Fisheries Act* Authorization), those that require potential compensation, and those sites identified in the Letter of Advice (LOA) in the August 2007 No Net Loss and Monitoring Plan and/or subsequent amendments that have been monitored annually since 2008/2009 and were re-surveyed in spring 2023 (Figure 1). Twelve crossings previously determined to be non-fish bearing have been re-categorized as known or potential fish habitat following the completion of additional baseline surveys to support permitting for proposed expansion plans. Twenty-one (21) fishless crossings that were originally identified in the August 2007 No Net Loss and Monitoring Plan, and/or subsequent amendments that are periodically surveyed to confirm continued lack of fish use, were not visited in 2023 following two consecutive years (2019-2020) of surveys that confirmed the original determinations of non-fish bearing status.

In addition to monitoring of fish passage at stream crossings, crossings were surveyed for potential issues with erosional and sedimentation condition and/or performance. Crossings requiring remediation for potential fish passage issues (e.g., perched culverts) were identified, and remediation plans will be developed.

Additionally, throughout 2023, Baffinland continued to develop a plan to address fish passage issues, and to engage with DFO as the plan was developed. On January 19, 2024, DFO issued a Letter of Advice for Baffinland's Tote Road Culvert Remediation proposal to implement a permanent crossing solution for ten (10) corrugated steel pipe (SCP) crossings along the Tote Road. Tote Road culvert upgrades work under the DFO Letter of Advice (LOA) is ongoing and updates will be provided in subsequent annual reports.

1.3 REPORTING

Annual reports have previously been submitted for the years 2007 to 2021 (Knight Piésold 2007b, 2008 and Baffinland 2009 to 2021, incl.).

This 2023 Annual Report, herein, covers the period of activity up to and including December 31, 2023. It summarizes the fish habitat monitoring results and provides a record for additional works or undertakings completed in accordance with the approved No Net Loss and Monitoring Plan (Knight Piésold 2007a) and conditions of the authorization, subsequent amendments, and Letters of Advice.

SECTION 2.0 - PROJECT DESCRIPTION

2.1 CONSTRUCTION WORK

Design summaries and descriptions of work along the Tote Road completed up to the end of 2009 are presented, in detail, in Knight Piésold (2007c) and Baffinland (2009). Road construction activities and installation of fish access improvement structures at some crossings are described in Baffinland's annual reports to DFO (2010 to 2021, incl.).

In order to safely and efficiently transport iron ore from the Mine Site to Milne Port during the early operational period of the mine, the existing Tote Road has been further upgraded (sections were straightened, widened and/or moved) to accommodate large haul trucks and in addition to mitigate sedimentation and erosion. The first phase of the upgrades involved replacement of sea container crossings with bridges. Bridge installation was completed during the winter of 2013/14 and seacan container crossings were removed at all locations by early 2017. Modifications to accommodate upgrades to the Tote Road and specific water crossings to support the ERP of the Project commenced in 2013 and remain ongoing. Baffinland has received approvals from DFO and the NWB in the form of LOAs (Appendix A) and email correspondence to proceed with these changes.

There was no construction work at fish-bearing stream crossings along the Tote Road during the open water period in 2023. However, culvert maintenance was conducted on 20 culverts on the Tote Road to stabilize road embankments, remediate erosion zones, remove sediment deposits at silt fencing and swales, add rip rap to swales with check dams, and installation erosion and sediment controls (ESC) where required. Table 1 summarizes the locations and activities where culvert maintenance was conducted in 2023 while Appendix C provides a photographic record of the activities completed.

Future Tote Road improvements/realignments required in support of on-going operations and future expansion projects will follow the latest guidance received from DFO and ensure development of permanent crossing remedial plans. Baffinland will work with the DFO as necessary to ensure planned modifications to fish bearing crossings are in compliance of the *Fisheries Act* and the interim codes of practice for culvert maintenance and temporary cofferdams and diversion channels (as published).

2.2 FISH HABITAT ASSESSMENT

Watercourses initially identified as HADD (n = 25), compensation (n = 12), and LOA (n = 23) sites (Knight Piésold 2007a) were assessed for quality of available fish habitat at least once between 2006 and 2009 (Baffinland 2009). Three sites (CV-183, CV-181, and BG-16) originally identified as

potential compensation sites at the onset of the program were not revisited in recent surveys because:

- Sites CV-183 and CV-181 no longer exist (these crossings were removed during initial construction upgrades in the winter of 2008/2009).
- Site BG-16 was originally identified as a compensation site during the 2007 habitat assessment based on a desktop assessment rather than a field assessment. After a field habitat assessment conducted at the crossing in 2009 confirmed that BG-16 was not a fish bearing crossing, it was removed from the compensation site classification (Baffinland 2009).

In 2020, two additional fishless sites (CV-176 and CV-167) were removed from the compensation site list and LOA classifications, respectively. The stream crossing at CV-176 was significantly altered during the installation of authorized infrastructure that included diversions and infills of stream reaches, where laydowns were constructed at the Port Site, and consequently the crossing no longer exists in its natural state. Site CV-167 was incorrectly identified as fish habitat.

Sites confirmed as fish habitat were monitored annually from 2010-2023 while fishless sites have been monitored periodically, including in 2019 and 2020, to confirm the continued presence of natural barriers to fish passage preventing access to the crossing area (Knight Piésold 2007b, 2008, Baffinland 2009 to 2022, incl.).

The primary objectives of the spring 2023 monitoring program were to assess the presence of fish, habitat quality, and upstream accessibility through installed culverts at fish-bearing sites and identify crossings that require remediation to fish habitat or passage through culverts.

Habitat and fish surveys were conducted along 50 m reaches upstream and downstream of each applicable crossing. Fish presence was determined through visual surveys and the use of a backpack electrofisher. In previous years, both methods have proven to be highly reliable techniques for determining fish presence/absence in the clear, shallow streams that are typical of the study area. All captured fish were identified to species, enumerated, measured for fork length (mm) and examined for evidence of any external health issues including deformities, erosions, lesions, or tumours (DELTs), physical injuries, and overall health (i.e., skinny individuals).

The 2023 habitat assessments were conducted in more detail than recent surveys in order to better compare pre- and post-remediation conditions and quantify predicted improvements to habitat and fish access. Detailed habitat data were recorded at 20 m, 60 m, and 100 m intervals (i.e., transects across the stream channel) upstream and downstream of the culvert. Data collected included bankfull and wetted widths, water depths and velocities, stream morphology, and proportions of various substrate sizes. Representative photos of available habitat were taken

at each transect. The condition of culverts, as well as water inflow and outflow velocity and depth, were also noted for each fish-bearing culvert at each crossing. Results of the 2023 stream crossing monitoring surveys are summarized in Section 3.0. Detailed results for each of the fish-bearing crossings are presented in habitat assessment sheets within Appendix B.

Compensation works completed for the Tote Road prior to 2009 are described in detail in Knight Piésold (2007a) and the results of recent compensation works (e.g., rustic fishway at BG-30) and detailed fish habitat and fish use surveys from 2009 to 2021 are presented in Baffinland (2009 to 2021, incl.). Following successful completion of habitat works at BG-30 (Baffinland 2012), there was a net habitat gain of approximately 1,050 km², which together with other gains met the compensation goals described in Knight Piésold (2007a). Fish presence upstream of the fishway in BG-30 has been confirmed during site visits from 2013-2023, indicating continuous structural integrity and successful fish passage.

Monitoring will continue in 2024 to assess fish passage at crossings on fish-bearing streams and to assess the condition and performance of the crossings including the crossings with significant modification as a result of recent upgrades and remedial works completed in 2024 that have been approved by DFO.

SECTION 3.0 - AQUATIC MONITORING

An aquatic monitoring program was developed to ensure that all measures and works specified in the No Net Loss and Monitoring Plan (Knight Piésold 2007a), as well as the *Fisheries Act* Authorization and amendments have been implemented and are functioning as intended. Details of aquatic monitoring conducted up to 2021 are provided in Knight Piésold (2007b, 2008) and Baffinland (2009 to 2021, incl.). Aquatic monitoring in 2023 focused on assessing any changes to fish habitat and fish passage at all fish-bearing crossings and to collect detailed habitat data prior to initiation of 2024 remediation works.

3.1 CONSTRUCTION AND TURBIDITY MONITORING

There was no in-stream construction work at HADD, compensation, or LOA classification crossings during periods of flow that required turbidity monitoring in 2023.

3.2 WATER QUALITY MONITORING OF BASELINE FISHERIES CULVERTS

Water quality monitoring data from Knight Piésold baseline monitoring work performed during 2005 and 2006, in conjunction with monitoring of the same crossings from 2015-2023 are presented in Table 2.

3.3 FISH USE ASSESSMENTS

Spring fish use assessments were conducted at forty-nine (49) fish-bearing crossings along the Tote Road from June 30th to July 11th 2023 (Figure 1, Table 3). Water temperature, velocities, and depths within the culverts at the inflow and outflow and the height of any perches were recorded.

Tables 4 and 5 present catch statistics for Arctic Char and Ninespine Stickleback, respectively, from each of the 49 sites surveyed in spring 2023. See Appendix B for additional site-specific habitat details, photographs, and a summary of fish habitat use.

Table 6 summarizes habitat and fish use assessments for the surveyed sites and provides descriptions of potential fish passage or habitat issues noted in the spring survey. A detailed summary of issues is provided in Section 3.5.

Overall, catch totals in 2023 were lower relative to previous years at many crossings as presented in previous annual reports (Baffinland, 2009 to 2021, incl.). These reduced catch rates were attributed to high flows and low water temperatures at the time of the survey (i.e., fish movements from overwintering habitat into tributary streams were likely limited at the time of the survey). Spring electrofishing surveys captured or observed one hundred and nine (109) juvenile Arctic Char at nineteen (19) crossings (Table 4).

Site CV-115, which had been previously identified as fish-bearing (in 2010) but has insufficient flows since 2016, was not surveyed in 2023 due to insufficient water depth in the channel. The most recent survey during which the stream at CV-115 was sufficiently wetted to provide fish habitat during the survey periods was in 2016, when it consisted of isolated pools each containing a few stranded juvenile Arctic Char (Baffinland 2016).

Seventeen (17) Ninespine Stickleback were captured at nine (9) of the crossings in spring 2023 (Table 5). One site (BG-03) previously classified as potential fish habitat was confirmed as fish habitat in 2023 when two Ninespine Stickleback were captured downstream of the culvert; char were not captured or observed at this site in 2023 or previous surveys.

Site-specific Arctic Char catches in spring ranged from zero to thirty-three (33) fish and catch-per-unit-effort (CPUE) ranged from 0.00 to 16.27 fish/minute (Table 4). Site-specific Ninespine Stickleback catches in spring ranged from zero to five (5) fish and CPUE ranged from 0.00 to 1.59 fish/minute (Table 5).

The fork length of captured Arctic Char ranged from 42-420 mm (mean = 101 mm; Table 4). Nearly 62% of the catch had fork lengths between 110-189 mm with a mode of 110-119 mm (Figure 2), which is larger than in previous surveys when conducted at higher water temperatures and lower flows. Ninespine Stickleback fork length ranged in size from 45-84 mm (Table 5).

There were no DELTs present on any of the fish captured in the spring 2023 survey, which is typical for char and stickleback in the study area. Additionally, no abnormal behaviour, physical injuries, or other indications of poor condition of fish were observed during the field programs.

3.4 REMEDIATION WORKS

Tote Road monitoring in spring 2023 identified twenty-one (21) sites with potential issues requiring remediation at the culvert crossings (Table 6). Some of these issues have been identified in previous years while others were first observed in spring 2023. Baffinland has discussed proposed remediation actions for several sites with the DFO to decide upon a practical course of action and implementation schedule. Eight (8) crossings (CV-129, CV-114, CV-111, CV-106, CV-061, CV-061b, BG-50, and CV-216) had perched fish passage culverts in spring 2023. Previous remediation measures involving the construction of rocky ramps or backwatering structures have shown some success at crossings with small perch heights (e.g., CV-129, CV-216), but they may not be sustainable in the long-term. Crossings BG-01, BG-17, BG-24, BG-30, BG-50, CV-078, CV-079, CV-11, CV-224, CV-225, CV-106, CV-114 and CV-216 are included in the 2024/2025 remediation plan. Baffinland has been and will continue to work with all stakeholders to finalize remediation work for addressing the perched culvert outlets at these crossings.

The spring 2023 survey identified that culverts at CV-057 and CV-059 were partially buried by sediment. These culverts have since been remediated in 2024 and details will be provided in the subsequent annual report.

Baffinland has discussed proposed remediation works with the DFO prior to instream remediation work proceeding at ten (10) priority fish bearing crossings during winter 2023/2024. The remediation of priority crossings CV-114, CV-112, CV-106, CV-102, CV-059, CV-057, BG-27, BG-04, CV-216 and CV-001 is to be completed as per, Final Memo-10 Round CSP Culverts to DFO, (January 15, 2024), and as per the final plans reviewed and approved by the DFO. Planned modifications to culverts and road embankments are to comply with the *Fisheries Act* and the interim codes of practice for culvert maintenance and temporary cofferdams and diversion channels (as published).

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TABLES AND FIGURES

TABLE 1. Erosion and Sediment Controls implemented in 2023

CROSSING ID	DATE	APPROXIMATE ROAD KM	EASTING	NORTHING	UPSTREAM	DOWNSTREAM	ESC CONTROLS
BG-01	09-Aug-24	100	558000	7914928	* Road embankment reinforced with rip-rap stone to the North and South of culvert	* Road embankment reinforced with rip-rap stone to the North and South of culvert	* Silt fences installed on DS prior to work commencing
CV-224	27-Jul-24	97.5	556238	7915045	* Swales on North and South of culvert were reinforced with rip-rap stone, check dams installed in Swales * Road embankment reinforced with rip-rap stone to the North and South of culvert	* Swales on North and South were reinforced with rip-rap stone, check dams installed in Swales * Road embankment reinforced with rip-rap stone to the North and South of culvert * Old silt fence removed and silt collected by fence, New silt fence installed in same location after sediment removal	* Old silt fence removed and silt collected by fence, New silt fence installed in same location
CV-001	27-Jul-24	94.5	553544	7914896	* Swales on North and South of culvert were reinforced with rip-rap stone, check dams installed in Swales * Road embankment reinforced with rip-rap stone to the North and South of culvert	* Swales on North and South of culvert were reinforced with rip-rap stone, check dams installed in Swales * Road embankment reinforced with rip-rap stone to the North and South of culvert	* Silt fences installed US and DS prior to work commencing to contain deleterious substances

CROSSING ID	DATE	APPROXIMATE ROAD KM	EASTING	NORTHING	UPSTREAM	DOWNSTREAM	ESC CONTROLS
BG-04	23-Jul-24	94	553250	7915101	* Road embankment reinforced with rip-rap stone to the North and South of culvert	* Road embankment reinforced with rip-rap stone to the North and South of culvert	* Check dam installed on north swale * old silt fence was now the stream bank and could not be removed. Additional fence added prior to construction commencing
BG-17	23-Jul-23	90	550703	7917643	* Road embankment reinforced with rip-rap stone to the North of culvert * Swale on South of culvert was reinforced with rip-rap stone, check dams installed in Swales	* Road embankment reinforced with rip-rap stone to the North of culvert	*Check dams installed in swales
BG-24	23-Jul-23	88	548766	7918877	* Road embankment reinforced with rip-rap stone to the North and South of culvert	* Road embankment reinforced with rip-rap stone to the North and South of culvert	*Silt fence installed DS along roadway to the south
BG-27	23-Jul-23	86.5	547875	7919356	* Road embankment reinforced with rip-rap stone to the South of culvert * Check dam installed on north swale	* Road embankment reinforced with rip-rap stone to the North and South of culvert	* Check dam installed on north swale

CROSSING ID	DATE	APPROXIMATE ROAD KM	EASTING	NORTHING	UPSTREAM	DOWNSTREAM	ESC CONTROLS
BG-29	23-Jul-23	84	546228	7919872	* Road embankment reinforced with rip-rap stone to the North and South of culvert	* Road embankment reinforced with rip-rap stone to the North and South of culvert	
BG-30	23-Jul-23	84.5	546070	7919843	* Road embankment reinforced with rip-rap stone to the North and South of culvert	* Road embankment reinforced with rip-rap stone to the North and South of culvert	
CV-216	23-Jul-24	80.5	542763	7921725	* Road embankment reinforced with rip-rap stone to the North and South of culvert	* Road embankment reinforced with rip-rap stone to the North and South of culvert	* Silt fence installed US prior to work commencing to contain deleterious substances
CV-215	08-Aug-24	79	541954	7922174	* Road embankment reinforced with rip-rap stone to the North and South of culvert	* Road embankment reinforced with rip-rap stone to the North and South of culvert	* Silt fence installed DS prior to work commencing to contain deleterious substances
CV-030	09-Aug-24	77.5	540097	7921306	* Road embankment reinforced with rip-rap stone to the North and South of culvert	* Road embankment reinforced with rip-rap stone to the North and South of culvert	* Silt fences installed US and DS prior to work commencing to contain deleterious substances
BG-33	23-Jul-23	77	539712	7921096	* No work was needed on this side	* Road embankment reinforced with rip-rap stone to the North and South of culvert	

CROSSING ID	DATE	APPROXIMATE ROAD KM	EASTING	NORTHING	UPSTREAM	DOWNSTREAM	ESC CONTROLS
CV-049	23-Jul-23	63.5	529664	7926551	* Road embankment reinforced with rip-rap stone to the North of culvert	* No work done on this side of culvert	
BG-50	11-Aug-23	63	529316	7926811	* Swale South of culvert were reinforced with rip-rap stone, check dams installed in Swale * Road embankment reinforced with rip-rap stone to the South of culvert	* Swale South of culvert was reinforced with rip-rap stone and check dams * Silt fence and spring berm installed at end of swale * Road embankment reinforced with rip-rap stone to the South of culvert	* Coir log and spring berm installed in US ditch prior to work commencing to contain deleterious substances * Check dams installed in swales
CV-057	17-Aug-23	60.5	528378	7928658	* Road embankment reinforced with rip-rap stone to the North and South of culvert	* Road embankment reinforced with rip-rap stone to the North and South of culvert * Torn culvert end removed	
CV-058	11-Aug-23	60	528318	7928843	* Road embankment reinforced with rip-rap stone to the North and South of culvert	* Road embankment reinforced with rip-rap stone to the North and South of culvert	* Silt fences installed US prior to work commencing to contain deleterious substances

CROSSING ID	DATE	APPROXIMATE ROAD KM	EASTING	NORTHING	UPSTREAM	DOWNSTREAM	ESC CONTROLS
CV-059	30-Jul-23	60	528094	7929348	<ul style="list-style-type: none"> * Road embankment reinforced with rip-rap stone to the North of culvert * Swale South of culvert were reinforced with rip-rap stone, check dams installed in Swale 	<ul style="list-style-type: none"> * Road embankment reinforced with rip-rap stone 	<ul style="list-style-type: none"> * Check dams installed in south Swale
CV-061	22-Aug-23	57.5	527270	7931363	<ul style="list-style-type: none"> * Road embankment reinforced with rip-rap stone 	<ul style="list-style-type: none"> * Road embankment reinforced with rip-rap stone 	
CV-072	22-Aug-23	54	526882	7934609	<ul style="list-style-type: none"> * Road embankment reinforced with rip-rap stone to the North and south of culvert 	<ul style="list-style-type: none"> * No work was needed on this side of culvert 	
CV-078	20-Aug-23	51.5	525852	7936786	<ul style="list-style-type: none"> * Road embankment reinforced with rip-rap stone to the North and South of culvert 	<ul style="list-style-type: none"> * Road embankment reinforced with rip-rap stone to the North and South of culvert * Torn culvert end removed 	<ul style="list-style-type: none"> * Silt fences installed US and DS prior to work commencing to contain deleterious substances
CV-079	13-Aug-23	50	525538	7937313	<ul style="list-style-type: none"> * Road embankment reinforced with rip-rap stone to the North of culvert 	<ul style="list-style-type: none"> * Road embankment reinforced with rip-rap stone to the North of culvert 	<ul style="list-style-type: none"> * Silt fences installed US prior to work commencing to contain deleterious substances

CROSSING ID	DATE	APPROXIMATE ROAD KM	EASTING	NORTHING	UPSTREAM	DOWNSTREAM	ESC CONTROLS
CV-102	14-Aug-23	36	521936	7950590	<ul style="list-style-type: none"> * Road embankment reinforced with rip-rap stone to the North and South of culvert * Silt fence installed at base of road embankment to the south, that was close to open water to eliminate possibility of deleterious substances enter stream while construction takes place 	<ul style="list-style-type: none"> * Road embankment reinforced with rip-rap stone to the North and South of culvert 	<ul style="list-style-type: none"> * Silt fences installed US prior to work commencing to contain deleterious substances
CV-106	14-Aug-23	33	521663	7953391	<ul style="list-style-type: none"> * Road embankment reinforced with rip-rap stone to the North and South of culvert 	<ul style="list-style-type: none"> * Road embankment reinforced with rip-rap stone to the North and South of culvert 	<ul style="list-style-type: none"> Silt fences installed US and DS prior to work commencing to contain deleterious substances
CV-111	14-Aug-23	32	521363	7954522	<ul style="list-style-type: none"> * Swales on North and South of culvert were reinforced with rip-rap stone, check dams installed in Swales * Road embankment reinforced with rip-rap stone to the North and South of culvert 	<ul style="list-style-type: none"> * Road embankment reinforced with rip-rap stone to the North and South of culvert 	<ul style="list-style-type: none"> * Check dams installed in swales

CROSSING ID	DATE	APPROXIMATE ROAD KM	EASTING	NORTHING	UPSTREAM	DOWNSTREAM	ESC CONTROLS
CV-112	14-Aug-23	31.5	521033	7954934	<ul style="list-style-type: none"> * Silt fence removed and replaced to the south * Swales on North and South of culvert were reinforced with rip-rap stone, check dams installed in Swales * Road embankment reinforced with rip-rap stone to the North and South of culvert 	<ul style="list-style-type: none"> * Road embankment reinforced with rip-rap stone to the North and South of culvert 	<ul style="list-style-type: none"> * Silt fences installed US and DS prior to work commencing to contain deleterious substances
CV-114	12-Aug-23	29	520273	7956530	<ul style="list-style-type: none"> * Road embankment reinforced with rip-rap stone to the North and South of culvert * Swale to the north on the upstream side was reinforced and had check dams installed * Silt fence installed at base of swale and along glacial till extending from the swale to the east * Sediment removed from swale on south side and lined with rip-rap stone 	<ul style="list-style-type: none"> * Road embankment reinforced with rip-rap stone to the North and South of culvert 	<ul style="list-style-type: none"> * Silt fence installed perpendicular to road US, along base of natural hill side
CV-129	05-Sep-24	15	512391	7966786	Road embankment reinforced with rip-rap stone	Road embankment reinforced with rip-rap stone	

TABLE 2. WATER QUALITY MONITORING OF BASELINE FISHERIES, 2005, 2006, 2015-2023

Table 2.1: Water Quality Monitoring Of Baseline Fisheries Culverts Surface
Water Quality Summary For Sample Site N1-025 (CV128)

Parameters	Units	2023 LOR	CCME Guideline																						
				2006			2015				2016				2017		2018				2019				
				14-Jun-06	03-Aug-06	08-Sep-06	03-Jul-15	03-Jul-15	12-Aug-15	12-Aug-15	30-Jun-16	30-Jun-16	25-Aug-16	25-Aug-16	30-Jun-17	30-Jun-17	03-Jul-18	03-Jul-18	02-Sep-18	02-Sep-18	21-Jun-19	21-Jun-19	10-Aug-19	10-Aug-19	22-Jun-20
							US	DS	US	DS	US	DS	DS	US	US	DS	US	DS	US	DS	US	DS	US	DS	
In Situ Parameters																									
Temperature	°C	-	-	0.32	10.41	3.66	-	-	7.2	7.2	6.1	7.7	9.6	9.2	3.3	3.6	5.9	5.9	4.9	4.9	6.1	6.0	14.5	14.2	6.4
Specific Conductance	µS/cm	-	-	0.133	0.12	0.16	0.53	0.58	0.139	0.139	0.390	0.800	0.169	0.116	0.147	0.1575	0.0786	0.0785	0.1357	0.1375	0.0756	0.0754	0.1712	0.1705	0.107
Dissolved Oxygen	mg/L	-	9.5	13.02	11.71	13.03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12.41
Dissolved Oxygen	%	-	-	-	-	-	-	-	105.9	105.1	103.5	106.2	101.6	103.7	102.4	102.3	97.9	97.8	102.2	98.5	102.2	101.3	107.3	105.4	100.8
pH	pH units	-	6.5 - 9.0	8.18	8.12	8.21	8.33	8.14	8.3	8.2	7.9	8.3	8.09	8.05	7.62	7.67	8.00	8.16	8.13	7.78	7.92	8.00	8.32	8.25	7.91
Wetted Width	m	-	-	76	120	99	-	-	50	50	-	-	-	-	30	30	~25	~25	~40	~35	-	-	-	-	-
Average Depth	m	-	-	too much ice	0.3	0.6	-	-	0.5	0.5	-	-	-	-	5	5	-	-	-	-	-	-	-	-	-
Flow Rate	m³/s	-	-	-	26.73	-	-	-	-	-	-	-	-	-	60	51	-	-	-	-	-	-	-	-	-
Physical Parameters																									
pH	pH units	0.10	6.5 - 9.0	7.85	7.37	7.51	7.79	7.84	8.16	8.04	8.11	8.15	8.08	8.20	7.83	7.84	7.82	7.83	8.22	8.17	7.91	7.77	8.25	8.32	7.78
Conductivity	µS/cm	1.0	-	145	125.00	166	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	111
Turbidity	NTU	0.10	-	0.6	0.70	-	1.1	1.19	0.45	0.45	10.2	10.8	0.28	0.28	2.43	2.27	2.11	1.92	0.22	0.28	0.48	0.66	0.24	0.31	0.85
Hardness	mg/L as CaCO₃	0.5	-	73	65.0	85	42	42.0	63.0	62.0	58	53	84.0	84.0	38	42.0	40	41	81	79.0	44.7	45.1	85.6	85.9	58
TSS	mg/L	1.0	Variable ⁸	-	-	-	<2.0	<2.0	<2.0	<2.0	54.8	44.4	<2.0	7.9	8.4	13.5	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
TDS	mg/L	10	-	94	81	108	77	67	72 *	67 *	50	240	78	79	37	44	51	51	85	85	49	54	112	108	56
Dissolved Anions																									
Alkalinity (mg/L CaCO₃)	mg/L as CaCO₃	2.0	-	72	67	86	37	41	61	61	42	38	84	84	29	34	37	37	83	83	47	47	93	92	52
Br ⁻	mg/L	-	-	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cl ⁻	mg/L	0.50	120	1	<1	1	0.53	0.54	0.85	0.89	0.62	0.60	1.46	1.49	0.89	0.88	0.58	0.61	1.36	1.39	0.52	0.55	1.31	1.33	3.11
Fluoride	mg/L	-	-	-	-	-	-	-	-	-	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.025	0.026	-	-	-	-	-
SO₄ ⁻	mg/L	-	-	2	<1	4	0.42	0.47	0.0039	0.0031	0.38	0.36	1.18	1.19	0.38	0.39	0.33	0.37	0.73	0.72	-	-	-	-	-
Nutrients																									
NH₃+NH₄	mg/L N	-	0.021 - 231 ^a	0.1	0.03	0.08	<0.15	<0.15	<0.15	0.19	<0.15	<0.15	<0.15	<0.15	0.16	<0.15	-	-	-	-	-	-	-	-	-
NO₂ ⁻ (Nitrite)	mg/L N	0.010	0.060	<0.005	<0.005	0.016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.010	<0.010	<0.010	<0.010	<0.010
NO₃ ⁻ (Nitrate)	mg/L N	0.020	3.0	<0.10	<0.10	<0.10	<0.020	<0.02	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.021	
NO₂+NO₃	mg/L N	-	-	<0.10	<0.10	<0.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.022	<0.022	<0.022	<0.022	-
Ammonia, Total as N	mg/L	0.005	Variable ^a	-	-	-	<0.050	<0.050	-	-	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	-	-	<0.010	<0.010	<0.010	<0.010	0.016
Total Phosphorus	mg/L	0.0020	0.01	<0.01	<0.01	0.03	0.0036	0.0044	0.0039	0.0031	0.0677	0.0354	0.0044	0.0085	0.0107	0.0102	0.0045	0.0046	<0.0030	<0.0030	0.0033	0.0033	<0.0030	<0.0030	0.0031
Dissolved Phosphorus	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Organic Compounds																									
Phenols	mg/L	-	0.004	<0.001	<0.001	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DOC	mg/L	0.50	-	-	-	-	1.7	1.60	1.7	1.6	<1.0	<1.0	1.8	1.6	1.84	1.79	1.37	1.33	2.04	0.62	1.72	1.74	1.67	1.96	3.93
TOC	mg/L	0.50	-	-	-	-	1.9	1.90	1.7	1.7	1.8	1.4	1.8	2.9	2.09	2.15	1.54	1.85	2.30	0.54	2.17	2.32	2.05	2.19	3.92
TKN	mg/L	-	-	-	-	-	<0.015	<0.015	<0.15	0.19	<0.15	<0.15	<0.15	<0.15	0.16	<0.15	<0.15	<0.15	<0.15	<0.15	-	-	-	-	-
Chlorophyll-a	mg/m3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pheophytin-a	mg/m3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Metals and Non-Metals																									
Aluminum	mg/L	0.0030	Variable ^f	0.006	0.01	0.101	0.029	0.029	0.022	<0.010	0.827	0.759	<0.010	0.014	0.123	0.129	0.047	0.0587	0.0085	0.0053	0.0279	0.0314	0.0078	0.0078	0.0298
Antimony	mg/L	0.00010	-	-	-	-	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic	mg/L	0.00010	0.005	<0.001	<0.001	<0.001	<0.0010	<0.0010	<0.00010	<0.00010	0.00023	0.00022	0.00011	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.0001	<0.00010
Barium	mg/L	0.00010	-	<0.01	<0.01	<0.01	-	-	-	-	0.00801	0.00742	0.00663	0.00672	0.00378	0.00386	0.00315	0.00315	0.00589	0.00589	0.00352	0.00351	0.00728	0.00748	0.00322
Beryllium	mg/L	0.000020	-	-	-	-	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth	mg/L	0.000050	-	-	-	-	-	-	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron	mg/L	0.010	1.5	<0.01	<0.01	<0.01	-	-	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium	mg/L	0.0000050	Variable ^e	<0.0001	<0.0001	<0.0001	<0.000090	<0.000090	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Calcium	mg/L	0.050	-	17	16	20	9																		

Table 2.1: Water Quality Monitoring Of Baseline Fisheries Culverts Surface
Water Quality Summary For Sample Site N1-025 (CV128)

Parameters	Units	2023 LOR	CCME Guideline																							
				2006				2015				2016				2017		2018				2019				
				14-Jun-06	03-Aug-06	08-Sep-06	03-Jul-15	03-Jul-15	12-Aug-15	12-Aug-15	30-Jun-16	30-Jun-16	25-Aug-16	25-Aug-16	30-Jun-17	30-Jun-17	03-Jul-18	03-Jul-18	02-Sep-18	02-Sep-18	21-Jun-19	21-Jun-19	10-Aug-19	10-Aug-19	22-Jun-20	
				US	DS	US	DS	US	DS	DS	DS	US	DS	US	DS	US	DS	US	DS	US	DS	US	DS			
Titanium	mg/L	0.00030	-	-	-	-	-	-	-	-	0.0256	0.0238	<0.00030	0.00042	0.00399	0.0045	0.00145	0.00164	<0.00030	<0.00030	0.00083	0.00129	0.00032	<0.00030	0.00104	
Tungsten	mg/L	0.00010	-	-	-	-	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010		
Uranium	mg/L	0.000010	0.015	-	-	-	<0.0010	<0.0010	0.00135	0.00135	0.000505	0.000481	0.00212	0.00209	0.000299	0.000353	0.000346	0.000347	0.00147	0.00154	0.000367	0.000381	0.00211	0.00219	0.000507	
Vanadium	mg/L	0.00050	0.12	<0.001	<0.001	<0.001	-	-	-	-	0.00163	0.00149	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050		
Zinc	mg/L	0.0030	0.03	<0.01	<0.01	<0.01	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030		
Zirconium	mg/L	0.00020	-	-	-	-	-	-	-	-	0.00083	0.00076	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00020	<0.00020	<0.00020	<0.00020		
Dissolved Metals and Non-Metals																										
Aluminum	mg/L	0.0010	-	<0.005	<0.005	0.005	0.029	0.0108	0.0068	0.0122	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0077		
Arsenic	mg/L	0.00010	-	<0.001	<0.001	<0.001	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00010		
Barium	mg/L	0.00010	-	<0.01	<0.01	<0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00298		
Boron	mg/L	0.010	-	<0.01	<0.01	<0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.010		
Cadmium	mg/L	0.0000050	-	<0.0001	<0.0001	<0.0001	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0000050		
Calcium	mg/L	0.050	-	16	16	21	9.65	9.46	14.1	14.2	-	-	-	-	-	-	-	-	-	-	-	-	-	13.6		
Chromium	mg/L	0.00050	-	<0.001	<0.001	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00050		
Cobalt	mg/L	0.00010	-	<0.0002	<0.0002	<0.0002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00010		
Copper	mg/L	0.00020	-	<0.001	<0.001	<0.001	0.00034	0.00033	0.00041	0.00043	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00033		
Iron	mg/L	0.010	-	<0.03	<0.03	<0.03	0.030	0.015	<0.010	0.014	-	-	-	-	-	-	-	-	-	-	-	-	-	0.063		
Lead	mg/L	0.000050	Variable ^e	<0.001	<0.001	<0.001	<0.000050	<0.000050	<0.000050	<0.000050	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.000050		
Magnesium	mg/L	0.0050	-	8	6	8	4.44	4.46	6.62	6.47	-	-	-	-	-	-	-	-	-	-	-	-	-	5.84		
Manganese	mg/L	0.00010	-	<0.01	<0.01	<0.01	0.00102	0.00072	0.00064	0.00084	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00215		
Mercury	mg/L	0.0000050	-	-	-	-	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0000050		
Molybdenum	mg/L	0.000050	-	<0.005	<0.005	<0.005	0.000059	0.000063	0.000123	0.000123	-	-	-	-	-	-	-	-	-	-	-	-	-	0.000096		
Nickel	mg/L	0.00050	-	<0.005	<0.005	<0.005	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00050		
Phosphorus	mg/L	0.050	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Potassium	mg/L	0.050	-	0.52	0.26	0.55	0.361	0.348	0.465	0.463	-	-	-	-	-	-	-	-	-	-	-	-	-	0.412		
Selenium	mg/L	0.000050	-	<0.001	<0.001	<0.001	<0.000050	<0.000050	<0.000050	<0.000050	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.000050		
Silver	mg/L	0.000010	-	<0.0001	<0.0001	<0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.000050		
Sodium	mg/L	0.050	-	0.64	0.28	0.6	<0.50	<0.50	0.62	0.62	-	-	-	-	-	-	-	-	-	-	-	-	-	0.534		
Strontium	mg/L	0.00020	0.25	0.012	0.011	0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0091		
Thallium	mg/L	0.000010	-	-	-	-	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.000010		
Tin	mg/L	0.00010	-	<0.01	<0.01	<0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00010		
Uranium	mg/L	0.000010	-	-	-	-	0.000315	0.000317	0.00127	0.00127	-	-	-	-	-	-	-	-	-	-	-	-	-	0.000454		
Vanadium	mg/L	0.00050	-	<0.001	<0.001	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00050		
Zinc	mg/L	0.0010	Variable ^e	<0.01	<0.01	<0.01	0.0021	<0.0010	<0.0010	0.0011	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0021		
Miscellaneous (Water)																										
6PPD-Quinone	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		

Table 2.1: Water Quality Monitoring Of Baseline Fisheries Culverts Surface
Water Quality Summary For Sample Site N1-025 (CV128)

Parameters	Units	2023 LOR	CCME Guideline	Date																													
				2020								2021								2022								2023					
				22-Jun-20	22-Jun-20	19-Jul-20	19-Jul-20	19-Jul-20	14-Aug-20	14-Aug-20	15-Jun-21	15-Jun-21	15-Jun-21	16-Aug-21	16-Aug-21	16-Aug-21	20-Jun-22	20-Jun-22	29-Aug-22	29-Aug-22	25-Jun-23	25-Jun-23	16-Jul-23	21-Aug-23	21-Aug-23								
				US Field Blank	DS	US	DS	US Travel Blank	US	DS	DS	US	Field Duplicate	DS	Field Duplicate	US	DS	US	DS	US	DS	US	DS	US	DS	US							
In Situ Parameters																																	
Temperature	°C	-	-	-	8.1	16.5	17.1	-	12.3	13.5	4.5	4.8	-	7.3	-	10.4	12.9	5.7	6.2	6.6	0.2	0.4	6.5	6.7	8.0	8.2							
Specific Conductance	µS/cm	-	-	-	0.1193	0.2385	0.2533	-	0.2531	0.2825	102.7	105.1	-	164.8	-	164.8	141.7	78.5	157.0	165.3	121.3	121	66.82	66.7	136.9	137.5							
Dissolved Oxygen	mg/L	-	9.5	-	12.49	10.46	11.02	-	100.6	124.2	12.77	12.66	-	11.95	-	11.99	11.55	11.38	12.99	13.03	13.08	13.11	12.22	12.23	11.34	11.19							
Dissolved Oxygen	%	-	-	-	105.5	106.8	114.7	-	10.82	12.95	99.1	99.2	-	100.6	-	101.2	110.5	96.8	105.3	107.0	92.0	92.8	101.1	101.4	98.2	97.4							
pH	pH units	-	6.5 - 9.0	-	8.04	8.38	8.4	-	8.28	8.36	7.90	8.09	-	8.29	-	8.27	8.17	7.81	8.28	8.33	7.88	7.88	8.04	7.84	8.24	8.21							
Wetted Width	m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
Average Depth	m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
Flow Rate	m³/s	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
Physical Parameters																																	
pH	pH units	0.10	6.5 - 9.0	5.71	7.89	8.29	8.29	6.27	8.21	8.32	7.91	7.97	6.27	7.81	5.60	7.85	8.10	7.60	8.10	8.14	7.93	7.91	7.91	7.76	8.16	8.15							
Conductivity	µS/cm	1.0	-	<3.0	124	249	269	<3.0	257	298	108	108	<1.0	173	<1.0	173	145	78	159	158	123	128	69.5	69.3	141	141							
Turbidity	NTU	0.10	-	<0.10	1.2	0.52	1.08	<0.10	0.73	1.34	1.41	2.07	0.32	0.59	<0.10	0.48	13.90	2.76	<1.0	<1.0	1.14	0.88	3.41	3.47	0.55	0.5							
Hardness	mg/L as CaCO₃	0.5	-	<0.50	63.8	129	138	<0.50	137	158	52.6	53.4	<0.50	86.1	<0.50	87.8	74.8	39.2	84.6	86.6	64.1	65.8	34.2	34.5	71.7	73.9							
TSS	mg/L	1.0	Variable ^B	<2.0	2.7	<2.0	<2.0	<2.0	2.2	<2.0	1.4	5.2	<1.0	2.3	<2.0	<2.0	13.2	7.1	<3.0	<3.0	7.8	3.2	3.8	2.3	1.2	1.2							
TDS	mg/L	10	-	<10	68	173	148	<10	159	184	43	53	<20	92	<10	89	100	48	77	77	59	65	38	43	45	63							
Dissolved Anions																																	
Alkalinity (mg/L CaCO₃)	mg/L as CaCO₃	2.0	-	<10	56	123	494	<10	125	129	64.6	67.5	1.2	88.6	<1.0	88.7	69.0	37.8	77.4	75.5	81.1	87.1	54.5	34.7	71.2	71.6							
Br ⁻	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-							
Cl ⁻	mg/L	0.50	120	<0.50	4.29	7.62	12.4	<0.50	8.83	19.7	1.93	1.93	<0.50	1.83	<0.50	1.79	4.64	2.52	1.68	1.69	2.2	3.37	0.55	0.56	1.25	1.26							
Fluoride	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-							
SO₄ ⁻	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-							
Nutrients																																	
NH₃+NH₄	mg/L N	-	0.021 - 231 ^A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-							
NO₂ (Nitrite)	mg/L N	0.010	0.060	<0.010	<0.010	<0.010	<0.010	<0.010	<0.0010	<0.0010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010							
NO₃ (Nitrate)	mg/L N	0.020	3.0	<0.020	<0.020	<0.020	<0.020	<0.020	0.109	0.0961	0.028	0.027	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.031	0.025	<0.020	<0.020	<0.020	<0.020							
NO₂+NO₃	mg/L N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-							
Ammonia, Total as N	mg/L	0.005	Variable ^A	<0.010	<0.010	<0.010	0.011	<0.010	0.0073	0.0086	0.020	<0.010	<0.010	<0.010	<0.010	<0.010	0.019	0.019	<0.010	<0.010	0.0059	0.0063	<0.0050	<0.0050	0.0116	0.0054							
Total Phosphorus	mg/L	0.0020	0.01	<0.0030	0.0067	0.0047	0.0092	<0.0030	0.0038	0.0052	0.0048	0.0061	<0.0030	<0.0030	<0.0030	<0.0030	0.0049	0.0046	0.0059	<0.0030	0.0056	0.0066	0.0051	0.0051	0.0029	0.0031							
Dissolved Phosphorus	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.050	<0.050	<0.050	<0.050	-	-	-	-	-	-							
Organic Compounds																																	
Phenols	mg/L	-	0.004	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-							
DOC	mg/L	0.50	-	1.08	3.91	5.74	5.6	0.95	5.6	5.36	3.88	3.37	1.04	3.04	0.64	3.05	3.64	2.82	1.54	2.20	3.27	3.47	1.08	1.11	1.7	1.58							
TOC	mg/L	0.50	-	1.36	3.95	6.16	6.05	1.25	5.44	5.17	3.61	3.51	1.06	5.33	3.66	5.13	3.43	3.01	2.01	1.96	3.19	3.29	1.54	1.56	1.82	2.08							
TKN	mg/L	-	-	-	-	-	-	-	-	-	0.220	0.260	0.180	0.130	<0.050	0.110	0.233	0.188	0.067	0.055	-	-	-	-	-	-							
Chlorophyll-a	mg/m3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-							
Pheophytin-a	mg/m3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-							
Total Metals and Non-Metals																																	
Aluminum	mg/L	0.0030	Variable ^F	0.0192	0.071	0.0103	0.0233	<0.0050	0.0049	0.0208	0.0599	0.0418	<0.0050	0.0364	<0.0050	0.0236	0.5530	0.0696	0.0052	<0.0050	0.0342	0.0424	0.0564	0.0617	0.021	0.0148							
Antimony	mg/L	0.00010	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010							
Arsenic	mg/L	0.00010	0.005	<0.00010	<0.00010	0.0001	0.00011	<0.00010	0.00015	0.00017	0.00012	0.00012	<0.00010	<0.00010	<0.00010	<0.00010	0.00013	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010							
Barium	mg/L	0.00010	-	<0.00010	0.0051	0.00559	0.00792	<0.00010	0.00606	0.00928	0.00483	0.00466	<0.00010	0.00683	<0.00010	0.00680	0.01030	0.00264	0.00597	0.00587	0.00499	0.00539	0.00314	0.00326	0.00617	0.00578							
Beryllium	mg/L	0.000020	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020							
Bismuth	mg/L	0.000050	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050							
Boron	mg/L	0.010	1.5	<0.010	<0.010	<0.010	<0.01																										

