		Highway 91/17 Upgrade Project	
Submittal No.	PGC-SUB-002522.01	Document No.	H9117-EV-RPT-0019
Title	Environmental Completion Report	Revision:	2
Date Submitted to MoTI		June 1, 2023	
Prepared by:	Harnoor Gill, MESL		

REVISION LOG

Version #	Date	Revised By	Approved By	Revised Section
0	05 May 2023	Joey Chiasson, AScT	Patty Burt, RP Bio, AQP	
1	12 May 2023	Jenna Tracey, RP Bio	Patty Burt, RP Bio, AQP	<p>Executive Summary: Revisions to the archaeology paragraphs.</p> <p>Section 4.2: Confirmation of notification to regulators.</p> <p>Section 4.4: Reporting commitments added.</p> <p>Section 5: Reworded under salvage permits.</p> <p>Section 7: Revisions to the archaeology data.</p>
2	31 May 2023	Jenna Tracey, RP Bio		<p>Executive Summary: Updated</p> <p>Section 3: Added new subsection 3.2 to address EWPs</p> <p>Section 3.3: Added permit details (WSA, HCA, AIP)</p> <p>Section 3.4: added regulatory reporting details</p> <p>Section 3.5: Added OEEA Project design refinements</p> <p>Section 4.2: Provided additional incident details</p> <p>Section 4.3: Provided additional NCR details</p> <p>Section 4.4: Added AIP reporting commitments</p> <p>Section 8: Updated</p>

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EXECUTIVE SUMMARY

The Highway 91/17 Upgrade Project is located adjacent to the south shore of the Fraser River and the northern boundary of the Burns Bog Ecological Conservancy Area (BBECA) and the Delta Nature Reserve (DNR) and is part of the wider Highway 91/17 and Deltaport Way Upgrades. The project goal was to improve travel safety and efficiency on Highway 91, Highway 17, and the Highway 91 Connector, and reduce conflicts between local traffic, commercial vehicles, and other travelers. The Project was designed to complement the 72nd Avenue Interchange Project and the Alex Fraser Bridge Improvements Project.

A Construction Environmental Management Plan (CEMP Rev 3 accepted and revised to Rev 9 during Project Construction) was prepared to guide project design and construction, based on the Design Build Standard Specification 165 Protection of the Environmental and Industry Best Management Practices to ensure the Project meets all environmental obligations and requirements. Activities undertaken to support CEMP implementation included development, revisions and implementation of 14 CEMP Sub-Plans, obtaining required permits, wildlife salvages, vegetation surveys, environmental monitoring and reporting, and design refinements to reduce environmental effects. The project's estimated environmental effects had been reduced by approximately 40% through design refinements.

Monthly environmental progress reports were prepared and forwarded to the BC Ministry of Transportation and Infrastructure (MoTI), the Ministry of Forests (MoF formally the Ministry of Forests, Lands, Natural Resources Operations and Development), and Fisheries and Oceans Canada (DFO). All approvals for work were obtained prior to the start of the Project works, including BC *Water Sustainability Act* (WSA) Approvals and Notifications, DFO Requests for Review and Letters of Advice, provincial and Indigenous Groups heritage investigation and alteration permits, BC Ministry of Environment and Climate Change Strategy (ENV) Approval in Principle for management of known contaminated soils, and provincial and federal wildlife and fish salvage and inventory permits.

As a condition of WSA Approvals, the Project was required to identify offsets for Project-related permanent impacts to instream, riparian and wetland habitat. To meet offsetting requirements, PGC prepared an Environmental Enhancement Mitigation Plan (EEMP), which was shared with MoTI, applicable environmental agencies, and Indigenous Groups for review and comment. The EEMP was accepted by MoF, and an amended WSA Approval was issued to include habitat offsetting and environmental enhancement commitments and monitoring requirements.

Construction activities were completed in accordance with site- and task-specific PGC Environmental Work Plans (EWPs), subject to review and approval by MoTI. A total of 58 EWPs were generated for the Project to provide specific guidance for environmentally-sensitive tasks and implementation of CEMP mitigation and management measures.

In 2020, most of the clearing, grubbing, topsoil stripping, and preload sand placement were completed in Sections 1, 3, and 4 of the Project. In 2021, preload and surcharge placement were completed, and large portions of the project were in the settling phase, with preload and surcharge removals and gravel placement ongoing. Additionally, all detours had been completed, most permanent stormwater installations were installed, and preparation work for pavement placement, electrical services barriers, and line painting of new alignments had been done. The S1 bridge was completed, and landscaping had commenced in various areas of the project. In 2022, preload and surcharge removal commenced in Sections 2, 3 and 4.

Gravel and asphalt placement followed, along with bridge construction, landscaping, environmental enhancement area construction, and drainage and erosion control works. In Section 2, excavation and relocation of contaminated material within the Sunbury Mounds area was initiated and completed, followed by construction of the new interchange in this location. All new bridges were completed and tied-in to roadworks, including new asphalt placement, barrier placement, line painting and sign installation. Topsoiling, planting, and landscaping were completed in all sections.

