



REPORT

Ministry of Transportation and Infrastructure Highway 8 Corridor Re-instatement Water Management Plan



AUGUST 2024

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1 INTRODUCTION

1.1 Background

Highway 8 is a ~69-kilometer two-lane highway that runs between Merritt and Spences Bridge in the BC Interior. Primary uses of Highway 8 are for local resident transportation (mostly Indigenous), agriculture, and the forestry industry. Few improvements have occurred to Highway 8 since its original construction and there are several conditions that would not achieve current day engineering standards including curves, narrow shoulders, uphill slope/rockfall hazards. The Nicola River flows west alongside the extent of Highway 8 towards Spences Bridge.

During November 2021, the Atmospheric River Event had major impacts to Highway 8. Water flows in the Nicola River increased to 750 m³/s, nearly twice the previously recorded flow of record. Damage occurred to 24 sites along Highway 8, with over 7 km of the 2-lane highway completely lost. Temporary repairs were completed by generally reinstating the highway in the original alignment (or close to) and similar elevation with an 8 m gravel travel surface and interim level of hydrotechnical resiliency (riprap). There is a total of 24 sites, separated into five projects (A-F*), that require permanent repair.

The Highway 8 Reinstatement Project (Project) is a permanent repair to restore the safety, reliability, and efficiency of transportation on Highway 8 at 24 sites. The McElhanney Associated Joint Venture (MAJV) has been awarded the opportunity to provide engineering and environmental oversight for the Project. The intent of this document is to communicate Project water demands and mitigation efforts taken by the team to best inform conversations with local groups, Fisheries and Oceans Canada (DFO), and the *Water Sustainability Act* (WSA) and support the Short-Term Use application for the project. The Project Area spans from the confluence of the Nicola and Thompson rivers east ~40 km towards Merritt, BC (Figure 1-1).

* Note that Project B, the Highway 8 August 2022 debris flow sites, was originally included as a project but these sites have since been deemed DFAA eligible and are not being delivered by this team.



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SERVICE LAYER CREDITS: WORLD STREET MAP BACKGROUND (COMMUNITY MAP OF CANADA); ESRI CANADA, ESRI, TOMTOM, GARMIN, SAFEGRAPH, GEOTECHNOLOGIES, INC, METI/NASA, USGS, EPA, USDA, NRCAN, PARKS CANADA
STREETS - COMMUNITY MAP OF CANADA; ESRI CANADA



LEGEND
 Project Area

AE PROJECT NO.	2024-2491
SCALE	1:125,000
COORD. SYSTEM	NAD 1983 UTM ZONE 10N
DATE	2024-08-15
REV	00
DRAWN BY	BDJ/MS
CHECKED BY	SK/BE

FIGURE 1-1: PROJECT LOCATION AND AREA
 MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE
 HIGHWAY 8 RE-INSTATEMENT

1.2 Water Use Plan Overview

This document highlights the following aspects of construction within the Project Area:

- Water usage needs;
- Water sources (proposed);
- Water scarcity;
- Proposed water use reduction efforts; and,
- Risks.

1.3 Work Plan Overview

The Project includes 24 sites, separated into five projects (A-F[†]), that require permanent repair. The scope of the Project works, and project naming convention is provided in Table 1-1. MAJV will be responsible as the owner’s engineer for Project D, E and F sites outlined in Table 1-1.

Instream work will include hydrotechnical resiliency (i.e., erosion protection work, including riprap) and pile driving for bridge abutments. Existing surface water runoff within the Project Area, drains into the Nicola River. During construction there is no plan to divert flow within the Nicola River.

Table 1-1 Scope of Project Works

Project	Sites	Scope of Project Works
Project A [†]	1 – 3	<ul style="list-style-type: none"> • Additional hydrotechnical resiliency
Project A [†]	4 – 5	<ul style="list-style-type: none"> • Additional hydrotechnical resiliency • Reinstatement of road prism, paving, barrier, etc.
Project A [†]	6 – 8	<ul style="list-style-type: none"> • Additional hydrotechnical resiliency • Reinstatement of road prism, paving, barrier, etc.
Project C [†]	9 – 10	<ul style="list-style-type: none"> • Removal and replacement of two temporary-lane bridges • Permanent road construction, largely on a new alignment, including retaining walls and paving • Additional hydrotechnical resiliency • Decommissioning of abandoned Highway 8 alignment
Project D	11	<ul style="list-style-type: none"> • Additional hydrotechnical resiliency • Reinstatement of road prism, paving, barrier, etc.
Project D	12 – 15	<ul style="list-style-type: none"> • Additional hydrotechnical resiliency • Reinstatement of road prism, paving, barrier, etc.