Table 2.1: Water Quality Monitoring Of Baseline Fisheries Culverts Surface Water Quality Summary For Sample Site N1-025 (CV128)

[illegible]

Table 2.2 Water Quality Monitoring Of Baseline Fisheries Culverts Surface
Water Quality Summary For Sample Site N1-050 (CV099)

Parameters	Units	2023 LOR	CCME Guideline																				
				2005			2006			2015				2016				2017		2018			
				13-Jun-05	06-Aug-05	09-Sep-05	14-Jun-06	03-Aug-06	08-Sep-06	03-Jul-15	03-Jul-15	12-Aug-15	12-Aug-15	30-Jun-16	30-Jun-16	25-Aug-16	25-Aug-16	29-Jun-17	29-Jun-17	03-Jul-18	03-Jul-18	02-Sep-18	02-Sep-18
In Situ Parameters																							
Temperature	°C	-	-	0.11	9.36	4.13	0.04	8.31	2.74	-	-	9.3	8.2	10.83	12.19	9	9.1	1.6	2.2	6.1	6.2	5.10	4.50
Specific Conductance	µS/cm	-	-	0.104	0.220	0.308	0.112	0.254	0.305	0.112	0.111	0.337	0.338	-	-	0.347	0.353	0.136	0.1489	0.1536	0.1518	0.2694	0.2699
Dissolved Oxygen	mg/L	-	9.5	13.69	10.95	12.74	13.80	12.02	13.37	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Oxygen	%	-	-	-	-	-	-	-	-	-	-	103.5	101.7	97.4	97	102.5	107.5	101.6	103.3	98.10	98.20	99.30	98.30
pH	pH units	-	6.5 - 9.0	7.54	8.31	8.07	8.17	8.36	8.55	8.27	8.28	8.55	8.53	7.97	7.93	8.24	8.3	7.77	7.81	8.12	8.09	8.38	8.33
Wetted Width	m	-	-	-	-	-	ice	11	12	6	6	2	2	-	-	-	-	2	2	~15	~20	7.80	4.60
Average Depth	m	-	-	-	-	-	0.1	0.15	0.3	0.1	0.1	0.15	0.15	-	-	-	-	0.3	2	-	-	0.09	0.12
Flow Rate	m³/s	-	-	-	-	-	-	0.82	1.88	-	-	-	-	-	-	-	-	0.396	3.4	-	-	0.13	0.11
Physical Parameters																							
pH	pH units	0.10	6.5 - 9.0	-	-	-	7.68	8.14	8.13	8.13	8.13	8.37	8.36	8.09	8.08	8.42	8.46	7.8	7.8	8.11	8.10	8.43	8.40
Conductivity	µS/cm	1.0	-	105	235	296	122	259	315	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Turbidity	NTU	0.10	-	0.84	0.23	<0.10	0.9	0.2	-	0.32	0.48	1.07	0.12	0.42	0.47	0.13	0.16	1.93	2.43	0.92	0.69	0.12	0.11
Hardness	mg/L as CaCO ₃	0.5	-	54.2	128	177	62	144	162	81	80	157	156	59	60	185	187	36	34	82	81	166	166
TSS	mg/L	1.0	Variable ^g	-	-	-	-	-	-	<2.0	2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	11.3	13.6	<2.0	<2.0	<2.0	<2.0
TDS	mg/L	10	-	57	123	170	79	168	205	93	77	168	157	70	65	176	178	36	38	99	95	160	165
Dissolved Anions																							
Alkalinity	mg/L as CaCO ₃	2.0	-	52	134	156	61	141	163	80	81	161	160	60	61	176	179	31	30	75	77	154	160
Br ⁻	mg/L	-	-	<0.3	<0.3	<0.3	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cl ⁻	mg/L	0.50	120	1.1	0.6	1.9	<1	1	3	1.2	1.22	4.14	4.15	1.16	1.06	8.54	8.68	<0.50	<0.50	1.18	1.20	4.05	4.14
Fluoride	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	0.021	<0.020	0.03	0.029	<0.020	<0.020	0.021	0.021	0.042	0.042
SO ₄ ⁻	mg/L	-	-	0.6	1.1	2.5	2.0	2.0	6.0	1.1	1.2	4.80	5.12	1.03	0.84	7.13	6.77	<0.30	<0.30	0.87	0.87	3.72	3.81
Nutrients																							
NH ₃ +NH ₄	mg/L N	-	0.021 - 231 ^a	0.3	0.2	0.6	0.09	0.04	<0.02	<0.15	<0.15	0.23	0.17	<0.15	<0.15	<0.15	0.16	<0.15	<0.15	-	-	-	-
NO ₂ ⁻ (Nitrite)	mg/L N	0.010	0.060	<0.06	<0.06	<0.06	<0.005	<0.005	0.017	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NO ₃ ⁻ (Nitrate)	mg/L N	0.020	3.0	<0.05	<0.05	<0.05	<0.10	<0.10	<0.10	<0.020	<0.020	0.031	0.037	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
NO ₂ +NO ₃	mg/L N	-	-	<0.06	<0.06	<0.06	<0.10	<0.10	<0.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Ammonia as N	mg/L	0.0050	Variable ^a	-	-	-	-	-	-	-	-	-	-	<0.020	<0.020	<0.020	0.048	<0.020	<0.020	<0.020	<0.020	-	-
Total Phosphorus	mg/L	0.0020	0.01	<0.02	<0.02	<0.10	<0.01	<0.01	<0.01	<0.0030	<0.0030	<0.0030	0.0034	0.0051	0.0037	0.0041	0.0137	0.0114	0.014	0.0040	<0.0030	<0.0030	<0.0030
Dissolved Phosphorus	mg/L	-	-	<0.02	<0.02	<0.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Organic Compounds																							
Phenols	mg/L	-	0.004	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DOC	mg/L	0.50	-	-	-	-	-	-	-	1.8	1.7	2.7	2.8	1.3	1.3	2.5	2.5	2.13	2.16	2.45	2.33	2.81	2.90
TOC	mg/L	0.50	-	-	-	-	-	-	-	1.8	1.8	2.7	2.8	1.4	1.5	2.6	2.8	2.43	1.27	2.66	2.56	3.39	2.44
TKN	mg/L	-	-	-	-	-	-	-	-	<0.15	0.23	0.23	0.17	<0.15	<0.15	<0.15	0.16	0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Chlorophyll-a	mg/m3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pheophytin-a	mg/m3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Metals and Non-Metals																							
Aluminum	mg/L	0.0030	Variable ^f	0.026	0.005	<0.004	0.015	<0.005	<0.005	0.012	0.014	<0.010	<0.010	0.021	0.015	<0.010	<0.010	0.111	0.108	0.0086	0.0208	<0.0050	<0.0050
Antimony	mg/L	0.00010	-	<0.0004	<0.0004	<0.0004	-	-	-	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic	mg/L	0.00010	0.005	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.0010	<0.0010	0.00010	0.00011	<0.00010	<0.00010	0.00014	0.00014	<0.00010	<0.00010	<0.00010	<0.00010	0.00012	<0.00010
Barium	mg/L	0.00010	-	0.002	0.004	0.005	<0.01	<0.01	<0.01	-	-	-	-	0.00241	0.00253	0.0066	0.0068	0.00186	0.00175	0.00271	0.00278	0.00555	0.00565
Beryllium	mg/L	0.000020	-	<0.005	<0.005	<0.005	-	-	-	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth	mg/L	0.000050	-	<0.0003	<0.0003	<0.0003	-	-	-	-	-	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron	mg/L	0.010	1.5	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium	mg/L	0.0000050	Variable ^c	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.000090	<0.000090	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Calcium	mg/L	0.050	-	13.0	29.3	39.8	16	34	37	17.6	18	35.9	34.9	13.7	13.2	41.3	41.2	8.06	7.67	19.10	18.9	37.80	38.50
Cesium	mg/L	0.000010	-	-	-	-	-	-	-	-	-	-	-	<0.000010	<0.000010	<0.000010	<0.000010	0.000014	0.000013	<0.000010	<0.000010	<0.000010	<0.000010
Chromium	mg/L	0.00050	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	

Table 2.2 Water Quality Monitoring Of Baseline Fisheries Culverts Surface
Water Quality Summary For Sample Site N1-050 (CV099)

Parameters	Units	2023 LOR	CCME Guideline																				
				2005			2006			2015				2016				2017		2018			
				13-Jun-05	06-Aug-05	09-Sep-05	14-Jun-06	03-Aug-06	08-Sep-06	03-Jul-15	03-Jul-15	12-Aug-15	12-Aug-15	30-Jun-16	30-Jun-16	25-Aug-16	25-Aug-16	29-Jun-17	29-Jun-17	03-Jul-18	03-Jul-18	02-Sep-18	02-Sep-18
				US	DS	US	DS	US	DS	US	DS	US	DS	US	DS	US	DS	US	DS	US	DS	US	DS
Sodium	mg/L	0.050	-	0.39	0.67	1.15	0.37	0.67	1.61	0.76	0.75	2.64	2.55	0.66	0.71	4.03	4.02	<0.50	<0.50	0.63	0.63	2.29	2.23
Strontium	mg/L	0.00020	0.25	0.0068	0.0140	0.0198	0.010	0.018	0.022	-	-	-	-	0.0074	0.0072	0.0242	0.0242	0.0041	0.0038	0.0108	0.0105	0.0225	0.02
Sulfur	mg/L	0.50	-	-	-	-	-	-	-	-	-	-	-	0.59	<0.50	2.79	3.04	<0.50	<0.50	<0.50	0.52	1.77	1.63
Tellurium	mg/L	0.00020	-	-	-	-	-	-	-	-	-	-	-	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Thallium	mg/L	0.000010	0.0008	<0.0002	<0.0002	<0.0002	-	-	-	<0.00030	<0.00030	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thorium	mg/L	0.00010	-	-	-	-	-	-	-	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tin	mg/L	0.00010	-	<0.001	<0.001	<0.001	<0.01	<0.01	<0.01	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L	0.00030	-	<0.003	<0.003	<0.003	-	-	-	-	-	-	-	0.0009	0.0007	<0.00030	0.00033	0.00499	0.00417	<0.00030	0.000630	<0.00030	<0.00030
Tungsten	mg/L	0.00010	-	-	-	-	-	-	-	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Uranium	mg/L	0.000010	0.015	-	-	-	-	-	-	<0.0010	<0.0010	0.000982	0.001040	0.000173	0.000137	0.00122	0.00117	0.000046	0.000064	0.000291	0.000318	0.001010	0.000998
Vanadium	mg/L	0.00050	0.12	<0.0009	<0.0009	<0.0009	<0.001	<0.001	0.001	-	-	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc	mg/L	0.0030	0.03	0.002	<0.001	<0.001	<0.01	<0.01	<0.01	<0.0030	0.0044	<0.0030	0.0193	0.0045	<0.0030	0.007	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Zirconium	mg/L	0.00020	-	-	-	-	-	-	-	-	-	-	-	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Dissolved Metals and Non-Metals																							
Aluminum	mg/L	0.0010	-	0.004	<0.004	<0.004	<0.005	<0.005	<0.005	<0.0050	<0.0050	<0.0050	<0.0050	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/L	0.00010	-	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.00010	<0.00010	0.00011	0.00010	-	-	-	-	-	-	-	-	-	-
Barium	mg/L	0.00010	-	0.002	0.004	0.005	<0.01	<0.01	<0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	0.010	-	<0.05	0.02	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/L	0.0000050	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-	-	-	-	-	-	-	-
Calcium	mg/L	0.050	-	12.3	29.7	37.4	15	33	37	18.4	18.8	34.7	34.7	-	18.4	18.8	34.7	-	-	-	-	-	-
Chromium	mg/L	0.00050	-	<0.001	0.002	0.002	<0.001	<0.001	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	mg/L	0.00010	-	<0.0003	<0.0003	<0.0003	<0.0002	<0.0002	<0.0002	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/L	0.00020	-	<0.0008	<0.0008	<0.0008	<0.001	<0.001	<0.001	0.00030	0.00031	0.00050	0.00055	-	-	-	-	-	-	-	-	-	-
Iron	mg/L	0.010	-	<0.05	<0.02	<0.02	<0.03	<0.03	<0.03	<0.010	<0.010	<0.010	<0.010	-	-	-	-	-	-	-	-	-	-
Lead	mg/L	0.000050	Variable ^e	<0.0002	<0.0002	<0.0002	<0.001	<0.001	<0.001	<0.000050	<0.000050	<0.000050	<0.000050	-	-	-	-	-	-	-	-	-	-
Magnesium	mg/L	0.0050	-	5.67	13.3	17.3	6	15	17	8.59	7.92	17.1	17	-	-	-	-	-	-	-	-	-	-
Manganese	mg/L	0.00010	-	0.0060	<0.0007	<0.0007	<0.01	<0.01	<0.01	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-	-	-	-	-	-	-	-
Mercury	mg/L	0.0000050	-	-	-	-	-	-	-	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-	-	-	-	-	-	-	-
Molybdenum	mg/L	0.000050	-	<0.0003	<0.0003	<0.0003	<0.005	<0.005	<0.005	<0.000010	<0.000010	0.000107	0.000112	-	-	-	-	-	-	-	-	-	-
Nickel	mg/L	0.00050	-	<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.000050	0.000059	<0.00050	<0.00050	-	-	-	-	-	-	-	-	-	-
Phosphorus	mg/L	0.050	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/L	0.050	-	0.52	0.44	0.52	0.52	0.34	0.53	<0.00050	<0.00050	0.616	0.631	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	0.000050	-	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	0.386	0.360	<0.000050	<0.000050	-	-	-	-	-	-	-	-	-	-
Silver	mg/L	0.000010	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.000050	<0.000050	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	mg/L	0.050	-	0.42	0.67	1.10	0.34	0.68	1.61	0.76	0.73	2.41	2.39	-	-	-	-	-	-	-	-	-	-
Strontium	mg/L	0.00020	0.25	0.0070	0.0147	0.0188	0.009	0.019	0.023	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	0.000010	-	<0.0002	<0.0002	<0.0002	-	-	-	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	0.00010	-	<0.001	<0.001	<0.001	<0.01	<0.01	<0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	0.000010	-	-	-	-	-	-	-	0.00023	0.000251	0.000911	0.000966	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	0.00050	-	<0.0009	0.0046	0.0046	<0.001	<0.001	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/L	0.0010	Variable ^e	0.009	0.002	0.002	<0.01	<0.01	<0.01	0.0017	0.0044	<0.0010	0.0182	-	-	-	-	-	-	-	-	-	-
Miscellaneous (Water)																							
6PPD-Quinone	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 2.2 Water Quality Monitoring Of Baseline Fisheries Culverts Surface Water Quality Summary For Sample Site N1-050 (CV099)

Parameters	Units	2023 LOR	CCME Guideline	Date																						
				2019				2020										2021				2022				
				21-Jun-19	21-Jun-19	11-Aug-19	11-Aug-19	22-Jun-20	22-Jun-20	20-Jul-20	20-Jul-20	14-Aug-20	14-Aug-20	14-Aug-20	14-Jun-21	14-Jun-21	16-Aug-21	16-Aug-21	20-Jun-22	20-Jun-22	20-Jun-22	29-Aug-22	29-Aug-22			
				US	DS	US	DS	US	DS	US	DS	US	DS	US Travel Ban	DS	US	DS	US	DS	US	Field Duplicate	DS	US			
In Situ Parameters																										
Temperature	°C	-	-	7.00	7.10	12.4	11.9	1.60	1.7	13.80	13.50	9.30	9.00	9.00	0.5	0.4	7.5	7.6	2.3	1.1	-	7.0	6.7			
Specific Conductance	µS/cm	-	-	0.1631	0.1634	0.3530	0.3534	0.0672	0.0681	0.2853	0.2816	0.3798	0.3798	0.3798	57.2	57.6	303	302	92.4	88.3	-	358.4	357.7			
Dissolved Oxygen	mg/L	-	9.5	-	-	-	-	13.83	13.8	10.23	10.49	98.80	100.90	100.90	14.36	14.27	11.82	11.77	13.59	13.94	-	12.69	12.82			
Dissolved Oxygen	%	-	-	98.90	98.70	100.5	98.6	98.80	99.1	98.50	100.60	11.37	11.65	11.65	100.2	99.2	100.7	100.5	99.2	98.4	-	105.5	106.1			
pH	pH units	-	6.5 - 9.0	8.26	8.28	8.37	8.37	7.69	7.81	8.35	8.45	8.52	8.50	8.50	7.69	7.72	8.45	8.55	7.86	7.77	-	8.33	8.44			
Wetted Width	m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Average Depth	m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Flow Rate	m³/s	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Physical Parameters																										
pH	pH units	0.10	6.5 - 9.0	8.24	8.21	8.48	8.46	7.68	7.65	8.41	8.42	8.55	-	6.32	7.68	7.69	8.30	8.33	7.82	7.83	7.01	8.46	8.47			
Conductivity	µS/cm	1.0	-	-	-	-	-	70.00	70.70	293.00	293.00	389.00	390.00	<2.0	67.2	66.9	318	317	94.2	90.0	95.4	362	360			
Turbidity	NTU	0.10	-	0.20	0.19	0.15	0.12	0.65	0.69	0.13	<0.10	<0.10	<0.10	<0.10	4.20	5.42	0.10	0.11	4.06	5.70	4.55	<1.0	<1.0			
Hardness	mg/L as CaCO₃	0.5	-	100	98	173	179	37.3	37.7	150	150	208	203	<0.50	31.4	30.9	169	168	48.5	45.6	48	199	196			
TSS	mg/L	1.0	Variable ^g	<2.0	<2.0	<2.0	<2.0	<2.0	2.00	<2.0	<2.0	<2.0	<2.0	<2.0	20.7	25.3	<1.0	1.0	11.4	10.8	7.5	<3.0	<3.0			
TDS	mg/L	10	-	102	100	196	230	32	44	153	158	216	221	18	45	28	166	160	61	68	87	190	184			
Dissolved Anions																										
Alkalinity	mg/L as CaCO₃	2.0	-	95	96	183	184	35	35	145	145	185	183	<1.0	44.7	43.6	165	165	49.3	45.6	49.2	170.0	170.0			
Br ⁻	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Cl ⁻	mg/L	0.50	120	1.32	1.39	7.96	8.05	0.61	0.62	6.84	7.10	13.80	13.80	<0.50	1.03	1.06	4.67	4.59	1.07	1.08	1.08	9.87	9.65			
Fluoride	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
SO₄ ²⁻	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Nutrients																										
NH₃+NH₄	mg/L N	-	0.021 - 231 ^a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
NO₂ ⁻ (Nitrite)	mg/L N	0.010	0.060	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.0010	<0.0010	<0.0010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010			
NO₃ ⁻ (Nitrate)	mg/L N	0.020	3.0	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.0050	0.01	<0.0050	<0.020	0.022	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020			
NO₂+NO₃	mg/L N	-	-	<0.022	<0.022	<0.022	<0.022	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Total Ammonia as N	mg/L	0.0050	Variable ^a	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.0050	<0.0050	<0.0050	<0.010	<0.010	<0.10	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010			
Total Phosphorus	mg/L	0.0020	0.01	<0.0030	<0.0030	<0.0030	<0.0030	0.01	0.01	<0.0030	<0.0030	<0.0020	0.0020	<0.0020	0.0309	0.0209	<0.0030	<0.0030	0.0130	0.0098	0.0128	0.0094	<0.0030			
Dissolved Phosphorus	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.050	<0.050	<0.050	<0.050	<0.050			
Organic Compounds																										
Phenols	mg/L	-	0.004	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
DOC	mg/L	0.50	-	2.80	2.60	2.69	2.75	2.80	2.92	3.19	3.41	2.97	2.98	<0.50	3.51	3.86	5.96	4.30	3.40	4.17	3.71	3.73	2.76			
TOC	mg/L	0.50	-	3.23	3.47	3.11	3.15	3.14	3.17	3.62	3.71	2.92	2.93	<0.50	3.77	3.81	6.18	6.25	3.56	3.73	3.67	3.06	2.99			
TKN	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	0.230	0.250	0.160	0.170	0.282	0.247	0.227	0.144	0.118			
Chlorophyll-a	mg/m3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Pheophytin-a	mg/m3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Total Metals and Non-Metals																										
Aluminum	mg/L	0.0030	Variable ^f	0.0148	0.01	<0.0050	0.0071	0.0472	0.0419	<0.0050	0.00550	<0.0030	<0.0030	<0.0030	0.120	0.122	<0.0050	0.0053	0.145	0.105	0.131	<0.0050	<0.0050			
Antimony	mg/L	0.00010	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010			
Arsenic	mg/L	0.00010	0.005	<0.00010	<0.00010	0.00015	0.00015	<0.00010	<0.00010	<0.00010	<0.000110	0.00017	0.00015	<0.00010	0.00011	<0.00010	<0.00010	0.00012	<0.00010	<0.00010	<0.00010	0.00011	0.00011			
Barium	mg/L	0.00010	-	0.00347	0.00335	0.00753	0.00765	0.00330	0.00162	0.00616	0.00601	0.00712	0.00701	<0.00010	0.00197	0.00189	0.00583	0.00586	0.00263	0.00241	0.00259	0.00646	0.00641			
Beryllium	mg/L	0.000020	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010			
Bismuth	mg/L	0.000050	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050			
Boron	mg/L	0.010	1.5	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010			
Cadmium	mg/L	0.0000050	Variable ^c	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.00001520	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050			
Calcium	mg/L	0.050	-	22.40	21.90	38.2	40.8	8.77	9.03	34.10	34.50	43.80	44.00	<0.050	8.09	7.96	36.9	36.6	12.1	10.7	12.7	40.5	41.3			
Cesium	mg/L	0.000010	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000014	0.000014	<0.000010	<0.000010	0.000020	0.000013	0.000019	<0.000010	<0.000010			
Chromium	mg/L	0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00	<0.00010	<0.00010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050			
Cobalt	mg/L	0.00010	0.00078	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00011	<0.00010	0.0001	<0.00010	<0.00010			
Copper	mg/L	0.00050	0.002 - 0.004 ^c	<0.0010	<0.0010	<0.0010	<0.0010	0.003740	<0.00050	0.000580	0.000590	0.000560	0.000560	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00052	0.00052			
Iron	mg/L	0.010	0.300	<0.010	<0.010	<0.010	<0.010	0.0490	0.0430	<0.010	<0.010	<0.010	<0.010	<0.010	0.121	0.120	<0.010	<0.010	0.186	0.156	0.167	<0.010	<0.010			
Lead	mg/L	0.000050	0.001 - 0.007 ^c	<0.000050	<0.000050	<0.000050	<0.000050	0.0001220	0.0000570	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000134	0.000134	<0.000050	<0.000050	0.000149	0.000116	0.000129	<0.000050	<0.000050			
Lithium	mg/L	0.0010	-	0.0010	0.0011	0.0017	0.0019	<0.0010	<0.0010	0.0019	0.0018	0.0024	0.0024	<0.0010	<0.0010	<0.0010	0.0016	0.0016	<0.0010	<0.0010	0.0011	0.002	0.0021			
Magnesium	mg/L	0.0050	-	9.50	9.85	18.3	18.6	4.03	3.93	16.10	16.20	22.30	22.00	<0.0050	3.56	3.55	17.6	18.2	5.51	5.37	5.47	22.80	24.00			
Manganese	mg/L	0.00010	Variable ^c	<0.00050	<0.00050	<0.00050	<0.00050	0.002820	0.002310	<0.00050	<0.00050	0.000110	0.000140	<0.00010	0.00526	0.00503	<0.00050	<0.00050	0.0168	0.0167	0.0164	<0.00050	<0.00050			
Mercury	mg/L	0.0000050	0.000026	<0.000010	<0.000010	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050</					

Table 2.2 Water Quality Monitoring Of Baseline Fisheries Culverts Surface Water Quality Summary For Sample Site N1-050 (CV099)

Parameters	Units	2023 LOR	CCME Guideline	Date																			
				2019				2020					2021				2022						
				21-Jun-19	21-Jun-19	11-Aug-19	11-Aug-19	22-Jun-20	22-Jun-20	20-Jul-20	20-Jul-20	14-Aug-20	14-Aug-20	14-Aug-20	14-Jun-21	14-Jun-21	16-Aug-21	16-Aug-21	20-Jun-22	20-Jun-22	20-Jun-22	29-Aug-22	29-Aug-22
				US	DS	US	DS	US	DS	US	DS	US	DS	US Travel Ban	DS	US	DS	US	DS	US	DS	Field Duplicate	DS
Sodium	mg/L	0.050	-	0.839	0.83	3.36	3.38	0.438	0.321	3.160	3.27	5.680	5.580	<0.050	0.414	0.414	2.33	2.44	0.526	0.538	0.507	4.52	4.65
Strontium	mg/L	0.00020	0.25	0.0118	0.01	0.0269	0.0269	0.0047	0.0046	0.0215	0.02	0.0296	0.0277	<0.00020	0.0047	0.0045	0.0222	0.0214	0.0077	0.0064	0.0076	0.0267	0.0259
Sulfur	mg/L	0.50	-	0.63	0.58	1.78	1.97	<0.50	<0.50	1.94	1.82	3.55	3.83	<0.50	<0.50	<0.50	1.61	1.55	<0.50	<0.50	<0.50	2.87	2.65
Tellurium	mg/L	0.00020	-	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Thallium	mg/L	0.000010	0.0008	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thorium	mg/L	0.00010	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tin	mg/L	0.00010	-	<0.00010	<0.00010	<0.00010	<0.00010	0.00	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L	0.00030	-	<0.00030	0.000490	<0.00030	<0.00030	0.00188	0.00172	<0.00030	<0.00030	<0.00030	<0.00030	0.00567	0.00542	<0.00030	<0.00030	0.00546	0.00375	0.00444	<0.00030	<0.00030	<0.00030
Tungsten	mg/L	0.00010	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Uranium	mg/L	0.000010	0.015	0.000381	0.000391	0.0012	0.00124	0.000065	0.000070	0.000803	0.000842	0.001390	0.001450	<0.000010	0.000072	0.000057	0.000977	0.000962	0.000120	0.000075	0.000122	0.00140	0.00126
Vanadium	mg/L	0.00050	0.12	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc	mg/L	0.0030	0.03	<0.0037	<0.0030	<0.0030	<0.0030	<0.00910	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Zirconium	mg/L	0.00020	-	<0.00020	<0.00020	0.00024	0.00025	<0.00020	<0.00020	<0.00020	<0.00020	0.000220	0.000210	<0.00020	0.00027	0.00024	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00021	0.00022
Dissolved Metals and Non-Metals																							
Aluminum	mg/L	0.0010	-	-	-	-	-	0.008	0.008	<0.0050	<0.0050	<0.0010	<0.0010	<0.0010	0.0146	0.0152	<0.0050	<0.0050	0.0060	0.0084	0.0062	<0.0050	<0.0050
Arsenic	mg/L	0.00010	-	-	-	-	-	<0.00010	<0.00010	0.000	0.000	0.000	<0.00010	<0.00010	<0.00010	<0.00010	0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00010	0.00011
Barium	mg/L	0.00010	-	-	-	-	-	0.001	0.001	0.006	0.006	0.007	0.007	<0.00010	0.00140	0.00139	0.00612	0.00611	0.00217	0.00203	0.00208	0.00662	0.00644
Boron	mg/L	0.010	-	-	-	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium	mg/L	0.0000050	-	-	-	-	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000055	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Calcium	mg/L	0.050	-	-	-	-	-	8.410	8.630	33.400	33.400	46.600	44.500	0.068	7.23	6.98	37.1	36.9	11.7	10.5	11.6	40.7	39.80000
Chromium	mg/L	0.00050	-	-	-	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00010	<0.00010	<0.00010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt	mg/L	0.00010	-	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper	mg/L	0.00020	-	-	-	-	-	<0.00020	0.000	0.001	0.001	0.001	0.001	<0.00020	<0.00020	<0.00020	0.00043	0.00047	0.00036	<0.00020	<0.00020	0.00	0.00
Iron	mg/L	0.010	-	-	-	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.016	0.016	<0.010	<0.010	0.016	0.018	0.015	<0.010	<0.010
Lead	mg/L	0.000050	Variable ^e	-	-	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Magnesium	mg/L	0.0050	-	-	-	-	-	3.960	3.920	16.100	16.200	22.300	22.400	<0.0050	3.26	3.27	18.6	18.4	4.70	4.74	4.61	23.600000	23.5
Manganese	mg/L	0.00010	-	-	-	-	-	0.001	0.001	<0.00050	<0.00050	<0.00010	<0.00010	<0.00010	0.00392	0.00406	<0.00050	<0.00050	0.0105	0.0110	0.0102	<0.00050	<0.00050
Mercury	mg/L	0.0000050	-	-	-	-	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.000050	-	-	-	-	-	<0.000050	<0.000050	0.000	0.000	0.000	0.000	<0.000050	<0.000050	<0.000050	0.000058	0.000056	0.000055	<0.000050	<0.000050	0.000127	0.000137
Nickel	mg/L	0.00050	-	-	-	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Phosphorus	mg/L	0.050	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/L	0.050	-	-	-	-	-	0.234	0.240	0.704	0.682	0.789	0.771	<0.050	0.359	0.350	0.653	0.658	0.453	0.464	0.449	0.7170	0.714
Selenium	mg/L	0.000050	-	-	-	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Silver	mg/L	0.000010	-	-	-	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000010	<0.000010	<0.000010	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Sodium	mg/L	0.050	-	-	-	-	-	0.342	0.361	3.250	3.260	5.660	5.510	<0.050	0.409	0.411	2.41	2.44	0.56	0.514	0.491	4.52	4.64
Strontium	mg/L	0.00020	0.25	-	-	-	-	0.004	0.005	0.022	0.022	0.026	0.026	<0.00020	0.0042	0.0039	0.0224	0.0220	0.0073	0.0060	0.0072	0.02600	0.02690
Thallium	mg/L	0.000010	-	-	-	-	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin	mg/L	0.00010	-	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Uranium	mg/L	0.000010	-	-	-	-	-	0.000	0.000	0.001	0.001	0.001	0.001	<0.000010	0.000066	0.000949	0.000946	0.000103	0.0000630	0.000102	0.00128	0.00124	0.00124
Vanadium	mg/L	0.00050	-	-	-	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc	mg/L	0.0010	Variable ^e	-	-	-	-	<0.0010	0.003	<0.0010	0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0012	<0.0010	0.0019	0.0015	0.0015	0.0016	<0.0010
Miscellaneous (Water)																							
6PPD-Quinone	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0020	<0.0020

Table 2.2 Water Quality Monitoring Of Baseline Fisheries Culverts Surface
Water Quality Summary For Sample Site N1-050 (CV099)

Parameters	Units	2023 LOR	CCME Guideline	2023					
				25-Jun-23	25-Jun-23	16-Jul-23	16-Jul-23	21-Aug-23	21-Aug-23
				DS	US	DS	US	DS	US
In Situ Parameters									
Temperature	°C	-	-	1.3	1.3	7.7	7.4	6.2	6.3
Specific Conductance	µS/cm	-	-	76.7	69.1	133	131	271.0	269.1
Dissolved Oxygen	mg/L	-	9.5	13.12	13.30	11.53	11.68	11.88	11.83
Dissolved Oxygen	%	-	-	95.7	96.9	99.0	99.4	99.0	98.7
pH	pH units	-	6.5 - 9.0	7.81	7.82	8.11	8.09	8.47	8.40
Wetted Width	m	-	-	-	-	-	-	-	-
Average Depth	m	-	-	-	-	-	-	-	-
Flow Rate	m³/s	-	-	-	-	-	-	-	-
Physical Parameters									
pH	pH units	0.10	6.5 - 9.0	7.76	7.73	8.05	8.02	8.34	8.35
Conductivity	µS/cm	1.0	-	79.3	71.7	140	138	280	276
Turbidity	NTU	0.10	-	0.76	0.76	1.31	0.9	0.35	0.35
Hardness	mg/L as CaCO ₃	0.5	-	41.4	36.6	70.0	69.3	148.0	149.1
TSS	mg/L	1.0	Variable ^g	3.7	2.8	1.3	<1.0	<1.0	<1.0
TDS	mg/L	10	-	40	36	71	72	106	109
Dissolved Anions									
Alkalinity	mg/L as CaCO ₃	2.0	-	67.1	57.9	70.3	72.4	143	141
Br ⁻	mg/L	-	-	-	-	-	-	-	-
Cl ⁻	mg/L	0.50	120	0.7	0.63	1.2	1.2	3.77	3.98
Fluoride	mg/L	-	-	-	-	-	-	-	-
SO ₄ ⁻	mg/L	-	-	-	-	-	-	-	-
Nutrients									
NH ₃ +NH ₄	mg/L N	-	0.021 - 231 ^a	-	-	-	-	-	-
NO ₂ ⁻ (Nitrite)	mg/L N	0.010	0.060	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
NO ₃ ⁻ (Nitrate)	mg/L N	0.020	3.0	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
NO ₂ +NO ₃	mg/L N	-	-	-	-	-	-	-	-
Total Ammonia as N	mg/L	0.0050	Variable ^a	<0.0050	<0.0050	<0.0050	<0.0050	0.0072	0.0084
Total Phosphorus	mg/L	0.0020	0.01	0.0072	0.0075	0.0037	0.004	0.0029	0.0027
Dissolved Phosphorus	mg/L	-	-	-	-	-	-	-	-
Organic Compounds									
Phenols	mg/L	-	0.004	-	-	-	-	-	-
DOC	mg/L	0.50	-	3.28	3.34	1.7	1.78	3.83	18.4
TOC	mg/L	0.50	-	3.53	3.49	2.23	2.22	3.75	3.82
TKN	mg/L	-	-	-	-	-	-	-	-
Chlorophyll-a	mg/m3	-	-	-	-	-	-	-	-
Pheophytin-a	mg/m3	-	-	-	-	-	-	-	-
Total Metals and Non-Metals									
Aluminum	mg/L	0.0030	Variable ^f	0.043	0.0422	0.018	0.0122	0.0102	0.0131
Antimony	mg/L	0.00010	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic	mg/L	0.00010	0.005	<0.00010	<0.00010	<0.00010	<0.00010	0.00011	<0.00010
Barium	mg/L	0.00010	-	0.00159	0.00144	0.0029	0.0027	0.00493	0.00493
Beryllium	mg/L	0.000020	-	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Bismuth	mg/L	0.000050	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron	mg/L	0.010	1.5	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium	mg/L	0.0000050	Variable ^c	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Calcium	mg/L	0.050	-	10.5	8.66	15.8	15.2	32.4	31.9
Cesium	mg/L	0.000010	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Chromium	mg/L	0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt	mg/L	0.00010	0.00078	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper	mg/L	0.00050	0.002 - 0.004 ^c	<0.00050	<0.00050	0.00103	<0.00050	0.00052	<0.00050
Iron	mg/L	0.010	0.300	0.046	0.046	0.019	0.012	0.016	0.02
Lead	mg/L	0.000050	0.001 - 0.007 ^c	0.000055	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium	mg/L	0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	0.0016	0.0016
Magnesium	mg/L	0.0050	-	4.23	4.38	7.42	7.45	16.2	16
Manganese	mg/L	0.00010	Variable ^c	0.00427	0.00491	0.00097	0.00047	0.00045	0.00057
Mercury	mg/L	0.0000050	0.000026	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.000050	0.073	<0.000050	<0.000050	<0.000050	<0.000050	0.000052	0.000054
Nickel	mg/L	0.00050	0.025 - 0.150 ^c	<0.00050	<0.00050	<0.00050	0.00073	<0.00050	<0.00050
Phosphorus	mg/L	0.050	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Potassium	mg/L	0.050	-	0.334	0.34	0.336	0.334	0.52	0.516
Rubidium	mg/L	0.00020	-	0.00047	0.00041	0.00032	0.0003	0.00041	0.00042
Selenium	mg/L	0.000050	0.001	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Silicon	mg/L	0.10	-	0.37	0.34	0.55	0.52	1.22	1.22
Silver	mg/L	0.000010	0.25	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010

Table 2.2 Water Quality Monitoring Of Baseline Fisheries Culverts Surface
Water Quality Summary For Sample Site N1-050 (CV099)

Parameters	Units	2023 LOR	CCME Guideline	2023					
				25-Jun-23	25-Jun-23	16-Jul-23	16-Jul-23	21-Aug-23	21-Aug-23
				DS	US	DS	US	DS	US
Sodium	mg/L	0.050	-	0.296	0.312	0.634	0.627	2.07	2.06
Strontium	mg/L	0.00020	0.25	0.00571	0.00422	0.00847	0.00795	0.0185	0.0182
Sulfur	mg/L	0.50	-	<0.50	<0.50	<0.50	<0.50	1.25	1.22
Tellurium	mg/L	0.00020	-	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Thallium	mg/L	0.000010	0.0008	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thorium	mg/L	0.00010	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tin	mg/L	0.00010	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L	0.00030	-	0.0014	0.00149	0.00076	0.00037	0.00051	0.00051
Tungsten	mg/L	0.00010	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Uranium	mg/L	0.000010	0.015	0.000083	0.000046	0.000228	0.000224	0.000779	0.000737
Vanadium	mg/L	0.00050	0.12	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc	mg/L	0.0030	0.03	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Zirconium	mg/L	0.00020	-	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Dissolved Metals and Non-Metals									
Aluminum	mg/L	0.0010	-	0.0054	0.0046	0.0027	0.0022	0.002	0.0021
Arsenic	mg/L	0.00010	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Barium	mg/L	0.00010	-	0.00134	0.00136	0.00272	0.00261	0.00498	0.00506
Boron	mg/L	0.010	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium	mg/L	0.0000050	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Calcium	mg/L	0.050	-	9.99	8.26	15.8	15.7	32.3	31.9
Chromium	mg/L	0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt	mg/L	0.00010	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper	mg/L	0.00020	-	0.00024	<0.00020	0.00036	0.00027	0.00046	0.00046
Iron	mg/L	0.010	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Lead	mg/L	0.000050	Variable ^e	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Magnesium	mg/L	0.0050	-	3.95	3.85	7.34	7.24	16.2	16.7
Manganese	mg/L	0.00010	-	0.0027	0.0032	0.00021	0.00014	0.00017	0.00022
Mercury	mg/L	0.0000050	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.000050	-	<0.000050	<0.000050	<0.000050	<0.000050	0.000121	0.000053
Nickel	mg/L	0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Phosphorus	mg/L	0.050	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Potassium	mg/L	0.050	-	0.33	0.32	0.38	0.369	0.507	0.506
Selenium	mg/L	0.000050	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Silver	mg/L	0.000010	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium	mg/L	0.050	-	0.324	0.297	0.661	0.655	2.1	2.05
Strontium	mg/L	0.00020	0.25	0.00558	0.00408	0.0087	0.00863	0.0191	0.0176
Thallium	mg/L	0.000010	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin	mg/L	0.00010	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Uranium	mg/L	0.000010	-	0.00007	0.000041	0.000224	0.00021	0.000764	0.000712
Vanadium	mg/L	0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc	mg/L	0.0010	Variable ^e	0.0018	<0.0010	0.0022	<0.0010	0.0013	<0.0010
Miscellaneous (Water)									
6PPD-Quinone	ug/L	-	-	-	-	-	-	-	-