Daily monitoring and weekly environmental reporting documented environmental meetings and communications, activity monitoring, issues and deficiencies that occurred during the construction. Monthly environmental progress reports were prepared and issued to MoTI, DFO and MoF throughout the reporting period, covering construction activities, upcoming works, environmental issues and deficiencies, and communications and meetings. For the entirety of the project and its activities, there were 107 environmental spills recorded and a total of 176 environmental issues recorded throughout the project.

Known contaminated soils in targeted areas of Section 1 and Section 2 of the Project Footprint have been managed in accordance with the ENV Approval in Principle (AIP) Site 14000, issued in 2021. All other areas involving management of contaminated media outside of the AIP areas have been managed under the Independent Remediation regulatory process. Both the AIP and independent remediation processes in addition to the CEMP, also followed guidance from the Remediation Plans prepared by Brybil and Core6 for Sections 1 and 2, and MESL for Sections 3 and 4.

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The Highway 91/17 Upgrade Project was completed in accordance with all Design-Build Agreement contractual conditions, permit requirements and obligations, and applicable Design Build Standard Specifications and Best Management Practices for the protection of the environment.

1.0 INTRODUCTION

The Highway 91/17 Upgrade Project (the Project) is a combination of roadway improvements to increase the safety, reliability, and efficiency of the transportation of goods and commercial traffic through Delta, BC. The upgrades were delivered through the BC Ministry of Transportation and Infrastructure (MoTI). The Project is located adjacent to the south shore of the Fraser River and the northern boundary of the Burns Bog Ecological Conservancy Area (BBECA) and the Delta Nature Reserve (DNR).

In order to protect important environmental features in the project area, construction of the project was guided by the accepted Construction Environmental Management Plan (CEMP) which included measures to avoid or address potential project-related effects and ensure compliance with the 2018 Design Build Standard Specifications for Highway Construction (DBSS) Section 165 Protection of the Environment, project-related permits and approvals.

This Completion Report summarizes the implementation of environmental requirements associated with the CEMP and includes: construction activities completed, an overview of delivery of key elements of Pacific Gateway Constructors (PGC) environmental management approach, environmental issues identified, and mitigation measures, outstanding environmental works and commitments, pre-construction preparation (permitting, rare and invasive plant surveys, bird nesting surveys, fish and wildlife salvages), contaminated sites management, and archaeology and heritage resources.

2.0 WORKS COMPLETED TO DATE

All construction activities for the project started on April 30, 2020 and the project reached substantial completion on November 30, 2022.

The project has been subdivided into Sections 1 to 4, as illustrated in *Figure 1* and construction works have been summarized below by these sections.

2.1 SUMMARY OF CONSTRUCTION ACTIVITIES

Section 1 – River Road Interchange

In 2020, Section 1 of the construction project saw clearing and grubbing, topsoil stripping, and the placement of preload sand. A detour was completed for the underpass construction and culvert installations occurred for River Road ditch. In 2021, the remaining construction stages were completed, with the preload for Culvert 105 and River Road/Frontage Road tie-in already finished. The S1 Bridge and tie-in roadworks were completed in September 2021, followed by topsoiling, landscaping, and ditching. The full interchange opened in December 2021. By the end of 2022, all site deficiencies were resolved, slopes were topsoiled and hydroseeded, and minor deficiency works were completed on the Section 1 bridge.

Section 2 – Sunbury Interchange

During 2020, topsoil stripping was completed. Widening of Highway 17 at the western extent of the Project had occurred as well as the culvert extension on 96th Street ditch downstream of the highway and stormwater outfall and drainage south of the highway. During 2021, stone column installations were

completed at the S2 bridge locations, and preparations were made for contaminated site excavations in 2022. In 2022, preload settlement was completed, and road works, drainage, and landscaping were completed on all alignments, including environmental enhancements areas. The contaminated materials were excavated and relocated, and bridge construction was completed by June 2022.

Section 3 – Weigh Scale Access Interchange

In 2020, clearing and topsoil stripping was completed in Section 3, Burns Bog was isolated and filled with preload. The construction of Weigh Scale Road had not begun. In 2021, the construction of Weigh Scale Road had begun, construction of the embankment and preload in Section 3 was partially complete, and detours had been activated with preload. In 2022, preload settlement was completed, and road works including drainage, asphalt placement, curbs, signage, and barrier placement was completed by November 2022. The lightweight concrete fill was placed over the Fortis Gas Mains, the Section 3 bridge and tie-in roadworks were completed, and landscaping and environmental enhancement was finished by the end of November 2022.