Project	Sites	Scope of Project Works
Project E	16 – 19	<ul style="list-style-type: none"> • Additional hydrotechnical resiliency • Reinstatement of road prism, paving, barrier, etc. • Completion of site 17 rock cut
Project F	20 – 21	<ul style="list-style-type: none"> • Permanent approach works, bridge membrane repairs, and paving • Additional hydrotechnical resiliency
Project F	22	<ul style="list-style-type: none"> • Piling of Curnow Bridge abutments • Permanent approach works and paving • Additional hydrotechnical resiliency

† Note that Project A (Sites 1 - 3, 4 -5, and 6-8) designs were advanced before the MAJV team was procured through a separate engineering and environmental team.

* Note that Project B, the Highway 8 August 2022 debris flow sites, was originally included as a project but these sites have since been deemed DFAA ineligible and are not being delivered by this team.

‡ Note that Sites 9 and 10 are being managed directly by the Alliance Team. The volume of water is estimated for the purpose of this Water Management Plan and short-term use application.

1.4 Water Related Permits Overview

The Project will require the following permits:

- Short Term Use Approval under Section 10 of the *Water Sustainability Act* (SBC 2014, c.15) for water use during construction; and,
- Notification or Change Approval under Section 11 of the *Water Sustainability Act* for in-stream works.

2 WATER USAGE REQUIREMENTS

Throughout the Project duration, early 2024 to 2027, approximately 21,039,375 L of water will be utilized. This total includes a 25% contingency to account for any variance.

Most of the water will be used for construction works (i.e., dust suppression); however, a small amount may be utilized for the following purposes:

- Crew hygiene (handwashing and other sanitary purposes);
- Moisture supplement during backfill activities;
- Preventative fire suppression measures;
- Concrete curing;
- Silica exposure controls; and
- Lunch and office trailer facilities (self-contained washroom & kitchen units).

Table 2-1 outlines the application rates, water volumes required per site and proposed water usage dates for the extent of the Project. Water volumes were calculated per site based on the following parameters and assumptions:

- Site surface area (m²);

- Application rate (L/m²) – assumed to be 2 L/m²;
- Application frequency and period – assumed water application would be required every 2 hours over a 10-hour day;
- Number of days – assumed dust suppression will be required for a three-week period before paving begins.

Section 10 applications are valid for 24-months; therefore, the Short Term Use application will be updated and amended for any specific projects extending past the 24-month term outlined in the approval.

Table 2-1 Water Usage Per Site and Timing

Project	Site #	Area (m ²)	App.* Rate (L/m ²)	App. Every (hr)	App. Period (hr/day)	# of Days	Proposed Dates	Year	Water Volume (L)
A	4	6,000	2.0	2	10	21	Aug 15 – Nov 01	2024	1,260,000
A	5	1,450	2.0	2	10	21	Aug 15 – Nov 01	2024	304,500
A	6	2,250	2.0	2	10	21	Aug 15 – Nov 01	2024	472,500
A	7	0	2.0	2	10	21	Aug 15 – Nov 01	2024	0
A	8	6,250	2.0	2	10	21	Aug 15 – Nov 01	2024	1,312,500
C	9	4,750	2.0	2	10	21	July 01 – Feb 28	2025 – 2027	997,500
C	10	19,950	2.0	2	10	21	July 01 – Feb 28	2025 – 2027	294,000
D	11	5,350	2.0	2	10	21	Sept 01 – Dec 15	2024	1,123,500
D	12	1,400	2.0	2	10	21	July 01 – Nov 01	2025	4,189,500
D	13	5,650	2.0	2	10	21	July 01 – Nov 01	2025	1,186,500
D	14	3,900	2.0	2	10	21	July 01 – Nov 01	2025	819,000
D	15	3,700	2.0	2	10	21	July 01 – Nov 01	2025	777,000