Table 2.3 Water Quality Monitoring Of Baseline Fisheries Culverts Surface Water Quality Summary For Sample Site N1-053 (CV093)

[illegible]

Table 2.3 Water Quality Monitoring Of Baseline Fisheries Culverts Surface
Water Quality Summary For Sample Site N1-053 (CV093)

Parameters	Units	2023 LOR	CCME Guideline	Date																					
				2006			2015		2016		2017		2018		2019				2020		2021				
				14-Jun-06	03-Aug-06	08-Sep-06	12-Aug-15	12-Aug-15	30-Jun-16	30-Jun-16	29-Jun-17	29-Jun-17	03-Jul-18	03-Jul-18	21-Jun-19	21-Jun-19	27-Jul-19	27-Jul-19	28-Jun-20	28-Jun-20	14-Jun-21	14-Jun-21	16-Aug-21	16-Aug-21	16-Aug-21
							US	DS	DS	US	US	DS	US	DS	US	DS	US	DS	US	DS	DS	US	DS	DS Travel Bl	US
Thorium	mg/L	0.00010	-	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
Tin	mg/L	0.00010	-	<0.01	<0.01	<0.01	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
Titanium	mg/L	0.00030	-	-	-	-	-	-	0.00097	0.00745	0.00043	0.00305	<0.0020	0.00136	0.00103	0.00113	-	-	-	-	0.00774	0.00192	<0.0070	<0.00030	0.00110
Tungsten	mg/L	0.00010	-	-	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
Uranium	mg/L	0.000010	0.015	-	-	-	0.000422	0.00059	0.000159	0.000159	0.000082	0.000125	0.000174	0.000193	0.000196	0.000347	-	-	-	-	0.000544	0.000164	0.000464	<0.000010	0.000299
Vanadium	mg/L	0.00050	0.12	<0.001	<0.001	<0.001	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc	mg/L	0.0030	0.03	<0.01	<0.01	<0.01	<0.0030	0.0033	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0032	<0.0030	-	-	-	-	<0.0030	<0.0030	<0.0030	<0.0030
Zirconium	mg/L	0.00020	-	-	-	-	-	-	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00020	<0.00020	-	-	-	-	0.00021	<0.00020	<0.00020	<0.00020	<0.00020
Dissolved Metals and Non-Metals																									
Aluminum	mg/L	0.0010	-	<0.005	<0.005	<0.005	<0.0050	0.0412	-	-	-	-	-	-	-	-	-	-	-	-	0.0151	0.0080	<0.0050	<0.0050	<0.0050
Arsenic	mg/L	0.00010	-	<0.001	<0.001	<0.001	<0.00010	<0.00010	-	-	-	-	-	-	-	-	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Barium	mg/L	0.00010	-	<0.01	<0.01	<0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00236	0.00171	0.00320	<0.00010	0.00272
Boron	mg/L	0.010	-	<0.01	<0.01	<0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.010	<0.010	0.013	<0.010	0.014
Cadmium	mg/L	0.0000050	-	<0.0001	<0.0001	<0.0001	<0.000010	<0.000010	-	-	-	-	-	-	-	-	-	-	-	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Calcium	mg/L	0.050	-	24	26	28	43	41.9	-	-	-	-	-	-	-	-	-	-	-	-	24.8	21.9	45.6	<0.050	45.9
Chromium	mg/L	0.00050	-	<0.001	<0.001	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt	mg/L	0.00010	-	<0.0002	<0.0002	<0.0002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper	mg/L	0.00020	-	<0.001	<0.001	<0.001	0.00024	0.00038	-	-	-	-	-	-	-	-	-	-	-	-	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Iron	mg/L	0.010	-	<0.03	<0.03	<0.03	<0.010	0.03	-	-	-	-	-	-	-	-	-	-	-	-	<0.010	<0.010	<0.010	<0.010	<0.010
Lead	mg/L	0.000050	Variable ^e	<0.001	<0.001	<0.001	<0.000050	<0.000050	-	-	-	-	-	-	-	-	-	-	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Magnesium	mg/L	0.0050	-	6	5	6	10.9	13	-	-	-	-	-	-	-	-	-	-	-	-	3.69	2.98	8.71	<0.0050	8.92
Manganese	mg/L	0.00010	-	<0.01	<0.01	<0.01	<0.00050	0.00051	-	-	-	-	-	-	-	-	-	-	-	-	0.00128	0.00093	<0.00050	<0.00050	<0.00050
Mercury	mg/L	0.0000050	-	-	-	-	<0.000010	<0.000010	-	-	-	-	-	-	-	-	-	-	-	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.000050	-	<0.005	<0.005	<0.005	0.000076	0.000118	-	-	-	-	-	-	-	-	-	-	-	-	0.000110	0.000056	0.000218	<0.000050	0.000199
Nickel	mg/L	0.00050	-	<0.005	<0.005	<0.005	<0.00050	<0.00050	-	-	-	-	-	-	-	-	-	-	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Phosphorus	mg/L	0.050	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/L	0.050	-	0.24	0.15	0.25	0.344	0.538	-	-	-	-	-	-	-	-	-	-	-	-	0.503	0.294	0.585	<0.050	0.552
Selenium	mg/L	0.000050	-	<0.001	<0.001	<0.001	<0.000050	<0.000050	-	-	-	-	-	-	-	-	-	-	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Silver	mg/L	0.000010	-	<0.0001	<0.0001	<0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Sodium	mg/L	0.050	-	0.32	0.24	0.4	0.6	1.61	-	-	-	-	-	-	-	-	-	-	-	-	0.279	0.221	0.341	<0.050	0.324
Strontium	mg/L	0.00020	0.25	0.018	0.019	0.022	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0277	0.0216	0.0466	<0.0010	0.0461
Thallium	mg/L	0.000010	-	-	-	-	<0.000010	<0.000010	-	-	-	-	-	-	-	-	-	-	-	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin	mg/L	0.00010	-	<0.01	<0.01	<0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Uranium	mg/L	0.000010	-	-	-	-	0.000414	0.000573	-	-	-	-	-	-	-	-	-	-	-	-	0.000447	0.000145	0.000445	<0.000010	0.000277
Vanadium	mg/L	0.00050	-	<0.001	<0.001	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc	mg/L	0.0010	Variable ^e	<0.01	<0.01	<0.01	<0.0010	0.0025	-	-	-	-	-	-	-	-	-	-	-	-	<0.0010	<0.0010	0.0022	<0.0010	<0.0010
Miscellaneous (Water)																									
6PPD-Quinone	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 2.3 Water Quality Monitoring Of Baseline Fisheries Culverts Surface
Water Quality Summary For Sample Site N1-053 (CV093)

Parameters	Units	2023 LOR	CCME Guideline									
				2022			2023					
				20-Jun-22	20-Jun-22	20-Jun-22	25-Jun-23	25-Jun-23	16-Jul-23	16-Jul-23	21-Aug-23	21-Aug-23
				DS	US	DS Field Blank	DS	US	DS	US	DS	US
In Situ Parameters												
Temperature	°C	-	-	5.4	3.6	-	-	-	-	-	5.0	5.6
Specific Conductance	µS/cm	-	-	150.5	141.5	-	-	-	-	-	275.5	279.7
Dissolved Oxygen	mg/L	-	9.5	12.48	12.69	-	-	-	-	-	12.08	12.06
Dissolved Oxygen	%	-	-	98.7	95.2	-	-	-	-	-	97.9	99.3
pH	pH units	-	6.5 - 9.0	8.09	8.07	-	-	-	-	-	8.19	8.21
Wetted Width	m	-	-	-	-	-	-	-	-	-	-	-
Average Depth	m	-	-	-	-	-	-	-	-	-	-	-
Flow Rate	m³/s	-	-	-	-	-	-	-	-	-	-	-
Physical Parameters												
pH	pH units	0.10	6.5 - 9.0	8.09	8.08	6.64	-	-	-	-	8.33	8.38
Conductivity	µS/cm	1.0	-	151	142	<1.0	-	-	-	-	281	299
Turbidity	NTU	0.10	-	4.12	4.90	<0.10	-	-	-	-	1.4	0.8
Hardness	mg/L as CaCO₃	0.50	-	82.8	75.6	<0.50	-	-	-	-	148	149
TSS	mg/L	1.0	Variable ^g	5.7	5.7	<2.0	-	-	-	-	9.4	1.7
TDS	mg/L	10	-	97	93	34	-	-	-	-	126	121
Dissolved Anions												
Alkalinity	mg/L as CaCO₃	2.0	-	77.4	75.0	<1.0	-	-	-	-	138	141
Br ⁻	mg/L	-	-	-	-	-	-	-	-	-	-	-
Cl ⁻	mg/L	0.50	120	1.78	0.85	<0.50	-	-	-	-	1.4	1.4
Fluoride	mg/L	-	-	-	-	-	-	-	-	-	-	-
SO₄ ⁻	mg/L	-	-	-	-	-	-	-	-	-	-	-
Nutrients												
NH₃+NH₄	mg/L N	-	0.021 - 231 ^a	-	-	-	-	-	-	-	-	-
NO₂ (Nitrite)	mg/L N	0.010	0.060	<0.010	<0.010	<0.010	-	-	-	-	<0.010	<0.010
NO₃ (Nitrate)	mg/L N	0.020	3.0	0.023	<0.020	<0.020	-	-	-	-	<0.020	<0.020
NO₂+NO₃	mg/L N	-	-	-	-	-	-	-	-	-	-	-
Ammonia total as N	mg/L	0.0050	Variable ^a	<0.010	<0.010	<0.010	-	-	-	-	<0.0050	<0.0050
Total Phosphorus	mg/L	0.0020	0.01	<0.0030	<0.0030	<0.0030	-	-	-	-	0.003	0.0048
Dissolved Phosphorus	mg/L	-	-	<0.050	<0.050	<0.050	-	-	-	-	-	-
Organic Compounds												
Phenols	mg/L	-	0.004	-	-	-	-	-	-	-	-	-
DOC	mg/L	0.50	-	1.78	1.69	<0.50	-	-	-	-	2.31	2.03
TOC	mg/L	0.50	-	1.66	1.49	<0.50	-	-	-	-	1.88	1.82
TKN	mg/L	-	-	0.068	0.064	<0.050	-	-	-	-	-	-
Chlorophyll-a	mg/m3	-	-	-	-	-	-	-	-	-	-	-
Pheophytin-a	mg/m3	-	-	-	-	-	-	-	-	-	-	-
Total Metals and Non-Metals												
Aluminum	mg/L	0.0030	Variable ^f	0.1250	0.0340	0.0055	-	-	-	-	0.0329	0.0306
Antimony	mg/L	0.00010	-	<0.00010	<0.00010	<0.00010	-	-	-	-	<0.00010	<0.00010
Arsenic	mg/L	0.00010	0.005	<0.00010	<0.00010	<0.00010	-	-	-	-	<0.00010	<0.00010
Barium	mg/L	0.00010	-	0.00286	0.00165	<0.00010	-	-	-	-	0.00317	0.00301
Beryllium	mg/L	0.000020	-	<0.00010	<0.00010	<0.00010	-	-	-	-	<0.000020	<0.000020
Bismuth	mg/L	0.000050	-	<0.000050	<0.000050	<0.000050	-	-	-	-	<0.000050	<0.000050
Boron	mg/L	0.010	1.5	<0.010	<0.010	<0.010	-	-	-	-	0.014	0.014
Cadmium	mg/L	0.0000050	Variable ^c	<0.0000050	<0.0000050	<0.0000050	-	-	-	-	<0.0000050	<0.0000050
Calcium	mg/L	0.050	-	25.7	24.1	<0.050	-	-	-	-	47.1	46.7
Cesium	mg/L	0.000010	-	0.000028	<0.000010	<0.000010	-	-	-	-	<0.000010	<0.000010
Chromium	mg/L	0.00050	-	<0.00050	<0.00050	<0.00050	-	-	-	-	<0.00050	<0.00050
Cobalt	mg/L	0.00010	0.00078	<0.00010	<0.00010	<0.00010	-	-	-	-	<0.00010	<0.00010
Copper	mg/L	0.00050	0.002 - 0.004 ^c	<0.00050	<0.00050	<0.00050	-	-	-	-	<0.00050	0.00059
Iron	mg/L	0.010	0.300	0.121	0.033	<0.010	-	-	-	-	0.037	0.039
Lead	mg/L	0.000050	0.001 - 0.007 ^c	0.00015	<0.000050	<0.000050	-	-	-	-	<0.000050	<0.000050
Lithium	mg/L	0.0010	-	0.0019	0.001	<0.0010	-	-	-	-	0.0034	0.0031
Magnesium	mg/L	0.0050	-	4.15	3.45	0.0074	-	-	-	-	8.41	8.52
Manganese	mg/L	0.00010	Variable ^c	0.00370	0.00102	<0.00050	-	-	-	-	0.00094	0.00099
Mercury	mg/L	0.0000050	0.000026	<0.0000050	<0.0000050	<0.0000050	-	-	-	-	<0.0000050	<0.0000050
Molybdenum	mg/L	0.000050	0.073	0.000094	0.000055	<0.000050	-	-	-	-	0.000216	0.000204
Nickel	mg/L	0.00050	0.025 - 0.150 ^c	<0.00050	<0.00050	<0.00050	-	-	-	-	<0.00050	<0.00050
Phosphorus	mg/L	0.050	-	<0.050	<0.050	<0.050	-	-	-	-	<0.050	<0.050
Potassium	mg/L	0.050	-	0.510	0.306	<0.050	-	-	-	-	0.548	0.479
Rubidium	mg/L	0.00020	-	0.00081	0.00028	<0.00020	-	-	-	-	0.00046	0.00036
Selenium	mg/L	0.000050	0.001	<0.000050	<0.000050	<0.000050	-	-	-	-	<0.000050	<0.000050
Silicon	mg/L	0.10	-	0.66	0.40	<0.10	-	-	-	-	1.12	1.11
Silver	mg/L	0.000010	0.25	<0.000050	<0.000050	<0.000050	-	-	-	-	<0.000010	<0.000010
Sodium	mg/L	0.050	-	0.316	0.272	<0.050	-	-	-	-	0.322	0.331
Strontium	mg/L	0.00020	0.25	0.0293	0.0229	<0.0010	-	-	-	-	0.0454	0.0448
Sulfur	mg/L	0.50	-	0.53	<0.50	<0.50	-	-	-	-	3.63	3.34
Tellurium	mg/L	0.00020	-	<0.00020	<0.00020	<0.00020	-	-	-	-	<0.00020	<0.00020
Thallium	mg/L	0.000010	0.0008	<0.000010	<0.000010	<0.000010	-	-	-	-	<0.000010	<0.000010

Table 2.3 Water Quality Monitoring Of Baseline Fisheries Culverts Surface
Water Quality Summary For Sample Site N1-053 (CV093)

Parameters	Units	2023 LOR	CCME Guideline								
				2022			2023				
				20-Jun-22	20-Jun-22	20-Jun-22	25-Jun-23	25-Jun-23	16-Jul-23	16-Jul-23	21-Aug-23
				DS	US	DS Field Blank	DS	US	DS	US	DS
Thorium	mg/L	0.00010	-	<0.00010	<0.00010	<0.00010	-	-	-	-	<0.00010
Tin	mg/L	0.00010	-	<0.00010	<0.00010	<0.00010	-	-	-	-	<0.00010
Titanium	mg/L	0.00030	-	0.00469	0.00125	<0.00030	-	-	-	-	0.00167
Tungsten	mg/L	0.00010	-	<0.00010	<0.00010	<0.00010	-	-	-	-	<0.00010
Uranium	mg/L	0.000010	0.015	0.000625	0.000128	<0.000010	-	-	-	-	0.000453
Vanadium	mg/L	0.00050	0.12	<0.00050	<0.00050	<0.00050	-	-	-	-	<0.00050
Zinc	mg/L	0.0030	0.03	<0.0030	<0.0030	<0.0030	-	-	-	-	<0.0030
Zirconium	mg/L	0.00020	-	<0.00020	<0.00020	0.00042	-	-	-	-	<0.00020
Dissolved Metals and Non-Metals											
Aluminum	mg/L	0.0010	-	0.0110	0.0056	<0.0050	-	-	-	-	0.0063
Arsenic	mg/L	0.00010	-	<0.00010	<0.00010	<0.00010	-	-	-	-	<0.00010
Barium	mg/L	0.00010	-	0.00241	0.00176	<0.00010	-	-	-	-	0.00308
Boron	mg/L	0.010	-	<0.010	<0.010	<0.010	-	-	-	-	0.012
Cadmium	mg/L	0.0000050	-	<0.0000050	<0.0000050	<0.0000050	-	-	-	-	<0.0000050
Calcium	mg/L	0.050	-	27.1	25.1	<0.050	-	-	-	-	45.4
Chromium	mg/L	0.00050	-	<0.00050	<0.00050	<0.00050	-	-	-	-	<0.00050
Cobalt	mg/L	0.00010	-	<0.00010	<0.00010	<0.00010	-	-	-	-	<0.00010
Copper	mg/L	0.00020	-	<0.00020	<0.00020	<0.00020	-	-	-	-	0.00029
Iron	mg/L	0.010	-	<0.010	<0.010	<0.010	-	-	-	-	<0.010
Lead	mg/L	0.000050	Variable ^e	<0.000050	<0.000050	<0.000050	-	-	-	-	<0.000050
Magnesium	mg/L	0.0050	-	3.660000	3.120000	<0.0050	-	-	-	-	8.3
Manganese	mg/L	0.00010	-	0.00068	<0.00050	<0.00050	-	-	-	-	0.00037
Mercury	mg/L	0.0000050	-	<0.0000050	<0.0000050	<0.0000050	-	-	-	-	<0.0000050
Molybdenum	mg/L	0.000050	-	0.000099	<0.000050	<0.000050	-	-	-	-	0.00022
Nickel	mg/L	0.00050	-	<0.00050	<0.00050	<0.00050	-	-	-	-	<0.00050
Phosphorus	mg/L	0.050	-	-	-	-	-	-	-	-	<0.050
Potassium	mg/L	0.050	-	0.481	0.324	<0.050	-	-	-	-	0.514
Selenium	mg/L	0.000050	-	<0.000050	<0.000050	<0.000050	-	-	-	-	<0.000050
Silver	mg/L	0.000010	-	<0.000050	<0.000050	<0.000050	-	-	-	-	<0.000010
Sodium	mg/L	0.050	-	0.317	0.273	<0.050	-	-	-	-	0.315
Strontium	mg/L	0.00020	0.25	0.0316	0.0235	<0.0010	-	-	-	-	0.0455
Thallium	mg/L	0.000010	-	<0.000010	<0.000010	<0.000010	-	-	-	-	<0.000010
Tin	mg/L	0.00010	-	<0.00010	<0.00010	<0.00010	-	-	-	-	<0.00010
Uranium	mg/L	0.000010	-	0.000558	0.000132	<0.000010	-	-	-	-	0.000438
Vanadium	mg/L	0.00050	-	<0.00050	<0.00050	<0.00050	-	-	-	-	<0.00050
Zinc	mg/L	0.0010	Variable ^e	0.0022	0.0015	0.0014	-	-	-	-	0.002
Miscellaneous (Water)											
6PPD-Quinone	ug/L	-	-	-	-	-	-	-	-	-	-

Table 2.4 Water Quality Monitoring Of Baseline Fisheries Culverts Surface Water
Quality Summary For Sample Site N1-060 (CV078)

Parameters	Units	2023 LOR	CCME Guideline																						
				2005			2006					2015		2016			2017		2018						
				13-Jun-05	06-Aug-05	09-Sep-05	13-Jun-06	02-Aug-06	08-Sep-06	20-Jul-11	28-Aug-11	12-Aug-15	12-Aug-15	30-Jun-16	30-Jun-16	25-Aug-16	25-Aug-16	29-Jun-17	29-Jun-17	03-Jul-18	03-Jul-18	02-Sep-18	02-Sep-18	02-Sep-18	22-Jun-19
											US	DS	DS	US	DS	US	US	DS	US	DS	US	US Duplicate	DS	US	
In Situ Parameters																									
Temperature	°C	-	-	0.22	9.28	4.02	-0.06	13.05	3.95	12.56	7.37	9.6	9.3	8.16	9.36	9.8	10	3.8	4.4	5.2	5.5	6.0	6.0	5.6	4.3
Specific Conductance	µS/cm	-	-	0.079	0.222	0.284	0.097	0.237	0.267	0.247	0.326	0.314	0.315	7.264	7.264	0.299	0.297	0.154	0.123	0.1668	0.1668	0.237	0.2367	0.2371	0.1616
Dissolved Oxygen	mg/L	-	9.5	13.48	10.95	12.72	14.17	11.43	12.55	-	11.92	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Oxygen	%	-	-	-	-	-	-	-	-	95.3	99.3	102.7	102.3	100.4	100.1	102.5	103.8	102.20	102.80	97.70	97.60	99.30	99.30	96.30	99.30
pH	pH units	-	6.5 - 9.0	7.36	8.30	7.96	8.22	8.26	8.36	8.15	8.34	8.53	8.48	7.81	7.93	8.24	8.25	7.65	7.87	8.19	8.18	8.39	8.39	8.3	8.22
Wetted Width	m	-	-	-	-	-	ice	9	9	3	7.3	3	3	-	-	-	-	11	10	12.4	12.7	4.5	4.5	4.3	-
Average Depth	m	-	-	-	-	-	0.15	0.25	0.2	0.2	0.3	0.1	0.1	-	-	-	-	2	0.19	0.1	0.12	0.08	0.08	0.12	-
Flow Rate	m³/s	-	-	-	-	-	-	0.74	0.96	-	-	-	-	-	-	-	-	2.90	2.78	1.11	0.75	0.10	0.10	0.08	-
Physical Parameters																									
pH	pH units	0.10	6.5 - 9.0	-	-	-	7.56	8.10	8.10	8.15	8.22	8.16	8.32	8.09	8.09	8.42	8.42	7.93	7.91	8.18	8.17	8.42	8.37	8.41	8.24
Conductivity	µS/cm	1.0	-	83	234	269	104	244	277	245	333	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Turbidity	NTU	0.10	-	0.40	<0.10	<0.10	0.5	<0.10	-	H.T.E	9D	1.45	0.24	0.26	0.17	0.13	0.14	0.5	0.37	0.29	0.56	<0.10	<0.10	<0.10	0.13
Hardness	mg/L as CaCO₃	0.50	-	41.0	124	160	52	137	141	141	192	156	152	60	59	165	163	46	44	91	90	146	150	147	106
TSS	mg/L	1.0	Variable ^g	-	-	-	-	-	-	<2	<2	2.4	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
TDS	mg/L	10	-	63	123	120	68	159	180	159	216	159 *	143 *	65	70	152	148	50	56	102	101	140	155	155	99
Dissolved Anions																									
Alkalinity	mg/L as CaCO₃	2.0	-	40	120	141	51	132	146	132	170	158	152	61	64	161	158	41	43	85	82	149	146	149	103
Br ⁻	mg/L	-	-	<0.3	<0.3	<0.3	<0.05	<0.05	<0.05	<0.25	<0.25	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cl ⁻	mg/L	0.50	120	0.9	0.2	0.6	<1	<1	<1	2	3	3.08	0.79	<0.50	<0.50	1.19	1.19	<0.50	<0.50	0.69	0.7	0.98	0.99	1.16	0.59
Fluoride	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	<0.020	<0.020	0.023	0.024	<0.020	<0.020	0.023	0.023	0.037	0.038	0.037	-
SO₄ ⁻	mg/L	-	-	0.6	0.8	1.9	2.0	1.0	5.0	4	12	3.84	2.68	<0.30	0.31	3.37	3.35	<0.30	<0.30	0.62	0.62	2.02	2.02	2.03	-
Nutrients																									
NH₃+NH₄	mg/L N	-	0.021 - 231 ^a	0.2	0.6	0.8	<0.02	<0.02	<0.02	0.02	0.04	0.24	0.25	<0.15	<0.15	<0.15	<0.15	-	-	-	-	-	-	-	-
NO₂ ⁻ (Nitrite)	mg/L N	0.010	0.060	<0.06	<0.06	<0.06	<0.005	<0.005	0.018	<0.10	<0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.010
NO₃ ⁻ (Nitrate)	mg/L N	0.020	3.0	<0.05	<0.05	<0.05	<0.10	<0.10	<0.10	<0.10	0.18	0.030	0.026	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
NO₂+NO₃	mg/L N	-	-	<0.06	<0.06	<0.06	<0.10	<0.10	<0.10	<0.10	0.18	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.022
Ammonia total as N	mg/L	0.0050	Variable ^a	-	-	-	-	-	-	-	-	<0.050	<0.050	0.021	<0.020	0.027	0.041	<0.020	<0.020	<0.020	<0.020	-	-	-	<0.010
Total Phosphorus	mg/L	0.0020	0.01	<0.02	<0.02	<0.10	<0.01	<0.01	<0.01	0.003	<0.003	0.0044	<0.0030	0.0193	0.0282	0.01	0.0139	0.0085	0.0304	<0.0030	<0.0030	0.015	<0.0030	<0.0030	<0.0030
Dissolved Phosphorus	mg/L	-	-	<0.02	<0.02	<0.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Organic Compounds																									
Phenols	mg/L	-	0.004	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DOC	mg/L	0.50	-	-	-	-	-	-	-	1.7	0.8	2.4	1.9	1	<1.0	1.5	1.5	1.75	1.78	1.75	1.74	1.72	1.86	1.72	1.73
TOC	mg/L	0.50	-	-	-	-	-	-	-	1.5	1.7	2.2	1.8	1.1	1.0	1.6	1.6	2.24	2.13	2.13	1.76	2.01	2.45	2.62	2.34
TKN	mg/L	-	-	-	-	-	-	-	-	0.16	<0.10	0.24	0.25	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	0.18	<0.15	-
Chlorophyll-a	mg/m3	-	-	-	-	-	-	-	-	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pheophytin-a	mg/m3	-	-	-	-	-	-	-	-	<0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Metals and Non-Metals																									
Aluminum	mg/L	0.0030	Variable ^f	0.006	<0.004	<0.004	0.006	<0.005	<0.005	<0.003	<0.003	0.059	0.016	0.011	0.016	<0.010	<0.010	0.0271	0.024	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.009
Antimony	mg/L	0.00010	-	<0.0004	<0.0004	<0.0004	-	-	-	<0.0001	<0.0001	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic	mg/L	0.00010	0.005	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	0.0001	<0.0001	0.00011	<0.00010	<0.00010	<0.00010	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Barium	mg/L	0.00010	-	<0.001	0.002	0.003	<0.01	<0.01	<0.01	0.0035	0.00429	-	-	0.00166	0.0019	0.00389	0.00385	0.00131	0.00128	0.00202	0.00213	0.00349	0.00348	0.00351	0.00236
Beryllium	mg/L	0.000020	-	<0.005	<0.005	<0.005	-	-	-	<0.0005	<0.0005	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth	mg/L	0.000050	-	<0.0003	<0.0003	<0.0003	-	-	-	<0.0005	<0.0005	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron	mg/L	0.010	1.5	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	0.013	0.012	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.0			

Table 2.4 Water Quality Monitoring Of Baseline Fisheries Culverts Surface Water
Quality Summary For Sample Site N1-060 (CV078)

Parameters	Units	2023 LOR	CCME Guideline																							
				2005			2006					2015		2016				2017		2018						
				13-Jun-05	06-Aug-05	09-Sep-05	13-Jun-06	02-Aug-06	08-Sep-06	20-Jul-11	28-Aug-11	12-Aug-15	12-Aug-15	30-Jun-16	30-Jun-16	25-Aug-16	25-Aug-16	29-Jun-17	29-Jun-17	03-Jul-18	03-Jul-18	02-Sep-18	02-Sep-18	02-Sep-18	22-Jun-19	
In Situ Parameters																										
Titanium	mg/L	0.00030	-	<0.003	<0.003	<0.003	-	-	-	<0.01	<0.01	-	-	0.0006	0.00083	<0.00030	0.00032	0.00091	0.00087	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	0.00049	
Tungstun	mg/L	0.00010	-	-	-	-	-	-	-	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
Uranium	mg/L	0.000010	0.015	-	-	-	-	-	-	0.000331	0.000562	0.000577	0.000403	0.000072	0.000073	0.000468	0.000458	0.000047	0.000039	0.000181	0.000185	0.000432	0.000421	0.000421	0.000200	
Vanadium	mg/L	0.00050	0.12	<0.0009	<0.0009	<0.0009	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
Zinc	mg/L	0.0030	0.03	<0.001	<0.001	<0.001	<0.01	<0.01	<0.01	<0.003	<0.003	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	
Zirconium	mg/L	0.00020	-	-	-	-	-	-	-	-	-	-	-	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00020	
Dissolved Metals and Non-Metals																										
Aluminum	mg/L	0.0010	-	<0.004	<0.004	<0.004	<0.005	<0.005	<0.005	<0.003	<0.003	<0.0050	<0.0050	-	-	-	-	-	-	-	-	-	-	-	-	
Arsenic	mg/L	0.00010	-	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.0001	<0.0001	<0.00010	<0.00010	-	-	-	-	-	-	-	-	-	-	-	-	
Barium	mg/L	0.00010	-	<0.001	0.002	0.003	<0.01	<0.01	<0.01	0.00334	0.00408	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Boron	mg/L	0.010	-	<0.05	0.02	<0.01	<0.01	<0.01	<0.01	0.015	<0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Cadmium	mg/L	0.0000050	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.00001	<0.00001	<0.000010	<0.000010	-	-	-	-	-	-	-	-	-	-	-	-	
Calcium	mg/L	0.050	-	13.1	37.5	42.4	16	40	40	39.4	52.5	41.3	42.8	-	-	-	-	-	-	-	-	-	-	-	-	
Chromium	mg/L	0.00050	-	<0.001	0.002	0.001	<0.001	<0.001	<0.001	<0.0005	<0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Cobalt	mg/L	0.00010	-	<0.0003	0.0004	<0.0003	<0.0002	<0.0002	<0.0002	<0.0001	<0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Copper	mg/L	0.00020	-	<0.0008	<0.0008	<0.0008	<0.001	<0.001	<0.001	<0.0005	<0.0005	0.00034	0.00024	-	-	-	-	-	-	-	-	-	-	-	-	
Iron	mg/L	0.010	-	<0.05	<0.02	<0.02	<0.03	<0.03	<0.03	<0.03	<0.03	<0.010	<0.010	-	-	-	-	-	-	-	-	-	-	-	-	
Lead	mg/L	0.000050	Variable ^e	<0.0002	<0.0002	<0.0002	<0.001	<0.001	<0.001	<0.00005	<0.00005	<0.000050	<0.000050	-	-	-	-	-	-	-	-	-	-	-	-	
Magnesium	mg/L	0.0050	-	2.09	9.19	11.0	3	9	10	9.47	13.6	12.8	10.9	-	-	-	-	-	-	-	-	-	-	-	-	
Manganese	mg/L	0.00010	-	0.0013	<0.0007	<0.0007	<0.01	<0.01	<0.01	0.000135	<0.00005	<0.00050	<0.00050	-	-	-	-	-	-	-	-	-	-	-	-	
Mercury	mg/L	0.0000050	-	-	-	-	-	-	-	<0.00001	<0.00001	<0.000010	<0.000010	-	-	-	-	-	-	-	-	-	-	-	-	
Molybdenum	mg/L	0.000050	-	<0.0003	<0.0003	<0.0003	<0.005	<0.005	<0.005	0.000068	0.000107	0.000125	0.000086	-	-	-	-	-	-	-	-	-	-	-	-	
Nickel	mg/L	0.00050	-	<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.0005	<0.0005	<0.00050	<0.00050	-	-	-	-	-	-	-	-	-	-	-	-	
Phosphorus	mg/L	0.050	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Potassium	mg/L	0.050	-	0.26	0.28	0.26	0.20	0.27	0.28	0.357	0.356	0.488	0.361	-	-	-	-	-	-	-	-	-	-	-	-	
Selenium	mg/L	0.000050	-	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.000050	<0.000050	-	-	-	-	-	-	-	-	-	-	-	-	
Silver	mg/L	0.000010	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.000001	<0.000001	1.61	0.61	-	-	-	-	-	-	-	-	-	-	-	-	
Sodium	mg/L	0.050	-	0.30	0.28	0.34	0.30	0.30	0.46	0.696	1.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Strontium	mg/L	0.00020	0.25	0.0099	0.0247	0.0281	0.012	0.028	0.030	0.026	0.0365	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Thallium	mg/L	0.000010	-	<0.0002	<0.0002	<0.0002	-	-	-	<0.0001	<0.0001	<0.000010	<0.000010	-	-	-	-	-	-	-	-	-	-	-	-	
Tin	mg/L	0.00010	-	<0.001	<0.001	<0.001	<0.01	<0.01	<0.01	<0.0001	<0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Uranium	mg/L	0.000010	-	-	-	-	-	-	-	0.000296	0.000531	0.000549	0.000409	-	-	-	-	-	-	-	-	-	-	-	-	
Vanadium	mg/L	0.00050	-	<0.0009	0.0043	0.0042	<0.001	<0.001	0.002	<0.001	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Zinc	mg/L	0.0010	Variable ^e	<0.001	0.001	0.002	<0.01	<0.01	<0.01	<0.003	<0.003	<0.0010	0.0026	-	-	-	-	-	-	-	-	-	-	-	-	
Miscellaneous (Water)																										
6PPD-Quinone	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Table 2.4 Water Quality Monitoring Of Baseline Fisheries Culverts Surface Water
Quality Summary For Sample Site N1-060 (CV078)

Parameters	Units	2023 LOR	CCME Guideline	Date													
				2019			2020							2021			
				22-Jun-19	11-Aug-19	11-Aug-19	22-Jun-20	22-Jun-20	20-Jul-20	20-Jul-20	20-Jul-20	14-Aug-20	14-Aug-20	14-Jun-21	14-Jun-21	16-Aug-21	16-Aug-21
				DS	US	DS	US	DS	DS	US	DS	DS01	US	DS	DS	US	DS
In Situ Parameters																	
Temperature	°C	-	-	3.9	13.6	13.6	1.9	1.9	15.6	15.2	15.2	8.5	8.3	1.2	1.0	7.3	7.3
Specific Conductance	µS/cm	-	-	0.1619	0.3037	0.3044	0.0960	0.0966	0.257	0.2582	0.2582	0.3185	0.3189	72.4	72	274.5	274.1
Dissolved Oxygen	mg/L	-	9.5	-	-	-	13.57	13.63	9.93	9.0	9.0	100.4	99.6	13.34	14.18	11.83	11.80
Dissolved Oxygen	%	-	-	98.60	98.7	99.8	13.57	98.10	99.4	98.50	98.50	11.75	11.72	99.6	99.8	100.8	100.6
pH	pH units	-	6.5 - 9.0	8.23	8.26	8.36	7.98	7.97	8.39	8.4	8.4	8.45	8.39	7.69	7.72	8.48	8.43
Wetted Width	m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average Depth	m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Flow Rate	m³/s	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Physical Parameters																	
pH	pH units	0.10	6.5 - 9.0	8.22	8.39	8.46	7.84	7.81	8.38	8.36	8.37	8.49	8.46	7.79	7.79	8.28	8.29
Conductivity	µS/cm	1.0	-	-	-	-	99.4	100	266	268	268	326	329	78.4	77.3	286	286
Turbidity	NTU	0.10	-	0.14	0.15	0.21	0.36	0.45	<0.10	<0.10	<0.10	<0.10	<0.10	4.18	2.24	<0.10	0.23
Hardness	mg/L as CaCO₃	0.50	-	105	153	156	53	53.3	143	143	143	183	181	37.7	37.3	155	154
TSS	mg/L	1.0	Variable ^B	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	12.8	8.1	<1.0	<1.0
TDS	mg/L	10	-	103	163	166	55	53	138	154	152	194	183	46	49	147	152
Dissolved Anions																	
Alkalinity	mg/L as CaCO₃	2.0	-	104	166	171	50	50	142	143	143	170	168	49.6	53.1	154	154
Br ⁻	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cl ⁻	mg/L	0.50	120	0.64	1.21	1.41	<0.50	0.61	1.44	1.8	1.52	2.57	2.79	0.98	0.86	1.87	1.90
Fluoride	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SO₄ ⁻	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nutrients																	
NH₃+NH₄	mg/L N	-	0.021 - 231 ^a	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NO₂ ⁻ (Nitrite)	mg/L N	0.010	0.060	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.0010	<0.0010	<0.010	<0.010	<0.010	<0.010
NO₃ ⁻ (Nitrate)	mg/L N	0.020	3.0	<0.020	<0.020	<0.020	<0.020	<0.020	0.027	0.041	<0.020	0.0362	0.0371	<0.020	<0.020	<0.020	<0.020
NO₂+NO₃	mg/L N	-	-	<0.022	<0.022	<0.022	-	-	-	-	-	-	-	-	-	-	-
Ammonia total as N	mg/L	0.0050	Variable ^a	<0.010	0.014	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.0050	<0.0050	<0.010	<0.010	<0.010	<0.010
Total Phosphorus	mg/L	0.0020	0.01	<0.0030	0.012	<0.0030	0.0132	0.0034	<0.0030	<0.0030	<0.0030	<0.0020	<0.0020	0.0096	0.0085	<0.0030	<0.0030
Dissolved Phosphorus	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Organic Compounds																	
Phenols	mg/L	-	0.004	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DOC	mg/L	0.50	-	1.81	1.62	1.7	2.93	2.83	2.47	2.28	2.11	1.92	2	3.08	3.08	3.12	3.15
TOC	mg/L	0.50	-	2.54	3.39	2.23	3.04	3.24	2.74	2.77	2.67	1.55	1.81	3.08	3.09	5.34	5.22
TKN	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	0.190	0.180	0.150	0.190
Chlorophyll-a	mg/m3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pheophytin-a	mg/m3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Metals and Non-Metals																	
Aluminum	mg/L	0.0030	Variable ^f	0.0097	0.0053	0.0074	0.0164	0.0277	<0.0050	0.0067	0.0054	<0.0030	0.0033	0.0752	0.0329	<0.0050	<0.0050
Antimony	mg/L	0.00010	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic	mg/L	0.00010	0.005	<0.00010	0.00012	0.00011	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00012	0.00013	<0.00010	<0.00010	<0.00010	<0.00010
Barium	mg/L	0.00010	-	0.00260	0.00459	0.0045	0.00153	0.00216	0.00383	0.00418	0.0039	0.00428	0.00442	0.00175	0.00129	0.00389	0.00388
Beryllium	mg/L	0.000020	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth	mg/L	0.000050	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron	mg/L	0.010	1.5	<0.010	<0.010	<0.010	<0.010	<0.010	0.011	0.011	0.011	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium	mg/L	0.0000050	Variable ^c	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000075	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Calcium	mg/L	0.050	-	29.1	44.1	42.8	15.2	14.3	41	40	40.5	48	49.5	11.8	11.2	39.9	40.1
Cesium	mg/L	0.000010	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000010	<0.000010	<0.000010	<0.000010
Chromium	mg/L	0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00010	<0.00010	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt	mg/L	0.00010	0.00078	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper	mg/L	0.00050	0.002 - 0.004 ^c	<0.0010	<0.0010	<0.0010	<0.00050	0.00097	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Iron	mg/L	0.010	0.300	<0.010	<0.010	<0.010	0.017	0.034	<0.010	<0.010	<0.010	<0.010	<0.010	0.069	0.033	<0.010	<0.010
Lead	mg/L	0.000050	0.001 - 0.007 ^c	<0.000050	<0.000050	<0.000050	0.000051	0.000085	<0.000050	0.000051	<0.000050	<0.000050	<0.000050	0.000075	<0.000050	<0.000050	<0.000050
Lithium	mg/L	0.0010	-	<0.0010	0.0012	0.0012	<0.0010	<0.0010	0.0015	0.0014	0.0014	0.0017	0.0017	<0.0010	<0.0010	0.0011	0.0012
Magnesium	mg/L	0.0050	-	7.79	11.5	11.2	3.6	3.45	9.96	10	10.3	13.7	13.7	2.81	2.68	12.4	12.4
Manganese	mg/L	0.00010	Variable ^c	<0.00050	<0.00050	<0.00050	0.00098	0.00192	<0.00050	<0.00050	<0.00050	<0.00010	0.00016	0.00375	0.00295	<0.00050	<0.00050
Mercury	mg/L	0.0000050	0.000026	<0.000010	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.000050	0.073	<0.000050	0.0000105	0.000091	<0.000050	<0.000050	0.000069	0.000068	0.000071	0.000093	0.000098	<0.000050	<0.000050	0.000071	0.000066
Nickel	mg/L	0.00050	0.025 - 0.150 ^c	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00070	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Phosphorus	mg/L	0.050	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Potassium	mg/L	0.050	-	0.262	0.365	0.368	0.229	0.338	0.366	0.389	0.387	0.346	0.351	0.308	0.275	0.382	0.380
Rubidium	mg/L	0.00020	-	0.00023	0.00035												

Table 2.4 Water Quality Monitoring Of Baseline Fisheries Culverts Surface Water
Quality Summary For Sample Site N1-060 (CV078)