Section 4 – Nordel Interchange

In Section 4, the majority of clearing and topsoil stripping was finished in 2020, and isolation and wildlife salvage measures were undertaken prior to the start of construction. Preload placement, culvert installation, and permanent drainage installations were completed in most areas. Widening of the onramp heading south onto Highway 91 and preload placement near DNR was also completed. In 2021, all preload had been placed, stone column activities were finished and the storm drainage system around the truck parking lot was started. Lock block walls 406 and 407 were built on either side of Highway 91. L2200 had been completed. By June 2022, preload settlement was completed and preload was removed on alignment L500, L600, L2100, L2200, L2300, L2400, and L2500. All detours were removed and road works, including drainage, asphalt placement, curbs, signage, and barrier placement continued on all alignments, and were completed by the end of November 2022. The bridge and tie-in roadworks were finished at the end of September 2022. Landscaping and environmental enhancement areas were topsoiled, seeded and planted, and all drainage were completed to final alignments by the end of November 2022.

Project Overview

In November 2022, the project reached substantial completion, with minor additional works including paving, signage, landscaping, and line painting completed in early 2023. Environmental enhancement areas in accordance with the approved EEMP were completed, and habitat monitoring scope has been developed in accordance with the EEMP requirements, with the first report submission to regulator expected in December 2023.

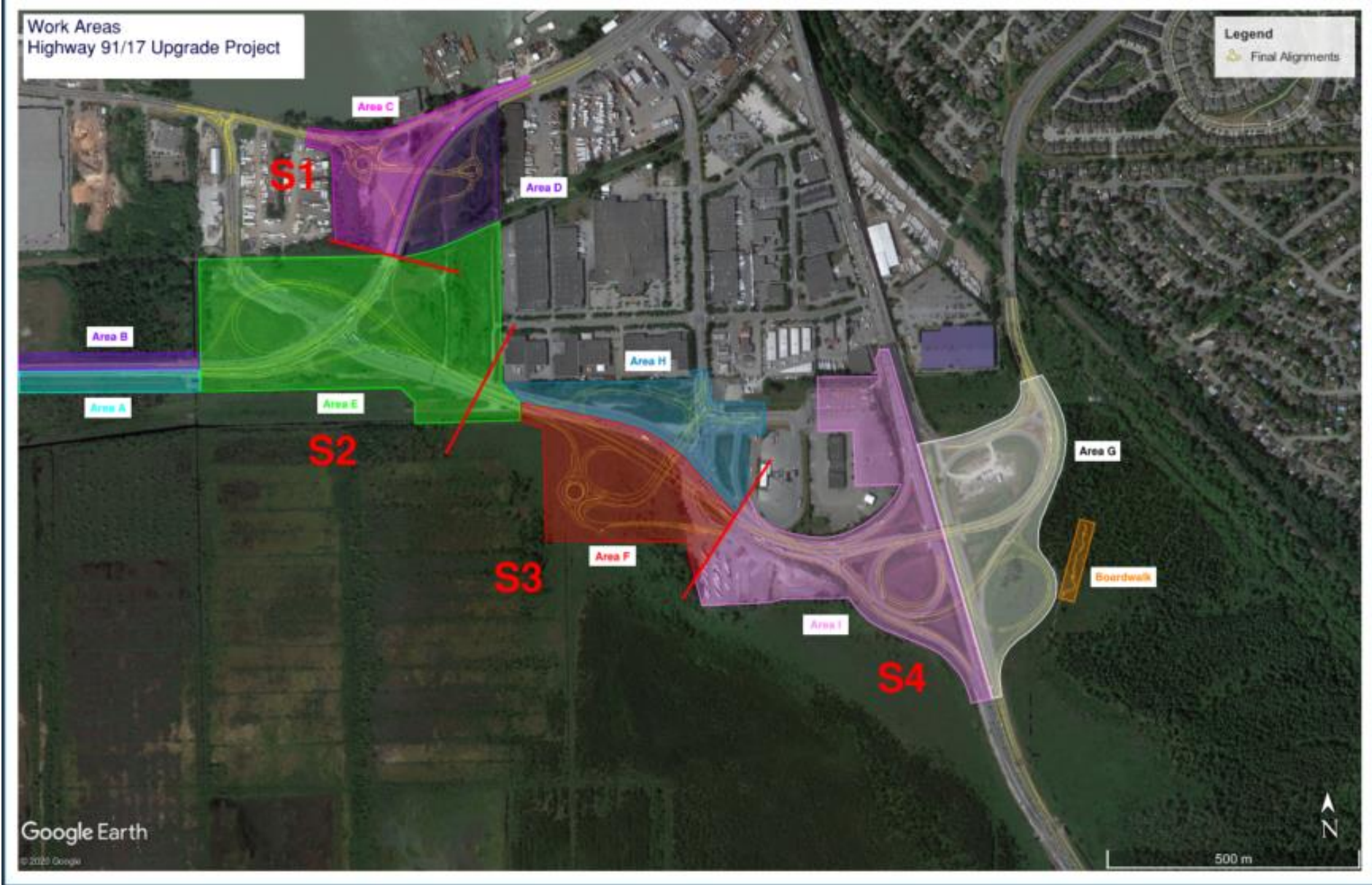


Figure 1: Approximate Work Area Locations

3.0 ENVIRONMENTAL MANAGEMENT APPROACH

Project design and construction was advanced following environmental requirements associated with the Design Build Agreement as well as the terms and conditions of environmental approvals including those associated with the South Fraser Perimeter Road (SFPR) Project Environmental Assessment Certificate (EAC) Table of Commitments and Assurances, as presented in *Appendix 1*. This section provides a summary of the Project environmental management program and CEMP development and revisions, permitting requirements, and monitoring and reporting activities.