Project	Site #	Area (m ²)	App.* Rate (L/m ²)	App. Every (hr)	App. Period (hr/day)	# of Days	Proposed Dates	Year	Water Volume (L)
E	16	3,700	2.0	2	10	21	Nov 01 – Nov 01	2025 – 2026	777,000
E	17	3,700	2.0	2	10	21	Nov 01 – Nov 01	2025 – 2026	777,000
E	18	6,750	2.0	2	10	21	Nov 01 – Nov 01	2025 – 2026	1,417,500
E	19	3,900	2.0	2	10	21	Nov 01 – Nov 01	2025 – 2026	819,000
F	20	250	2.0	2	10	21	May 15 – Sept 15	2025	52,500
F	21	1,000	2.0	2	10	21	May 15 – Sept 15	2025	210,000
F	22	200	2.0	2	10	21	Jan 01 – Apr 30	2025	42,000
Sub-total									16,831,500
Contingency									25%
Total Water Required									21,039,375

* App. = Application.

3 WATER SOURCES

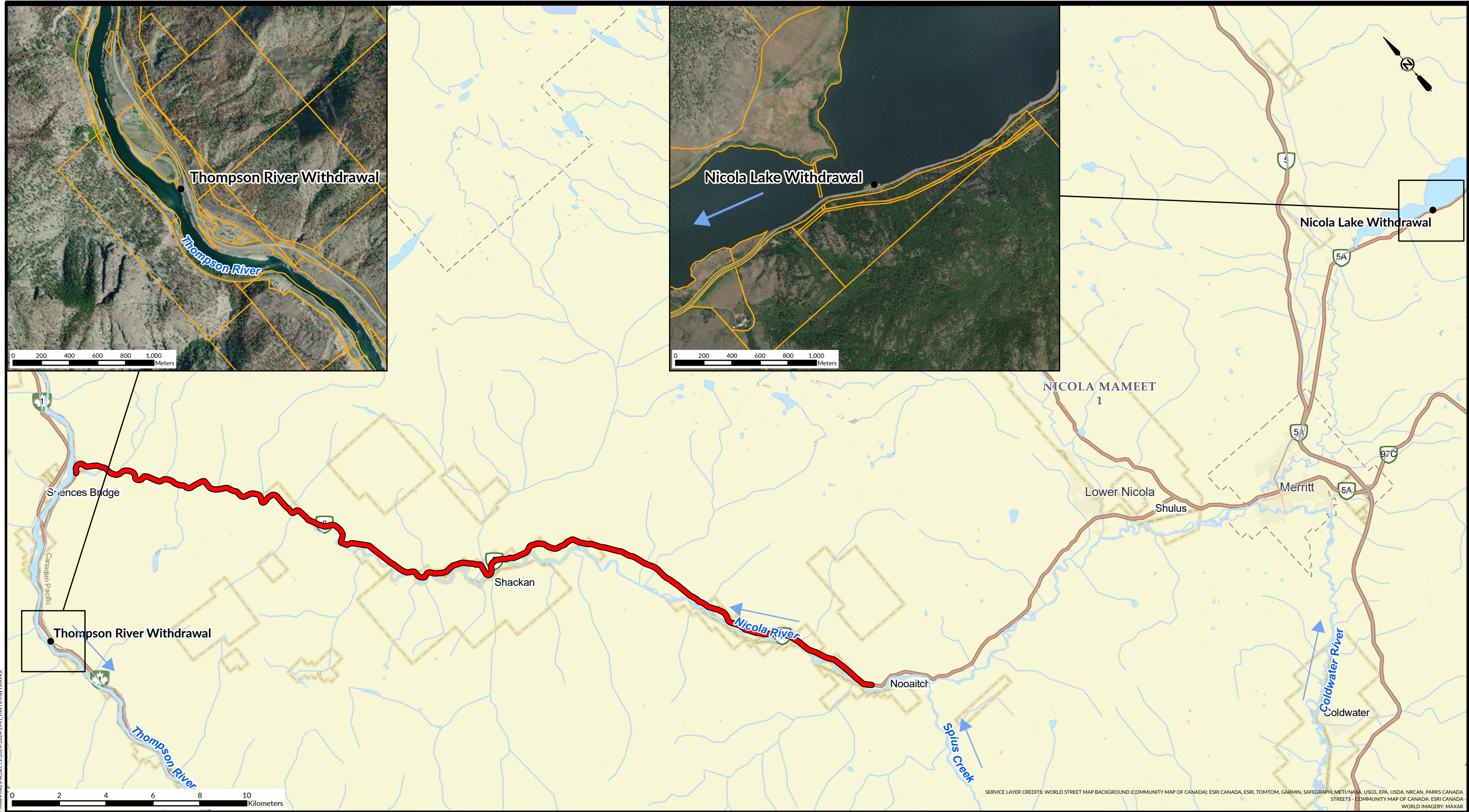
The Project plans to draw water for construction use only from multiple sources. Note, any water drawn from a surface or groundwater source should be non-potable. Water withdrawal rate from any surface or groundwater source shall be limited to no more than allowed within the federal, provincial or municipal water withdrawal permit(s).