Parameters	Units	2023 LOR	CCME Guideline	Date													
				2019			2020							2021			
				22-Jun-19	11-Aug-19	11-Aug-19	22-Jun-20	22-Jun-20	20-Jul-20	20-Jul-20	20-Jul-20	14-Aug-20	14-Aug-20	14-Jun-21	14-Jun-21	16-Aug-21	16-Aug-21
				DS	US	DS	US	DS	US	DS	DS01	US	DS	DS	DS	US	DS
In Situ Parameters																	
Titanium	mg/L	0.00030	-	<0.00030	<0.00030	0.00038	0.00053	0.00093	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	0.00241	0.00099	<0.00030	<0.00030
Tungstun	mg/L	0.00010	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Uranium	mg/L	0.000010	0.015	0.000223	0.000521	0.00049	0.000062	0.000079	0.000333	0.000369	0.000369	0.00056	0.000577	0.000080	0.000045	0.000495	0.000479
Vanadium	mg/L	0.00050	0.12	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc	mg/L	0.0030	0.03	<0.0030	<0.0030	<0.0030	<0.0030	0.01	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Zirconium	mg/L	0.00020	-	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Dissolved Metals and Non-Metals																	
Aluminum	mg/L	0.0010	-	-	-	-	0.00830	0.0065	0.0089	<0.0050	<0.0050	0.0011	<0.0010	0.0077	0.0074	<0.0050	<0.0050
Arsenic	mg/L	0.00010	-	-	-	-	<0.00010	<0.00010	0.00011	0	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Barium	mg/L	0.00010	-	-	-	-	0.00151	0.00152	0.00415	0	0.00423	0.00436	0.00419	0.00140	0.00114	0.00411	0.00421
Boron	mg/L	0.010	-	-	-	-	<0.010	<0.010	0.011	0	0.012	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium	mg/L	0.0000050	-	-	-	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Calcium	mg/L	0.050	-	-	-	-	15.10000	15	40	40	40.1	50.4	50.8	10.9	10.7	40.7	40.5
Chromium	mg/L	0.00050	-	-	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00010	<0.00010	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt	mg/L	0.00010	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper	mg/L	0.00020	-	-	-	-	0.00031	0.00033	0.0003	0	0.00025	0.0003	0.00027	<0.00020	<0.00020	0.00026	0.00026
Iron	mg/L	0.010	-	-	-	-	0.01100	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	<0.010	<0.010	<0.010
Lead	mg/L	0.000050	Variable ^e	-	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Magnesium	mg/L	0.0050	-	-	-	-	3.73000	3.84	10.4	10	10.5	13.9	13.2	2.57	2.60	12.8	12.8
Manganese	mg/L	0.00010	-	-	-	-	0.00092	0.00077	<0.00050	<0.00050	<0.00050	<0.00010	<0.00010	0.00442	0.00450	<0.00050	<0.00050
Mercury	mg/L	0.0000050	-	-	-	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.000050	-	-	-	-	<0.000050	<0.000050	0.000074	0	0.000074	0.000095	0.000112	<0.000050	<0.000050	0.000066	0.000072
Nickel	mg/L	0.00050	-	-	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Phosphorus	mg/L	0.050	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/L	0.050	-	-	-	-	0.22600	0.227	0.404	0	0.401	0.494	0.422	0.260	0.254	0.411	0.404
Selenium	mg/L	0.000050	-	-	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Silver	mg/L	0.000010	-	-	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000010	<0.000010	<0.000050	<0.000050	<0.000050	<0.000050
Sodium	mg/L	0.050	-	-	-	-	0.28600	0.286	0.851	1	0.806	1.23	1.18	0.339	0.342	1.03	1.02
Strontium	mg/L	0.00020	0.25	-	-	-	0.00960	0.0097	0.0328	0	0.0332	0.0381	0.0385	0.0084	0.0080	0.0306	0.0312
Thallium	mg/L	0.000010	-	-	-	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin	mg/L	0.00010	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Uranium	mg/L	0.000010	-	-	-	-	0.00006	0.00061	0.000331	0	0.000369	0.000537	0.000548	0.000065	0.000037	0.000466	0.000456
Vanadium	mg/L	0.00050	-	-	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc	mg/L	0.0010	Variable ^e	-	-	-	0.00250	0.0029	0.0028	0	0.0016	0.0011	0.0018	<0.0010	<0.0010	<0.0010	<0.0010
Miscellaneous (Water)																	
6PPD-Quinone	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Quality Summary For Sample Site N1-060 (CV078)

Parameters	Units	2023 LOR	CCME Guideline	2022					2023						
				20-Jun-22	20-Jun-22	20-Jun-22	29-Aug-22	29-Aug-22	25-Jun-23	25-Jun-23	16-Jul-23	16-Jul-23	21-Aug-23	21-Aug-23	21-Aug-23
				DS	US	JS Travel Blau	DS	US	DS	US	DS	US	DS	US	JS Travel Blau
In Situ Parameters															
Temperature	°C	-	-	1.7	0.7	-	6.9	6.9	0.9	0.3	9.7	9.5	6.3	6.3	-
Specific Conductance	µS/cm	-	-	70.8	67.5	-	317	326.5	55.1	54	159	157.4	267.3	264.5	-
Dissolved Oxygen	mg/L	-	9.5	13.58	13.66	-	13.50	13.24	13.02	12.73	11.16	11.14	11.70	11.65	-
Dissolved Oxygen	%	-	-	97.3	95.1	-	112.8	110.6	94.8	91.2	100.8	100.5	97.7	98.2	-
pH	pH units	-	6.5 - 9.0	7.83	7.76	-	8.31	8.33	7.96	7.84	8.10	8.13	8.37	8.39	-
Wetted Width	m	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average Depth	m	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Flow Rate	m³/s	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Physical Parameters															
pH	pH units	0.10	6.5 - 9.0	7.75	7.75	7.80	8.42	8.39	7.59	7.39	8.09	8.05	8.46	8.38	6.27
Conductivity	µS/cm	1.0	-	71.6	70.2	<1.0	317	316	58.5	57.3	167	165	273	272	1.1
Turbidity	NTU	0.10	-	2.55	2.20	<0.10	<1.0	<1.0	1.68	0.61	0.29	1.29	0.27	<0.10	<0.10
Hardness	mg/L as CaCO₃	0.50	-	36	34.6	<0.50	178	178	28.86	27.51	84.64	83.85	145.55	142.72	<0.50
TSS	mg/L	1.0	Variable ^B	2.5	3.8	<2.0	<3.0	<3.0	7.6	2.5	<1.0	<1.2	<1.0	<1.0	<1.0
TDS	mg/L	10	-	51	55	29	168	169	27	28	91	86	132	136	<10
Dissolved Anions															
Alkalinity	mg/L as CaCO₃	2.0	-	38.8	37.5	<1.0	161.0	162.0	35.2	48.8	88.5	87.2	141	142	<2.0
Br ⁻	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cl ⁻	mg/L	0.50	120	0.74	0.66	<0.50	1.89	1.73	<0.50	<0.50	0.76	0.74	1.86	1.63	<0.50
Fluoride	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SO₄ ⁻	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nutrients															
NH₃+NH₄	mg/L N	-	0.021 - 231 ^A	-	-	-	-	-	-	-	-	-	-	-	-
NO₂ ⁻ (Nitrite)	mg/L N	0.010	0.060	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
NO₃ ⁻ (Nitrate)	mg/L N	0.020	3.0	0.023	0.021	<0.020	0.046	0.043	0.035	0.044	<0.020	<0.020	<0.020	<0.020	<0.020
NO₂+NO₃	mg/L N	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ammonia total as N	mg/L	0.0050	Variable ^A	<0.010	0.013	<0.010	<0.010	<0.010	<0.0050	0.0064	<0.0050	0.0073	0.0057	<0.0050	<0.0050
Total Phosphorus	mg/L	0.0020	0.01	0.0034	0.0138	<0.0030	<0.0030	<0.0030	0.0035	0.0038	0.0022	0.0025	0.0033	<0.0020	<0.0020
Dissolved Phosphorus	mg/L	-	-	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-	-	-	-	-
Organic Compounds															
Phenols	mg/L	-	0.004	-	-	-	-	-	-	-	-	-	-	-	-
DOC	mg/L	0.50	-	2.44	2.13	<0.50	2.31	1.80	2.89	1.83	1.36	1.29	2.25	2.20	<0.50
TOC	mg/L	0.50	-	2.19	2.11	<0.50	1.93	1.88	1.81	2.08	1.85	1.82	2.68	2.48	<0.50
TKN	mg/L	-	-	0.160	0.186	<0.050	0.060	0.070	-	-	-	-	-	-	-
Chlorophyll-a	mg/m3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pheophytin-a	mg/m3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Metals and Non-Metals															
Aluminum	mg/L	0.0030	Variable ^F	0.1210	0.0688	<0.0050	<0.0050	<0.0050	0.0617	0.0336	0.0055	0.0061	0.0047	0.0045	<0.0030
Antimony	mg/L	0.00010	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic	mg/L	0.00010	0.005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Barium	mg/L	0.00010	-	0.00174	0.00118	<0.00010	0.00418	0.00398	0.00128	0.00085	0.00224	0.00220	0.00353	0.00338	<0.00010
Beryllium	mg/L	0.000020	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Bismuth	mg/L	0.000050	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron	mg/L	0.010	1.5	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium	mg/L	0.0000050	Variable ^C	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Calcium	mg/L	0.050	-	12.3	11.4	<0.050	46.3	47.2	9.40	9.06	23.1	22.8	38.1	37.9	<0.050
Cesium	mg/L	0.000010	-	0.000024	0.000011	<0.000010	<0.000010	<0.000010	0.000012	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Chromium	mg/L	0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt	mg/L	0.00010	0.00078	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper	mg/L	0.00050	0.002 - 0.004 ^C	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00058	<0.00050	<0.00050	<0.00050	<0.00050
Iron	mg/L	0.010	0.300	0.119	0.065	<0.010	<0.010	<0.010	0.062	0.036	<0.010	<0.010	<0.010	<0.010	<0.010
Lead	mg/L	0.000050	0.001 - 0.007 ^C	0.000124	0.000061	<0.000050	<0.000050	<0.000050	0.000078	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium	mg/L	0.0010	-	<0.0010	<0.0010	<0.0010	0.0014	0.0015	<0.0010	<0.0010	<0.0010	<0.0010	0.0011	0.0010	<0.0010
Magnesium	mg/L	0.0050	-	2.27	2.18	<0.0050	14.40	14.60	1.69	1.65	6.50	6.39	11.6	11.9	<0.0050
Manganese	mg/L	0.00010	Variable ^C	0.00525	0.00462	<0.00050	<0.00050	<0.00050	0.00308	0.00303	0.00018	0.00021	0.00025	0.00020	<0.00010
Mercury	mg/L	0.0000050	0.000026	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.000050	0.073	<0.000050	<0.000050	<0.000050	0.000112	0.000104	<0.000050	<0.000050	<0.000050	<0.000050	0.000056	0.000063	<0.000050
Nickel	mg/L	0.00050	0.025 - 0.150 ^C	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Phosphorus	mg/L	0.050	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Potassium	mg/L	0.050	-	0.315	0.280	<0.050	0.372	0.370	0.214	0.203	0.240	0.240	0.308	0.308	<0.050
Rubidium	mg/L	0.00020	-	0.00062	0.00041	<0.00020	0.00034	0.00026	0.00037	0.00031	0.00023	<0.00020	0.00029	0.00027	<0.00020
Selenium	mg/L	0.000050	0.001	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Silicon	mg/L	0.10	-	0.39	0.29	<0.10	0.79	0.82	0.26	0.20	0.55	0.55	1.06	1.07	<0.10
Silver	mg/L	0.000010	0.25	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium	mg/L	0.050	-	0.304	0.298	<0.050	1.08	1.09	0.199	0.196	0.365	0.364	0.856	0.861	<0.050
Strontium	mg/L	0.00020	0.25	0.0099	0.0090	<0.0010	0.0387	0.0370	0.00645	0.00608	0.0150	0.0152	0.0292	0.0292	<0.00020
Sulfur	mg/L	0.50	-	<0.50	<0.50	<0.50	2.23	2.08	<0.50	<0.50	<0.50	<0.50	1.16	1.04	<0.50
Tellurium	mg/L	0.00020	-	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Thallium	mg/L	0.000010	0.0008	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thorium	mg/L	0.00010	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tin	mg/L	0.00010	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010

Table 2.4 Water Quality Monitoring Of Baseline Fisheries Culverts Surface Water
Quality Summary For Sample Site N1-060 (CV078)

Parameters	Units	2023 LOR	CCME Guideline												
				2022					2023						
				20-Jun-22	20-Jun-22	20-Jun-22	29-Aug-22	29-Aug-22	25-Jun-23	25-Jun-23	16-Jul-23	16-Jul-23	21-Aug-23	21-Aug-23	21-Aug-23
				DS	US	DS Travel Blank	DS	US	DS	US	DS	US	DS	US	DS Travel Blank
In Situ Parameters															
Titanium	mg/L	0.00030	-	0.00417	0.00186	<0.00030	<0.00030	<0.00030	0.00248	0.00121	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Tungstun	mg/L	0.00010	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Uranium	mg/L	0.000010	0.015	0.000099	0.000044	<0.000010	0.000561	0.000552	0.000069	0.000031	0.000166	0.000163	0.000422	0.000421	<0.000010
Vanadium	mg/L	0.00050	0.12	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc	mg/L	0.0030	0.03	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Zirconium	mg/L	0.00020	-	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Dissolved Metals and Non-Metals															
Aluminum	mg/L	0.0010	-	0.0084	0.0087	<0.0050	<0.0050	<0.0050	0.0090	0.0038	0.0019	0.0016	0.0018	0.0012	<0.0010
Arsenic	mg/L	0.00010	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Barium	mg/L	0.00010	-	0.00116	0.00105	0.00017	0.0041	0.0041	0.00102	0.00070	0.00236	0.00225	0.00351	0.00349	<0.00010
Boron	mg/L	0.010	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium	mg/L	0.0000050	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Calcium	mg/L	0.050	-	11.50000	10.90000	<0.050	47.30000	47.10000	9.02	8.63	23.2	23.0	37.8	37.5	<0.050
Chromium	mg/L	0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt	mg/L	0.00010	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper	mg/L	0.00020	-	<0.00020	<0.00020	<0.00020	0.00	0.000240	<0.00020	<0.00020	0.00024	0.00020	0.00030	0.00027	<0.00020
Iron	mg/L	0.010	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Lead	mg/L	0.000050	Variable ^e	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Magnesium	mg/L	0.0050	-	1.790000	1.760000	<0.0050	14.600000	14.600000	1.52	1.43	6.42	6.35	12.3	11.8	<0.0050
Manganese	mg/L	0.00010	-	0.00247	0.00297	<0.00050	<0.00050	<0.00050	0.00176	0.00150	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Mercury	mg/L	0.0000050	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.000050	-	<0.000050	<0.000050	<0.000050	0.000101	0.000108	<0.000050	<0.000050	<0.000050	<0.000050	0.000061	0.000057	<0.000050
Nickel	mg/L	0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Phosphorus	mg/L	0.050	-	-	-	-	-	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Potassium	mg/L	0.050	-	0.264	0.250	<0.050	0.37900	0.37700	0.209	0.180	0.279	0.276	0.304	0.295	<0.050
Selenium	mg/L	0.000050	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Silver	mg/L	0.000010	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium	mg/L	0.050	-	0.314	0.305	<0.050	1.08	1.0700	0.225	0.184	0.398	0.388	0.856	0.830	<0.050
Strontium	mg/L	0.00020	0.25	0.009800	0.008900	<0.0010	0.03760	0.03920	0.00638	0.00586	0.0162	0.0164	0.0295	0.0292	<0.00020
Thallium	mg/L	0.000010	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin	mg/L	0.00010	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Uranium	mg/L	0.000010	-	0.000058	0.000032	<0.000010	0.000551	0.000526	0.000069	0.000026	0.000164	0.000158	0.000405	0.000392	<0.000010
Vanadium	mg/L	0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc	mg/L	0.0010	Variable ^e	0.0031	<0.0010	0.0025	0.0020	<0.0010	<0.0010	<0.0010	0.0016	<0.0010	<0.0010	<0.0010	<0.0010
Miscellaneous (Water)															
6PPD-Quinone	ug/L	-	-	-	-	-	<0.0020	<0.0020	-	-	-	-	-	-	-

Parameters	Units	2023 LOR	CCME Guideline																								
				2005			2006			2015				2016				2017		2018							
				07-Jun-05	06-Aug-05	09-Sep-05	13-Jun-06	02-Aug-06	08-Sep-06	03-Jul-15	03-Jul-15	11-Aug-15	11-Aug-15	30-Jun-16	30-Jun-16	25-Aug-16	25-Aug-16	29-Jun-17	29-Jun-17	03-Jul-18	03-Jul-18	03-Jul-18	02-Sep-18	02-Sep-18	22-Jun-19		
										US	DS	US	DS	DS	US	DS	US	US	DS	US	US Duplicate	DS	US	DS	US		
In Situ Parameters																											
Temperature	°C	-	-	0.26	9.75	6.05	-0.05	13.74	6.53	-	-	11.4	11.3	10.4	7.2	11.5	11.3	5.9	8.5	6.3	6.3	6.5	7.9	7.9	3.1		
Specific Conductance	µS/cm	-	-	0.067	0.139	0.145	0.112	0.137	0.152	0.130	0.084	0.183	0.180	6.109	6.213	0.175	0.175	0.126	0.171	0.104	0.104	0.1041	0.1394	0.1418	0.1177		
Dissolved Oxygen	mg/L	-	9.5	13.06	10.71	11.89	13.58	10.32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Dissolved Oxygen	%	-	-	-	-	-	-	-	-	-	-	101.5	101.9	98.5	99.4	101.4	100.5	102.4	111.7	96.1	96.1	96.6	100.4	101.2	99.0		
pH	pH units	-	6.5 - 9.0	7.58	8.03	7.70	8.02	8.1	8.16	8.20	8.17	8.42	8.42	6.21	7.47	8.22	8.15	7.78	7.76	8.17	8.17	8.06	8.37	8.40	8.16		
Wetted Width	m	-	-	-	-	-	52	42	38	-	-	6	6	-	-	-	-	5	10.6	-	-	7.9	-	-	-		
Average Depth	m	-	-	-	-	-	-	0.3	0.3	-	-	0.2	0.2	-	-	-	-	2	0.19	-	-	0.09	-	-	-		
Average Depth	m ³ /s	-	-	-	-	-	-	4.09	-	-	-	-	-	-	-	-	-	3.8	1.06742	-	-	0.244	-	-	-		
Physical Parameters																											
pH	pH units	0.10	6.5 - 9.0	-	-	-	7.7	7.61	7.64	7.98	7.99	8.20	8.17	7.86	7.94	8.32	8.28	7.94	7.92	7.97	7.95	7.99	8.34	8.39	8.09		
Conductivity	µS/cm	1.0	-	72	149	143	124	140	171	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Turbidity	NTU	0.10	-	0.33	0.25	0.16	0.5	0.3	-	0.29	0.28	0.2	0.2	0.6	0.46	0.28	0.26	0.44	0.72	0.63	0.8	0.6	0.24	0.23	0.23		
Hardness	mg/L as CaCO ₃	0.50	-	32.4	79.5	82.0	61	75	80	63	62	80	81	48	48	85	93	55	55	52	52	53	81	85	74		
TSS	mg/L	1.0	Variable ⁸	-	-	-	-	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	2	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0		
TDS	mg/L	10	-	54	74	86	81	91	111	70	73	86 *	84 *	60	65	83	84	66	66	68	72	55	90	95	77		
Dissolved Anions																											
Alkalinity	mg/L as CaCO ₃	2.0	-	33	74	71	62	74	87	63	63	82	80	47	50	84	89	51	50	43	51	47	83	85	73		
Br ⁻	mg/L	-	-	<0.3	<0.3	<0.3	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Cl ⁻	mg/L	0.50	120	0.9	0.8	0.9	<1	<1	2	1.29	1.30	2.06	2.20	1.26	1.26	1.89	1.88	1.29	1.3	1.12	1.13	1.16	1.55	1.76	1.46		
Fluoride	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	<0.020	<0.020	0.024	0.025	<0.020	<0.020	<0.020	<0.020	<0.020	0.03	0.029	-		
SO ₄ ⁻	mg/L	-	-	0.7	0.5	0.6	2	<1	3	0.82	1.03	1.55	2.28	0.65	0.62	1.25	1.21	0.64	0.61	0.58	0.58	0.6	0.84	0.91	-		
Nutrients																											
NH ₃ +NH ₄	mg/L N	-	0.021 - 231 ^a	0.20	0.10	<0.10	0.04	0.11	<0.02	<0.15	<0.15	0.28	0.22	<0.15	<0.15	0.2	<0.15	-	-	-	-	-	-	-	-		
NO ₂ (Nitrite)	mg/L N	0.010	0.060	<0.06	<0.06	<0.06	<0.005	<0.005	0.013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.010		
NO ₃ (Nitrate)	mg/L N	0.020	3.0	0.06	<0.05	<0.05	<0.10	<0.10	<0.10	<0.020	0.035	<0.020	0.052	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020		
NO ₂ +NO ₃	mg/L N	-	-	0.06	<0.06	<0.06	<0.10	<0.10	<0.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.022		
Ammonia total as N	mg/L	0.0050	Variable ^a	-	-	-	-	-	-	-	-	-	-	<0.020	0.054	0.061	<0.020	<0.020	<0.020	<0.020	<0.020	-	-	-	<0.010		
Total Phosphorus	mg/L	0.0020	0.01	<0.02	<0.02	<0.10	<0.01	<0.01	<0.01	0.0043	0.0058	0.0040	0.0038	0.0044	0.0032	0.0231	0.0088	0.0061	0.0066	0.004	0.0037	0.004	<0.0030	<0.0030	0.0119		
Dissolved Phosphorus	mg/L	-	-	<0.02	<0.02	<0.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Organic Compounds																											
Phenols	mg/L	-	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
DOC	mg/L	0.50	-	-	-	-	-	-	-	2.1	2.1	2.5	2.6	2.1	1.9	2.1	2.3	2.24	2.14	1.9	2.07	1.87	2.48	2.41	2.68		
TOC	mg/L	0.50	-	-	-	-	-	-	-	2.1	1.9	2.7	2.6	2.3	2.2	2.5	2.2	2.48	2.79	2.16	2.18	2.08	3.19	3.00	3.39		
TKN	mg/L	-	-	-	-	-	-	-	-	<0.15	<0.15	0.28	0.22	<0.15	<0.15	0.2	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	-		
Chlorophyll-a	mg/m ₃	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Phaeophytin-a	mg/m ₃	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Total Metals and Non-Metals																											
Aluminum	mg/L	0.0030	Variable ¹	0.008	<0.004	<0.004	<0.005	<0.005	0.006	<0.010	<0.010	<0.010	<0.010	0.018	0.014	<0.010	<0.010	0.0282	0.0269	0.0063	0.0067	0.0085	<0.0050	0.0058	0.0183		
Antimony	mg/L	0.00010	-	<0.0004	<0.0004	<0.0004	-	-	-	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010		
Arsenic	mg/L	0.00010	0.005	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.0010	<0.0010	<0.00010	<0.00010	<0.00010	<0.00010	0.00011	0.00012	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010		
Barium	mg/L	0.00010	-	0.001	0.004	0.004	<0.01	<0.01	<0.01	-	-	-	-	0.00347	0.0034	0.00545	0.00569	0.00391	0.00394	0.00328	0.00337	0.00336	0.00532	0.00527	0.00484		
Beryllium	mg/L	0.000020	-	<0.005	<0.005	<0.005	-	-	-	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010		
Bismuth	mg/L	0.000050	-	<0.0003	<0.0003	<0.0003	-	-	-	-	-	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050		
Boron	mg/L	0.010	1.5	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010		
Cadmium	mg/L	0.0000050	Variable ^c	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.000090	<0.000090	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050		
Calcium	mg/L	0.050	-	8.86	18.3	18.5	14	17	19	14.1	13.9	20.2	19.2	10.5	10.6	19	21.2	12.3	12.5	12.1	12.1	12.2	18.9	20.5	16.3		
Cesium	mg/L	0.000010	-	-	-	-	-	-	-	-	-	-	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010		
Chromium	mg/L	0.00050	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	-	-	0.0008	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050		
Cobalt	mg/L	0.00010	0.00078	<0.0003	<0.0003	<0.0003	<0.0002	<0.0002	<0.0002	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010		
Copper	mg/L	0.00050	0.002 - 0.004 ^c	<0.0008	0.0009	<0.0008	<0.001	<0.001	<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		
Iron	mg/L	0.010	0.300	<0.02	<0.02	<0.02	<0.03	<0.03	<0.03	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.016	0.016	0.018	0.021	0.019	0.027		
Lead	mg/L	0.000050	0.001 - 0.007 ^c	<0.0002	<0.0002	<0.0002	<0.001	<0.001	<0.001	<0.00050	<0.00050	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050		
Lithium	mg/L	0.0010	-	-	-	-	-	-	-	-	-	-	-	<0.0010	<0.0010	0.0012	0.0013	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010		
Magnesium	mg/L	0.0050	-	2.49	8.23	8.71	7	8	8	6.28	6.36	9.52	9.21	5.19	5.14	9.19	9.72	5.89	5.87	5.37	5.39	5.41	8.21	8.16	7.88		
Manganese	mg/L	0.00010	Variable ^c	0.0071	0.0010	0.0009	<0.01	<0.01	<0.01	<0.0010	<0.0010	<0.00050	0.00118	0.00154	0.00144	0.00101	0.00106	0.00222	0.00208	0.00089	0.00084	0.00093	0.00073	0.00078	0.00131		
Mercury	mg/L	0.0000050	0.000026	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.00001																	

Parameters	Units	2023 LOR	CCME Guideline																							
				2005			2006			2015				2016				2017		2018						
				07-Jun-05	06-Aug-05	09-Sep-05	13-Jun-06	02-Aug-06	08-Sep-06	03-Jul-15	03-Jul-15	11-Aug-15	11-Aug-15	30-Jun-16	30-Jun-16	25-Aug-16	25-Aug-16	29-Jun-17	29-Jun-17	03-Jul-18	03-Jul-18	03-Jul-18	02-Sep-18	02-Sep-18	22-Jun-19	
										US	DS	US	DS	DS	US	DS	US	US	DS	US	US Duplicate	DS	US	DS	US	
Dissolved Metals and Non-Metals																										
Aluminum	mg/L	0.0010	-	<0.004	<0.004	<0.004	<0.005	<0.005	<0.005	0.0056	<0.0050	<0.0050	<0.0050	-	-	-	-	-	-	-	-	-	-	-	-	
Arsenic	mg/L	0.00010	-	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-	-	-	-	-	-	-	-	-	-	
Barium	mg/L	0.00010	-	0.001	0.004	0.004	<0.01	<0.01	<0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Boron	mg/L	0.010	-	<0.05	0.02	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Cadmium	mg/L	0.0000050	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.000011	<0.000010	<0.000010	<0.000010	-	-	-	-	-	-	-	-	-	-	-	-	
Calcium	mg/L	0.050	-	9.62	18.3	17.2	13	17	19	14.9	13.9	17.9	18.1	-	-	-	-	-	-	-	-	-	-	-	-	
Chromium	mg/L	0.00050	-	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Cobalt	mg/L	0.00010	-	<0.0003	<0.0003	<0.0003	<0.0002	<0.0002	<0.0002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Copper	mg/L	0.00020	-	<0.0008	<0.0008	<0.0008	<0.001	<0.001	<0.001	0.001	0.00041	0.00072	0.00045	-	-	-	-	-	-	-	-	-	-	-	-	
Iron	mg/L	0.010	-	<0.02	0.02	<0.02	<0.03	<0.03	<0.03	0.052	<0.010	0.017	<0.010	-	-	-	-	-	-	-	-	-	-	-	-	
Lead	mg/L	0.000050	Variable ^e	<0.0002	<0.0002	<0.0002	<0.001	<0.001	<0.001	0.000085	<0.000050	<0.000050	<0.000050	-	-	-	-	-	-	-	-	-	-	-	-	
Magnesium	mg/L	0.0050	-	2.67	8.24	7.80	7	8	8	6.24	6.64	8.57	8.60	-	-	-	-	-	-	-	-	-	-	-	-	
Manganese	mg/L	0.00010	-	0.0068	<0.0007	<0.0007	<0.01	<0.01	<0.01	0.00271	<0.00050	0.00105	<0.00050	-	-	-	-	-	-	-	-	-	-	-	-	
Mercury	mg/L	0.0000050	-	-	-	-	-	-	-	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-	-	-	-	-	-	-	-	-	-	
Molybdenum	mg/L	0.000050	-	<0.0003	<0.0003	<0.0003	<0.005	<0.005	<0.005	0.00008	0.000055	0.000067	0.000072	-	-	-	-	-	-	-	-	-	-	-	-	
Nickel	mg/L	0.00050	-	<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-	-	-	-	-	-	-	-	-	-	
Phosphorus	mg/L	0.050	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Potassium	mg/L	0.050	-	0.52	0.48	0.49	0.61	0.46	0.49	0.589	0.58	0.672	0.688	-	-	-	-	-	-	-	-	-	-	-	-	
Selenium	mg/L	0.000050	-	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.000050	<0.000050	<0.000050	<0.000050	-	-	-	-	-	-	-	-	-	-	-	-	
Silver	mg/L	0.000010	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Sodium	mg/L	0.050	-	0.34	0.52	0.51	0.49	0.52	0.9	0.97	0.91	1.42	1.44	-	-	-	-	-	-	-	-	-	-	-	-	
Strontium	mg/L	0.00020	0.25	0.0061	0.0100	0.0092	0.008	0.01	0.014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Thallium	mg/L	0.000010	-	<0.0002	<0.0002	<0.0002	-	-	-	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-	-	-	-	-	-	-	-	-	-	
Tin	mg/L	0.00010	-	<0.001	<0.001	<0.001	<0.01	<0.01	<0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Uranium	mg/L	0.000010	-	-	-	-	-	-	-	0.000244	0.000314	0.000398	0.000411	-	-	-	-	-	-	-	-	-	-	-	-	
Vanadium	mg/L	0.00050	-	<0.0009	0.0027	0.0022	<0.001	<0.001	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Zinc	mg/L	0.0010	Variable ^e	0.003	0.002	0.009	<0.01	<0.01	<0.01	0.00750	0.0013	<0.0010	0.0039	-	-	-	-	-	-	-	-	-	-	-	-	
Miscellaneous (Water)																										
6PPD-Quinone	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Water Quality Summary For Sample Site N1-070 (BG50)

Parameters	Units	2023 LOR	CCME Guideline	Date																								
				2019				2020				2021				2022				2023								
				22-Jun-19	09-Aug-19	09-Aug-19	22-Jun-20	22-Jun-20	20-Jul-20	20-Jul-20	14-Aug-20	14-Aug-20	14-Jun-21	14-Jun-21	14-Jun-21	14-Jun-21	17-Aug-21	17-Aug-21	19-Jun-22	19-Jun-22	29-Aug-22	29-Aug-22	25-Jun-23	25-Jun-23	17-Jul-23	17-Jul-23	20-Aug-23	20-Aug-23
				DS	US	DS	US	DS	US	US	DS	US	DS	Field Duplica	US	DS	US	DS	US	DS	US	DS	US	DS	US	DS	US	
In Situ Parameters																												
Temperature	°C	-	-	3.1	15.6	15.6	2.3	2.4	14.2	14.3	8.5	9	3.5	-	3.3	6.5	6.6	0.90	0.2	9.0	8.6	0.9	0.9	7.3	7.3	8.3	8.2	
Specific Conductance	µS/cm	-	-	0.1177	0.1707	0.1736	0.1194	0.1192	0.1618	0.1629	0.1988	0.2003	129.9	-	130	176	175.3	132.8	128.7	200	180	94	94	82.7	82.1	147.5	144	
Dissolved Oxygen	mg/L	-	9.5	-	-	-	13.58	13.49	10.16	10.19	99.9	101.3	13.39	-	13.17	12.17	12.20	13.58	13.62	12.62	12.32	13.09	13.09	11.37	11.87	11.24	11.28	
Dissolved Oxygen	%	-	-	99.1	102.5	102.7	99	98.4	98.8	99.5	11.73	11.72	101.6	-	99.6	100.8	101.4	95.2	93.5	110.6	107.2	94.7	94.7	100.6	100.7	98.9	99.1	
pH	pH units	-	6.5 - 9.0	8.12	8.31	8.36	7.91	7.89	8.2	8.24	8.37	8.38	7.88	-	7.75	8.36	8.34	7.87	7.83	8.41	8.32	7.78	7.78	7.96	7.92	8.26	8.23	
Wetted Width	m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Average Depth	m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	m³/s	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Physical Parameters																												
pH	pH units	0.10	6.5 - 9.0	8.11	8.14	7.78	7.81	7.8	8.24	8.23	8.39	8.4	8.01	7.97	7.90	7.97	8.00	7.93	7.83	8.19	8.23	7.69	7.76	7.83	7.78	8.17	8.17	
Conductivity	µS/cm	1.0	-	-	-	-	123	123	172	170	203	206	135	136	136	185	183	135	129	191	183	97.6	97.7	86.3	85.4	155	158	
Turbidity	NTU	0.10	-	0.25	0.30	0.37	0.52	0.59	0.15	0.17	0.22	0.21	1.18	1.16	1.12	0.27	0.23	10.10	1.28	<1.0	<1.0	1.52	1.22	0.72	1.01	1.17	0.57	
Hardness	mg/L as CaCO₃	0.50	-	74.2	84.8	87.4	62.3	62.5	77.8	83.7	102	105	66.2	66.5	65.3	92.4	91.4	66.4	65.5	102	96.5	49.1	48.6	42.1	41.3	76.0	74.5	
TSS	mg/L	1.0	Variable [#]	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	1.3	1.3	1.4	<2.0	1.0	33.5	6.5	<3.0	<3.0	3.1	3.2	<1.0	<1.0	1.8	1.2	
TDS	mg/L	10	-	80	104	112	92	93	94	95	131	128	84	84	77	96	97	68	67	98	87	44	46	48	53	64	76	
Dissolved Anions																												
Alkalinity	mg/L as CaCO₃	2.0	-	74	89	83	58	58	77	83	99	100	82.4	75.2	76.7	91.4	92.1	64.6	62.7	104.0	87.8	81.1	70.4	48.9	48.7	86.6	75.4	
Br ⁻	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Cl ⁻	mg/L	0.50	120	1.45	1.62	2.20	3.12	2.67	3.46	3.52	4.87	5.04	3.23	3.24	3.27	3.69	3.41	2.73	2.64	4.11	3.26	1.57	1.55	1.47	1.03	2.72	2.23	
Fluoride	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
SO₄ ⁻	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Nutrients																												
NH₃+NH₄	mg/L N	-	0.021 - 231 ^a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
NO₂ (Nitrite)	mg/L N	0.010	0.060	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.0010	<0.0010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	
NO₃ (Nitrate)	mg/L N	0.020	3.0	<0.020	0.154	2.62	0.031	0.03	<0.020	<0.020	<0.0050	0.01	0.026	0.025	0.024	<0.020	<0.020	0.022	0.020	0.021	<0.020	0.028	0.026	<0.020	<0.020	<0.020	<0.020	
NO₂+NO₃	mg/L N	-	-	<0.022	0.154	2.62	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Ammonia total as N	mg/L	0.0050	Variable ^a	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.0050	<0.0050	<0.010	<0.010	<0.010	<0.010	<0.010	0.012	<0.010	<0.010	<0.010	0.012	0.0195	0.0064	0.0187	0.0074	0.0072	
Total Phosphorus	mg/L	0.0020	0.01	0.0033	0.0049	<0.0030	0.0056	0.0071	<0.0030	0.0033	0.0036	0.0038	0.0044	0.0053	0.0081	<0.0030	<0.0030	0.0060	0.0044	<0.0030	<0.0030	0.0057	0.0053	0.0033	0.0036	0.0021	0.0027	
Dissolved Phosphorus	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.050	<0.050	<0.050	<0.050	-	-	-	-	-	-	
Organic Compounds																												
Phenols	mg/L	-	0.004	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
DOC	mg/L	0.50	-	2.79	2.33	2.44	3.47	3.42	2.99	3.36	2.53	2.54	3.67	4.17	4.09	3.58	3.52	2.81	2.71	2.38	2.80	2.56	2.65	1.7	1.85	2.34	1.96	
TOC	mg/L	0.50	-	3.27	2.79	2.64	3.69	3.77	3.34	3.54	2.44	2.38	4.06	3.75	3.82	5.83	5.91	2.74	2.84	2.54	2.51	2.52	2.66	1.98	1.94	2.25	2.19	
TKN	mg/L	-	-	-	-	-	-	-	-	-	-	-	0.190	0.230	0.250	0.160	0.150	0.211	0.192	0.092	0.086	-	-	-	-	-	-	
Chlorophyll-a	mg/m₃	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Phytophytin-a	mg/m₃	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Total Metals and Non-Metals																												
Aluminum	mg/L	0.0030	Variable ^f	0.0086	0.0101	0.0503	0.0262	0.0441	0.0057	0.0098	0.0033	0.009	0.0191	0.0229	0.0119	0.0078	<0.0050	0.539	0.0827	0.0186	<0.0050	0.0697	0.0629	0.0114	0.0074	0.0238	0.0058	
Antimony	mg/L	0.00010	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
Arsenic	mg/L	0.00010	0.005	<0.00010	0.00010	0.00013	<0.00010	<0.00010	0.00010	<0.00010	0.00014	0.00012	0.00012	0.00012	0.00010	<0.00010	<0.00010	0.00017	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
Barium	mg/L	0.00010	-	0.00471	0.00594	0.0069	0.00469	0.00468	0.00534	0.00542	0.00603	0.00607	0.00533	0.00523	0.00502	0.00570	0.00569	0.00952	0.00629	0.00587	0.00523	0.004	0.00384	0.00304	0.00284	0.00476	0.00459	
Beryllium	mg/L	0.000020	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	
Bismuth	mg/L	0.000050	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	
Boron	mg/L	0.010	1.5	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	
Cadmium	mg/L	0.0000050	Variable ^c	<0.0000050	<0.0000050	0.0000123	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	
Calcium	mg/L	0.050	-	16.5	19.1	20.6	13.5	13.7	19	19.4	24.9	25	14.5	14.7	14.7	20.2	20.1	15.3	14.4	21.7	20.2	10.5	10.6	9.33	9.12	17.1	16.4	
Cesium	mg/L	0.000010	-	<0.000010	<0.000010	0.000012	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000119	0.000018	<0.000010	<0.000010	0.000012	0.000012	<0.000010	<0.000010	<0.000010	<0.000010	
Chromium	mg/L	0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00064	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
Cobalt	mg/L	0.00010	0.00078	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00022	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
Copper	mg/L	0.00050	0.002 - 0.004 ^e	<0.0010	<0.0010	0.0012	<0.00050	0.00063	<0.00050	0.00055	<0.00050	0.00051	<0.00050	<0.00050	<0.00050	0.00055	0.00055	0.00121	0.00066	<0.00050	<0.00050	0.00053	0.00058	<0.00050	<0.00050	<0.00050	<0.00050	
Iron	mg/L	0.010	0.300	0.016	0.035	0.081	0.042	0.043	0.020	0.025	0.030	0.029	0.039	0.038	0.0													