3.1 CEMP DEVELOPMENT AND UPDATES

The CEMP prepared by PGC followed the guidance in Schedule 6 of the Overview Environmental Effects Assessment (OEEA [Hatfield 2019]) and the Design-Builder’s Environmental Obligations (Schedule 6 of the Design-Build Agreement [DBA]) (*Appendix 1*) for the Project; as well as the requirements of the Environmental Assessment Application, and the EAC for the SFPR (part of which overlaps with the Project).

The CEMP was a working document that addresses general mitigation measures for construction of the Project and included 14 Environmental Work Plans (EWPs) that were completed by PGC team. The CEMP was finalized 04 May 2020 (Rev 3) prior to the start of construction, being reviewed internally and by MoTI with edits incorporated that addressed comments, additions and requests including comments provided through review by Indigenous Groups. As the CEMP was a working document, changes were required in the construction phase to address site specific conditions, modifications to environmental management approach, and provide clarification on mitigation and management measures, in addition to required annual reviews of the document. These changes included revisions to the Hydrology work plan and Contaminated Sites Management Plan figures (*Appendix D* of the CEMP), changes to the idling policy (*Appendix K* of the CEMP), removal of the requirement for dust canisters (*Appendix B* of the CEMP), and changes to the Spill Management and Emergency Response Plan (*Appendix L* of the CEMP). The changes for Rev 6 in 2021 included revisions to *Appendix D* Section 5.3.3 and *Appendix L* Section 5.1. Changes to Rev 7 in 2022 had been updated to reflect the changes in the PGCs Contact List, Table 5.1 and addressed in *Appendix D, E, G, H, K, M* and *N*. Changes for Rev 8 in 2022 included revisions to CEMP *Appendix L*, Section 5 and CEMP *Appendix M*, Sections 5.2, 5.4 and 5.4.1. The final changes for Rev 9 in March 2023 reflected that the project had moved to a dormant phase with additional changes to EWP *Appendix G*.

Implementation of the CEMP was supported by the development of 14 EWPs as summarized in *Table 1*.

Table 1. Summary of CEMP Environmental Work Plans

Sub-Plan	Plan Summary
Appendix A: Agriculture Mitigation Plan (AMP)	The AMP describes the BMPs and mitigation measures that will be implemented to avoid, minimize or reduce impacts on agricultural land and agricultural operations, requirements for monitoring/reporting, and Environmental Management Team (EMT) members responsible for implementation of the AMP. It describes how the PGC will comply with the conditions of the Agricultural Land Commission approval. Mitigation measures are focussed primarily on minimizing disruption to farm activities, minimizing impacts on livestock and lands used during construction, and ensuring that existing topsoil is retained and reused. Monitoring will be undertaken by a Professional Agrologist from the Province.

Sub-Plan	Plan Summary
<p>Appendix B: Air Quality and Dust Control Plan (AQDCP)</p>	<p>The AQDCP describes the BMPs and mitigation measures to be used to control dust and other emissions during construction, monitoring/reporting requirements, and EMT members responsible for its implementation. Special attention is paid to air quality management for Burns Bog. Air quality monitoring will include fugitive dusts, ambient particulate matter, and ambient air quality. Mitigation measures associated with the AQDCP focuses on dust control and minimizing potential impacts from gaseous emissions. Dust control for roads and the worksite is to be achieved through speed limits, street sweeping, and non-toxic dust suppressants (i.e., water). Gaseous emissions mitigation involves idle reduction strategies, use of catalyzed diesel particulate filters, and low-sulphur fuels. Monitoring will be achieved through visual observation and physical measurements of particulate matter.</p>
<p>Appendix C: Archaeological Chance Find Management Procedure (CFMP)</p>	<p>The CFMP describes the previous archaeological investigations undertaken in the Project area, the types of archaeological and traditional use sites that could be encountered, procedures to be followed should previously unidentified archaeological or heritage resources be encountered, and who to contact in that event. Chance finds of new archaeological sites or human remains are dealt with by avoidance, salvage, or, in some cases, site protection. Monitoring for this sub-plan primarily entails visual observation.</p>
<p>Appendix D: Construction and Hazardous Waste Management Plan (CHWMP)</p>	<p>The CHWMP ensures that construction-related waste management (i.e., construction and/or hazardous waste) is undertaken in a way that avoids potential effects on human health and the environment and is compliant with environmental regulations. It describes procedures and BMPs to manage construction material, waste materials, sediment and soil, or other hazardous substances, measures to be implemented for managing material that may attract wildlife, appropriate disposal of materials including, and the requirement to reuse materials wherever possible. Elements of the CHWMP are closely linked to the Spill Management and Emergency Response Plan (SMERP) and the Contaminated Sites Management Plan (CSMP). Mitigation measures associated with the CHWMP primarily deal with reducing and recycling of waste generated on site, with special provisions for organic and hazardous waste.</p>
<p>Appendix E: Contaminated Sites Management Plan (CSMP)</p>	<p>The CSMP identifies areas of potential contamination to ensure the health and safety of Project workers, protection of the environment, and that contaminated sites are managed in compliance with the Contaminated Sites Regulation (CSR). The CSMP provides approaches to manage contaminated and/or potentially contaminated material (such as beneficial reusing material through Protocol 13 Screening Level Risk Assessment procedures, containing and capping the material onsite through the Environmental Waste Discharge Authorization process [e.g., permits, approvals, operational certificates, and abandonment permits] and/or disposing contaminated material offsite to a designated licenced facility and/or through soil relocation agreement permitting processes), outlines mitigation measures to avoid potential site contamination issues, provides guidance and procedures for response to accidental releases of contamination, and lists best management and monitoring practices for the movement of fill material. The plan also describes the contractor's approach to characterize soils to be excavated and identifies constraints on re-using or re-locating excavated material. The plan also outlines the requirements for groundwater management (i.e., testing, permitting, dewatering, treatment, and discharging) if groundwater is encountered during construction activities. The EMT will be responsible for the implementation of the CSMP.</p>
<p>Appendix F: Contractor Awareness and Education Plan (CAEP)</p>	<p>The CAEP describes the environmental training, education and awareness programs that will be provided to the Project personnel, including senior design and construction personnel, the construction safety manager, and workers on the Project area. It provides a structured system for the dissemination of information to PGCs, sub-PGCs, and MoTI personnel who may not be familiar with the Project's environmental values/issues, and the contents of this EMP. This includes a training program designed</p>