The determination of precise locations for water withdrawal or disposal may change as construction proceeds and may be influenced by environmental factors occurring at the time of construction. For example, water levels in significant watercourses may vary from year to year, depending on spring runoff or seasonal precipitation. Further, locations proposed are based upon desktop studies and must be confirmed by visual inspection before a final decision concerning their use. Therefore, exact locations may be subject to change.

3.1 Primary Source of Water

Community members expressed concerns about drought and water withdrawal from the Nicola River throughout Phase 1 (emergency works) and the planning of Phase 2. In response to these concerns, the BC Ministry of Transportation and Infrastructure (MOTI) is not proposing any water withdrawal from the Nicola River, and instead has proposed sources at the Thompson River and Nicola Lake. These sources will be the primary draw location due to

proximity to the Project Area. The Thomson River is adjacent to the Project Area, while Nicola Lake is located approximately 35 km southeast. Should there be restrictions in place, MAJV will stop withdrawing water from these sources and will withdraw water from other locations (See Section 3.2). Table 3-1 outlines the proposed withdrawal locations (Figure 3-1).



- LEGEND**
- █ Project Area
 - Parcel Boundaries
 - ➔ Flow Direction

AE PROJECT NO.	2024-2491
SCALE	1:150,000
COORD. SYSTEM	NAD 1983 UTM ZONE 10N
DATE	2024-08-15
REV	00
DRAWN BY	BDJ/MS
CHECKED BY	SK/BE

FIGURE 3-1: PROPOSED PRIMARY WITHDRAWAL LOCATIONS

MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE

HIGHWAY 8 RE-INSTATEMENT

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SERVICE LAYER CREDITS: WORLD STREET MAP BACKGROUND (COMMUNITY MAP OF CANADA); ESRI CANADA, ESRI, TOMTOM, GARMIN, SAFEGRAPH, METI/NASA, USGS, EPA, USDA, NRCAN, PARKS CANADA STREETS - COMMUNITY MAP OF CANADA; ESRI CANADA WORLD IMAGERY: MAXAR

Table 3-1 Proposed Primary Withdrawal Locations

Waterbody	Zone	Easting	Northing	Description
Nicola Lake	10	670829	5558394	Existing boat launch and rest area on the southern shore of Nicola Lake.
Thompson River	10	618359	5586837	Gravel pull-out adjacent to Hwy 8 and the Thompson River, near the entrance to a recreational camping area.

3.2 Alternative Source of Water

Understanding that there may be withdrawal restrictions on the Thompson River and/or Nicola Lake, Nicola River will be the proposed alternative source. The Nicola River is adjacent to the Project Area; however, it is not proposed as the primary source due to environmental flow needs and water scarcity concerns. Prior to obtaining water from this source, MAJV will consult with the respective authorities, review specifications, and acquire permits, as necessary.

3.3 Equipment

A water truck, equipped with a large storage tank, hose and pump system will be utilized to withdraw and transport water to sites. It will be up to the Contractor(s) to determine the exact specifications of this system. However, they will be informed that adherence to Fisheries and Oceans Canada’s interim code of practice for end of pipe fish protection screens² is mandatory.

4 WATER SCARCITY CONCERNS

4.1 Rising Temperatures of Water

There is a concern that construction activities may impact temperatures of nearby waterbodies. Smaller volumes of water are more sensitive to these changes. As MAJV adheres to rules and restrictions imposed by water governing agencies, therefore reducing impacts to nearby waterbodies in this manner.