Parameters	Units	2023 LOR	CCME Guideline	Date																							
				2019			2020						2021					2022				2023					
				22-Jun-19	09-Aug-19	09-Aug-19	22-Jun-20	22-Jun-20	20-Jul-20	20-Jul-20	14-Aug-20	14-Aug-20	14-Jun-21	14-Jun-21	14-Jun-21	17-Aug-21	17-Aug-21	19-Jun-22	19-Jun-22	29-Aug-22	29-Aug-22	25-Jun-23	25-Jun-23	17-Jul-23	17-Jul-23	20-Aug-23	20-Aug-23
				DS	US	DS	US	DS	US	DS	US	DS	DS	Field Duplicate	US	DS	US	DS	US	DS	US	DS	US	DS	US	DS	US
Dissolved Metals and Non-Metals																											
Aluminum	mg/L	0.0010	-	-	-	-	0.0059	0.0074	<0.0050	<0.0050	0.0013	0.0028	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0125	0.0058	0.0053	<0.0050	0.0050	0.0038	0.0036	0.0026	0.0026	0.0025
Arsenic	mg/L	0.00010	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Barium	mg/L	0.00010	-	-	-	-	0.00451	0.00471	0.00496	0.00566	0.0061	0.00633	0.00493	0.00512	0.00489	0.00584	0.00581	0.00605	0.00547	0.00602	0.0053	0.00357	0.00334	0.00309	0.00299	0.00455	0.00445
Boron	mg/L	0.010	-	-	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium	mg/L	0.0000050	-	-	-	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	
Calcium	mg/L	0.050	-	-	-	-	13.5	13.7	17.6	18.5	22.7	23.4	14.3	14.3	14.2	20.8	20.4	14.50000	14.70000	23.0	21.1	10.4	10.2	9.45	9.23	16.7	16.3
Chromium	mg/L	0.00050	-	-	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00010	<0.00010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt	mg/L	0.00010	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper	mg/L	0.00020	-	-	-	-	0.00042	0.00047	0.00046	0.00048	0.0005	0.00051	0.00041	0.00043	0.00040	0.00048	0.00049	0.00050	0.000480	0.00	0.00	0.00048	0.00032	0.00035	0.00034	0.00044	0.00040
Iron	mg/L	0.010	-	-	-	-	0.018	0.02	0.015	0.014	0.019	0.018	0.019	0.020	0.020	<0.010	<0.010	<0.010	<0.010	0.01000	0.01600	0.021	0.020	0.011	0.011	0.014	0.013
Lead	mg/L	0.000050	Variable [®]	-	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Magnesium	mg/L	0.0050	-	-	-	-	6.95	6.88	8.2	9.1	10.9	11.3	7.39	7.48	7.23	9.82	9.79	7.330000	7.020000	10.7	10.6	5.56	5.56	4.46	4.38	8.24	8.13
Manganese	mg/L	0.00010	-	-	-	-	0.00217	0.00236	<0.00050	0.00063	0.00032	0.00035	0.00347	0.00371	0.00346	<0.00050	<0.00050	0.00576	0.00623	<0.00050	<0.00050	0.00673	0.00722	0.00048	0.00046	0.00045	0.00046
Mercury	mg/L	0.0000050	-	-	-	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.000050	-	-	-	-	0.000057	0.00007	0.000063	0.000081	0.000082	0.000085	0.000074	0.000071	0.000078	0.000072	0.000072	0.000097	0.000073	0.000091	0.000076	<0.000050	<0.000050	<0.000050	<0.000050	0.000068	0.000060
Nickel	mg/L	0.00050	-	-	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Phosphorus	mg/L	0.050	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Potassium	mg/L	0.050	-	-	-	-	0.589	0.597	0.552	0.642	0.71	0.748	0.794	0.803	0.771	0.722	0.702	0.796	0.733	0.71	0.63	0.532	0.518	0.423	0.406	0.545	0.507
Selenium	mg/L	0.000050	-	-	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	
Silver	mg/L	0.000010	-	-	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000010	<0.000010	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium	mg/L	0.050	-	-	-	-	1.45	1.46	1.91	2.06	2.88	3.06	1.73	1.75	1.73	2.29	2.32	1.8	1.84	2.33	2.4	0.982	0.961	0.710	0.702	1.67	1.62
Strontium	mg/L	0.00020	0.25	-	-	-	0.0086	0.0086	0.0118	0.0129	0.0148	0.015	0.0099	0.0098	0.0100	0.0146	0.0143	0.011000	0.010000	0.01590	0.01530	0.00651	0.00648	0.00642	0.00621	0.0123	0.0117
Thallium	mg/L	0.000010	-	-	-	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin	mg/L	0.00010	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Uranium	mg/L	0.000010	-	-	-	-	0.000355	0.00035	0.000424	0.00043	0.000542	0.00057	0.000422	0.000417	0.000407	0.000521	0.000514	0.000745	0.000394	0.000564	0.000466	0.000257	0.000233	0.000164	0.000146	0.000365	0.000346
Vanadium	mg/L	0.00050	-	-	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc	mg/L	0.0010	Variable [®]	-	-	-	<0.0010	0.0017	<0.0010	0.0014	<0.0010	0.0013	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0018	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	<0.0010	<0.0010	<0.0010
Miscellaneous (Water)																											
6PPD-Quinone	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0020	<0.0020	-	-	-	-	-	-

Table 2.6 Water Quality Monitoring Of Baseline Fisheries Culverts Surface
Water Quality Summary For Sample Site N1-080 (CV040)

Parameters	Units	2023 LOR	CCME Guideline	Date																						
				2005				2006				2015				2016				2017		2018				
				13-Jun-05	06-Aug-05	09-Sep-05	13-Jun-06	13-Jun-06	02-Aug-06	08-Sep-06	03-Jul-15	03-Jul-15	11-Aug-15	11-Aug-15	29-Jun-16	29-Jun-16	25-Aug-16	25-Aug-16	29-Jun-17	29-Jun-17	04-Jul-18	04-Jul-18	03-Sep-18	03-Sep-18	03-Sep-18	
																									DS Field Blank	
In Situ Parameters																										
Temperature	°C	-	-	0.07	10.80	4.78	-0.1	-0.1	14.96	4.91	-	-	12.8	12.7	15.7	16	-	11.1	3.8	2.4	8.1	8.5	3.4	3.3	3.3	
Specific Conductance	µS/cm	-	-	0.047	0.243	0.318	0.084	0.084	0.264	0.306	0.130	0.125	0.387	0.390	0.151	0.151	-	0.391	0.177	0.101	0.2026	0.1968	0.3137	0.3133	0.31	
Dissolved Oxygen	mg/L	-	9.5	13.48	10.39	12.74	13.65	13.65	10.46	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Dissolved Oxygen	%	-	-	-	-	-	-	-	-	-	-	-	101.7	102.3	99.8	103.6	-	99.8	109.2	100.8	94.1	94.4	96.3	95.3	95.3	
pH	pH units	-	6.5 - 9.0	6.99	8.39	8.05	7.97	7.97	8.37	8.50	8.32	8.16	8.61	8.65	8.19	8.23	-	8.36	7.64	7.84	8.24	8.24	8.27	8.24	8.24	
Wetted Width	m	-	-	-	-	-	ice	-	3	4	-	-	7	7	-	-	-	-	12.1	30.8	9.2	7.7	9.2	7.3	7.3	
Average Depth	m	-	-	-	-	-	-	-	0.25	0.2	-	-	0.2	0.2	-	-	-	-	0.14	0.12	0.06	0.08	0.10	-	-	
Flow Rate	m³/s	-	-	-	-	-	-	-	0.28	-	-	-	0	0	-	-	-	-	1.13	1.55	0.07	0.133	.052	.144	.144	
Physical Parameters																										
pH	pH units	0.10	6.5 - 9.0	-	-	-	7.40	7.47	8.22	8.18	8.18	8.19	8.53	8.50	8.1	8.19	8.47	8.51	7.73	7.75	8.24	8.24	8.43	8.37	5.77	
Conductivity	µS/cm	1.0	-	54	257	303	92	93	273	321	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Turbidity	NTU	0.10	-	0.37	0.13	<0.10	0.6	0.5	0.2	-	0.44	0.54	0.19	0.15	1.48	1.05	0.28	0.33	0.77	0.71	0.62	0.64	0.5	0.27	<0.10	
Hardness	mg/L as CaCO₃	0.50	-	25.1	138	178	48	48	153	159	95	94	168	169	68	69	193	202	35	37	106	102	176	182	<10	
TSS	mg/L	1.0	Variable [®]	-	-	-	-	-	-	-	<2.0	<2.0	<2.0	<2.0	2.0	<2.0	<2.0	<2.0	<2.0	5.1	<2.0	<2.0	<2.0	<2.0	<2.0	
TDS	mg/L	10	-	46	126	200	60	61	177	209	77	90	178 *	170 *	65	65	208	201	44	46	112	118	195	205	<20	
Dissolved Anions																										
Alkalinity	mg/L as CaCO₃	2.0	-	24	130	167	45	45	147	167	112	99	175	177	68	75	187	191	32	27	103	100	171	168	<10	
Br ⁻	mg/L	-	-	<0.3	<0.3	<0.3	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Cl ⁻	mg/L	0.50	120	0.9	0.7	2.4	<1	<1	1	5	2.48	2.28	8.34	8.66	1.81	1.84	13.5	13.8	0.57	0.57	3.16	2.91	13.5	13.8	<0.50	
Fluoride	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.020	<0.020	0.026	0.027	<0.020	<0.020	0.031	0.024	0.042	0.041	<0.020	
SO₄ ⁻	mg/L	-	-	0.6	0.8	2.1	2	2	<1	4.00	1.58	1.47	4.81	5.36	0.76	0.84	6.03	6.52	0.3	<0.30	1.3	0.89	3.62	3.52	<0.30	
Nutrients																										
NH₃+NH₄	mg/L N	-	0.021 - 231 ^a	0.2	0.5	0.6	0.05	0.09	0.04	<0.02	0.17	<0.15	0.37	0.28	<0.15	<0.15	0.24	0.17	-	-	-	-	-	-	-	
NO₂ ⁻ (Nitrite)	mg/L N	0.010	0.060	<0.06	<0.06	<0.06	<0.005	<0.005	<0.005	0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
NO₃ ⁻ (Nitrate)	mg/L N	0.020	3.0	<0.05	<0.05	<0.05	<0.10	<0.10	<0.10	<0.10	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020		
NO₃ ⁻ +NO₃	mg/L N	-	-	<0.06	<0.06	<0.06	<0.10	<0.10	<0.10	<0.10	-	-	-	-	-	-	<0.020	0.085	-	-	-	-	-	-		
Ammonia total as N	mg/L	0.0050	Variable ^a	-	-	-	-	-	-	-	<0.050	<0.050	<0.050	<0.050	<0.020	<0.020	-	-	<0.020	<0.020	<0.020	<0.020	-	-	-	
Total Phosphorus	mg/L	0.0020	0.01	0.030	<0.02	<0.10	<0.01	<0.01	<0.01	<0.01	0.0040	0.0032	<0.0030	<0.0030	0.0067	0.0038	0.0048	0.0034	0.0158	0.0159	<0.0030	0.0031	<0.0030	<0.0030	<0.0030	
Dissolved Phosphorus	mg/L	-	-	<0.02	<0.02	<0.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Organic Compounds																										
Phenols	mg/L	-	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
DOC	mg/L	0.50	-	-	-	-	-	-	-	-	2.2	2.2	3.4	3.5	1.6	1.4	3.2	3	3.93	3.56	3.2	3.05	3.27	3.16	0.51	
TOC	mg/L	0.50	-	-	-	-	-	-	-	-	2.4	2.5	3.6	3.5	1.9	2.1	3.6	3.3	4.45	4.17	3.4	3.28	4.01	3.61	0.62	
TKN	mg/L	-	-	-	-	-	-	-	-	-	0.17	<0.15	0.37	0.28	<0.15	<0.15	0.24	0.17	0.29	0.26	<0.15	<0.15	0.18	0.27	<0.15	
Chlorophyll-a	mg/m₃	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Pheophytin-a	mg/m₃	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Total Metals and Non-Metals																										
Aluminum	mg/L	0.0030	Variable ^f	0.005	<0.004	<0.004	0.006	0.005	<0.005	<0.005	0.019	0.025	0.011	<0.010	0.096	0.042	0.024	0.02	0.0527	0.065	0.0092	0.0121	0.0239	0.011	<0.0050	
Antimony	mg/L	0.00010	-	<0.0004	<0.0004	<0.0004	-	-	-	-	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
Arsenic	mg/L	0.00010	0.005	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.001	<0.0010	<0.0010	0.00010	<0.00010	<0.00010	<0.00010	0.00014	0.00011	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
Barium	mg/L	0.00010	-	0.001	0.006	0.007	<0.01	<0.01	<0.01	<0.01	-	-	-	-	0.0055	0.00502	0.0119	0.0118	0.00266	0.00274	0.00574	0.00561	0.0101	0.0104	<0.00010	
Beryllium	mg/L	0.000020	-	<0.005	<0.005	<0.005	-	-	-	-	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
Bismuth	mg/L	0.000050	-	<0.0003	<0.0003	<0.0003	-	-	-	-	-	-	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	
Boron	mg/L	0.010	1.5	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	
Cadmium	mg/L	0.0000050	Variable ^g	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.00010	<0.00010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	
Calcium	mg/L	0.050	-	6.07	33.9	42.9	11	11	38	40	-	-	-	-	16.9	16.8	44.7	46.1	8.08	8.64	25.1	24.6	41.2	43.6	<0.050	
Cesium	mg/L	0.000010	-	-	-	-	-	-	-	-	-	-	-	-	0.000012	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	
Chromium	mg/L	0.00050	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<						

Parameters	Units	2023 LOR	CCME Guideline	Date																				
				2005			2006			2015				2016				2017		2018				
				13-Jun-05	06-Aug-05	09-Sep-05	13-Jun-06	13-Jun-06	02-Aug-06	08-Sep-06	03-Jul-15	03-Jul-15	11-Aug-15	11-Aug-15	29-Jun-16	29-Jun-16	25-Aug-16	25-Aug-16	29-Jun-17	29-Jun-17	04-Jul-18	04-Jul-18	03-Sep-18	03-Sep-18
				US	DS	US	DS	DS	US	DS	US	DS	DS	US	DS	US	US	US	DS	US	DS	US	DS	DS Field Blank
Boron	mg/L	0.010	-	<0.05	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/L	0.0000050	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-	-	-	-	-	-	-	-
Calcium	mg/L	0.050	-	6.06	35.0	40.5	11	11	38	39	22.5	22.3	37.9	39.6	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	0.00050	-	<0.001	0.002	0.002	<0.001	<0.001	<0.001	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	mg/L	0.00010	-	<0.0003	<0.0003	<0.0003	<0.0002	<0.0002	<0.0002	<0.0002	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/L	0.00020	-	<0.0008	<0.0008	<0.0008	<0.001	<0.001	<0.001	<0.001	0.00057	0.00054	0.00076	0.00077	-	-	-	-	-	-	-	-	-	-
Iron	mg/L	0.010	-	<0.05	<0.02	<0.02	<0.03	<0.03	<0.03	<0.03	<0.010	<0.010	<0.010	0.014	-	-	-	-	-	-	-	-	-	-
Lead	mg/L	0.000050	Variable ^e	<0.0002	<0.0002	<0.0002	<0.001	<0.001	<0.001	<0.001	<0.000050	<0.000050	<0.000050	<0.000050	-	-	-	-	-	-	-	-	-	-
Magnesium	mg/L	0.0050		2.50	13.3	16.0	5	5	14	15	9.49	9.32	17.8	17	-	-	-	-	-	-	-	-	-	-
Manganese	mg/L	0.00010	-	0.0022	<0.0007	<0.0007	<0.01	<0.01	<0.01	<0.01	<0.00050	<0.00050	<0.00050	0.00118	-	-	-	-	-	-	-	-	-	-
Mercury	mg/L	0.0000050	-	-	-	-	-	-	-	-	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-	-	-	-	-	-	-	-
Molybdenum	mg/L	0.000050	-	<0.0003	<0.0003	<0.0003	<0.005	<0.005	<0.005	<0.005	0.000067	0.000073	0.000176	0.000174	-	-	-	-	-	-	-	-	-	-
Nickel	mg/L	0.00050	-	<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-	-	-	-	-	-	-	-
Phosphorus	mg/L	0.050	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/L	0.050	-	0.39	0.72	0.76	0.61	0.60	0.73	0.80	0.644	0.607	1.24	1.24	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	0.000050	-	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.001	<0.000050	<0.000050	<0.000050	<0.000050	-	-	-	-	-	-	-	-	-	-
Silver	mg/L	0.000010	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	mg/L	0.050	-	0.29	1.25	1.96	0.42	0.46	1.38	3.12	2.54	2.41	7.10	6.67	-	-	-	-	-	-	-	-	-	-
Strontium	mg/L	0.00020	0.25	0.0027	0.0192	0.0224	0.005	0.005	0.023	0.026	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	0.000010	-	<0.0002	<0.0002	<0.0002	-	-	-	-	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	0.00010	-	<0.001	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	0.000010	-	-	-	-	-	-	-	-	0.00101	0.00096	0.00300	0.00288	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	0.00050	-	<0.0009	0.0047	0.0045	<0.001	<0.001	<0.001	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/L	0.0010	Variable ^e	0.001	0.002	0.002	<0.01	<0.01	<0.01	<0.01	0.0025	0.0037	<0.0010	0.0029	-	-	-	-	-	-	-	-	-	-
Miscellaneous (Water)																								
6PPD-Quinone	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

[illegible]

Table 2.6 Water Quality Monitoring Of Baseline Fisheries Culverts Surface
Water Quality Summary For Sample Site N1-080 (CV040)

Parameters	Units	2023 LOR	CCME Guideline	Date																									
				2019				2020								2021				2022				2023					
				22-Jun-19	22-Jun-19	09-Aug-19	09-Aug-19	22-Jun-20	22-Jun-20	22-Jun-20	21-Jul-20	21-Jul-20	14-Aug-20	14-Aug-20	14-Jun-21	14-Jun-21	17-Aug-21	17-Aug-21	24-Jun-22	24-Jun-22	29-Aug-22	29-Aug-22	25-Jun-23	25-Jun-23	17-Jul-23	17-Jul-23	20-Aug-23	20-Aug-23	
				US	DS	US	DS	US	DS	Travel Blank	US	DS	US	DS	DS	US	DS	US	DS	US	DS	US	DS	US	US	DS	US	DS	US
Boron	mg/L	0.010	-	-	-	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010		
Cadmium	mg/L	0.0000050	-	-	-	-	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050		
Calcium	mg/L	0.050	-	-	-	-	-	10.2	9.86	<0.050	41.1	41.800	53.2	54.300	4.72	4.67	42.6	40.4	2.650	2.410	48.30	48.50	5.89	4.84	20.5	20.5	46.5	40.7	
Chromium	mg/L	0.00050	-	-	-	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050		
Cobalt	mg/L	0.00010	-	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010		
Copper	mg/L	0.00020	-	-	-	-	-	0.00036	0.00031	<0.00020	0.00088	0.001	0.00078	0.001	<0.00020	0.00021	0.00078	0.00075	<0.00020	<0.00020	0.000730	0.000740	0.00023	0.00022	0.00059	0.00048	0.00095	0.00072	
Iron	mg/L	0.010	-	-	-	-	-	0.013	0.012	<0.010	<0.010	0.013	<0.010	<0.010	0.012	0.017	<0.010	<0.010	0.012	<0.010	<0.010	<0.010	0.021	0.013	0.011	<0.010	<0.010	<0.010	
Lead	mg/L	0.000050	Variable ^e	-	-	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	
Magnesium	mg/L	0.0050	-	-	-	-	-	4.37	4.12	<0.0050	19	17.600	24.5	23.800	1.95	1.97	15.9	18.7	0.996	0.908	23.90	25.40	2.47	1.97	8.28	8.78	17.7	20.3	
Manganese	mg/L	0.00010	-	-	-	-	-	0.00252	0.00256	<0.00050	0.00072	0.005	0.0013	0.005	0.00633	0.00665	0.00194	0.00160	0.00587	0.00505	0.00179	0.00083	0.00985	0.00862	0.0022	0.00118	0.00174	0.00126	
Mercury	mg/L	0.0000050	-	-	-	-	-	<0.0000050	0.0000063	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050		
Molybdenum	mg/L	0.000050	-	-	-	-	-	<0.000050	<0.000050	<0.000050	0.000165	0.000	0.00019	0.000	<0.000050	<0.000050	0.000153	0.000148	<0.000050	<0.000050	0.000216	0.000206	0.00012	0.000082	0.000074	0.000071	0.00014	0.000154	
Nickel	mg/L	0.00050	-	-	-	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
Phosphorus	mg/L	0.050	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	
Potassium	mg/L	0.050	-	-	-	-	-	0.449	0.425	<0.050	1.13	1.150	1.39	1.360	0.338	0.343	0.945	1.03	0.211	0.197	1.190	1.24	0.534	0.415	0.598	0.614	0.96	1.02	
Selenium	mg/L	0.000050	-	-	-	-	-	<0.000050	<0.000050	<0.000050	<0.000050	0.000	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	
Silver	mg/L	0.000010	-	-	-	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000010	<0.000010	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	
Sodium	mg/L	0.050	-	-	-	-	-	0.532	0.457	<0.050	7.44	6.550	12.1	10.900	0.384	0.427	3.74	5.69	0.255	0.241	10.2	11.8	0.63	0.449	1.88	2.09	4.81	7.47	
Strontium	mg/L	0.00020	0.25	-	-	-	-	0.0053	0.0051	<0.0010	0.0284	0.032	0.0346	0.036	0.0030	0.0030	0.0326	0.0275	0.0021	0.0018	0.0368	0.0357	0.00545	0.00373	0.0129	0.0126	0.0377	0.0298	
Thallium	mg/L	0.000010	-	-	-	-	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	
Tin	mg/L	0.00010	-	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
Uranium	mg/L	0.000010	-	-	-	-	-	0.000168	0.000167	<0.000010	0.00272	0.003	0.00384	0.004	0.000116	0.000117	0.00209	0.00259	0.00010	0.00007	0.00036	0.000393	0.000697	0.000264	0.000803	0.000832	0.00231	0.00301	
Vanadium	mg/L	0.00050	-	-	-	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
Zinc	mg/L	0.0010	Variable ^e	-	-	-	-	0.0029	0.0028	<0.0010	<0.0010	0.004	<0.0010	0.002	<0.0010	<0.0010	0.0016	<0.0010	0.0017	<0.0010	0.0023	<0.0010	<0.0010	0.0012	0.0019	<0.0010	0.0023	<0.0010	
Miscellaneous (Water)																													
6PPD-Quinone	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0020	<0.0020	-	-	-	-	-	-	

Table 2.7 Water Quality Monitoring Of Baseline Fisheries Culverts Surface
Water Quality Summary For Sample Site N1-100 (CV217)

Parameters	Units	2023 LOR	CCME Guideline	Date																						
				2005			2006			2015			2016				2017		2018					2019		
				07-Jun-05	06-Aug-05	09-Sep-05	13-Jun-06	29-Jul-06	10-Sep-06	12-Aug-15	12-Aug-15	29-Jun-16	29-Jun-16	25-Aug-16	25-Aug-16	29-Jun-17	29-Jun-17	04-Jul-18	04-Jul-18	04-Jul-18	02-Sep-18	02-Sep-18	22-Jun-19	22-Jun-19	09-Aug-19	
										US	DS	US	DS	DS	US	US	DS	US	DS	US	DS	US	DS	US		
In Situ Parameters																										
Temperature	°C	-	-	0.74	9.35	6.59	1.56	7.36	3.02	9.6	9.4	5.6	6.4	8.7	10.7	4.4	3.2	2.7	2.7	2.6	8.0	8.7	2.7	2.6	15.8	
Specific Conductance	µS/cm	-	-	0.019	0.081	0.088	0.031	0.083	0.091	0.100	0.101	0.640	0.800	0.102	0.095	0.166	0.125	0.0826	0.0826	0.0824	0.0723	0.0904	0.0691	0.0695	0.0894	
Dissolved Oxygen	mg/L	-	9.5	12.14	11.62	12.82	12.71	13.40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Dissolved Oxygen	%	-	-	-	-	-	-	-	-	102.30	102.8	107.4	109.5	94.1	100.0	107.1	101.9	93.5	93.5	93.5	102.8	103.3	97.6	97.3	105.2	
pH	pH units	-	6.5 - 9.0	7.20	7.60	7.02	7.38	7.59	7.92	8.08	8.07	7.74	8.36	8.19	8.11	7.45	7.71	7.76	7.76	7.92	8.23	8.30	7.97	8.08	8.45	
Wetted Width	m	-	-	-	-	-	-	54	59	-	-	-	-	-	-	-	15.4	50	50	50	-	-	-	-	-	
Average Depth	m	-	-	-	-	-	-	5	2.5	-	-	-	-	-	-	-	0.7	-	-	-	-	-	-	-	-	
Flow Rate	m³/s	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.5276	-	-	-	-	-	-	-	-	
Physical Parameters																										
pH	pH units	0.10	6.5 - 9.0	-	-	-	6.97	7.03	6.97	7.80	7.81	7.42	7.41	8.08	7.96	7.65	7.72	7.65	6.29	7.67	7.97	7.95	7.64	7.68	7.63	
Conductivity	µS/cm	1.0	-	27	90	93	38	86	97	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Turbidity	NTU	0.10	-	0.50	0.99	0.55	0.7	1.1	1.4	1.0	1.1	1.1	1.1	2.0	1.0	1.06	1.01	0.72	0.19	1.88	0.75	0.69	0.57	0.66	0.61	
Hardness	mg/L as CaCO₃	0.50	-	8.57	42.0	46.3	16	41	43	37	38	27	29	42	38	28	33	34	<10	34	34	37.0	36.9	37.5	36.6	
TSS	mg/L	1.0	Variable [#]	-	-	-	-	-	-	2	2	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	
TDS	mg/L	10	-	31	<30	<30	25	56	63	50 *	46 *	40	25	52	38	34	41	48	<10	53	65	67	47	53	41	
Dissolved Anions																										
Alkalinity	mg/L as CaCO₃	2.0	-	8	43	45	16	44	47	38	35	30	31	41	35	17	27	33	<10	32	35	34	37	37	38	
Br ⁻	mg/L	-	-	<0.3	<0.3	<0.3	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Cl ⁻	mg/L	0.50	120	0.8	1.0	1.2	<1	1	2	4.96	5.29	2.44	2.49	3.87	3.79	2.50	3.74	5.66	<0.50	5.68	5.39	10.90	4.42	4.51	4.05	
Fluoride	mg/L	-	-	-	-	-	-	-	-	-	-	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	-	-	-	
SO₄ ⁻	mg/L	-	-	0.7	0.6	0.7	2	2	3	1.30	1.35	0.70	0.72	1.15	0.97	0.71	1.06	1.06	<0.30	1.11	0.86	1.28	-	-	-	
Nutrients																										
NH₃+NH₄	mg/L N	-	0.021 - 231 ^a	0.5	<0.10	0.4	0.04	0.05	0.04	0.27	0.28	<0.15	<0.15	<0.15	<0.15	-	-	-	-	-	-	-	-	-	-	
NO₂ ⁻ (Nitrite)	mg/L N	0.010	0.060	<0.06	<0.06	<0.06	<0.005	0.018	0.008	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.010	<0.010	<0.010	
NO₃ ⁻ (Nitrate)	mg/L N	0.020	3.0	<0.05	<0.05	<0.05	<0.10	<0.10	<0.10	<0.020	<0.020	<0.020	<0.020	0.03	<0.020	<0.020	<0.020	0.027	<0.020	0.027	<0.020	<0.020	0.027	0.025	0.025	
NO₂+NO₃	mg/L N	-	-	<0.06	<0.06	<0.06	<0.10	<0.10	<0.10	-	-	-	-	-	-	-	-	-	-	-	-	-	0.027	0.025	0.025	
Ammonia total as N	mg/L	0.0050	Variable ^a	-	-	-	-	-	-	<0.050	<0.050	<0.020	0.05	<0.020	<0.020	0.029	<0.020	<0.020	<0.020	<0.020	-	-	<0.010	<0.010	<0.010	
Total Phosphorus	mg/L	0.0020	0.01	<0.02	<0.02	<0.10	<0.01	<0.01	0.02	0.0080	0.0058	0.0068	<0.0030	0.0071	0.0095	0.0084	0.0087	0.0041	<0.0030	0.0032	0.006	0.050	0.0043	0.0037	<0.0030	
Dissolved Phosphorus	mg/L	-	-	<0.02	<0.02	<0.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Organic Compounds																										
Phenols	mg/L	-	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
DOC	mg/L	0.50	-	-	-	-	-	-	-	2.2	2.2	1.8	1.9	2.3	1.9	2.01	1.88	1.92	<0.50	1.97	2.17	2.22	2.45	2.43	2.15	
TOC	mg/L	0.50	-	-	-	-	-	-	-	2.3	2.3	1.9	1.8	2.3	2.0	2.24	2.17	2.18	0.65	2.25	2.51	2.84	2.81	2.92	2.33	
TKN	mg/L	-	-	-	-	-	-	-	-	0.27	0.28	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	-	-	-	
Chlorophyll-a	mg/m₃	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Pheophytin-a	mg/m₃	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Total Metals and Non-Metals																										
Aluminum	mg/L	0.0030	Variable ^f	0.025	0.039	0.020	0.023	0.043	0.066	0.091	<0.010	0.042	0.150	0.052	0.037	0.033	0.071	0.0189	<0.0050	0.018	0.0249	0.0204	0.0202	0.0391	0.0378	
Antimony	mg/L	0.00010	-	<0.0004	<0.0004	<0.0004	-	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
Arsenic	mg/L	0.00010	0.005	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
Barium	mg/L	0.00010	-	0.002	0.004	0.005	<0.01	<0.01	<0.01	-	-	0.00368	0.00433	0.00576	0.00502	0.00389	0.00457	0.00410	<0.00010	0.00413	0.00438	0.00455	0.00446	0.00475	0.00526	
Beryllium	mg/L	0.000020	-	<0.005	<0.005	<0.005	<0.00010	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
Bismuth	mg/L	0.000050	-	<0.0003	<0.0003	<0.0003	-	-	-	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	
Boron	mg/L	0.010	1.5	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	
Cadmium	mg/L	0.0000050	Variable ^g	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	
Calcium	mg/L	0.050	-	1.51	8.62	9.34	3.0	8.0	9.0	7.76	7.77	5.19	5.58	8.32	7.66	5.61	6.66	6.90	<0.050	6.88	6.82	7.40	7.19	7.19	7.34	
Cesium																										

Table 2.7 Water Quality Monitoring Of Baseline Fisheries Culverts Surface
Water Quality Summary For Sample Site N1-100 (CV217)

Parameters	Units	2023 LOR	CCME Guideline	Date																					
				2005				2006				2015		2016				2017		2018				2019	
Dissolved Metals and Non-Metals																									
Aluminum	mg/L	0.0010	-	0.013	0.006	0.004	0.009	<0.005	0.007	<0.0050	0.090	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	mg/L	0.00010	-	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.00010	<0.00010	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	mg/L	0.00010	-	0.002	0.004	0.005	<0.01	<0.01	<0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	0.010	-	<0.05	0.02	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/L	0.0000050	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.000010	<0.000010	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	mg/L	0.050	-	1.60	9.05	8.60	3	8	9	7.39	7.78	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/L	0.00050	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	mg/L	0.00010	-	<0.0003	<0.0003	<0.0003	<0.0002	<0.0002	<0.0002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/L	0.00020	-	<0.0008	0.0009	0.0010	<0.001	<0.001	<0.001	0.00066	0.00080	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron	mg/L	0.010	-	0.04	<0.02	<0.02	0.06	<0.03	<0.03	<0.010	0.107	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead	mg/L	0.000050	Variable ^a	<0.0002	<0.0002	<0.0002	<0.001	<0.001	<0.001	<0.000050	<0.000050	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium	mg/L	0.0050	-	1.24	5.23	5.12	2	5	5	4.40	4.56	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese	mg/L	0.00010	-	0.0175	<0.0007	<0.0007	<0.01	<0.01	<0.01	0.00058	0.00181	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	mg/L	0.0000050	-	-	-	-	-	-	-	<0.000010	<0.000010	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum	mg/L	0.000050	-	<0.0003	<0.0003	<0.0003	<0.005	<0.005	<0.005	0.000065	0.000080	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel	mg/L	0.00050	-	<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.00050	<0.00050	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phosphorus	mg/L	0.050	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/L	0.050	-	0.85	0.61	0.58	0.48	0.54	0.57	0.599	0.680	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/L	0.000050	-	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.000050	<0.000050	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver	mg/L	0.000010	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	mg/L	0.050	-	0.37	0.72	0.68	0.31	0.72	1.02	2.68	2.82	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Strontium	mg/L	0.00020	0.25	0.0013	0.0052	0.0049	0.002	0.006	0.007	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/L	0.000010	-	<0.0002	<0.0002	<0.0002	-	-	-	<0.000010	<0.000010	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/L	0.00010	-	<0.001	<0.001	<0.001	<0.01	<0.01	<0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/L	0.000010	-	-	-	-	-	-	-	0.000296	0.000329	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	0.00050	-	<0.0009	0.0015	<0.0009	<0.001	<0.001	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/L	0.0010	Variable ^a	0.002	0.002	0.001	<0.01	<0.01	<0.01	<0.0010	0.0029	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Miscellaneous (Water)																									
6PPD-Quinone	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Parameters	Units	2023 LOR	CCME Guideline									Date				Date						Date					
												2021				2022						2023					
				09-Aug-19	22-Jun-20	22-Jun-20	21-Jul-20	21-Jul-20	13-Sep-20	13-Sep-20	13-Sep-20	13-Jun-21	13-Jun-21	17-Aug-21	17-Aug-21	19-Jun-22	19-Jun-22	19-Jun-22	29-Aug-22	29-Aug-22	29-Aug-22	25-Jun-23	25-Jun-23	16-Jul-23	16-Jul-23	20-Aug-23	20-Aug-23
				DS	US	DS	US	DS	US	DS	Field Duplicate	DS	US	DS	US	DS	US	Field Duplicate	DS	US	Field Duplicate	DS	US	DS	US	DS	US
In Situ Parameters																											
Temperature	°C	-	-	15.2	2.6	2.0	13.0	12.1	4.17	4.00	4.00	2.0	4.2	7.6	8.2	2.7	4.4	-	7.3	7.4	-	2.1	1.0	7.5	15.4	7.0	7.2
Specific Conductance	µS/cm	-	-	0.0852	0.0578	0.0593	0.0944	0.0921	126.4	152.1	152.1	68.9	62	95.4	96.7	90.7	36.6	-	86.5	89.3	-	56.5	32.5	45.4	53.9	78.5	77.2
Dissolved Oxygen	mg/L	-	9.5	-	13.4	13.8	11.54	11.45	12.16	12.40	12.40	13.52	13.23	12.04	11.83	13.58	12.65	-	11.40	11.83	-	12.81	12.68	12.07	12.06	11.55	11.65
Dissolved Oxygen	%	-	-	105	98.7	99.3	108.4	104.9	94.5	94.8	94.8	99.1	102.6	102.8	102.6	99.9	97.6	-	95.6	98.1	-	96.3	92.3	103.0	123.7	98.3	99.5
pH	pH units	-	6.5 - 9.0	8.17	7.74	7.64	7.95	7.91	7.92	7.97	7.97	7.55	7.83	8.45	8.20	7.46	7.83	-	7.96	7.95	-	7.75	7.89	7.73	7.94	8.20	7.80
Wetted Width	m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Average Depth	m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Flow Rate	m³/s	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Physical Parameters																											
pH	pH units	0.10	6.5 - 9.0	7.75	7.52	7.49	7.75	7.81	7.83	7.81	7.82	7.60	7.55	7.54	7.81	7.44	7.26	7.82	7.53	7.55	7.52	7.38	7.18	7.68	7.56	7.76	7.74
Conductivity	µS/cm	1.0	-	-	60	62	98	98	133	165	162	71.4	65.1	101	107	90.2	39.8	38.2	86.9	88.6	88.8	57.6	32.8	48.5	55.1	83.6	80.7
Turbidity	NTU	0.10	-	0.68	1.33	0.86	1.19	1.13	0.24	2.14	4.24	1.66	1.56	0.46	0.46	1.56	2.59	2.86	<1.0	<1.0	<1.0	1.97	3	2.98	3.47	1.1	7.86
Hardness	mg/L as CaCO₃	0.50	-	37.9	26.2	27.1	39.6	39.0	46	52	52	28.5	26.6	40.6	42.8	36.3	18	17.3	37.6	39.7	38.2	24.58	14.41	20.62	26.37	35.66	34.59
TSS	mg/L	1.0	Variable ^d	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	5	1.5	2.1	1.0	<2.0	3.1	3.3	<2.0	<3.0	<3.0	<3.0	14.1	10.8	<1.0	4.1	<1.0	24.2
TDS	mg/L	10	-	43	54	55	64	58	70	78	89	43	45	57	58	50	<10	38	46	48	47	34	20	33	44	42	47
Dissolved Anions																											
Alkalinity	mg/L as CaCO₃	2.0	-	38	24	25	36	36	41	41	46	39.0	31.6	40.4	41.5	33.6	17.5	16.8	23.1	24.4	32.9	35.5	14.6	21.6	24.6	37.2	45.7
Br⁻	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cl⁻	mg/L	0.50	12																								

Table 2.7 Water Quality Monitoring Of Baseline Fisheries Culverts Surface
Water Quality Summary For Sample Site N1-100 (CV217)

Parameters	Units	2023 LOR	CCME Guideline	2020								2021				2022								2023							
Dissolved Metals and Non-Metals																															
Aluminum	mg/L	0.0010	-	-	0.013	0.019	0.015	0.015	<0.0050	0.0196	0.0136	0.0165	0.0144	0.0106	0.0068	0.0081	0.0133	0.0113	<0.0050	0.0134	<0.0050	0.0197	0.0267	0.013	0.0184	0.0064	0.011				
Arsenic	mg/L	0.00010	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010				
Barium	mg/L	0.00010	-	-	0.003	0.004	0.005	0.005	0.00541	0.00603	0.00590	0.00401	0.00366	0.00522	0.00547	0.00464	0.00233	0.0022	0.00428	0.00451	0.00435	0.0032	0.00208	0.00291	0.00402	0.00424	0.00402				
Boron	mg/L	0.010	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010				
Cadmium	mg/L	0.0000050	-	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050					
Calcium	mg/L	0.050	-	-	5.120	5.170	7.800	7.540	9.16	10.2	10.1	5.53	5.19	7.87	8.31	7.09	3.66	3.53	7.18000	7.3	7.13000	4.52	2.99	4.08	5.4	6.71	6.53				
Chromium	mg/L	0.00050	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050					
Cobalt	mg/L	0.00010	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010					
Copper	mg/L	0.00020	-	-	0.001	0.001	0.001	0.001	0.0008	0.0009	0.0008	0.00061	0.00057	0.00077	0.00085	0.00064	0.00023	0.00022	0.00	0.0007	0.00	0.00066	0.00037	0.00052	0.00075	0.00067	0.00077				
Iron	mg/L	0.010	-	-	0.028	0.026	0.016	0.019	<0.010	0.023	0.017	0.024	0.026	<0.010	<0.010	0.012	0.035	0.033	<0.010	0.021	<0.010	0.028	0.042	0.019	0.025	0.019	0.022				
Lead	mg/L	0.000050	Variable ^e	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000051	<0.000050	<0.000050	<0.000050					
Magnesium	mg/L	0.0050	-	-	3.270	3.440	4.890	4.890	5.64	6.46	6.48	3.56	3.31	5.09	5.36	4.51	2.15	2.05	4.780000	5.21	4.950000	3.2	1.67	2.51	3.1	4.55	4.4				
Manganese	mg/L	0.00010	-	-	0.004	0.004	0.002	0.002	<0.00050	0.00282	0.00261	0.00512	0.00590	<0.00050	<0.00050	0.00331	0.01220	0.0125	0.00088	0.00163	<0.00050	0.00422	0.0106	0.00142	0.00176	0.00171	0.00141				
Mercury	mg/L	0.0000050	-	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050					
Molybdenum	mg/L	0.000050	-	-	0.000	0.000	0.000	0.000	0.000113	0.000128	0.000126	0.000075	0.000068	0.000083	0.000090	0.000082	<0.000050	<0.000050	0.000077	0.000088	0.000076	0.000067	0.000051	<0.000050	0.000131	0.000083	0.000078				
Nickel	mg/L	0.00050	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050					
Phosphorus	mg/L	0.050	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050				
Potassium	mg/L	0.050	-	-	0.586	0.603	0.684	0.680	0.782	0.913	0.934	0.848	0.802	0.745	0.788	0.757	0.499	0.467	0.66	0.688	0.67	0.661	0.431	0.474	0.658	0.623	0.621				
Selenium	mg/L	0.000050	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050					
Silver	mg/L	0.000010	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010					
Sodium	mg/L	0.050	-	-	1.590	1.890	3.370	3.390	6.24	9.34	9.41	2.41	2.10	3.73	3.67	3.74	0.720	0.613	3.45	3.47	3.37	1.7	0.567	1.29	0.954	2.86	2.77				
Strontium	mg/L	0.00020	0.25	-	0.005	0.005	0.009	0.009	0.01500	0.02020	0.02070	0.0065	0.0058	0.0096	0.0098	0.0095	0.0029	0.0026	0.00870	0.0089	0.00900	0.00547	0.00228	0.00426	0.00481	0.00761	0.0075				
Thallium	mg/L	0.000010	-	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010					
Tin	mg/L	0.00010	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00012	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010					
Uranium	mg/L	0.000010	-	-	0.000	0.000	0.000	0.000	0.000519	0.000618	0.000639	0.000318	0.000279	0.000424	0.000433	0.000409	0.000072	0.000058	0.000366	0.000368	0.000378	0.000245	0.000083	0.000179	0.000197	0.000291	0.000293				
Vanadium	mg/L	0.00050	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050				
Zinc	mg/L	0.0010	Variable ^e	-	0.0010	0.0010	<0.0010	0.0015	<0.0010	0.0014	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0016	0.0012	<0.0010	<0.0010	<0.0010	<0.0010	0.0018	<0.0010	<0.0010	<0.0010	<0.0010				
Miscellaneous (Water)																															
6PPD-Quinone	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0020	<0.0020	<0.0020	-	-	-	-	-	-				

Table 2.8 Water Quality Monitoring Of Baseline Fisheries Culverts Surface Water Quality Summary For Sample Site N1-110 (BG24)