Sub-Plan	Plan Summary
	to ensure proper awareness and education in relation to the various CEMP sub-plans. Monitoring the CAEP will involve ongoing assessments of training effectiveness, with a view toward adaptive management.
Appendix G: Environmental Monitoring Plan (EnvMop)	The EnvMop details the Project's environmental monitoring program including general environmental and specialized (water/air quality) monitoring of construction to check the effective implementation of the CEMP sub-plans, including monitoring rational, parameters, sampling approach, issue tracking mechanism, and reporting. Monitoring and reporting are required to ensure compliance with EAC terms and conditions, legislation, and any applicable permits, approvals and/or authorizations. The EnvMop will also be used to identify and provide appropriate follow-up to any instances where suitable BMPs are not being applied or where mitigation measures are not effective. The EnvMop includes a table summarizing monitoring efforts required for each sub-plan.
Appendix H: Fisheries Habitat Mitigation and Compensation Plan (FHMCP)	The FHMCP describes a management approach that promotes impact avoidance, implementation of mitigation measures and BMPs to minimize any unavoidable impacts, application of offsetting and compensatory measures to offset any residual impacts that may apply after mitigation, and a monitoring and reporting program to assess effectiveness of the measures. The FHMCP identifies the EMT positions that will be responsible for implementation of this sub-plan. Mitigation measures focus on avoidance of direct impacts to fish, application of appropriate timing windows, and fish salvage techniques, protection of water quality, and PGC awareness/education. Monitoring will involve regular site visits and water quality sampling by the Environmental Monitor.
Appendix I: Health and Safety Plan (HSP)	The HSP summarizes aspects of environmental management that have implications for human health and safety and describes applicable health and safety strategies and/or measures, cross-referencing as necessary to the Health and Safety Program.
Appendix J: Invasive Species Management Plan (ISMP)	The ISMP addresses potential effects of the introduction and spread of invasive plant and aquatic wildlife species within the Project area. It identifies management practices to limit the spread and control of invasive species for the Project. It includes requirements for reporting during the advanced site preparation activities to demonstrate compliance and/or non-compliance with applicable and relevant standards and determine effectiveness of BMPs. BMPs include measures to minimize disturbance, protect existing native plants, revegetate with native species, minimize invasive seed transfer, and control invasive plants. Monitoring will be achieved through general inspection of roadside areas and annual surveys of specific Red- and Blue-listed plant community polygons.
Appendix K: Noise and Vibration Management Plan (NVMP)	The NVMP describes the Project site-specific schedule, procedures, and BMPs to control construction noise, emissions and vibration, in accordance with Schedule 4 [Design and Construction] and Schedule 6 [Environmental Obligations] of the DBA, including target noise emission levels of equipment, equipment maintenance and management, and describes community communication and noise monitoring requirements. The BMPs are focused on reducing and muffling noise produced by Project machinery, scheduling of noise-related works, and communicating with the local community. Noise and vibration monitoring will include assessment for potential noise impacts on wildlife and the community, along with feedback from the community.
Appendix L: Spill Management and Emergency Response Plan (SMERP)	The SMERP identifies spill prevention measures (e.g., containment, hazardous material storage and handling) and describes measures for addressing Project-related spills and emergencies (both internal and external notification) to minimize potential effects and risks to the public, on-site workers, and the environment. The SMERP lists the spill abatement materials/equipment to be stored in the Project area, educational requirements, and incident procedures regarding communications, containment clean-up,