MAJV understands that environmental monitoring and reporting is essential for understanding, recording, and anticipating construction impacts to water quality and evaluating the effectiveness of mitigation measures. Water temperature measurements will be taken regularly as part of the systematic monitoring program, compared to background temperature measurements, and reported bi-weekly in the environmental monitoring reports.

4.2 Operating During Drought

Drought is a serious consideration throughout the corridor. It is understood that there is a high likelihood for water restrictions between July to September of each construction year. Aside from implementing methods to reduce water use onsite, MAJV and the Contractor(s) will work with water governing agencies to source construction water to

² Department of Fisheries and Oceans Canada. 2020. Interim code of practice: End-of-pipe fish protection screens for small water intakes in freshwater. Available at: [Interim code of practice: End-of-pipe fish protection screens for small water intakes in freshwater \(dfo-mpo.gc.ca\)](https://www2.gov.gc.ca/interim-code-of-practice-end-of-pipe-fish-protection-screens-for-small-water-intakes-in-freshwater)

ensure that nearby communities, existing water license holders, and environmental flow needs are not impacted by construction water use.

Water use reduction methods will be implemented from mobilization day continuously to the end of the Project. Refer to Section 5 for details on planned water use reduction methods (Table 5-1).

4.3 Impact to Fish

Multiple concerns have been raised in relation to fish habitat. These concerns include, but are not limited to, the following:

- Impacts to salmonid populations (spawning, reduced flows, and increased water temperatures);
- Side channel fish habitat access during drought;
- Salmon migration outside the current known spawning periods;
- Fish impingement in pump inlets; and,
- Leaks from malfunctioning pumps.

Most construction activity will be outside of the stream and therefore will not impact fish habitat. Supporting activity such as withdrawing water from the Thompson River and Nicola Lake will be completed in compliance with regulations and permits. Implementing fish screens at intake locations, ceasing water withdrawal during restriction periods, and other procedures will ensure no impacts to fish or fish habitat occur.

The Thompson River and Nicola Lake will act as the Project's primary sources of non-potable water during construction, as discussed in Section 3.1. As shown in Section 5, fish screens will be in place for water withdrawal purposes. Monitoring will be in place during works within the wetted portion of the Nicola River to ensure that the construction activities are not adversely affecting water quality.

4.4 Access Management

MAJV understands that access to fishing activities is critical to local communities. Through early consultation with stakeholders, MAJV has identified where some of these historic fishing sites are located. Fishing access within the Project boundaries will be maintained, where safe to do so.

4.5 Turbidity

Turbidity is a key metric that demonstrates effectiveness of sediment and erosion control measures during construction. Turbidity changes happen naturally from various factors. To mitigate the impacts of sediment in waterbodies, refer to Appendix H – Erosion and Sediment Control and Surface Water Quality Plan in the corridor-wide EMP.³ The plan outlines mitigation measures to avoid or reduce impacts to water quality and monitoring and reporting requirements.

Regular water monitoring will be conducted by the Contractor(s) Environmental Monitors during water use and application for construction to measure and compare nephelometric turbidity levels (NTU) upstream and downstream of the Project Area during application and after heavy rain events (i.e., precipitation in excess of 25 mm in a 24-hour

³ Associated Environmental Consultants Inc. 2024. Highway 8 Corridor Re-instatement – Environmental Management Plan. Prepared for the Ministry of Transportation and Infrastructure.

period as measured at the nearest climate station with hourly/daily data reporting), during work in or adjacent to watercourses or when necessary. Measured parameters may include dissolved oxygen, pH, conductivity, temperature, and turbidity.

The criteria identified in the British Columbia Approved Water Quality Guidelines⁴ will be used to interpret the results of all water quality samples. Surface water entering watercourses from Project work sites will meet the following criteria for maximum induced turbidity:

- Change from background of 8 NTU at any one time for a duration of 24 hours in all waters during clear flows or in clear waters;
- Change from background of 2 NTU at any one time for a duration of 30 days in all waters during clear flows of in clear waters;
- Change from background of 5 NTU at any time when background is 8-50 NTU during high flows or in turbid waters; and,
- Change from background of 10% when background is >50 NTU at any time during high flows or in turbid waters.