Parameter	Units	2023 LOR	CCME Guideline	Date																					
				2005			2006			2015		2016				2017		2018				2019			
				07-Jun-05	06-Aug-05	09-Sep-05	13-Jun-06	29-Jul-06	10-Sep-06	12-Aug-15	12-Aug-15	29-Jun-16	29-Jun-16	25-Aug-16	25-Aug-16	29-Jun-17	29-Jun-17	04-Jul-18	04-Jul-18	31-Aug-18	31-Aug-18	22-Jun-19	22-Jun-19	09-Aug-19	09-Aug-19
In Situ Parameters										US	DS	DS	US	DS	US	US	DS	US	DS	US	DS	US	DS		
Temperature	°C	-	-	3.76	9.54	7.0	1.99	7.11	4.35	6.8	6.9	5.1	5.0	4.5	5.1	1.8	3.5	2.4	2.5	3.6	3.9	1.9	2.0	6.8	7.2
Specific Conductance	µS/cm	-	-	0.019	0.079	0.082	0.075	0.076	0.095	0.05	0.05	0.112	0.114	0.371	0.367	0.116	0.105	0.132	0.134	0.2278	0.2352	0.1486	0.1513	0.4873	0.4753
Dissolved Oxygen	mg/L	-	9.5	10.4	10.91	11.71	12.8	13.55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Oxygen	%	-	-	-	-	-	-	-	-	104.30	103.00	104.9	105.8	99.3	103.2	101.8	103.6	96.8	96.3	101.5	98.3	98.5	97.6	101.9	100.3
pH	pH units	-	6.5 - 9.0	8.07	7.58	7.02	7.55	7.51	7.88	8.58	8.51	7.75	7.84	7.91	7.97	7.41	7.68	8.02	7.83	8.33	7.29	8.11	7.94	8.31	8.18
Wetted Width	m	-	-	-	-	-	6	17	5	1.5	1.5	4.8	4.8	-	-	5.9	4.4	1.4	2.7	1.45	1.6	-	-	-	-
Average Depth	m	-	-	-	-	-	0.4	0.9	0.3	0.25	0.25	0.2	0.2	-	-	0.17	0.45	0.22	0.1	0.04	0.1	-	-	-	-
Flow Rate	m³/s	-	-	-	-	-	1.1	3.64	0.39	-	-	-	-	-	-	0.71213	0.5148	0.111	0.097	0.012	0.021	-	-	-	-
Physical Parameters																									
pH	pH units	0.10	6.5 - 9.0	-	-	-	7.40	6.95	6.95	8.34	8.29	7.84	7.91	8.15	8.30	7.90	7.91	7.97	8.03	8.45	8.37	8.13	8.15	8.25	8.29
Conductivity	µS/cm	1.0	-	26	88	82	84	78	119	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Turbidity	NTU	0.10	-	0.42	3.64	1.93	0.5	2.3	4.9	0.16	0.27	0.41	0.39	0.34	0.22	0.49	0.42	0.73	0.84	0.20	0.43	0.40	0.60	0.25	0.58
Hardness	mg/L as CaCO₃	0.50	-	7.14	43.6	43.4	47	41	52	133	136	52	52	168	169	43	43	68	69	130	139	91.2	92.3	193	185
TSS	mg/L	1.0	Variable [®]	-	-	-	-	-	-	<2	<2	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
TDS	mg/L	10	-	<30	51	<30	55	51	77	146 *	139 *	45	45	183	183	42	40	75	65	130	155	102	106	269	267
Dissolved Anions																									
Alkalinity	mg/L as CaCO₃	2.0	-	5	43	41	41	40	53	135	141	51	53	152	149	41	42	49	65	126	131	90	91	148	151
Br ⁻	mg/L	-	-	<0.3	<0.3	<0.3	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cl ⁻	mg/L	0.50	120	1.3	0.6	0.7	1	<1	4	5.18	5.26	0.8	0.8	16.5	18.0	1.04	1.07	1.26	1.39	6.98	7.41	2.35	2.51	50.1	45.7
Fluoride	mg/L	-	-	-	-	-	-	-	-	-	-	0.0	0.0	0.1	0.1	0.022	0.021	0.037	0.037	0.069	0.064	-	-	-	-
SO₄ ⁻²	mg/L	-	-	1.2	<0.5	0.5	2	2	4	5.54	5.38	0.8	0.6	12.2	13.7	0.46	0.58	0.91	0.91	7.38	6.48	-	-	-	-
Nutrients																									
NH₃+NH₄	mg/L N	-	0.021 - 231 ^a	0.7	0.4	0.6	<0.02	<0.02	<0.02	0.24	0.29	<0.15	<0.15	<0.15	<0.15	-	-	-	-	-	-	-	-	-	-
NO₂ ⁻ (Nitrite)	mg/L N	0.010	0.060	<0.06	<0.06	<0.06	<0.005	0.017	0.009	-	-	-	-	-	-	-	-	-	-	-	-	<0.010	<0.010	<0.010	<0.010
NO₃ ⁻ (Nitrate)	mg/L N	0.020	3.0	0.12	<0.05	<0.05	<0.10	<0.10	<0.10	0.03	0.03	<0.020	<0.020	0.07	0.08	<0.020	<0.020	0.02	<0.020	<0.020	<0.020	0.025	0.026	0.047	0.038
NO₂+NO₃	mg/L N	-	-	0.12	<0.06	<0.06	<0.10	<0.10	<0.10	-	-	-	-	-	-	-	-	-	-	-	-	0.025	0.026	0.047	0.038
Ammonia, total as N	mg/L	0.0050	Variable ^a	-	-	-	-	-	-	<0.050	<0.050	0.07	0.07	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	-	-	0.017	<0.010	<0.010	<0.010
Total Phosphorus	mg/L	0.0020	0.01	0.02	<0.02	<0.10	<0.01	<0.01	0.01	<0.0030	<0.0030	<0.0030	0.01	0.00	0.00	0.0086	0.0082	0.0060	0.0046	<0.0030	<0.0030	0.0064	0.0031	<0.0030	<0.0030
Dissolved Phosphorus	mg/L	-	-	<0.02	<0.02	<0.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Organic Compounds																									
Phenols	mg/L	-	0.004	0.001	<0.001	<0.001	<0.001	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DOC	mg/L	0.50	-	-	-	-	-	-	-	2.3	2.3	<1.0	<1.0	2.0	2.0	1.46	1.57	1.98	1.90	2.29	2.35	2.18	2.25	2.09	2.07
TOC	mg/L	0.50	-	-	-	-	-	-	-	2.3	2.4	<1.0	<1.0	2.2	2.1	1.64	1.76	2.38	2.27	2.70	4.32	3.34	2.99	2.5	2.47
TKN	mg/L	-	-	-	-	-	-	-	-	0.24	0.29	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	0.15	<0.15	-	-	-	-
Chlorophyll-a	mg/m₃	-	Chlorophyll-a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pheophytin-a	mg/m₃	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Metals and Non-Metals																									
Aluminum	mg/L	0.0030	Variable ^f	0.017	0.075	0.073	0.010	0.072	0.153	<0.010	0.018	0.022	0.015	0.011	<0.010	0.0214	0.0225	0.0219	0.0195	0.006	0.0137	0.0248	0.0271	0.010	0.0244
Antimony	mg/L	0.00010	-	<0.0004	<0.0004	<0.0004	-	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic	mg/L	0.00010	0.005	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.00010	<0.00010	<0.00010	<0.00010	0.0001	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00012	0.00013
Barium	mg/L	0.00010	-	<0.001	0.004	0.004	<0.01	<0.01	<0.01	-	-	0.00197	0.00176	0.00778	0.00702	0.00165	0.0017	0.00228	0.00236	0.00485	0.00602	0.00327	0.00353	0.00972	0.0101
Beryllium	mg/L	0.000020	-	<0.005	<0.005	<0.005	-	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth	mg/L	0.000050	-	<0.0003	<0.0003	<0.0003	-	-	-	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron	mg/L	0.010	1.5	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	<0.010	<0.010	0.011	0.011	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.014	0.013
Cadmium	mg/L	0.0000050	Variable ^c	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Calcium	mg/L	0.050	-	1.43	9.01	8.72	8.0	8.0	12	29.9	32.2	10.9	10.8	35.3	35.8	8.82	8.83	14.7	14.8	28.4	30.1	19.0	19.1	40.8	41.3
Cesium	mg/L	0.000010	-	-	-	-	-	-	-	-	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Chromium	mg/L	0.00050	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	0.00248	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt	mg/L	0.00010	0.00078	<0.0003	<0.0003	<0.0003	<0.0002	<0.0002	<0.0002	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper	mg/L	0.00050	0.002 - 0.004 ^c	<0.0008	0.0009	<0.0008	<0.001	<0.001	<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0012
Iron	mg/L	0.010	0.300	<0.02	0.05	0.06	0.03	0.05	0.08	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.017	0.016	<0.010	0.023	0.018	0.024	<0.010	0.035
Lead	mg/L	0.000050	0.001 - 0.007 ^c	<0.0002	0.0004	<0.0002	<0.001	<0.001	<0.001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium	mg/L	0.0010	-	-	-	-	-	-	-	-	-	<0.0010	0.0013	0.0041	0.0044	<0.0010	<0.0010	0.0015	0.0015	0.0025	0.0024	0.0021	0.002	0.0046	0.0046
Magnesium	mg/L	0.0050	-	0.868	5.12	5.24	5	5	7	16.4	17.4	5.94	5.95	19.3	19.3	4.99	5.12	7.71	7.78	14.4	15.4	10.2	10.5	20.9	20.3
Manganese	mg/L	0.00010	Variable ^c	0.0097	0.0024	0.0014	<0.01	<0.01	<0.01	0.00054	0.00335	0.00126	<0.00050	0.00526	0.0008	0.00062	0.00087	0.00052	0.00074	<0.00050	0.00383	<0.00050	0.00108	0.00065</	

Table 2.8 Water Quality Monitoring Of Baseline Fisheries Culverts Surface
Water Quality Summary For Sample Site N1-110 (BG24)

Parameter	Units	2023 LOR	CCME Guideline	Date																					
				2005			2006			2015		2016				2017		2018				2019			
				07-Jun-05	06-Aug-05	09-Sep-05	13-Jun-06	29-Jul-06	10-Sep-06	12-Aug-15	12-Aug-15	29-Jun-16	29-Jun-16	25-Aug-16	25-Aug-16	29-Jun-17	29-Jun-17	04-Jul-18	04-Jul-18	31-Aug-18	31-Aug-18	22-Jun-19	22-Jun-19	09-Aug-19	09-Aug-19
									US	DS	DS	US	DS	US	DS	US	DS	US	DS	US	DS	US	DS		
Tin	mg/L	0.00010	-	<0.001	<0.001	<0.001	<0.01	<0.01	<0.01	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010		
Titanium	mg/L	0.00030	-	<0.003	<0.003	<0.003	-	-	-	-	-	0.00087	0.00052	0.00055	<0.00030	0.00075	0.00088	0.00074	0.00071	<0.00030	0.00061	0.00100	0.00114	0.00036	0.00127
Tungsten	mg/L	0.00010	-	-	-	-	-	-	-	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	
Uranium	mg/L	0.000010	0.015	-	-	-	-	-	-	0.000941	0.000943	0.000116	0.000109	0.0012	0.00131	0.000068	0.000071	0.000217	0.000219	0.000954	0.000937	0.000398	0.000437	0.00153	0.00148
Vanadium	mg/L	0.00050	0.12	<0.0009	<0.0009	<0.0009	<0.001	<0.001	<0.001	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	
Zinc	mg/L	0.0030	0.03	0.0040	0.0010	0.0020	<0.01	<0.01	<0.01	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	
Zirconium	mg/L	0.00020	-	-	-	-	-	-	-	-	-	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00020	<0.00020	<0.00020	
Dissolved Metals and Non-Metals																									
Aluminum	mg/L	0.0010	-	0.010	0.009	0.007	<0.005	<0.005	<0.005	<0.0050	<0.0050	-	-	-	-	-	-	-	-	-	-	-	-	-	
Arsenic	mg/L	0.00010	-	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.00010	<0.00010	-	-	-	-	-	-	-	-	-	-	-	-	-	
Barium	mg/L	0.00010	-	<0.001	0.003	0.004	<0.01	<0.01	<0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Boron	mg/L	0.010	-	<0.05	0.02	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Cadmium	mg/L	0.0000050	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.000010	<0.000010	-	-	-	-	-	-	-	-	-	-	-	-	-	
Calcium	mg/L	0.050	-	1.54	9.19	8.14	9	8	11	28.0	28.9	-	-	-	-	-	-	-	-	-	-	-	-	-	
Chromium	mg/L	0.00050	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Cobalt	mg/L	0.00010	-	<0.0003	<0.0003	<0.0003	<0.0002	<0.0002	<0.0002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Copper	mg/L	0.00020	-	<0.0008	<0.0008	<0.0008	<0.001	<0.001	<0.001	0.00066	0.00063	-	-	-	-	-	-	-	-	-	-	-	-	-	
Iron	mg/L	0.010	-	<0.02	0.02	<0.02	<0.03	<0.03	<0.03	<0.010	<0.010	-	-	-	-	-	-	-	-	-	-	-	-	-	
Lead	mg/L	0.000050	Variable ^e	<0.0002	<0.0002	<0.0002	<0.001	<0.001	<0.001	<0.000050	<0.000050	-	-	-	-	-	-	-	-	-	-	-	-	-	
Magnesium	mg/L	0.0050	-	0.933	5.30	4.87	6	5	6	15.4	15.6	-	-	-	-	-	-	-	-	-	-	-	-	-	
Manganese	mg/L	0.00010	-	0.0092	0.0007	<0.0007	<0.01	<0.01	<0.01	<0.00050	0.00275	-	-	-	-	-	-	-	-	-	-	-	-	-	
Mercury	mg/L	0.0000050	-	-	-	-	-	-	-	<0.000010	<0.000010	-	-	-	-	-	-	-	-	-	-	-	-	-	
Molybdenum	mg/L	0.000050	-	<0.0003	<0.0003	<0.0003	<0.005	<0.005	<0.005	0.000093	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	
Nickel	mg/L	0.00050	-	<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.00050	<0.00050	-	-	-	-	-	-	-	-	-	-	-	-	-	
Phosphorus	mg/L	0.050	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Potassium	mg/L	0.050	-	0.83	0.51	0.49	0.52	0.50	0.50	0.577	0.635	-	-	-	-	-	-	-	-	-	-	-	-	-	
Selenium	mg/L	0.000050	-	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.000050	<0.000050	-	-	-	-	-	-	-	-	-	-	-	-	-	
Silver	mg/L	0.000010	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Sodium	mg/L	0.050	-	0.47	0.53	0.47	0.58	0.50	1.64	5.04	4.95	-	-	-	-	-	-	-	-	-	-	-	-	-	
Strontium	mg/L	0.00020	0.25	0.0011	0.0045	0.0044	0.005	0.005	0.008	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Thallium	mg/L	0.000010	-	<0.0002	<0.0002	<0.0002	-	-	-	<0.000010	<0.000010	-	-	-	-	-	-	-	-	-	-	-	-	-	
Tin	mg/L	0.00010	-	<0.001	<0.001	<0.001	<0.01	<0.01	<0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Uranium	mg/L	0.000010	-	-	-	-	-	-	-	0.000883	0.00088	-	-	-	-	-	-	-	-	-	-	-	-	-	
Vanadium	mg/L	0.00050	-	<0.0009	0.0013	<0.0009	<0.001	<0.001	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Zinc	mg/L	0.0010	Variable ^e	0.003	0.003	0.002	<0.01	<0.01	<0.01	<0.0010	0.0019	-	-	-	-	-	-	-	-	-	-	-	-	-	
Miscellaneous (Water)																									
6PPD-Quinone	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Table 2.8 Water Quality Monitoring Of Baseline Fisheries Culverts Surface
Water Quality Summary For Sample Site N1-110 (BG24)

Parameter	Units	2023 LOR	CCME Guideline	Date																					
				2020							2021				2022					2023					
				22-Jun-20	22-Jun-20	21-Jul-20	21-Jul-20	14-Aug-20	14-Aug-20	14-Aug-20	13-Jun-21	13-Jun-21	17-Aug-21	17-Aug-21	19-Jun-22	19-Jun-22	28-Aug-22	28-Aug-22	28-Aug-22	26-Jun-23	26-Jun-23	16-Jul-23	16-Jul-23	20-Aug-23	20-Aug-23
				US	DS	US	DS	US	DS	DS Field Blank	DS	US	DS	US	DS	US	DS	US	DS Travel Blank	DS	US	DS	US	DS	US
In Situ Parameters																									
Temperature	°C	-	-	0.9	1.0	8.9	10.2	3.1	3.4	3.4	1.3	0.9	3.9	3.6	3.4	1.7	6.9	5.4	-	0.3	0.1	5.7	5	4.0	3.7
Specific Conductance	µS/cm	-	-	0.093	0.0863	0.3193	0.3294	0.399	0.665	0.665	49.1	46.5	313.4	310	8.1	82.8	487.5	493.5	-	66.4	62.8	128.1	122	247.7	241.7
Dissolved Oxygen	mg/L	-	9.5	14.1	14.0	11.73	11.3	99.5	98.1	98.1	13.13	13.78	13.06	13.22	13.45	13.52	13.02	13.8	-	13.18	13.4	12.10	12.15	12.17	12.4
Dissolved Oxygen	%	-	-	98.7	98.1	100.6	91.2	13.36	13.08	13.08	94.1	98.0	101.6	101.9	99.4	97.0	109.5	111.8	-	94.9	95.9	98.5	97.2	95.9	97.1
pH	pH units	-	6.5 - 9.0	7.75	7.74	8.34	8.33	8.24	8.04	8.04	7.83	7.84	8.47	8.51	7.72	7.65	8.29	8.31	-	7.57	7.62	7.96	7.95	8.27	8.33
Wetted Width	m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average Depth	m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Flow Rate	m³/s	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Physical Parameters																									
pH	pH units	0.10	6.5 - 9.0	7.62	7.74	8.31	8.26	8.30	8.26	6.47	7.68	7.61	8.29	8.30	7.65	7.63	8.40	8.35	5.50	7.75	7.55	8.01	7.95	8.28	8.33
Conductivity	µS/cm	1.0	-	86.5	91	322	347	694	674	<2.0	51.8	49.1	339	335	89.1	87.9	487	490	<1.0	101	65.2	136	131	260	254
Turbidity	NTU	0.10	-	0.43	0.50	0.23	0.50	0.1	2.79	<0.10	3.40	2.38	0.62	0.41	6.04	2.74	<1.0	<1.0	<1.0	2.56	0.78	0.93	1.14	0.56	0.5
Hardness	mg/L as CaCO₃	0.50	-	39.5	42	132	134	227	233	<0.50	22.8	21.3	131	129	38.8	38.1	200	197	<0.50	38.3	32.8	62.9	60.8	126.1	120.6
TSS	mg/L	1.0	Variable [®]	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	7.6	5.1	1.3	1.1	10.0	4.3	<3.0	<3.0	<3.0	3.8	4.1	<1.0	1.2	<1.0	<1.0
TDS	mg/L	10	-	66	64	175	186	378	392	10	32	29	176	172	40	38	260	239	13	48	32	68	67	143	132
Dissolved Anions																									
Alkalinity	mg/L as CaCO₃	2.0	-	37	40	111	116	158	163	<1.0	26.5	23.0	122	120	37.9	37.2	162.0	159	<1.0	74.3	55.9	71.9	62.8	116	114
Br ⁻	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cl ⁻	mg/L	0.50	120	13.8	3.12	25.8	26.50	97.9	90.5	<0.50	2.08	1.88	21.0	20.9	3.60	3.51	41.70	43.7	<0.50	3.47	0.88	2.95	2.7	8.81	8.37
Fluoride	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SO₄	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nutrients																									
NH₃+NH₄	mg/L N	-	0.021 - 231 ^a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NO₂ ⁻ (Nitrite)	mg/L N	0.010	0.060	0.014	<0.010	<0.010	<0.010	<0.0050	<0.0050	<0.0010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
NO₃ ⁻ (Nitrate)	mg/L N	0.020	3.0	1.55	0.37	0.054	0.04	0.369	0.321	<0.0050	0.021	0.022	<0.020	<0.020	0.033	0.032	0.116	0.138	<0.020	0.026	0.023	0.022	0.023	0.042	0.043
NO₂+NO₃	mg/L N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ammonia, total as N	mg/L	0.0050	Variable ^a	<0.010	<0.010	<0.010	0.0170	<0.0050	<0.0050	<0.0050	<0.010	<0.010	<0.010	<0.010	0.012	0.013	0.011	<0.010	<0.010	<0.0050	<0.0050	<0.0050	<0.0050	0.0074	0.008
Total Phosphorus	mg/L	0.0020	0.01	0.0095	0.0070	<0.0030	0.0033	0.0022	0.0041	<0.0020	0.0037	0.0071	<0.0030	<0.0030	0.0054	0.0046	<0.0030	<0.0030	<0.0030	0.0049	0.0057	0.0036	0.006	0.002	0.0025
Dissolved Phosphorus	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.050	<0.050	<0.050	<0.050	<0.050	-	-	-	-	-	-
Organic Compounds																									
Phenols	mg/L	-	0.004	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DOC	mg/L	0.50	-	3.14	3.00	3.11	3.01	2.37	3.02	<0.50	3.58	3.00	3.48	3.98	3.00	2.65	1.80	1.71	<0.50	1.98	1.84	1.32	1.27	2.28	2.63
TOC	mg/L	0.50	-	3.6	3.78	3.29	3.49	2.26	2.87	0.56	3.18	2.90	5.69	5.95	2.86	2.54	3.21	2.70	0.57	2.14	1.98	1.09	1.26	2.41	2.57
TKN	mg/L	-	-	-	-	-	-	-	-	-	0.280	0.230	0.140	0.140	0.172	0.191	0.093	0.094	<0.050	-	-	-	-	-	-
Chlorophyll-a	mg/m₃	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pheophytin-a	mg/m₃	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Metals and Non-Metals																									
Aluminum	mg/L	0.0030	Variable ^f	0.03370	0.0382	0.0096	0.0247	0.0039	0.0819	<0.0030	0.0795	0.0439	0.0376	0.0214	0.167	0.0929	0.0150	<0.0050	<0.0050	0.108	0.0278	0.021	0.0189	0.021	0.014
Antimony	mg/L	0.00010	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic	mg/L	0.00010	0.005	<0.00010	<0.00010	<0.00010	0.0001	0.00012	0.00012	<0.00010	<0.00010	<0.00010	0.00012	0.00012	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.0001	<0.00010	<0.00010
Barium	mg/L	0.00010	-	0.00194	0.00193	0.00611	0.00687	0.0137	0.0141	<0.00010	0.00162	0.00127	0.00703	0.00621	0.00299	0.00223	0.01070	0.0096	<0.00010	0.00547	0.00126	0.0027	0.00251	0.00576	0.00497
Beryllium	mg/L	0.000020	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Bismuth	mg/L	0.000050	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron	mg/L	0.010	1.5	<0.010	<0.010	0.018	0.017	0.043	0.037	<0.010	<0.010	<0.010	0.016	0.016	<0.010	<0.010	0.028	0.031	<0.010	<0.010	<0.010	<0.010	<0.010	0.012	0.012
Cadmium	mg/L</																								

[illegible]

TABLE 3. FISH-BEARING STREAM CROSSING SITES SURVEYED IN SPRING 2023

Location ID	Authorizati on Type	UTM ¹		2023 Spring Survey ²					Fish Catch (Yes/No. DS/US)
		Easting	Northing	Date	DS Culvert Velocity (m/s)	US Culvert Velocity (m/s)	Perch (m)	Water Temp (°C)	
CV-129	HADD	512381	7966783	01-Jul	1.93	1.34	0.00	7.0	
CV-128a ³	-	513680	7966148	01-Jul	0.01	0.38	0.00	8.0	
CV-128 ²	HADD	513556	7965889	01-Jul	-	-	-	6.0	
CV-115	LOA	519222	7958135	01-Jul	0.16	0.39	0.00	16.00	
CV-114	HADD	520278	7956528	01-Jul	0.70	1.21	0.22	9.0	Yes - DS
CV-112	LOA	521033	7954935	01-Jul	0.32	1.56	0.00	4.0	
CV-111	HADD	521355	7954524	02-Jul	1.92	1.63	0.30	1.0	
CV-106	LOA	521663	7953392	02-Jul	0.63	0.64	0.36	9.0	Yes - DS
CV-104	HADD	521732	7952788	02-Jul	0.62	1.03	0.00	1.0	
CV-102	LOA	521934	7950591	02-Jul	0.61	0.46	0.00	9.0	Yes - US
CV-099	HADD	521886	7948843	02-Jul	-	-	-	2.0	
CV-085 ³	-	523827	7940900	02-Jul	0.91	0.98	0.00	8.0	
CV-079	HADD	525538	7937314	02-Jul	1.37	>2.0	0.50	2.0	
CV-078	HADD	525852	7936787	03-Jul	0.30	0.30	0.00	2.0	
CV-076	LOA	526586	7935498	03-Jul	1.16	1.25	0.00	6.0	Yes - DS
CV-072	HADD	526897	7934576	03-Jul	2.46	>2.0	0.00	1.0	
CV-061 ³	-	527268	7931366	03-Jul	1.37	0.61	0.05	6.0	
CV-061b ³	-	527523	7930683	03-Jul	0.89	0.54	0.10	8.0	Yes - DS
CV-060	HADD	527622	7930342	03-Jul	0.68	0.57	0.00	7.0	Yes - DS
CV-059	LOA	528094	7929347	03-Jul	0.70	0.70	0.00	4.0	
CV-058	LOA	528322	7928839	04-Jul	0.29	0.56	0.00	6.0	
CV-057	LOA	528379	7928657	04-Jul	0.26	0.11	0.00	4.00	
BG-50	HADD	529294	7926852	04-Jul	-	-	-	2.0	
CV-049	HADD	529654	7926545	04-Jul	~1.00	0.99	0.00	2.0	Yes - DS
CV-040 ³	HADD	535165	7920336	04-Jul	1.43	0.95	0.00	1.0	
CV-211 ³	-	536479	7920019	04-Jul	0.37	0.04	0.00	4.0	
CV-212 ³	-	537471	7920274	04-Jul	1.45	0.84	0.00	3.5	
BG-33 ³	-	539714	7921101	04-Jul	1.49	0.27	NM	3.0	Yes - DS
CV-030	LOA	540123	7921310	04-Jul	0.08	0.10	0.00	7.0	Yes – DS/US
BG-32	HADD	540729	7921597	04-Jul	0.96	1.58	0.00	1.5	Yes - DS
CV-214 ³	-	541311	7921929	05-Jul	0.00	0.01	0.00	2.0	Yes - DS
CV-215 ³	-	541956	7922174	05-Jul	0.72	0.50	0.00	4.0	
CV-217 ²	HADD	542321	7922189	04-Jul	-	-	-	3.0	
CV-216	HADD	542764	7921724	05-Jul	0.40	0.93	0.00	3.0	

Location ID	Authorizati on Type	UTM ¹		2023 Spring Survey ²					Fish Catch (Yes/No. DS/US)
		Easting	Northing	Date	DS Culvert Velocity (m/s)	US Culvert Velocity (m/s)	Perch (m)	Water Temp (°C)	
BG-30	COMP	546070	7919844	05-Jul	0.54	0.59	0.00	3.0	Yes - DS
BG-29	LOA	546229	7919877	05-Jul	0.29	0.47	0.00	3.0	Yes - DS
CV-021 ³	-	546474	7919874	05-Jul	0.71	0.12	0.10	5.0	Yes - DS
BG-27	LOA	547876	7919355	05-Jul	1.28	1.22	0.05	2.0	Yes - DS
BG-24	HADD	548766	7918878	05-Jul	2.35	1.97	0.00	2.0	Yes - DS
BG-17	HADD	550703	7917643	05-Jul	1.80	1.10	0.00	3.0	
BG-04	HADD	553250	7915100	05-Jul	0.43	1.31	0.00	4.0	Yes - DS
CV-001	COMP	553544	7914897	08-Jul	0.57	0.47	0.00	7.0	Yes - DS
BG-03 ³	-	554717	7915023	08-Jul	1.36	0.14	0.00	6.0	Yes - DS
CV-223	HADD	555705	7914676	04-Jul	-	-	0.00	-	
CV-224	HADD	556238	7915044	08,11 Jul	1.29	0.59	0.00	7.0	Yes - DS
CV-225	HADD	557421	7915187	11-Jul	2.59	0.97	0.20	9.0	Yes - DS
BG-01	HADD	558000	7914928	09-Jul	-	-	NM	3.0	Yes - DS
CV-186	LOA	560705	7913498	30-Jun	1.01	0.60	0.10	5.0	Yes - DS
CV-187	COMP	560957	7913414	30-Jun	0.02	1.56	0.00	5.0	

1 - NAD 83, Zone 17W

2 - Depths and velocities were recorded within the culvert at the inflow and outflow; DS = downstream end of culvert; US = upstream end of culvert. Velocities could not be collected at bridge crossings and some of the high-velocity culvert crossings: CV-128, CV-099, BG-50, CV-217, CV-223 and BG-01.

3 – New known or potential char-bearing streams not incorporated in past HADD or LOA Authorization (except CV-040, which was in the original FAA but was not routinely monitored in previous surveys due to the presence of a downstream barrier; the crossing has been routinely monitored since 2019 when the barrier was determined to be intermittent).

TABLE 4. ARCTIC CHAR CATCH DATA FROM FISH-BEARING STREAM CROSSINGS ALONG THE TOTE ROAD, SPRING 2023

Location ID	Transect ¹	Electrofishing Duration (s)	Total Catch ²	CPUE ³	Fork Length (mm) ⁴				
					n	Mean	SD	Min	Max
CV-129	DS	266	0	0.00	-	-	-	-	-
	US	145	0	0.00	-	-	-	-	-
	Total	411	0	0.00	-	-	-	-	-
CV-128a	DS	202	0	0.00	-	-	-	-	-
	US	287	0	0.00	-	-	-	-	-
	Total	489	0	0.00	-	-	-	-	-
CV-128 ⁵	DS	-	-	-	-	-	-	-	-
	US	-	-	-	-	-	-	-	-
	Total	-	-	-	-	-	-	-	-
CV-115	DS	106	0	0.00	-	-	-	-	-
	US	151	0	0.00	-	-	-	-	-
	Total	257	0	0.00	-	-	-	-	-
CV-114	DS	234	4	1.03	3	155	37.4	112	180
	US	112	0	0.00	-	-	-	-	-
	Total	346	0	0.69	3	155	37.4	112	180
CV-112	DS	145	0	0.00	-	-	-	-	-
	US	129	0	0.00	-	-	-	-	-
	Total	274	0	0.00	-	-	-	-	-
CV-111	DS	86	0	0.00	-	-	-	-	-
	US	62	0	0.00	-	-	-	-	-
	Total	148	0	0.00	-	-	-	-	-
CV-106	DS	109	3	1.65	3	69.3	7.37	61	75
	US	65	0	0	-	-	-	-	-
	Total	174	3	1.03	3	69.3	7.37	61	75
CV-104	DS	117	0	0.00	-	-	-	-	-
	US	56	0	0.00	-	-	-	-	-
	Total	173	0	0.00	-	-	-	-	-
CV-102	DS	86	3	2.09	-	-	-	-	-
	US	105	3	1.71	1	-	-	154	154
	Total	191	6	1.88	1	-	-	154	154
CV-099 ⁵	DS	-	-	-	-	-	-	-	-
	US	-	-	-	-	-	-	-	-
	Total	-	-	-	-	-	-	-	-

Location ID	Transect ¹	Electrofishing Duration (s)	Total Catch ²	CPUE ³	Fork Length (mm) ⁴				
					n	Mean	SD	Min	Max
CV-085	DS	81	0	0.00	-	-	-	-	-
	US	103	0	0.00	-	-	-	-	-
	Total	184	0	0.00	-	-	-	-	-
CV-079	DS	149	0	0.00	-	-	-	-	-
	US	105	0	0.00	-	-	-	-	-
	Total	254	0	0.00	-	-	-	-	-
CV-078	DS	90	0	0.00	-	-	-	-	-
	US	78	0	0.00	-	-	-	-	-
	Total	168	0	0.00	-	-	-	-	-
CV-076	DS	148	2	0.81	1	-	-	88	88
	US	105	0	0.00	-	-	-	-	-
	Total	253	2	0.47	1	-	-	88	88
CV-072	DS	124	0	0.00	-	-	-	-	-
	US	111	0	0.00	-	-	-	-	-
	Total	235	0	0.00	-	-	-	-	-
CV-061	DS	87	0	0.00	-	-	-	-	-
	US	92	0	0.00	-	-	-	-	-
	Total	179	0	0.00	-	-	-	-	-
CV-061b	DS	172	1	0.35	1	-	-	44	44
	US	110	0	0.00	-	-	-	-	-
	Total	282	1	0.21	1	-	-	44	44
CV-060	DS	151	0	0.00	1	-	-	81	81
	US	186	0	0.00	-	-	-	-	-
	Total	337	0	0.00	1	-	-	81	81
CV-059	DS	136	0	0.00	-	-	-	-	-
	US	117	0	0.00	-	-	-	-	-
	Total	253	0	0.00	-	-	-	-	-
CV-058	DS	147	0	0.00	-	-	-	-	-
	US	128	0	0.00	-	-	-	-	-
	Total	275	0	0.00	-	-	-	-	-
CV-057	DS	139	0	0.00	-	-	-	-	-
	US	133	0	0.00	-	-	-	-	-
	Total	272	0	0.00	-	-	-	-	-
BG-50 ⁶	DS	-	-	-	-	-	-	-	-
	US	-	-	-	-	-	-	-	-
	Total	-	-	-	-	-	-	-	-

Location ID	Transect ¹	Electrofishing Duration (s)	Total Catch ²	CPUE ³	Fork Length (mm) ⁴				
					n	Mean	SD	Min	Max
CV-049	DS	149	3	1.21	2	160.5	26.16	142	179
	US	144	0	0.00	-	-	-	-	-
	Total	293	3	0.61	2	160.5	26.16	142	179
CV-040	DS	131	0	0.00	-	-	-	-	-
	US	137	0	0.00	-	-	-	-	-
	Total	268	0	0.00	-	-	-	-	-
CV-211 ⁷	DS	86	0	0.00	-	-	-	-	-
	US	136	0	0.00	-	-	-	-	-
	Total	222	0	0.00	-	-	-	-	-
CV-212	DS	144	0	0.00	-	-	-	-	-
	US	101	0	0.00	-	-	-	-	-
	Total	245	0	0.00	-	-	-	-	-
BG-33	DS	110	2	1.09	2	189	104.65	115	263
	US	104	0	0.00	-	-	-	-	-
	Total	214	2	0.56	2	189	104.65	115	263
CV-030	DS	107	0	0.00	-	-	-	-	-
	US	123	0	0.00	-	-	-	-	-
	Total	230	0	0.00	-	-	-	-	-
BG-32	DS	128	0	0.00	-	-	-	-	-
	US	138	0	0.00	-	-	-	-	-
	Total	266	0	0.00	-	-	-	-	-
CV-214	DS	52	1	1.15	1	-	-	42	42
	US	63	0	0.00	-	-	-	-	-
	Total	115	1	0.52	1	-	-	42	42
CV-215	DS	76	0	0.00	-	-	-	-	-
	US	59	0	0.00	-	-	-	-	-
	Total	135	0	0.00	-	-	-	-	-
CV-217 ⁵	DS	-	-	-	-	-	-	-	-
	US	-	-	-	-	-	-	-	-
	Total	-	-	-	-	-	-	-	-
CV-216	DS	80	0	0.00	-	-	-	-	-
	US	46	0	0.00	-	-	-	-	-
	Total	126	0	0.00	-	-	-	-	-
BG-30	DS	77	5	3.90	2	139	4.24	136	142
	US	69	0	0.00	-	-	-	-	-
	Total	146	5	2.05	2	139	4.24	136	142

Location ID	Transect ¹	Electrofishing Duration (s)	Total Catch ²	CPUE ³	Fork Length (mm) ⁴				
					n	Mean	SD	Min	Max
BG-29	DS	109	4	2.20	4	113.25	27.38	85	149
	US	97	0	0.00	-	-	-	-	-
	Total	206	4	1.17	4	113.25	27.38	85	149
CV-021	DS	94	0	0.00	-	-	-	-	-
	US	111	0	0.00	-	-	-	-	-
	Total	205	0	0.00	-	-	-	-	-
BG-27	DS	111	4	2.16	3	122	44.19	71	149
	US	123	0	0.00	-	-	-	-	-
	Total	234	4	1.03	3	122	44.19	71	149
BG-24	DS	142	1	0.42	1	-	-	153	153
	US	103	0	0.00	-	-	-	-	-
	Total	245	1	0.24	1	-	-	153	153
BG-17	DS	134	0	0.00	-	-	-	-	-
	US	111	0	0.00	-	-	-	-	-
	Total	245	0	0.00	-	-	-	-	-
BG-04	DS	167	23	8.26	3	103	56.04	112	154
	US	83	0	0.00	-	-	-	-	-
	Total	250	23	5.52	3	103	56.04	112	154
CV-001	DS	118	32	16.27	17	126.71	26.11	84	181
	US	169	1	0.36	-	-	-	-	-
	Total	287	33	6.90	17	126.71	26.11	84	181
BG-03	DS	98	0	0.00	-	-	-	-	-
	US	106	0	0.00	-	-	-	-	-
	Total	204	0	0.00	-	-	-	-	-
CV-223 ⁵	DS	-	-	-	-	-	-	-	-
	US	-	-	-	-	-	-	-	-
	Total	-	-	-	-	-	-	-	-
CV-224	DS	113	5	2.65	5	104.8	42.49	59	170
	US	142	0	0.00	-	-	-	-	-
	Total	255	5	1.18	5	104.8	42.49	59	170
CV-225	DS	224	2	0.54	2	254.5	-	89	420
	US	132	0	0.00	-	-	-	-	-
	Total	356	2	0.34	2	254.5	-	89	420
BG-01	DS	Not Recorded	3	N/A	2	132	-	129	135
	US	69	0	0.00	-	-	-	-	-
	Total	Not Recorded	3	N/A	2	132	-	129	135

Location ID	Transect ¹	Electrofishing Duration (s)	Total Catch ²	CPUE ³	Fork Length (mm) ⁴				
					n	Mean	SD	Min	Max
CV-186	DS	151	5	1.99	1	-	-	121	121
	US	163	0	0.00	-	-	-	-	-
	Total	314	5	0.96	1	-	-	121	121
CV-187	DS	104	0	0.00	-	-	-	-	-
	US	92	0	0.00	-	-	-	-	-
	Total	196	0	0.00	-	-	-	-	-

1 - DS = 50-m transect downstream of the Tote Road crossing; US = 50-m transect upstream of the Tote Road crossing.

2 - Includes fish that were observed while electrofishing but were not captured.

3 - CPUE = Catch-per-unit-effort (# fish/minute).

4 - n = number of fish measured for fork length (may not equal total catch); SD = standard deviation.

5 - Observational survey only in spring 2023: bridge sites and larger streams (CV-128, CV-099, BG-50, CV-217, CV-223, BG-01) that were too fast, deep, and/or had challenging uneven substrate to effectively electrofish under high flows.

6 - Electrofishing is typically not conducted upstream of crossing BG-50 because immediately upstream of the crossing the two channels merge (bridge and culvert channels) and any fish observed/captured upstream are not indicative of successful passage through the culverts. Fish have been consistently observed upstream of the bridge/culverts every spring survey period.

7 – Fish have not yet been observed at this site in the crossing area, but are present in the sub-catchment and there are no downstream barriers preventing fish access to the crossing area.