Sub-Plan	Plan Summary
	debriefing, follow-up reporting and EMT members responsible for the implementation of the SMERP. In addition, the SMERP identifies relevant external contacts.
Appendix M: Surface Water Quality and Sediment Control Plan (SWQSCP)	The SWQSCP identifies areas that are prone to sedimentation or erosion and describes general and Project area-specific measures to be applied to mitigate soil erosion and shallow slope movement. These mitigation measures will control sediment-laden flows and to prevent sediment-laden water from entering watercourses. It also identifies the EMT members responsible for the monitoring/reporting program. Monitoring of erosion and sediment control structures, general site housekeeping, and water quality will be conducted on a weekly basis at active sites.
Appendix N: Wildlife and Habitat Management Plan (WHMP)	The WHMP identifies and describes Red- and Blue-listed wildlife species that may be in the Project area and provides a reasonable survey and/or salvage of such species prior to construction. It also identifies and describes sensitive wildlife habitat and/or sensitive vegetation areas in the Project area and describes management approaches and BMPs to avoid and/or minimize impacts on key wildlife, wildlife habitat, and vegetation (e.g., potential Pacific water shrew habitat). It provides a monitoring/reporting program and the EMT members responsible for its implementation, and describes wildlife enhancement measures, including restoration planning measures to benefit wildlife.

Implementation of the Project's environmental management program, including CEMP, was supported by all PGC personnel over the lifetime of the project identified in *Table 2* The MoTI (Owner's) Environmental Representative for the Project is Brendan Reddington.

Table 2. PGC Environmental Team

Project Contact	Project Role	Duties
Jenna Tracey, RP Bio, PGC	Environmental Manager	Project Environmental Manager, liaising with MoTI and Agency staff, review of environmental deliverables.
Allegra Hollingbury, P. Eng., PGC	Environmental Manager	Project Environmental Manager, liaising with MoTI and Agency staff, review of environmental deliverables.
Werner Beukes, R.P. Bio., PGC	Environmental /Field Coordinator and Manager	Project Environmental Manager, liaising with MoTI and Agency staff, review of environmental deliverables.
Joey Chiasson, ASCT, PGC	Environmental Field Coordinator	Support Werner Beukes and Jenna Tracey.
Paula O'Byrne, PGC	Environmental Field Coordinator	Support Jenna Tracey.
Andre Felicio, PGC	Environmental Field Coordinator	Support Werner Beukes.
Meaghan Mackenzie, PGC (co-op 2020)	Environmental Field Coordinator	Support Werner Beukes.
Danielle Toth, PGC (co-op 2020/21)	Environmental Field Coordinator	Support Werner Beukes.
Patty Burt, RP Bio, AQP, MESL	Environmental Lead	Manager of the Environmental group for the Design Team, reviewing reports, permits and approvals, Monthly and Annual reporting.
Kyle D'Appolonia, RP Bio., AQP, MESL	Environmental Monitor	Weekly Environmental Monitor/auditor, preparing weekly EM reports.
Mark Trousdell, RP Bio., AQP, MESL	Environmental Monitor	Weekly Environmental Monitor/auditor.
Kevin Christie, RP Bio., AQP, MESL	Environmental Monitor	Weekly Environmental Monitor/auditor.

Project Contact	Project Role	Duties
Nuzhat Beig, M.Eng, EIT, MESL	Submission Coordinator	Preparing weekly and monthly EM reports. Complied the Annual report.
Harnoor Gill	Submission Coordinator	Preparing weekly and monthly EM reports. Complied the Annual report.
Dave Hayward, RP Bio., CPESC, Brybil	Environmental Lead	Preparation of the CEMP, EEMP, Obtain Permits and Approvals for all instream work and salvages.
Jennifer Prive, RP Bio, Brybil	Environmental Wildlife Coordinator	Resources the expertise and equipment for both fish and wildlife salvages.
Philip Lowrey, P.Eng, CSAP	Contaminated Sites Professional	Securing permits, guidance and compliance for Segments 3 and 4.
Allan Morrison P.Eng, CSAP, MESL	Contaminated Sites Professional	Securing permits, guidance and compliance for Segments 3 and 4.
Chad Taylor, P.Eng, CSAP	Contaminated Sites Professional	Securing permits, guidance and compliance for Segments 3 and 4.
Rob Kupchanko, BSc, PAg, Brybil	Contaminated Sites Professional	Securing permits, guidance and compliance for Segments 1 and 2.
Jenny Botica, PhD, RPCA, RPA, CAHP, Kleanza	Archaeology Lead	Securing permits, managing First Nations field monitoring.

3.2 ENVIRONMENTAL WORK PLANS

Environmental Work Plans (EWP) were developed for environmentally sensitive construction works to ensure the identification of site-specific values and appropriate mitigation measures to protect identified environmental values in accordance with the Project CEMP. EWPs were generated by PGC and submitted for review to MoTI for approval prior to execution of tasks. A total of 58 EWPs were generated for Project activities.