5 WATER USE REDUCTIONS AND RISK

The Contractor(s) will approach water use cautiously. MAJV has proposed/considered various methods to reduce effective construction water demands. As per the Section 10 approval, the Contractor(s) will adhere to the authorized water quantity and purpose for the prescribed work related to the construction and maintenance of the Project. The Contractor(s) will not divert or consume water beyond the specified limit or for any other activity not covered by the approval. Furthermore, the Contractor(s) will record and monitor water use to ensure compliance with approved water volumes. MAJV has also assessed risks in relation to reduced water use methods, summarized in Table 5-1.

Table 5-1 Risks Related to Reduced Water Use Methods

Item No.	Proposal	Accepted / Rejected by MOTI	Requirements / Considerations	Risk
1	Utilize magnesium chloride/calcium chloride for dirt & gravel dust suppression	rejected (Nicola River)	Require review of environmental impact due to proximity to Nicola River	Increased cost and insufficient dirt & gravel dust suppression. Not acceptable product in our granular structure for drainage
2	Utilize curing compound for concrete curing	rejected	Require engineering approval. Require environmental impact review	Concrete cracking, chemical seepage to surrounding area

⁴ British Columbia Ministry of Environment and Climate Change Strategy (MOE). 2023. British Columbia approved water quality guidelines: Aquatic life, wildlife & agriculture - Guideline Summary. Water Quality Guideline Series, WQG-20. Prov. B.C., Victoria B.C. Available at: <https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-quality/water-quality-guidelines/approved-water-quality-guidelines?keyword=water&keyword=quality&keyword=guidelines>

Item No.	Proposal	Accepted / Rejected by MOTI	Requirements / Considerations	Risk
	Reduce time between sub-base surface placement and paving	accepted	Project and timeline constraints. Requires engineering approval.	None
3	Utilize a recirculation system that minimizes freshwater draw for concrete curing	accepted	Increased labour and equipment cost due to extensive setup effort	High water evaporation may cause system to be ineffective. Minimize this risk by utilizing UltraCure
4	Utilize self-closing and high efficiency taps (push-down taps)	accepted, if available	Cost to replace existing infrastructure within office trailers	None
5	Draw water from multiple sources	accepted	Increased set up cost due to need for multiple draw points	Area wide ban, unable to draw water during summer months, when construction water needs is at its peak
6	Installing Screen & Mesh at pump inlet	accepted	Compliance with DFO's interim code of practice ⁵	None
7	If using 3 rd party water supply, request water source documentation	accepted	Ensure that 3 rd party water supplier have a sustainable water source	3 rd party vendor unable to provide documentation resulting in search of a new vendor
8	Waterless urinals	accepted, if available	Cost to replace existing infrastructure within office trailers (likely portable toilets)	None
9	Use high-pressure hoses for equipment cleaning	accepted	Cost of high-pressure hose system	None
10	The lay-down of milled asphalt for dust suppression on gravel roads that may be temporary	rejected	Gravel roads will use water for dust suppression. Very little milled asphalt material available onsite	N/A
11	Use of alcohol for hand washing, pump toilet facilities	accepted	New regulation for worker sanitation	N/A

⁵ Department of Fisheries and Oceans Canada (DFO). 2020. Interim code of practice: End-of-pipe fish protection screens for small water intakes in freshwater. Available at: [Interim code of practice: End-of-pipe fish protection screens for small water intakes in freshwater \(dfo-mpo.gc.ca\)](https://www.dfo-mpo.gc.ca/fisheries/fish-protection/interim-code-practice-end-of-pipe-fish-protection-screens-for-small-water-intakes-in-freshwater)

Item No.	Proposal	Accepted / Rejected by MOTI	Requirements / Considerations	Risk
12	Implementation of best available technique for water withdrawal to reduce water-waste	accepted	Ensure pumps and hoses used are leak free. Use of flotation shut offs to only draw necessary water	Normal wear and tear on equipment. Replace or repair equipment as needed

6 CONCLUSION

This Water Management Plan has been drafted by MAJV on behalf of BC Ministry of Transportation and Infrastructure for proposed works on Highway 8 and serves to inform the contractor(s) and agency staff on applicable use, projected water volume requirements, and mitigation measures, and has been developed to supplement the Short-Term Use application under Section 10 of the *Water Sustainability Act*. The water volume requirements have been estimated based on construction activity needs for each project and a contingency has been added, if needed.