TABLE 5 NINESPINE STICKLEBACK CATCH DATA FROM FISH-BEARING STREAM CROSSINGS ALONG THE TOTE ROAD, SPRING 2023

Location ID	Transect ¹	Electrofishing Duration (s)	Total Catch ²	CPUE ³	Fork Length (mm) ⁴				
					n	Mean	SD	Min	Max
CV-129	DS	266	0	0.00	-	-	-	-	-
	US	145	0	0.00	-	-	-	-	-
	Total	411	0	0.00	-	-	-	-	-
CV-128a	DS	202	0	0.00	-	-	-	-	-
	US	287	0	0.00	-	-	-	-	-
	Total	489	0	0.00	-	-	-	-	-
CV-128 ⁵	DS	-	-	-	-	-	-	-	-
	US	-	-	-	-	-	-	-	-
	Total	-	-	-	-	-	-	-	-
CV-115	DS	106	0	0.00	-	-	-	-	-
	US	151	0	0.00	-	-	-	-	-
	Total	257	0	0.00	-	-	-	-	-
CV-114	DS	234	0	0.00	-	-	-	-	-
	US	112	0	0.00	-	-	-	-	-
	Total	346	0	0.00	-	-	-	-	-
CV-112	DS	145	0	0.00	-	-	-	-	-
	US	129	0	0.00	-	-	-	-	-
	Total	274	0	0.00	-	-	-	-	-
CV-111	DS	86	0	0.00	-	-	-	-	-
	US	62	0	0.00	-	-	-	-	-
	Total	148	0	0.00	-	-	-	-	-
CV-106	DS	109	0	0.00	-	-	-	-	-
	US	65	0	0.00	-	-	-	-	-
	Total	174	0	0.00	-	-	-	-	-
CV-104	DS	117	0	0.00	-	-	-	-	-
	US	56	0	0.00	-	-	-	-	-
	Total	173	0	0.00	-	-	-	-	-
CV-102	DS	86	2	1.40	2	56	-	55	57
	US	105	0	0.00	-	-	-	-	-
	Total	191	2	0.63	2	56	-	55	57
CV-099 ⁵	DS	-	-	-	-	-	-	-	-
	US	-	-	-	-	-	-	-	-
	Total	-	-	-	-	-	-	-	-

Location ID	Transect ¹	Electrofishing Duration (s)	Total Catch ²	CPUE ³	Fork Length (mm) ⁴				
					n	Mean	SD	Min	Max
CV-085	DS	81	0	0.00	-	-	-	-	-
	US	103	0	0.00	-	-	-	-	-
	Total	184	0	0.00	-	-	-	-	-
CV-079	DS	149	0	0.00	-	-	-	-	-
	US	105	0	0.00	-	-	-	-	-
	Total	254	0	0.00	-	-	-	-	-
CV-078	DS	90	0	0.00	-	-	-	-	-
	US	78	0	0.00	-	-	-	-	-
	Total	168	0	0.00	-	-	-	-	-
CV-076	DS	148	0	0.00	-	-	-	-	-
	US	105	0	0.00	-	-	-	-	-
	Total	253	0	0.00	-	-	-	-	-
CV-072	DS	124	0	0.00	-	-	-	-	-
	US	111	0	0.00	-	-	-	-	-
	Total	235	0	0.00	-	-	-	-	-
CV-061	DS	87	0	0.00	-	-	-	-	-
	US	92	0	0.00	-	-	-	-	-
	Total	179	0	0.00	-	-	-	-	-
CV-061b	DS	172	0	0.00	-	-	-	-	-
	US	110	0	0.00	-	-	-	-	-
	Total	282	0	0.00	-	-	-	-	-
CV-060	DS	151	0	0.00	-	-	-	-	-
	US	186	0	0.00	-	-	-	-	-
	Total	337	0	0.00	-	-	-	-	-
CV-059	DS	136	0	0.00	-	-	-	-	-
	US	117	0	0.00	-	-	-	-	-
	Total	253	0	0.00	-	-	-	-	-
CV-058	DS	147	0	0.00	-	-	-	-	-
	US	128	0	0.00	-	-	-	-	-
	Total	275	0	0.00	-	-	-	-	-
CV-057	DS	139	0	0.00	-	-	-	-	-
	US	133	0	0.00	-	-	-	-	-
	Total	272	0	0.00	-	-	-	-	-

Location ID	Transect ¹	Electrofishing Duration (s)	Total Catch ²	CPUE ³	Fork Length (mm) ⁴				
					n	Mean	SD	Min	Max
BG-50 ⁶	DS	-	-	-	-	-	-	-	-
	US	-	-	-	-	-	-	-	-
	Total	-	-	-	-	-	-	-	-
CV-049	DS	149	0	0.00	-	-	-	-	-
	US	144	0	0.00	-	-	-	-	-
	Total	293	0	0.00	-	-	-	-	-
CV-040	DS	131	0	0.00	-	-	-	-	-
	US	137	0	0.00	-	-	-	-	-
	Total	268	0	0.00	-	-	-	-	-
CV-211 ⁷	DS	86	0	0.00	-	-	-	-	-
	US	136	0	0.00	-	-	-	-	-
	Total	222	0	0.00	-	-	-	-	-
CV-212	DS	144	0	0.00	-	-	-	-	-
	US	101	0	0.00	-	-	-	-	-
	Total	245	0	0.00	-	-	-	-	-
BG-33	DS	110	1	0.55	1	-	-	54	54
	US	104	0	0.00	-	-	-	-	-
	Total	214	1	0.28	1	-	-	54	54
CV-030	DS	107	2	1.12	2	52	-	45	59
	US	123	3	1.46	2	47.5	-	46	49
	Total	230	5	1.30	4	49.8	6.4	45	59
BG-32	DS	128	1	0.47	1	-	-	64	64
	US	138	0	0.00	-	-	-	-	-
	Total	266	1	0.23	1	-	-	64	64
CV-214	DS	52	0	0.00	-	-	-	-	-
	US	63	0	0.00	-	-	-	-	-
	Total	115	0	0.00	-	-	-	-	-
CV-215	DS	76	0	0.00	-	-	-	-	-
	US	59	0	0.00	-	-	-	-	-
	Total	135	0	0.00	-	-	-	-	-
CV-217 ⁵	DS	-	-	-	-	-	-	-	-
	US	-	-	-	-	-	-	-	-
	Total	-	-	-	-	-	-	-	-

Location ID	Transect ¹	Electrofishing Duration (s)	Total Catch ²	CPUE ³	Fork Length (mm) ⁴				
					n	Mean	SD	Min	Max
CV-216	DS	80	0	0.00	-	-	-	-	-
	US	46	0	0.00	-	-	-	-	-
	Total	126	0	0.00	-	-	-	-	-
BG-30	DS	77	0	0.00	-	-	-	-	-
	US	69	0	0.00	-	-	-	-	-
	Total	146	0	0.00	-	-	-	-	-
BG-29	DS	109	0	0.00	-	-	-	-	-
	US	97	0	0.00	-	-	-	-	-
	Total	206	0	0.00	-	-	-	-	-
CV-021	DS	94	1	0.64	1	-	-	55	55
	US	111	0	0.00	-	-	-	-	-
	Total	205	1	0.29	1	-	-	55	55
BG-27	DS	111	0	0.00	-	-	-	-	-
	US	123	0	0.00	-	-	-	-	-
	Total	234	0	0.00	-	-	-	-	-
BG-24	DS	142	0	0.00	-	-	-	-	-
	US	103	0	0.00	-	-	-	-	-
	Total	245	0	0.00	-	-	-	-	-
BG-17	DS	134	0	0.00	-	-	-	-	-
	US	111	0	0.00	-	-	-	-	-
	Total	245	0	0.00	-	-	-	-	-
BG-04	DS	167	1	0.36	1	-	-	120	120
	US	83	0	0.00	-	-	-	-	-
	Total	250	1	0.24	1	-	-	120	120
CV-001	DS	118	1	0.51	1	-	-	84	84
	US	169	0	0.00	-	-	-	-	-
	Total	287	1	0.21	1	-	-	84	84
BG-03	DS	98	2	1.22	2	51.5	-	51	52
	US	106	-	0.00	-	-	-	-	-
	Total	204	2	0.59	2	51.5	-	51	52
CV-223 ⁵	DS	-	-	-	-	-	-	-	-
	US	-	-	-	-	-	-	-	-
	Total	-	-	-	-	-	-	-	-

Location ID	Transect ¹	Electrofishing Duration (s)	Total Catch ²	CPUE ³	Fork Length (mm) ⁴				
					n	Mean	SD	Min	Max
CV-224	DS	113	3	1.59	3	55.7	5.51	50	61
	US	142	0	0.00	-	-	-	-	-
	Total	255	3	0.71	3	55.7	5.51	50	61
CV-225	DS	224	0	0.00	-	-	-	-	-
	US	132	0	0.00	-	-	-	-	-
	Total	356	0	0.00	-	-	-	-	-
BG-01	DS	Not Recorded	0	0.00	-	-	-	-	-
	US	69	0	0.00	-	-	-	-	-
	Total	Not Recorded	0	0.00	-	-	-	-	-
CV-186	DS	151	0	0.00	-	-	-	-	-
	US	163	0	0.00	-	-	-	-	-
	Total	314	0	0.00	-	-	-	-	-
CV-187	DS	104	0	0.00	-	-	-	-	-
	US	92	0	0.00	-	-	-	-	-
	Total	196	0	0.00	-	-	-	-	-

1 - DS = 50-m transect downstream of the Tote Road crossing; US = 50-m transect upstream of the Tote Road crossing.

2 - Includes fish that were observed while electrofishing but were not captured.

3 - CPUE = Catch-per-unit-effort (# fish/minute).

4 - n = number of fish measured for fork length (may not equal total catch); SD = standard deviation.

5 - Observational survey only in spring 2023: bridge sites and some of the larger culvert streams (CV-128, CV-099, BG-50, CV-217, CV-223, BG-01) are typically too fast, deep, and/or have challenging uneven substrate to effectively electrofish during peak freshet.

6 - Electrofishing is typically not conducted upstream of BG-50 because immediately upstream of the crossing the two channels merge (bridge and culvert channels) and any fish observed/captured upstream are not indicative of successful passage through the culverts. Fish have been consistently observed upstream of the bridge/culverts every spring survey period.

7 - Fish have not yet been observed at this potential habitat site, but are present in the sub-catchment and there are no downstream barriers.

TABLE 6. SUMMARY OF FISH HABITAT STATUS, FISH PASSAGE, AND REMEDIATION WORK ALONG THE TOTE ROAD IN 2023

Location ID	Fish Habitat at Crossing (Y/N)	Fish Captured / Observed Downstream in 2023	Fish Captured / Observed Upstream in 2023	Potential Project-Related Fish Passage or Habitat Issues
CV-129	Y	N	N	YES - Slight perch; damaged culvert requires repair.
CV-128a	Y	N	N	YES - Culvert under old road is buried with sediment causing water to flow over the road during freshet, blocking fish passage.
CV-128	Y	Y	N	NONE
CV-115	Y	N	N	NONE
CV-114	Y	Y	N	YES - Both culverts perched. Previous remediation attempts (rocky ramps) need maintenance or other permanent solution
CV-112	Y	N	N	NONE
CV-111	Y	N	N	YES - Culvert has a significant perch (0.30 m) that is preventing fish access to upstream habitat.
CV-106	Y	Y	N	YES - Culvert perched and partially crushed, preventing fish access to upstream habitat.
CV-104	Y	N	N	NONE
CV-102	Y	Y	Y	NONE
CV-099	Y	N	N	YES – Some seepage under the road to the left of the culverts on the downstream side.
CV-085	Y	N	N	NONE
CV-079	Y	N	N	YES – Area below the hill was substantially flooded in spring 2023 with water backing up on the upstream side of the road. May increase erosion.
CV-078	Y	N	N	NONE
CV-076	Y	Y	N	NONE
CV-072	Y	N	N	NONE

Location ID	Fish Habitat at Crossing (Y/N)	Fish Captured / Observed Downstream in 2023	Fish Captured / Observed Upstream in 2023	Potential Project-Related Fish Passage or Habitat Issues
CV-061	Y	N	N	YES – Culvert is slightly perched (0.05 m).
CV-061b	Y	Y	N	YES - Both culverts are perched (0.07 m and 0.10 m, on the left and right (facing upstream), respectively).
CV-060	Y	Y	N	NONE
CV-059	Y	N	N	YES - Sediment accumulation obstructing flow through the culverts.
CV-058	Y	N	N	NONE
CV-057	Y	N	N	YES - Sediment accumulation obstructing flow through the culverts
BG-50	Y	N	N	YES - Culverts remain perched and impassable. Fish continue to use habitat in the channel downstream of these culverts.
CV-049	Y	Y	Y	NONE
CV-040	Y	N	N	NONE
CV-211	P	N	N	NONE
CV-212	Y	N	N	NONE
BG-33	Y	Y	N	YES - Flow upstream of the crossing is subsurface under rip rap placed to control erosion. Downstream end of culvert has a slight perch. (Note; subsequent to survey rip rap was removed)
CV-030	Y	Y	Y	NONE
BG-32	Y	Y	N	NONE
CV-214	Y	Y	N	NONE
CV-215	Y	N	N	NONE
CV-217	Y	N	N	NONE
CV-216	Y	N	N	YES – Centre and left culvert are partially buried by sediment at the upstream end and do not allow fish passage; right hand culvert can become perched during summer/fall.

Location ID	Fish Habitat at Crossing (Y/N)	Fish Captured / Observed Downstream in 2023	Fish Captured / Observed Upstream in 2023	Potential Project-Related Fish Passage or Habitat Issues
BG-30	Y	Y	N	YES – New deposit of road embankment aggregate in the stream at the culvert outflow is blocking fish passage.
BG-29	Y	Y	N	NONE
CV-021	Y	Y	N	NONE
BG-27	Y	Y	N	YES – Two of three culverts have very small perches and the third culvert is buried by sediment at the upstream end.
BG-24	Y	Y	N	NONE
BG-17	Y	N	N	NONE
BG-04	Y	Y	N	YES – Left and centre culverts have slight perch (0.08 and 0.05 m, respectively) that may obstruct some smaller fish.
CV-001	Y	Y	Y	NONE
BG-03	Y	Y	N	YES – Large cobble riprap partially obstructs flows downstream of culvert.
CV-223	Y			NONE
CV-224	Y	Y	N	NONE
CV-225	Y	Y	N	YES - High velocity flows are typical through the culverts in spring. Old road crossing embankments were observed obstructing flows to one of the downstream branches of this stream.
BG-01	Y	Y	N	YES – One fish-bearing culvert was full of ice at time of survey. (Note; subsequently addressed
CV-186	Y	Y	N	YES - Some debris had washed into the stream and culverts outlets damaged.
CV-187	Y	N	N	NONE

TABLE 7. INSTALLATION SUMMARY OF REMAINING HADD AND HABITAT COMPENSATION SITES ALONG THE TOTE ROAD

Crossing ID	UTM ¹		Crossing Size Classification	Authorization (HADD or Compensation) ²	Initial Work Completion Date ³	Additional Work Completion Date ⁴	Years Monitored	Additional Monitoring Required
	Easting	Northing						
CV-129	512381	7966783	Large	HADD	17-Sep-07	July 2011 Winter 2014/15 September 2019 September 2020	2008-2023	Continue monitoring of rocky ramp for successful passage and if any changes are made to the culverts
CV-128	513556	7965889	Extra-large	HADD	23-Sep-07	Winter 2013/14 March 2017	2009-2023	Routine Only
CV-114	520278	7956528	Medium	HADD	29-Sep-07	July 2011 September 2019 September 2020	2009-2023	Once alternative remediation is identified, monitor success of measures
CV-111	521355	7954524	Medium	HADD	28-Sep-07	Winter 2018/19 September 2019	2009-2023	Once alternative remediation is identified, monitor success of measures
CV-104	521732	7952788	Medium	HADD	01-Oct-07	November 2016	2009-2023	Routine Only
CV-099	521886	7948843	Large	HADD	04-Oct-07	Winter 2014/15 December 2017	2008-2023	Monitor remedial works if further ESC controls are required
CV-079	525538	7937314	Large	HADD	08-Jul-08	June 2018	2008-2023	Routine Only
CV-078	525852	7936787	Large	HADD	09-Jul-08	N/A	2008-2023	Routine Only
CV-072	526897	7934576	Large	HADD	05-Mar-08	N/A	2009-2023	Routine Only
CV-060	527622	7930342	Medium	HADD	27-Feb-08	N/A	2009-2023	Routine Only
BG-50	529294	7926852	Extra-large	HADD	30-Oct-07	Winter 2013/14 Winter 2014/15 November 2016 September 2019	2008-2023	Once alternative remediation is identified for the culvert channel, monitor success of measures
CV-049	529654	7926545	Large	HADD	10-Mar-08	N/A	2009-2023	Routine Only
BG-32	540729	7921597	Large	HADD	04-Apr-08	August 2012 September 2017	2009-2023	Routine Only
CV-217	542321	7922189	Extra-large	HADD	17-Apr-08	Winter 2013/14 Winter 2014/15 March 2017	2009-2023	Routine Only

Crossing ID	UTM ¹		Crossing Size Classification	Authorization (HADD or Compensation) ²	Initial Work Completion Date ³	Additional Work Completion Date ⁴	Years Monitored	Additional Monitoring Required
	Easting	Northing						
CV-216	542764	7921724	Large	HADD	08-Jun-08	October 2017 September 2019 September 2020	2009-2023	Continue monitoring backwatering structure or alternative remediation for effectiveness and fish passage
BG-30	546070	7919844	Small	Compensation - RA	2012	August 2012	2010-2023	Routine monitoring and maintenance of constructed fishway
BG-24	548766	7918878	Medium	HADD	15-May-08	N/A	2008-2023	Routine Only
BG-17	550703	7917643	Large	HADD	09-May-08	N/A	2009-2023	Routine Only
BG-04	553250	7915100	Medium	HADD	05-May-08	August 2012 February 2018 June 2018	2009-2023	Routine Only
CV-001	553544	7914897	Small	Compensation - RH	08-May-08	Winter 2014/15	2009-2023	Routine Only
CV-223	555705	7914676	Extra-large	HADD	03-May-08	Winter 2013/14	2008-2023	Routine Only
CV-224	556238	7915044	Medium	HADD	04-May-08	January 2018	2008-2023	Routine Only
CV-225	557421	7915187	Large	HADD	21-Sep-07	August 2010 Winter 2014/15 Spring 2020	2008-2023	Continue monitoring of backwater structure
BG-01	558000	7914928	Medium	HADD	20-Sep-07	August 2010 October 2017 September 2019	2008-2023	Continue monitoring for passage
CV-187	560957	7913414	Small	Compensation - RH	14-Jun-08	N/A	2008-2023	Routine Only

1 - NAD 83, Zone 17

2 - Includes current HADD and compensation sites and not those eliminated from calculations following 2010 surveys; RA = restored access, RH = restored habitat

3 - Includes work outlined during the initial planning and construction phase

4 - Includes repair work, installation of fish access improvement structures, and ERP upgrades

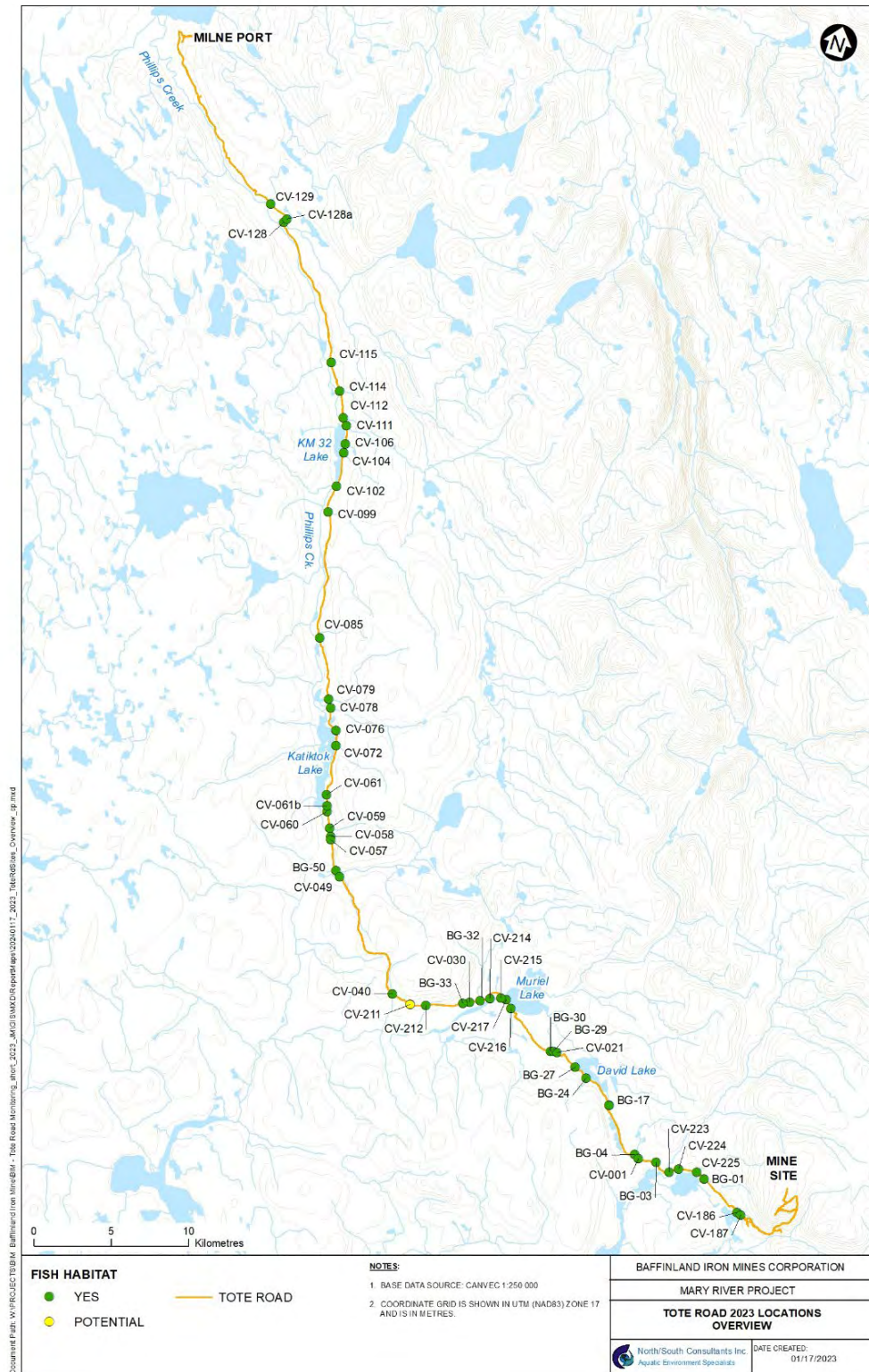


FIGURE 1. MAP OF TOTE ROAD SITES SURVEYED IN SPRING 2023 FISH AND FISH HABITAT ASSESSMENT FIELD PROGRAMS

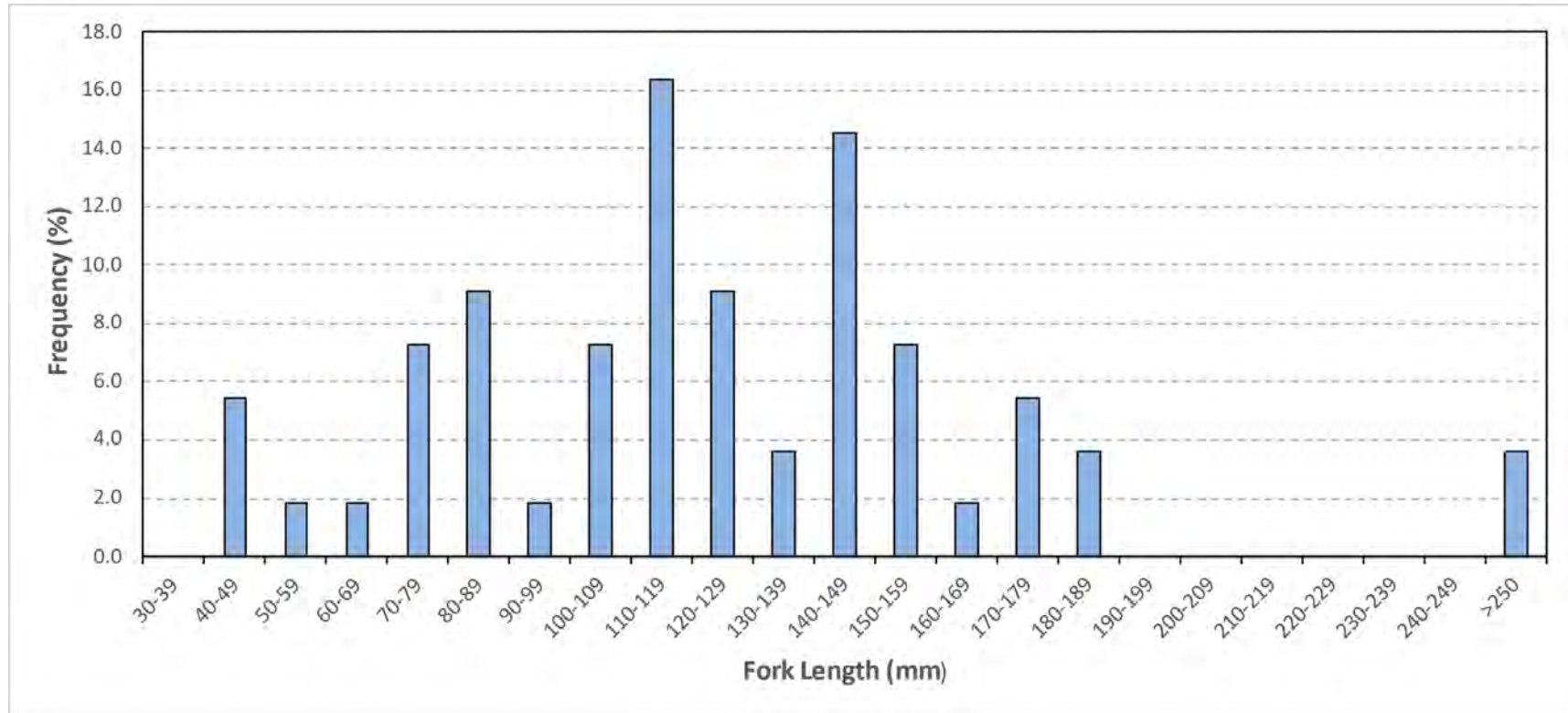


FIGURE 2. FORK LENGTH-FREQUENCY FOR ALL ARCTIC CHAR CAPTURED DURING SPRING 2023 SURVEYS OF FISH-BEARING SITES ALONG THE TOTE ROAD

APPENDIX A

DFO AUTHORIZATIONS AND AMENDMENTS



301-5204 50th Avenue
Yellowknife, NT
X1A 1E2

September 20, 2013

our file

Voire référence

Our file

Notre référence

07-HCAA-CA7-00050

Oliver Curran
Baffinland Iron Mines Corporation
2275 Upper Middle Road East, Suite 300
Oakville, ON
L6H 0C3

Dear Mr. Curran:

Subject: Proposal not likely to result in impacts to fish and fish habitat.

Fisheries and Oceans Canada – Fisheries Protection Program (DFO) received your proposal on August 29, 2013. Please refer to the file number and title below:

DFO File No.: **07-HCAA-CA7-00050**

Title: **Mary River Iron Ore Project, Baffin Island (Baffinland), Nunavut**

You may be aware of changes to the *Fisheries Act*, however these have not affected the review of your project at this time. For more information on current changes to the *Fisheries Act* please refer to the DFO website at www.dfo-mpo.gc.ca/media/infocus-alaune/2012/habitat-eng.htm.

Your proposal has been reviewed to determine whether it is likely to result in impacts to fish and fish habitat which are prohibited by the habitat protection provisions of the *Fisheries Act* or those prohibitions of the *Species at Risk Act* that apply to aquatic species.*

Our review consisted of:

Changes to Culverts along the Tote Road, Submission dated August 29, 2013 from Oliver Curran - Baffinland Iron Mines Corporation

Freshwater Aquatic Baseline Synthesis Report 2005-2011 (January 2012), Baffinland Iron Mines Corporation, Mary River Project, Prepared by North/South Consultants Inc.

*Those sections most relevant to the review of development proposals include 20, 22, 32 and 35 of the *Fisheries Act* and sections 32, 33 and 58 of the *Species at Risk Act*. For more information please visit www.dfo-mpo.gc.ca.

We understand that you propose to carry out the following culvert upgrades along the Tote Road:

Culvert ID	Proposed Culvert Diameter (m)	Proposed Culvert Length (m)	Area of Rip Rap (m2)	Proposed Culvert Upgrade
BG31A	1.2	19.5	24.96	Extend 1m left & 2.5m right
BG30	1	22	17.33	Extend 7m right
BG29	1	31	0	Extend 7.5m left & 8.5m right
BG27B	0.5	31	4.33	Extend 5m left & 8m right
BG27C	0.5	31	0	Extend 5m left & 8m right
BG27A	0.5	31	0	Extend 4.5m left & 8.5m right
BG17A	1.2	36.5	24.96	Extend 8m left & 13.5m right
BG17B	1.2	37.5	24.96	Extend 15.5m left & 7m right
BG04A	1.2	24	0	Extend 5.5m left & 3.5m right
BG04B	1.2	24	0	Extend 5m left & 4m right
CV224A	1	26	0	Extend 6m left & 5m right
CV224B	1	26.5	0	Extend 6.5m left & 5m right
CV225B	1.2	18	0	Replace with new length of 18m
CV225A	1	18.5	17.33	Replace with new length of 18.5m
BG01C	1.2	37	24.96	Extend 11m left & 8m right
BG01A	1.2	36.5	24.96	Extend 11.5m left & 7m right
BG01B	1.2	37	24.96	Extend 12m left & 7m right
BG01D	0.5	10	0	New Culvert
BG01F	0.5	18	0	New Culvert
BG01E	1.0	10	0	New Culvert
BG01G	0.5	23	0	New Culvert
CV186	1	27	0	Extend 6m left
CV187A	0.5	20.5	0	Extend 6m left & 4.5m right
CV187B	0.5	16	0	New Culvert
CV166A	1	23.5	17.33	Extend 8.5m right
CV166B	0.5	22.5	0	Extend 7.5m right
CV115A	0.5	17.5	0	Extend 2.5m left
CV115B	1	17	0	Extend 2m left

Provided that your plans are implemented as described DFO has concluded that your proposal is not likely to result in impacts to fish and fish habitat.

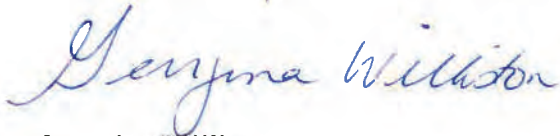
You will not need to obtain a formal approval from DFO in order to proceed with your proposal.

If the plans have changed or if the description of your proposal is incomplete you should contact this office to determine if the advice in this letter still applies.

Please be advised that any unauthorized impacts to fish and fish habitat which result from a failure to implement this proposal as described could lead to corrective action such as enforcement.

If you have any questions please contact the undersigned at (867) 669-4927 or by email at Georgina.Williston@dfo-mpo.gc.ca.

Yours sincerely,



Georgina Williston
Fisheries Protection Biologist

cc. Stuart Niven- Fisheries and Oceans Canada
Jim Millard- Baffinland Iron Mines Corporation
Bevin LeDrew- Sikumiut Environmental Management Ltd.



Fisheries and Oceans
Canada

Pêches et Océans
Canada

301-5204 50th Ave
Yellowknife, NT
X1A 1E2

Our file Notre référence
NU-07-0050

December 16, 2013

Baffinland Iron Mines Corp.
275 Upper Middle Road East Suite 300
Oakville, ON L6H 0C3

Dear Mr. Curran:

Subject: Implementation of mitigation measures to avoid and mitigate serious harm to fish.

The Fisheries Protection Program (the Program) of Fisheries and Oceans Canada received your proposal on August 28, 2013.

Your proposal has been reviewed to determine whether it is likely to result in serious harm to fish which is prohibited under subsection 35(1) of the *Fisheries Act*.

Our review consisted of:

Baffinland Submission: Tote Road Upgrade-Four Seacan Bridge Replacements, Tote Road Upgrade- Fish Bearing Culvert submission, Attachments 1 &2, August 2013.

We understand that you propose to: Upgrade the following crossings along the Tote Road.

The following seacan crossings will be removed and replaced with clear span bridges

- STA 17 (CV 128)
- STA 62 (BG50)
- STA 80 (CV 217)
- STA 97 (CV223)

The following culvert crossings will be upgraded as follows:

Culvert ID	Proposed Culvert Diameter (m)	Proposed Culvert Length (m)	Area of Rip Rap (m2)	Proposed works to be completed
CV217B	1.2	16	24.96	Extend 1m right
CV217C	1.2	16	24.96	Extend 1m right
CV217A	1.2	16	24.96	Extend 1m right
CV217D	0.15		0	Abandon
CV216B	1.2	17.5	0	Extend 1.5m left & 1m right
CV216C	1.2	16.5	0	Extend 1.5m left
CV216A	1.2	18.5	0	Extend 1.5m left & 2m right
CV216D	0.5	14.5	0	Replace with new length of 14.5m
CV216E	0.5	14	0	Abandon and replace with new length of 14m
CV216F	0.5	12	0	Replace with new length of 12m
CV223B	1.2	28	24.96	Extend 13m left
CV223C	1.2	28	24.96	Extend 13m left
CV223D	1.2	29	24.96	Extend 14m left
CV223A	2	24	69.33	Extend 14m left
CV223E	1.2	19.5	0	Extend 4.5m left
CV223F	1.2	19	0	Extend 4m left
CV115C	0.5	15.5	0	Extend 3.5m right
CV115D	0.5	17	4.33	Extend 8m left
CV114A	1	15.5	17.33	Extend 0.5m right
CV114B	0.5	14	0	Extend 5m left
CV114C	0.5	11	4.33	Replace with new length of 11m
CV114D	0.5	11.5	4.33	Extend 2m left & 0.5m right
CV112A	1.2	17.5	24.96	Extend 2.5m right
CV112B	0.5	24	0	Extend 9m right
CV112C	0.5	21	4.33	Extend 9m left
CV111	1	24	17.33	Extend 4.5m left & 1.5m right
CV106	1	19	17.33	Extend 4m left
CV104A	1.2	19	24.96	Extend 4m left
CV104B	1.2	19	24.96	Extend 4m left
CV102A	1	22.5	17.33	Extend 7.5m left
CV102B	0.5	21.5	0	Extend 6.5m left
CV102C	0.5	21.5	0	Extend 6.5m left
CV102D	0.5	20.5	0	Extend 5.5m left
CV099B	1.2	17	24.96	Replace with new length of 17m

Culvert ID	Proposed Culvert Diameter (m)	Proposed Culvert Length (m)	Area of rip rap (m2)	Proposed works to be completed
CV099A	1.2		0	Remove culvert
CV099C	2	18.5	69.33	Replace with new length of 18.5m
CV099D	0.5		0	Remove culvert
CV099E	0.5		0	Remove culvert
CV099F	0.5	14	0	Extend 2m right
CV087B	1.2	19	24.96	Extend 6.5m left & 0.5m right
CV087A	1.2	18.5	24.96	Extend 6m left & 0.5m right
CV087C	0.5	18	0	Extend 6m right
CV079B	1.2	16.5	0	Extend 1.5m left
CV079A	1.2	16.5	0	Extend 1.5m left
CV079C	0.15		0	Remove culvert
CV079D	0.15		0	Remove culvert
CV078A	1.2	16.5	0	Extend 1.5m left
CV078B	1	19.5	0	Extend 1.5m left
CV078C	1	19.5	0	Extend 1.5m left
CV078D	2	22	0	Extend 2m right
CV076	1	11.5	0	Replace with new length of 11.5m
CV072B	1.2	17.5	0	Replace with new length of 17.5m
CV072C	1.2	17.5	0	Replace with new length of 17.5m
CV072A	1.2	17.5	0	Replace with new length of 17.5m
CV060A	1	16.5	0	Extend 1.5m left
CV060B	1	16.5	0	Extend 1.5m left
CV059B	0.5	16.5	0	Extend 3.5m left & 1m right
CV059A	0.5	16	0	Extend 3m left & 1m right
CV059C	0.5	16.5	0	Extend 4m left & 0.5m right
CV059D	0.5	16.5	0	Extend 4m left & 0.5m right
CV057B	0.5	16.5	0	Extend 1.5m left
CV057C	0.5	16.5	0	Extend 1.5m left
CV057A	0.5	16.5	0	Extend 1.5m left
BG50A	1.2	33.5	24.96	Extend 15.5m left
BG50B	1.2	32	24.96	Extend 14m left
CV049A	1.2	24.5	24.96	Extend 5.5m left & 4m right
CV049B	1.2	24.5	24.96	Extend 4.5m left & 5m right
CV030A	1	16	0	Extend 1m left
CV030B	0.5	16	0	Extend 1m left

To avoid the potential of serious harm to fish and their habitat, we are recommending that the following mitigation measures be included into your plans.

- If in-stream work is required during the open water season it should be completed in the dry by de-watering the work area and diverting and/or pumping flows around cofferdams placed at the limits of the work area.
- Existing stream flows should be maintained downstream of the de-watered work area without interruption, during all stages of the work.
- A fish stranding program should be implemented if necessary by a qualified fisheries person, who is experienced in this area, immediately following isolation and prior to de-watering to ensure that fish are removed from any dewatered area and released alive immediately downstream of the work area.
- Flow dissipaters and/or filter bags, or equivalent, should be placed at water discharge points to prevent erosion and sediment release.
- Silt or debris that has accumulated around the temporary cofferdams should be removed prior to their withdrawal.

Provided that these mitigation measures are incorporated into your plans, the Program is of the view that your proposal will not result in serious harm to fish. No formal approval is required from the Program under the *Fisheries Act* in order to proceed with your proposal.

If your plans have changed or if the description of your proposal is incomplete, or changes in the future, you should consult our website (<http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html>) or consult with a qualified environmental consultant to determine if further review is required by the Program.

Please notify this office at least 10 days before starting your project. A copy of this letter should be kept on site while the work is in progress.

If you have any questions, please contact Georgina Williston at our Yellowknife office at 867-669-4927, by fax at 867-669-4940 or by email at geogina.williston@dfo-mpo.gc.ca. Please refer to the file number referenced above when corresponding with the Program.

Yours sincerely,



Stu Niven
Senior Fisheries Protection Biologist
Fisheries and Oceans Canada

Georgina Williston- Fisheries and Oceans Canada
Bevin LeDrew- Sikumiut Environmental Management Ltd.
Tessa Mackay- Hatch



Suite 301 – 5204 59th Ave.
Yellowknife NT, X1A 1E2

Our file Notre référence
NU-07-0050

February 20, 2015

James Millard
Environmental Manager
Baffinland Iron Mines Corp.
275 Upper Middle Road East Suite 300
Oakville, ON L6H 0C3

Dear Mr. Millard:

Subject: Implementation of mitigation measures to avoid and mitigate serious harm to fish – Mary River Project, Tote Road Realignment.

The Fisheries Protection Program of Fisheries and Oceans Canada received your proposal on February 15, 2015.

Your proposal has been reviewed to determine whether it is likely to result in serious harm to fish which is prohibited under subsection 35(1) of the *Fisheries Act*.

Your proposal has also been reviewed to determine whether it will adversely impact listed aquatic species at risk and contravene sections 32, 33 or 58 of the *Species at Risk Act (SARA)*.

Our review considered the following:

- Letter from Baffinland Iron Mines Re: Mary River Project – Request for Advice on Realignment of Tote Road at Culvert CV076, Km 53 Tote Road, DFO File dated February 15, 2015 and submitted by James Millard with 1 attachment.
- Attachment 1 - Mark-up of proposed field change, Drawing H349000-3000-10-012-0073

We understand that you propose to:

- Realign the existing Tote Road at Culvert CV076, 160 meters upstream from the existing crossing and install one culvert which is 1.2m in diameter and 18 m in length.
- Install culverts during the winter months when the stream is frozen to bottom.
- Remove existing culvert from the old Tote Road alignment.

Since there are no *SARA* species or their habitats identified in the project area, no additional approvals under *SARA* will be required for your proposed activities. To avoid the potential for serious harm to fish that is prohibited under the *Fisheries Act*, the mitigation measures set out in your project plans are to be followed.

Provided that you implement the required mitigation measures for your project, and follow the guidance available on the DFO website at <http://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures/index-eng.html>, the Program is of the view that your proposal should not result in serious harm to fish or contravene sections 32, 33 or 58 of the *Species at Risk Act*. No formal approval is required from the Program under the *Fisheries Act* or the *Species at Risk Act* in order to proceed with your proposal.

It remains your responsibility to ensure you avoid causing serious harm to fish in compliance with the *Fisheries Act*, and that you meet the requirements under the *Species at Risk Act* as it may apply to your project. If your plans have changed or if the description of your proposal is incomplete, or changes in the future, you should consult our website (<http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html>) or consult with a qualified environmental consultant to determine if further review is required by the Program.

Please be advised that it is also your *Duty to Notify* DFO if you have caused, or are about to cause, serious harm to fish that are part of or support a commercial, recreational or Aboriginal fishery. Such notifications should be directed to <http://www.dfo-mpo.gc.ca/pnw-ppe/violation-infraction/index-eng.html>.

A copy of this letter should be kept on site while the work is in progress. It remains your responsibility to meet all other federal or territorial requirements that apply to your project.

If you have any questions, please contact Georgina Williston at our Yellowknife office at (867) 669-4927, by fax at (867) 669-4940, or by email at georgina.williston@dfo-mpo.gc.ca. Please refer to the file number referenced above when corresponding with the Program.

Yours sincerely,



Julie Dahl
Regional Manager, Regulatory Reviews
Fisheries Protection Program

cc.
Georgina Williston- Fisheries and Oceans Canada
Oliver Curran-Baffinland Iron Mines Corp.
Erik Madsen-Baffinland Iron Mines Corp.



Fisheries and Oceans Canada Pêches et Océans Canada

5204-50th Avenue
Yellowknife, NT
X1A 1E2

December 9, 2014

Your file *Votre référence*

Our file *Notre référence*
NU-07-0050

Baffinland Iron Mines Corp.
Attention: Jim Millard, Environmental Manager
2275 Upper Middle Road, Suite 300
Oakville, ON
L6H 0C3

Dear Mr. Millard:

Subject: Implementation of mitigation measures to avoid and mitigate impacts to fish and fish habitat and listed aquatic species at risk – Mary River Project

The Fisheries Protection Program (the Program) of Fisheries and Oceans Canada received your proposal on November 27, 2014.

Your proposal has been reviewed to determine whether it is likely to result in serious harm to fish which is prohibited under subsection 35(1) of the *Fisheries Act*.

Your proposal has also been reviewed to determine whether it will adversely impact listed aquatic species at risk and contravene sections 32, 33 or 58 of the *Species at Risk Act (SARA)*.

Our review considered the following:

- Letter from Baffinland Iron Mines RE: Realignment of Tote Road at Culvert CV099. Dated November 27, 2014 and submitted by James Millard, with 1 attachment.
- Attachment 1- Mark up of proposed field change, Drawing H349000-3000-10-012-0052

We understand that you propose to:

- Realign the existing Tote Road and install one 2 metre diameter culvert in the stream bed and two 1.2 metre overflow culverts. Culverts will be approximately 27 metres in length.

- Install culverts during the winter months when the stream is frozen to bottom.
- Remove existing culverts along the old Tote Road alignment.

Since there are no SARA species or their habitats identified in the project area, no additional approvals under SARA will be required for your proposed activities.

To avoid the potential for serious harm to fish that is prohibited under the *Fisheries Act*, the mitigation measures set out in your project plans are to be followed.

Provided that you implement the required mitigation measures for your project, and follow the guidance available on the DFO website at <http://www.dfo-mpo.gc.ca/pnw-ppe/measures/index-eng.html>, the Program is of the view that your proposal should not result in serious harm to fish or contravene sections 32, 33 or 58 of the *Species at Risk Act*. No formal approval is required from the Program under the *Fisheries Act* or the *Species at Risk Act* in order to proceed with your proposal.