EWPs were developed in accordance with the Project terms and references, Project CEMP, and environmental Best Management Practices. EWPs content included Project background, task location and environmental context, proposed work schedule, roles, responsibilities and emergency contacts, applicable environmental permits, approvals and conditions, environmental procedures and best practices, environmental monitoring requirements, site restoration plans and document references.

3.3 PERMITTING

All required approvals and permits were acquired prior to the start of construction and had been renewed or amended as required during work activities. All work was completed under valid regulatory permits.

DFO Letters of Advice and WSA Approvals and Notifications for changes in and about a stream were obtained ahead of Project works. WSA Approvals 2007749, 2007755, 2007770, 2007783 and 2007795 were amended in 2021 by MoF following the approval of the EEMP identifying environmental enhancement and compensation design to offset permanent Project impacts on in-stream, riparian and wetland habitat.

WSA Approval 2007188 for changes in and about Burns Bog was obtained in March 2020 for the removal of a portion of the existing boardwalk and construction of a new section of boardwalk within the Delta Nature Reserve.

A General Permit under the *Wildlife Act* for salvage and relocation of amphibians and small mammals was obtained in 2021, expiring 06 April 2022. PGC obtained a new salvage and relocation permit valid for the remainder of the Project, from 07 April 2022 until 06 April 2023.

A Fish Collection Permit under the *Wildlife Act* for salvage of fish was obtained in 2020, expiring 30 September 2022. PGC obtained a new fish salvage permit valid for the remainder of the Project, from 05 October 2022 to 31 December 2022.

A Scientific Fish Collection License under the *Fisheries Act* General Regulation was obtained in 2020, expiring 30 September 2022. PGC obtained an amendment extending the License for the remainder of the Project, expiring 31 December 2022.

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Approval In Principle 14000 for relocation and management of contaminated materials in Section 1 and Section 2 of the Project under the *Environmental Management Act* and Contaminated Sites Regulation was obtained in June 2021. Details for these permits are included in the Permit Tracking List, Appendix 3.

Rare and invasive plant surveys and breeding bird nest surveys inside the window of March 15 to August 15 were completed prior to the start of construction, to confirm works did not negatively impact migratory birds in accordance with the *Migratory Birds Convention Act*. No rare plants were found, and invasive weeds were treated by PGC.

Under conditions of the WSA Approval granted for the Project, the Environmental Manager or Field Coordinator from PGC was required to be present during all day and night shifts to monitor environmentally sensitive construction activities and inspect the work sites according to the environmental requirements outlined in the CEMP and CEMP Sub-Plans,, Provincial (WSA) and Federal (*Fisheries Act*) legislation. Two non-compliances with these conditions were recorded, NCR 071 and NCR 118; refer to **Section 4.3** for details on these environmental non-compliances and resolution.

WSA Approval, Scientific Fish License and Fish Salvage permit conditions also included requirements for reporting to the applicable regulatory body should non-compliance with a permit condition occur. PGC provided notification to specified regulators for applicable issues; refer to **Section 4.2** for details on incidents and reporting.

3.4 MONITORING AND REPORTING

Environmental monitoring and reporting, that supports the CEMP, was critical to be compliance with terms and conditions of regulatory approvals and identify opportunities to refinement environmental mitigation based on lessons learned and observations in the field. Documentation of all environmental issues, concerns, requirements, sampling and salvage results occurred on a daily, weekly, monthly and annual schedule. Weekly summaries were provided by the Project auditor and the monthly reports were developed

based on those summaries. The monthly reports were submitted to MoTI on the 14th of every month for review and filing. Annual reporting was provided to MoTI at the end of each year of construction.

The following permit-specific reports were provided to the applicable regulatory bodies:

- AIP Annual Reports (14000), 2021 and 2022 – submitted to Ministry of Environment (MOE).
- Wildlife Salvage Permit Closure Reports (SU20-601719, SU21-622077, SU22-688123), 2020, 2021 and 2022 – submitted to MOF.
- Fish Salvage Permit Closure Reports (SU20-601411, SU22-777619), 2020 and 2022 – submitted to MOF.
- Fish Salvage Permit Closure Reports (XHAB31-2020, XHAB31-2022(AMD01)), 2020 and 2022 – submitted to DFO.
- Archaeological Impact Assessment Report (2018-0218), 2020 – submitted to MOF Archaeology Branch.
- Archaeological Site Alteration Report (2020-0272), 2020 – submitted to MOF Archaeology Branch
- Archaeological Impact Assessment Report (2021-0134), 2021 – submitted to MOF Archaeology Branch.
- Archaeological Impact Assessment Report (2022-0517) – to be submitted to MOF Archaeology Branch.

Environmental issues were identified on an ongoing basis through PGC monitoring, MESL audits, and Province observations and audits. Environmental issues were managed/mitigated on the ground and reported to MoTI and regulators as required based on permit conditions and requirements of the CEMP. PGC also assessed opportunities for improvement, lessons learned (toolbox trainings), and refinement of mitigation through monitoring and reporting, and incorporate findings as part of continual improvement to reduce potential for future environmental issues. Additional information on specific environmental issues that occurred is provided in **Section 4.0**.