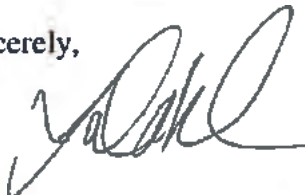
It remains your responsibility to ensure you avoid causing serious harm to fish in compliance with the *Fisheries Act*, and that you meet the requirements under the *Species at Risk Act* as it may apply to your project. If your plans have changed or if the description of your proposal is incomplete, or changes in the future, you should consult our website (<http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html>) or consult with a qualified environmental consultant to determine if further review is required by the Program.

Please be advised that it is also your *Duty to Notify* DFO if you have caused, or are about to cause, serious harm to fish that are part of or support a commercial, recreational or Aboriginal fishery. Such notifications should be directed to <http://www.dfo-mpo.gc.ca/pnw-ppe/violation-infraction/index-eng.html>.

A copy of this letter should be kept on site while the work is in progress. It remains your responsibility to meet all other federal or territorial requirements that apply to your project.

If you have any questions, please contact Georgina Williston at our Yellowknife office at 867-669-4927 or by email at Georgina.Williston@dfo-mpo.gc.ca. Please refer to the file number referenced above when corresponding with the Program.

Yours sincerely,



Julie Dahl
Regional Manager, Regulatory Reviews
Fisheries Protection Program

cc: Oliver Curran- Baffinland Iron Mines
Erik Madsen – Baffinland Iron Mines



5204-50th Avenue
Yellowknife, NT
X1A 1E2

October 27, 2014

Your file *Votre référence*

Our file *Notre référence*
NU-07-0050

Baffinland Iron Mines Corp.
Attention : Jim Millard, Environmental Manager
2275 Upper Middle Road, Suite 300
Oakville, ON
L6H 0C3

Dear Mr. Millard:

Subject: Implementation of mitigation measures to avoid and mitigate impacts to fish and fish habitat and listed aquatic species at risk – Mary River Project

The Fisheries Protection Program (the Program) of Fisheries and Oceans Canada received your proposal on October 17, 2014.

Your proposal has been reviewed to determine whether it is likely to result in serious harm to fish which is prohibited under subsection 35(1) of the *Fisheries Act*.

Your proposal has also been reviewed to determine whether it will adversely impact listed aquatic species at risk and contravene sections 32, 33 or 58 of the *Species at Risk Act* (SARA).

Our review considered the following:

- Letter from Baffinland Iron Mines RE: Realignment of Tote Road at Culvert CV225B. Dated October 16, 2014 and submitted by James Millard, with 2 attachments.
- Attachment 1- Mark of proposed field change, Drawing H349000-3000-10-012-0139
- Attachment 2- Project Wide, Civil Standard Drawing, Typical Culvert Detail, H349000-1000-10-041-0003

We understand that you propose to:

- Realign the existing Tote Road and install two new 1.2 metre culverts in the stream bed and one 1.0 metre culvert 45 m away as an overflow. Culverts will be approximately 27metres in length.

- Install culverts during the winter months when the stream is frozen to bottom.
- Remove the two existing 1.2m culverts along the old Tote Road alignment.

Since there are no *SARA* species or their habitats identified in the project area, no additional approvals under *SARA* will be required for your proposed activities.

To avoid the potential for serious harm to fish that is prohibited under the *Fisheries Act*, the mitigation measures set out in your project plans are to be followed.

Provided that you implement the required mitigation measures for your project, and follow the guidance available on the DFO website at <http://www.dfo-mpo.gc.ca/pnw-ppe/measures/index-eng.html>, the Program is of the view that your proposal should not result in serious harm to fish or contravene sections 32, 33 or 58 of the *Species at Risk Act*. No formal approval is required from the Program under the *Fisheries Act* or the *Species at Risk Act* in order to proceed with your proposal.

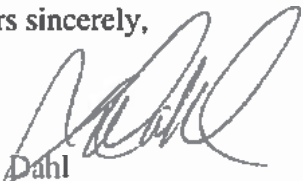
It remains your responsibility to ensure you avoid causing serious harm to fish in compliance with the *Fisheries Act*, and that you meet the requirements under the *Species at Risk Act* as it may apply to your project. If your plans have changed or if the description of your proposal is incomplete, or changes in the future, you should consult our website (<http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html>) or consult with a qualified environmental consultant to determine if further review is required by the Program.

Please be advised that it is also your *Duty to Notify* DFO if you have caused, or are about to cause, serious harm to fish that are part of or support a commercial, recreational or Aboriginal fishery. Such notifications should be directed to <http://www.dfo-mpo.gc.ca/pnw-ppe/violation-infraction/index-eng.html>.

A copy of this letter should be kept on site while the work is in progress. It remains your responsibility to meet all other federal or territorial requirements that apply to your project.

If you have any questions, please contact Georgina Williston at our Yellowknife office at 867-669-4927 or by email at Georgina.Williston@dfo-mpo.gc.ca. Please refer to the file number referenced above when corresponding with the Program.

Yours sincerely,



Julie Dahl
Regional Manager, Regulatory Reviews
Fisheries Protection Program

cc. Oliver Curran- Baffinland Iron Mines
Erik Madsen – Baffinland Iron Mines
Stu Niven – Fisheries and Oceans Canada

APPENDIX B
HABITAT ASSESSMENT SHEETS

APPENDIX B

HABITAT ASSESSMENT SHEETS

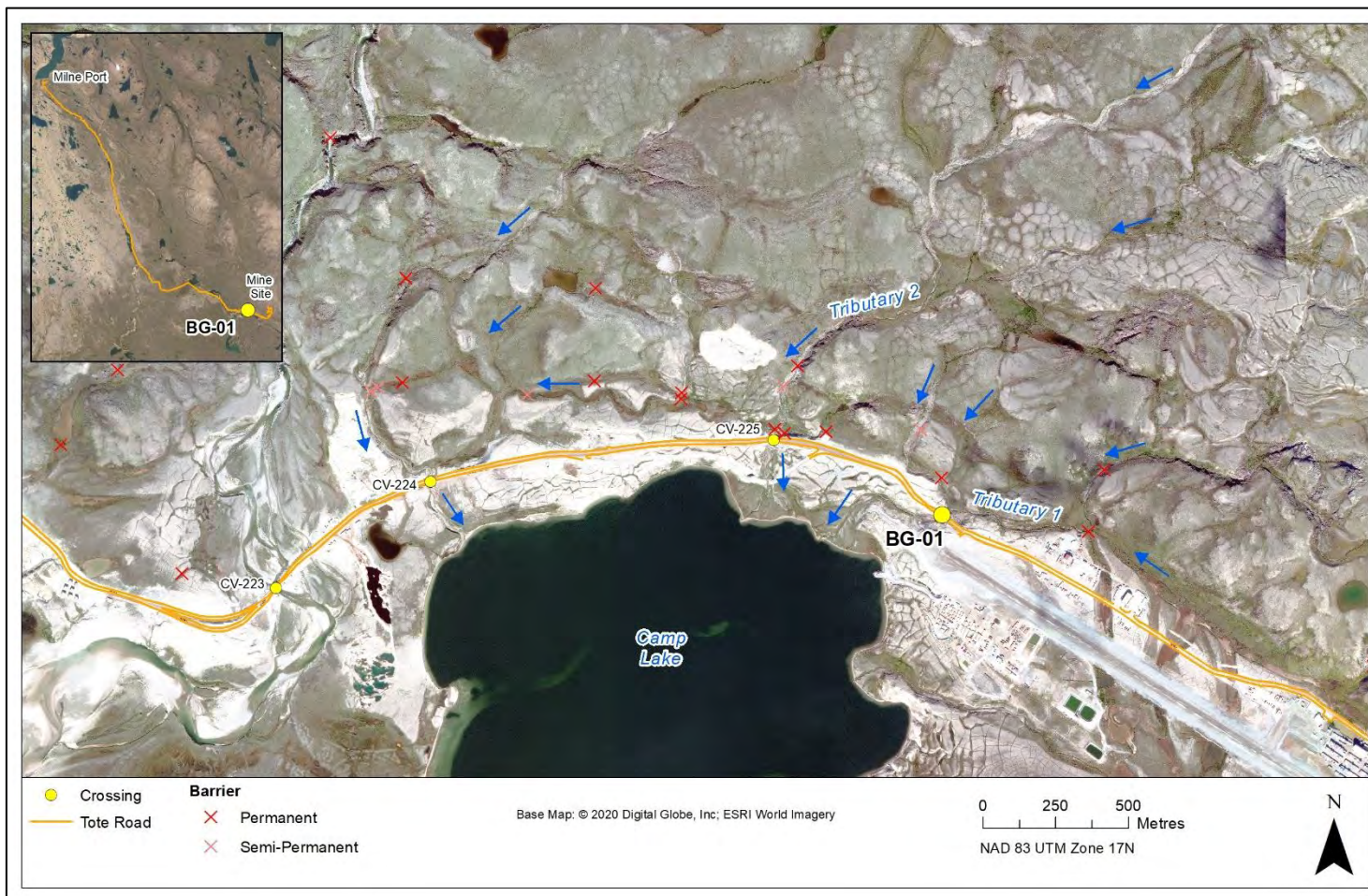
TOTE ROAD BG-01

LOCATION AND CROSSING DESCRIPTION

Site ID:	BG-01	Dates Surveyed:	9-Jul-23	Waterbody Type:	Stream
Project Interaction:	Tote Road Culvert	UTM Coordinates:	17W 558000 E 7914928 N		

GENERAL PHYSICAL CHARACTERISTICS

Flow Regime: Seasonal Stream Order: 3+



BAFFINLAND IRON MINES
MARY RIVER PROJECT

 **North/South Consultants Inc.**
Aquatic Environment Specialists

FISH HABITAT:

ARCTIC CHAR - YES

NINESPINE STICKLEBACK - YES

TOTE ROAD BG-01

SITE SUMMARY

The Tote Road crosses an unnamed stream at site BG-01 that flows 500 m southwest into Camp Lake. Camp Lake has been extensively surveyed and is known to support both overwintering and char spawning.

Detailed habitat data were collected in the crossing area in spring 2023. Wetted widths ranged between 6.4 and 22.3 m. Measured maximum depths were moderately deep, with a range of 0.27 – 0.70 m. Measured velocities were variable and ranged from 0.25 to 1.37 m/s. Stream morphology was typically riffle and run with shallow pools immediately upstream of the crossing. The substrate was primarily composed of cobble/boulder.

A few larger juvenile char were captured downstream of the crossing in spring 2023. The low catch rates in spring 2023 are likely the result of sampling during very high freshet flows with relatively low water temperature. Char use habitat in the stream for rearing and there is potential for adult use in the deeper areas near Camp Lake. There is no char spawning or overwintering habitat in the stream.

Ninespine Stickleback are abundant within Camp Lake and in the lowermost reaches of this stream near its confluence with the lake, but the species has only rarely been captured near the road. Relatively high velocities during the open-water period likely limit use of the crossing area by this species.

TOTE ROAD BG-01

FISH HABITAT POTENTIAL

Species	Spawning	Overwintering	Rearing	Adults Present
ARCH	N	N	Y	P
NNST	P	N	Y	Y

FISHERIES DATA

Location	Species	Survey Date	Temperature (°C)	Distance Fished (m)	Effort (Seconds)	# Fish Captured	# Fish Observed	CPUE (No. Fish/60 Seconds)	Length Range (mm)
Downstream	ARCH	9-Jul-23	3.0	50	Not recorded	2	1	N/A	129-135
	NNST					0	0	N/A	-
Upstream	ARCH			50	69	0	0	0.00	-
	NNST					0	0	0.00	-

OTHER NOTES / OBSERVATIONS

A few larger juvenile char were captured downstream of the crossing in spring 2023. Char use habitat in the stream for rearing and there is potential for adult use in the deeper areas near Camp Lake. There is no char spawning or overwintering habitat in the stream. Relatively high velocities during the open-water period likely limit use of the crossing area for stickleback.

TOTE ROAD BG-01

HYDROLOGY CHARACTERISTICS: 9-JUL-23

Wetted/Dry/Shallow (<0.02 m)/Unconnected Pools: Wetted

Stage: High

Site	Channel Width (m)		Water Depth (m)				Water Velocity (m/s)			
	Bankfull	Wetted	25%	50%	75%	Max	25%	50%	75%	Max
100D	20.5	6.4	-	-	-	0.47	-	-	-	1.37
60D	27.9	10.5	-	-	-	0.27	-	-	-	1.14
20D	18.2	10.1	-	-	-	0.29	-	-	-	1.08
0 (Centreline)	UNDER TOTE ROAD									
30U	18.9	11.4	-	-	-	0.70	-	-	-	0.25
60U	33.9	22.3	-	-	-	0.43	-	-	-	1.22
100U	34.5	11.4	-	-	-	0.30	-	-	-	1.21

OTHER NOTES / OBSERVATIONS

Wetted widths ranged between 6.4 and 22.3 m. Maximum depths were moderately deep, with a range of 0.27 – 0.70 m. Measured velocities were variable and ranged from 0.25 to 1.37 m/s.

TOTE ROAD BG-01

HABITAT CHARACTERISTICS: 9-JUL-23

Wetted/Dry/Shallow (<0.02 m)/Unconnected Pools: Wetted

Stage: High

Site	Stream Morphology Composition (%)							Substrate Composition (%)				
	Riffle	Pool (<0.2 m)	Pool (>0.2 m)	Run	Cascade	Rapids	Flat	Fines	Gravel	Small Cobble	Large Cobble	Boulders
100D	60	15	5	20	-	-	-	10	20	45	15	10
60D	70	10	-	20	-	-	-	5	15	65	10	5
20D	70	5	5	20	-	-	-	5	25	50	10	10
0 (Centreline)	UNDER TOTE ROAD											
30U	-	60	10	20	-	-	-	10	20	40	30	-
60U	30	30	20	20	-	-	-	10	15	50	20	5
100U	70	5	5	20	-	-	-	5	15	50	20	10

OTHER NOTES / OBSERVATIONS

Stream morphology was typically riffle and run with shallow pools immediately upstream of the crossing. The substrate was primarily composed of cobble/boulder.

TOTE ROAD BG-01

9-JUL-23



A



B



C



D



E



F

Photos 1-1. Photos taken 20 m downstream (top) and 60 m downstream (bottom) in spring 2023: (A,D) facing upstream; (B,E) facing downstream; and (C,F) across (left bank looking at right bank).

TOTE ROAD BG-01

9-JUL-23



A



B



C

Photos 1-2. Photos taken 100 m downstream in spring 2023: (A) facing upstream; (B) facing downstream; and (C) across (left bank looking at right bank).

TOTE ROAD BG-01

9-JUL-23



A



B



C



D



E



F

Photos 1-3. Photos taken 30 m upstream (top) and 60 m downstream (bottom) in spring 2023: (A,D) facing upstream; (B,E) facing downstream; and (C,F) across (left bank looking at right bank).

TOTE ROAD BG-01

9-JUL-23



A



B



C

Photos 1-4. Photos taken 100 m upstream in spring 2023: (A) facing upstream; (B) facing downstream; and (C) across (left bank looking at right bank).

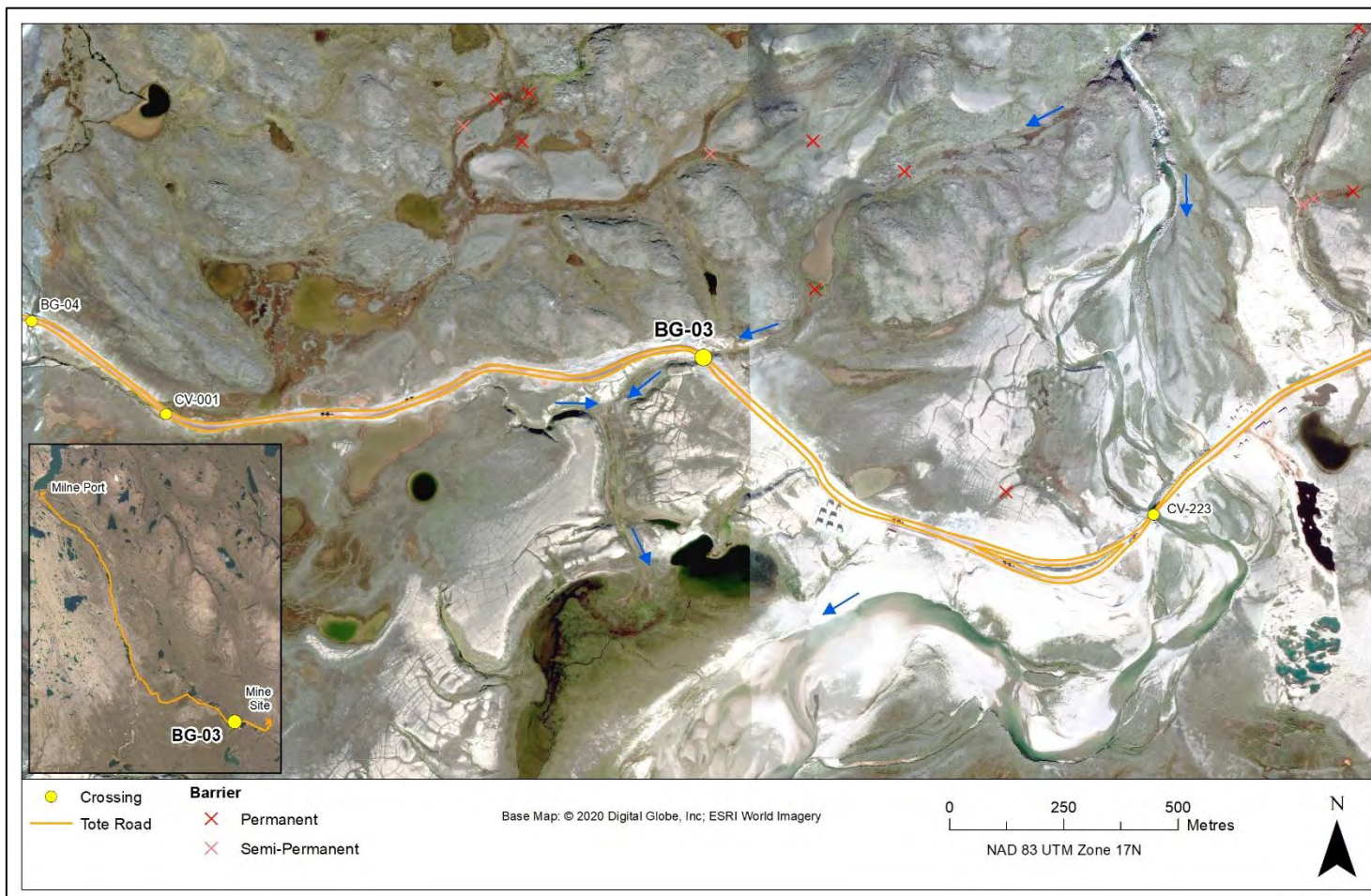
TOTE ROAD BG-03

LOCATION AND CROSSING DESCRIPTION

Site ID:	BG-03	Date Surveyed:	8-Jul-23	Waterbody Type:	Stream
Project Interaction:	Tote Road Culvert	UTM Coordinates:	17W 554719 E 7915020 N		

GENERAL PHYSICAL CHARACTERISTICS

Flow Regime: Seasonal Stream Order: 2



BAFFINLAND IRON MINES
MARY RIVER PROJECT

 **North/South Consultants Inc.**
Aquatic Environment Specialists

FISH HABITAT:

ARCTIC CHAR - POTENTIAL
NINESPINE STICKLEBACK - YES

TOTE ROAD BG-03

SITE SUMMARY

The Tote Road crosses a small, unnamed stream at site BG-03 that flows south into a small, unnamed pond/wetland 650 m downstream of the culvert. It is unknown if this pond has sufficient depths for overwintering, though it may be periodically connected to the Tom River/north basin of Mary Lake.

Detailed habitat data were collected the crossing area in in spring 2023. Wetted width over the surveyed area ranged between 1.2 and 7.2 m. The stream is very shallow downstream of the culvert (water depth ≤ 0.10 m). The stream is deeper (0.15-0.35 m) upstream of the road where there is some ponding. Measured maximum velocities were higher downstream (0.23-0.45 m/s) than upstream (0.01-0.11 m/s) transects. Stream morphology was largely riffle downstream and shallow and deep pool upstream of the crossing. Substrate was mainly gravel/cobble downstream and fines upstream.

Arctic Char have not been captured in this stream since it was first surveyed in 2019. Very shallow water throughout most of the open-water period and intermittent downstream connectivity with larger waterbodies may restrict char use to periods of very high water.

Ninespine Stickleback were captured for the first time in this stream in spring 2023, downstream from the culvert. The species can use habitat in the vicinity of the Tote Road crossing at BG-03 when water levels are sufficient for rearing/feeding and possibly spawning. There is no overwintering habitat in this stream.

TOTE ROAD BG-03

FISH HABITAT POTENTIAL

Species	Spawning	Overwintering	Rearing	Adults Present
ARCH	N	N	P	N
NNST	P	N	Y	Y

FISHERIES DATA

Location	Species	Survey Date	Temperature (°C)	Distance Fished (m)	Effort (Seconds)	# Fish Captured	# Fish Observed	CPUE (No. Fish/60 Seconds)	Length Range (mm)
Downstream	ARCH	8-Jul-23	6.0	50	98	0	0	0.00	-
	NNST					2	0	1.22	51-52
Upstream	ARCH			50	106	0	0	N/A	-
	NNST					0	0	N/A	-

OTHER NOTES / OBSERVATIONS

Two adult stickleback were captured downstream from the culvert in spring 2023. No char have been captured in this stream and no stickleback were observed or captured upstream of the culvert. Road aggregate material was partially blocking fish access to the downstream entrance of the culvert (see photos below).

TOTE ROAD BG-03

HYDROLOGY CHARACTERISTICS: 8-JUL-23

Wetted/Dry/Shallow (<0.02 m)/Unconnected Pools: Wetted

Stage: High

Site	Channel Width (m)		Water Depth (m)				Water Velocity (m/s)			
	Bankfull	Wetted	25%	50%	75%	Max	25%	50%	75%	Max
100D	36.2	4.5	-	-	-	0.07	-	-	-	0.23
60D	10.9	1.6	-	-	-	0.10	-	-	-	0.37
20D	5.5	1.2	-	-	-	0.08	-	-	-	0.45
0 (Centreline)	UNDER TOTE ROAD									
20U	12.1	7.2	-	-	-	0.35	-	-	-	0.01
60U	26.2	6.5	-	-	-	0.33	-	-	-	0.01
100U	15.2	2.8	-	-	-	0.15	-	-	-	0.11

OTHER NOTES / OBSERVATIONS

Wetted widths over the surveyed area ranged between 1.2 and 7.2 m in spring 2023. The stream was very shallow downstream of the culvert, with depths \leq 0.10 m. Upstream areas were deeper with maximum depths of 0.15-0.35 m. Measured maximum velocities were higher at downstream (0.23-0.45 m/s) than upstream (0.01-0.11 m/s) transects.

TOTE ROAD BG-03

HABITAT CHARACTERISTICS: 8-JUL-23

Wetted/Dry/Shallow (<0.02 m)/Unconnected Pools: Wetted Stage: High

Site	Stream Morphology Composition (%)							Substrate Composition (%)				
	Riffle	Pool (<0.2 m)	Pool (>0.2 m)	Run	Cascade	Rapids	Flat	Fines	Gravel	Small Cobble	Large Cobble	Boulders
100D	65	30	-	5	-	-	-	30	40	25	5	-
60D	80	15	-	5	-	-	-	20	40	30	10	-
20D	80	10	-	10	-	-	-	20	20	40	40	-
0 (Centreline)	UNDER TOTE ROAD											
20U	-	30	65	5	-	-	-	60	35	5	-	-
60U	10	45	35	10	-	-	-	100	-	-	-	-
100U	15	25	50	10	-	-	-	65	15	20	-	-

OTHER NOTES / OBSERVATIONS

Stream morphology was largely riffle downstream and shallow and deep pool upstream of the crossing. Substrate was mainly gravel/cobble downstream and fines upstream.

TOTE ROAD BG-03

HABITAT CHARACTERISTICS: 8-JUL-23

Wetted/Dry/Shallow (<0.02 m)/Unconnected Pools: Wetted Stage: High

Site	Stream Morphology Composition (%)							Substrate Composition (%)				
	Riffle	Pool (<0.2 m)	Pool (>0.2 m)	Run	Cascade	Rapids	Flat	Fines	Gravel	Small Cobble	Large Cobble	Boulders
100D	65	30	-	5	-	-	-	30	40	25	5	-
60D	80	15	-	5	-	-	-	20	40	30	10	-
20D	80	10	-	10	-	-	-	20	20	40	40	-
0 (Centreline)	UNDER TOTE ROAD											
20U	-	30	65	5	-	-	-	60	35	5	-	-
60U	10	45	35	10	-	-	-	100	-	-	-	-
100U	15	25	50	10	-	-	-	65	15	20	-	-

OTHER NOTES / OBSERVATIONS

Stream morphology was largely riffle downstream and shallow and deep pool upstream of the crossing. Substrate was mainly gravel/cobble downstream and fines upstream.

TOTE ROAD BG-03

8-JUL-23



A



B



C



D



E



F

Photos 1-1. Photos taken 20 m downstream (top) and 60 m downstream (bottom) in spring 2023: (A,D) facing upstream; (B,E) facing downstream; and (C,F) across (left bank looking at right bank).

TOTE ROAD BG-03

8-JUL-23



A



B



C

Photos 1-2. Photos taken 100 m downstream in spring 2023: (A) facing upstream; (B) facing downstream; and (C) across (left bank looking at right bank).

TOTE ROAD BG-03

8-JUL-23



A



B



C



D



E



F

Photos 1-3. Photos taken 20 m upstream (top) and 60 m downstream (bottom) in spring 2023: (A,D) facing upstream; (B,E) facing downstream; and (C,F) across (left bank looking at right bank).

TOTE ROAD BG-03

8-JUL-23



A



B



C

Photos 1-4. Photos taken 100 m upstream in spring 2023: (A) facing upstream; (B) facing downstream; and (C) across (left bank looking at right bank).

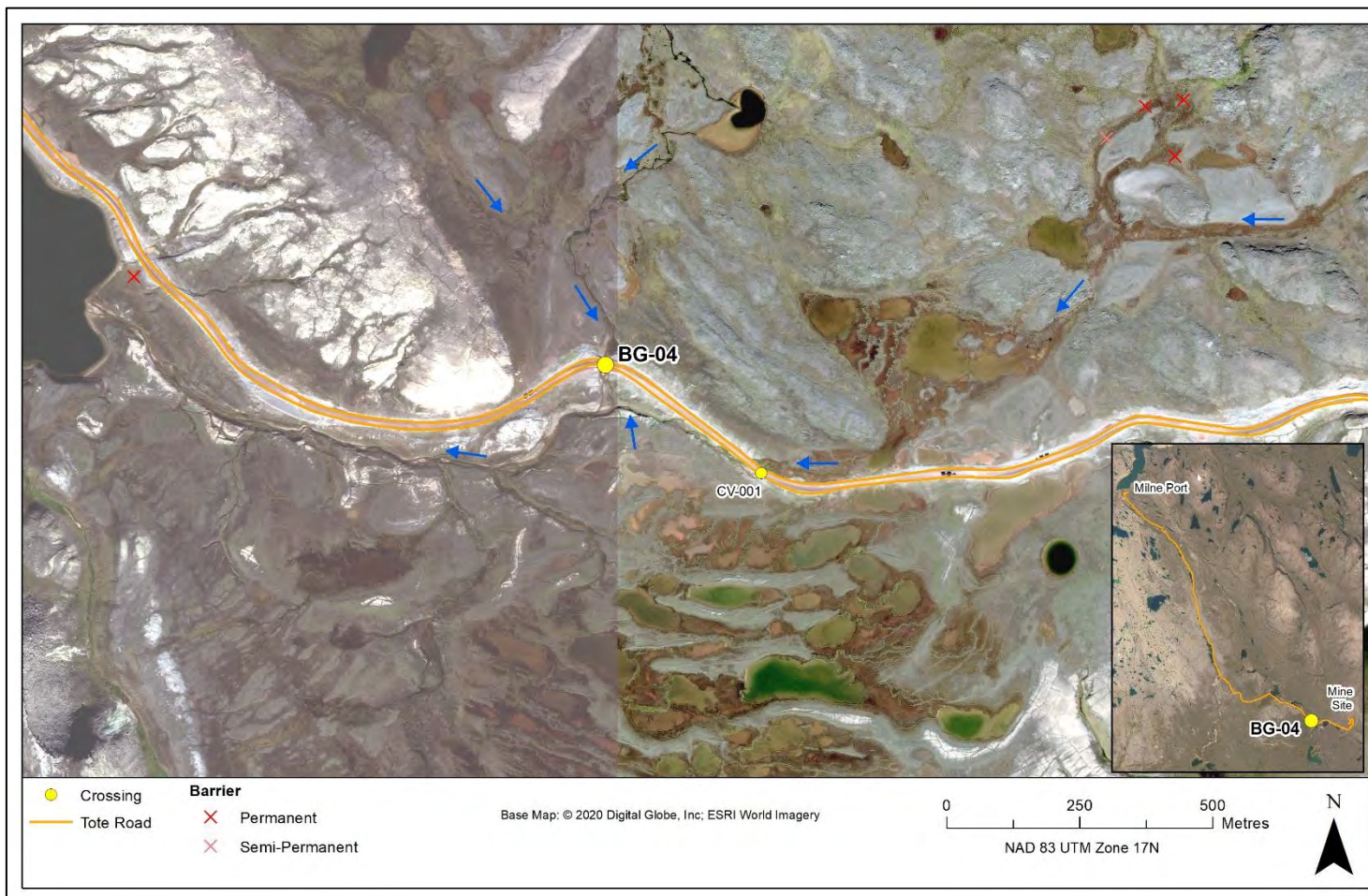
TOTE ROAD BG-04

LOCATION AND CROSSING DESCRIPTION

Site ID:	BG-04	Date Surveyed:	5-Jul-23	Waterbody Type:	Stream
Project Interaction:	Tote Road Culvert	UTM Coordinates:	17W 553250 E 7915100 N		

GENERAL PHYSICAL CHARACTERISTICS

Flow Regime: Seasonal Stream Order: 3+



BAFFINLAND IRON MINES
MARY RIVER PROJECT

 **North/South Consultants Inc.**
Aquatic Environment Specialists

FISH HABITAT:

ARCTIC CHAR - YES

NINESPINE STICKLEBACK - YES

TOTE ROAD BG-04

SITE SUMMARY

The Tote Road crosses a small, unnamed stream at site BG-04 that flows south into a stream that continues flowing west into an unnamed lake 1.3 km downstream of the culvert. The lake has been surveyed for bathymetry and substrate and has sufficient depth to support overwintering for both species. Several additional upstream lakes have also been surveyed, and all had sufficient depths for overwintering. Due to the presence of potential overwintering habitat upstream and downstream of the crossing, fish using the crossing habitat may originate from the upstream or downstream drainage. A small tributary of this stream is also crossed by the Tote Road at site CV-001.

Detailed habitat data were collected in the crossing area in spring 2023. Wetted widths over the surveyed area ranged between 3.7 and 19.1 m in spring 2023. Measured depths were shallow to moderate, not exceeding 0.50 m, with a range of 0.23 – 0.46 m. Measured velocities were moderate, often exceeding 0.5 m/s, with higher values in constricted runs and riffles between the wider, slower-flowing pools. Stream morphology was typically riffle and run interspersed with shallow and deep pools. The substrate downstream of the crossing was primarily composed of finer materials, while substrate in areas upstream from the culvert was composed mainly of cobble-boulder.

Both species have consistently been captured in this stream throughout the Tote Road monitoring program; both species use habitat in the vicinity of the Tote Road crossing at BG-04 for rearing/feeding. Stickleback may also use habitat near the crossing for spawning. There is no spawning habitat for char and no overwintering habitat in this stream for either species.

TOTE ROAD BG-04

FISH HABITAT POTENTIAL

Species	Spawning	Overwintering	Rearing	Adults Present
ARCH	N	N	Y	N
NNST	P	N	Y	Y

FISHERIES DATA

Location	Species	Survey Date	Temperature (°C)	Distance Fished (m)	Effort (Seconds)	# Fish Captured	# Fish Observed	CPUE (No. Fish/60 Seconds)	Length Range (mm)
Downstream	ARCH	5-Jul-23	4.0	50	167	3	20	8.26	43-112
	NNST					1	0	0.36	120
Upstream	ARCH			50	83	0	0	N/A	-
	NNST					0	0	N/A	-

OTHER NOTES / OBSERVATIONS

A single stickleback and large numbers of juvenile char, including several small (likely 1+) individuals, were captured/observed downstream of the culvert. No fish were observed or captured upstream of the culvert, though there no fish passage issues associated with the crossing were observed at the time of the survey.

TOTE ROAD BG-04

HYDROLOGY CHARACTERISTICS: 5-JUL-23

Wetted/Dry/Shallow (<0.02 m)/Unconnected Pools: Wetted

Stage: High

Site	Channel Width (m)		Water Depth (m)				Water Velocity (m/s)			
	Bankfull	Wetted	25%	50%	75%	Max	25%	50%	75%	Max
100D	29.1	9.7	-	-	-	0.29	-	-	-	0.15
60D	28.5	6.7	-	-	-	0.23	-	-	-	0.71
20D	24.3	19.1	-	-	-	0.46	-	-	-	0.51
0 (Centreline)	UNDER TOTE ROAD									
20U	22.0	9.6	-	-	-	0.36	-	-	-	0.45
60U	13.8	11.7	-	-	-	0.42	-	-	-	0.93
100U	7.6	3.7	-	-	-	0.32	-	-	-	1.37

OTHER NOTES / OBSERVATIONS

Wetted widths ranged between 3.7 and 19.1 m. Only maximum depths were recorded at each transect, which ranged from 0.23 – 0.46 m. Measured maximum velocities at each transect were variable; they tended to be higher in more constricted areas of the stream upstream from the culverts and ranged between 0.15 to 1.37 m/s overall.

TOTE ROAD BG-04

HABITAT CHARACTERISTICS: 5-JUL-23

Wetted/Dry/Shallow (<0.02 m)/Unconnected Pools: Wetted

Stage: High

Site	Stream Morphology Composition (%)							Substrate Composition (%)				
	Riffle	Pool (<0.2 m)	Pool (>0.2 m)	Run	Cascade	Rapids	Flat	Fines	Gravel	Small Cobble	Large Cobble	Boulders
100D	-	5	5	90	-	-	-	60	20	20	-	-
60D	50	10	10	30	-	-	-	40	30	20	10	-
20D	20	30	20	30	-	-	-	50	30	10	10	-
0 (Centreline)	UNDER TOTE ROAD											
20U	10	20	50	20	-	-	-	40	30	20	5	5
60U	40	30	10	20	-	-	-	5	20	40	20	15
100U	60	5	15	20	-	-	-	-	10	20	40	30

OTHER NOTES / OBSERVATIONS

Stream morphology was typically riffle and run between shallow and deep pools. The substrate was primarily composed of fines downstream from the culvert and cobble/boulder upstream.

TOTE ROAD BG-04

5-JUL-23



A



B



C



D



E



F

Photos 1-1. Photos taken 20 m downstream (top) and 60 m downstream (bottom) in spring 2023: (A,D) facing upstream; (B,E) facing downstream; and (C,F) across (left bank looking at right bank).

TOTE ROAD BG-04

5-JUL-23



A



B



C

Photos 1-2. Photos taken 100 m downstream in spring 2023: (A) facing upstream; (B) facing downstream; and (C) across (left bank looking at right bank).

TOTE ROAD BG-04

5-JUL-23



A



B



C



D



E



F

Photos 1-3. Photos taken 20 m upstream (top) and 60 m downstream (bottom) in spring 2023: (A,D) facing upstream; (B,E) facing downstream; and (C,F) across (left bank looking at right bank).

TOTE ROAD BG-04

5-JUL-23



A



B



C

Photos 1-4. Photos taken 100 m upstream in spring 2023: (A) facing upstream; (B) facing downstream; and (C) across (left bank looking at right bank).

TOTE ROAD BG-17

LOCATION AND CROSSING DESCRIPTION

Site ID:	BG-17	Dates Surveyed:	5-Jul-23	Waterbody Type:	Stream
Project Interaction:	Tote Road Culvert	UTM Coordinates:	17W 550703 E 7917643 N		

GENERAL PHYSICAL CHARACTERISTICS

Flow Regime: Seasonal Stream Order: 3+



BAFFINLAND IRON MINES
MARY RIVER PROJECT

 **North/South Consultants Inc.**
Aquatic Environment Specialists

FISH HABITAT:

ARCTIC CHAR - YES

NINESPINE STICKLEBACK - YES

TOTE ROAD BG-17

SITE SUMMARY

The Tote Road crosses a small, unnamed stream at site BG-17 that flows from a small, unnamed lake 920 m to the southeast towards David Lake, 940 m to the northwest of the crossing. The unnamed lake has been surveyed for bathymetry and substrate and has sufficient depth to support overwintering of both species. Although a bathymetric survey has not been undertaken at David Lake, it is a large lake that likely also supports overwintering. Fish accessing the crossing area could originate from either lake.

Detailed habitat data were collected in the crossing area in spring 2023. Wetted widths over the surveyed area ranged between 6.9 and 16.4 m. The stream is relatively deep with measured maximum depths ranging from 0.48 to an estimated 1.50 m. Measured velocities were moderate to high, typically >0.50 m/s and sometimes exceeding 1.00 m/s. Stream morphology was largely run throughout with some riffles downstream. Substrate was composed mainly of fines with some gravel patches.

Both species have consistently been captured in this stream throughout the Tote Road monitoring program and use habitat in the vicinity of the Tote Road crossing at BG-17 for rearing/feeding. Stickleback may also use habitat near the crossing for spawning. There is no spawning habitat for char and no overwintering habitat in this stream for either species.

TOTE ROAD BG-17

FISH HABITAT POTENTIAL

Species	Spawning	Overwintering	Rearing	Adults Present
ARCH	N	N	Y	P
NNST	P	N	Y	Y

FISHERIES DATA

Location	Species	Survey Date	Temperature (°C)	Distance Fished (m)	Effort (Seconds)	# Fish Captured	# Fish Observed	CPUE (No. Fish/60 Seconds)	Length Range (mm)
Downstream	ARCH	5-Jul-23	3.0	50	134	0	0	0.00	-
	NNST					0	0	0.00	-
Upstream	ARCH			50	111	0	0	0.00	-
	NNST					0	0	0.00	-

OTHER NOTES / OBSERVATIONS

No fish were observed or captured in spring 2023; fish may not have moved into the area by the time of the survey due to low water temperatures and/or high flows. Both species have been captured in this stream during previous surveys.

TOTE ROAD BG-17

HYDROLOGY CHARACTERISTICS: 5-JUL-23

Wetted/Dry/Shallow (<0.02 m)/Unconnected Pools: Wetted

Stage: High

Site	Channel Width (m)		Water Depth (m)				Water Velocity (m/s)			
	Bankfull	Wetted	25%	50%	75%	Max	25%	50%	75%	Max
100D	19.9	7.1				0.65				0.40
60D	28.8	16.4				0.48				0.86
20D	14.8	9.6				~1.50				~1.50
0 (Centreline)	UNDER TOTE ROAD									
20U										
60U	15.2	9.6				~1.00				~0.50
100U	12.4	6.9				0.80				~0.50

OTHER NOTES / OBSERVATIONS

Wetted widths over the surveyed area ranged between 6.9 and 16.4 m in spring 2023. The stream is relatively deep with measured maximum depths ranging from 0.48 to an estimated 1.50 m. Measured velocities were moderate to high, typically >0.50 m/s and sometimes exceeding 1.00 m/s.

TOTE ROAD BG-17

HABITAT CHARACTERISTICS: 5-JUL-23

Wetted/Dry/Shallow (<0.02 m)/Unconnected Pools: Wetted Stage: High

Site	Stream Morphology Composition (%)							Substrate Composition (%)				
	Riffle	Pool (<0.2 m)	Pool (>0.2 m)	Run	Cascade	Rapids	Flat	Fines	Gravel	Small Cobble	Large Cobble	Boulders
100D	10	-	-	90	-	-	-	65	30	5	-	-
60D	10	10	10	70	-	-	-	95	5	-	-	-
20D	20	40	10	30	-	-	-	45	30	10	10	5
0 (Centreline)	UNDER TOTE ROAD											
20U												
60U	-	10	20	70	-	-	-	80	-	-	10	10
100U	-	10	20	70	-	-	-	100	-	-	-	-

OTHER NOTES / OBSERVATIONS

Stream morphology was largely run throughout with some riffles downstream. Substrates were mainly fines with some gravel patches.

TOTE ROAD BG-17

5-JUL-23



A



B



C



D



E



F

Photos 1-1. Photos taken 20 m downstream (top) and 60 m downstream (bottom) in spring 2023: (A,D) facing upstream; (B,E) facing downstream; and (C,F) across (right bank looking at left bank).

TOTE ROAD BG-17

5-JUL-23



A



B



C

Photos 1-2. Photos taken 100 m downstream in spring 2023: (A) facing upstream; (B) facing downstream; and (C) across (left bank looking at right bank).

TOTE ROAD BG-17

5-JUL-23

Under Road

A



Under Road

B



Under Road

C



D

E

F

Photos 1-3. Photos taken 20 m upstream (top) and 60 m upstream (bottom) in spring 2023: (A,D) facing upstream; (B,E) facing downstream; and (C,F) across (left bank looking at right bank).

TOTE ROAD BG-17

5-JUL-23



A



B



C

Photos 1-4. Photos taken 100 m upstream in spring 2023: (A) facing upstream; (B) facing downstream; and (C) across (left bank looking at right bank).