To support continual improvement in refining environmental practices, training and communication between environmental and construction staff supported by senior PGC personnel occurred regularly to address the past and ongoing or potential issues. PGC Environmental Representatives conducted topical toolbox talks on a weekly basis based on work activities and observed opportunities for improvement, and site-specific presentations as required for construction crews. Crews provided signed copies of training materials, which were tracked and provided to MoTI as part of monthly reporting.

3.5 ENVIRONMENTAL DESIGN REFINEMENTS

During final project design, several refinements were made to the Project design in order to avoid or further minimize potential effects of the Project. Some of these refinements were identified because of feedback provided from regulators as part of the process of obtaining permits and approvals.

Several substantial changes to Project design were incorporated into final application for permits and approvals in order to reduce the overall environmental impact of the Project (footprint). Specifically, the WSA applications and DFO Project review request original applications were approved with a commitment to offset habitat based on the finalized design drawings. In the initial application, the footprint of aquatic and wetland/bog habitat was estimated to be around 80,000 m². With the design revisions, this footprint was reduced to 48,652 m², resulting in a 40% reduction in environmental footprint impact. Revisions from the 2019 Overview Environmental Effects Assessment Project design included the following changes:

- Modification of the S1 interchange to implement a second roundabout, reducing new impact area.
- Modification of the S4 interchange to maintain existing Nordel Way eastbound infrastructure and reduce new impact area within the Delta Nature Reserve.
- Modification of the S4 interchange to maintain existing Nordel Way westbound to Alex Fraser Bridge infrastructure, reducing new impact area.

4.0 ENVIRONMENTAL ISSUES

Environmental issues for the construction period were tracked and reported on a regular basis. Weekly and monthly reports include summaries of environmental issues identified by PGC and/or MESL representatives during the reporting period, and notifications of incidents were provided immediately to applicable MoTI representatives by PGC based on issue or incident severity.

In total there were 176 environmental issues and incidents that occurred on the Project.

4.1 SPILLS AND RELEASES

Of the 176 environmental issues and incidents during the reporting period, 107 were spills or releases of deleterious materials such as oil, diesel, tack or asphalt prime, coolant, hydraulic fluid, or concrete and contact water. Minor spills (< 1 L) accounted for 53 releases, 34 releases were between 1.1 L – 5 L, there were 19 large spills (5.1 L – 99.9 L), and 1 significant spill (> 100 L). Incident reports were generated for all large spills in accordance with the CEMP. There were 2 reportable releases (defined as releases to water, any spill greater than 100 L, or any spill substance and volume designated as reportable under the BC *Environmental Management Act*) during the reporting period.

4.2 ENVIRONMENTAL INCIDENTS

Minor issues that are not uncommon during the construction phase of road infrastructure and easily corrected, include for example: effectiveness of silt fence, keeping existing highway driving surfaces free of debris, fully stocked spill kits, use of spill trays under ideal equipment, general housekeeping activities

across the Project site. These matters were dealt with by increased equipment inspections, the installation of drip trays, and increased monitoring efforts to advise the PGC on deficiencies.

Environmental issues (i.e., releases of turbid water impacting water quality, fish kill) resulting in non-compliance with permit conditions were reported to MoF as required by WSA Approval conditions. PGC also provided reports to MoF when water quality was observed to be in exceedance of applicable BC Approved Water Quality Guidelines, in non-compliance with Approval conditions. In addition to compliance notifications, PGC also provided observations to MoF regarding water quality issues on site that were determined to not be associated with Project impacts.

These issues that were either environmental concerns and /or externally reported related to this Project are as follows:

- 17 September 2020: A spill tray under a dewatering pump with residue oil overfilled with water and spilled contaminated water into the East West Burns Bog Perimeter Ditch (Section 3 - Area E). It was estimated that approximately 100 mL was spilled into the ditch. After a cleanup operation all the contaminants were removed with absorbent spill pads and interlockable absorbent socks. All contaminated soil was removed from site and sent off-site by the hazardous waste service provider. The dewatering pump was removed from site and the causal factor was attributed to mechanical failure. Emergency Management BC was notified (File # DGIR202172) and the DFO Violations and Reporting number was called.
- 26 October 2020: Emulsified bitumen migrating offsite to a drainage ditch. Emergency Management BC (File Number 202551) and DFO were notified.
- 15 June 2021: Highway 91/17 sand migration from L1400 preload into the Burns Bog. Notification was provided to MOF in accordance with permit conditions.
- 17 September 2021: Highway 91/17 Light weight fill concrete cracking occurred at the L1300 due to pump failure and accumulation of elevated pH concrete-contact water beneath the fill area. Elevated pH water was contained and did not enter Silda Ditch, and was treated with CO2 prior to discharge. Notification was provided to MOF in accordance with permit conditions.
- 19 October 2021: Highway 91/17 release of high NTU water into downstream Silda Ditch. Notification was provided to MOF in accordance with permit conditions.
- 17 January 2022: Maintenance on bog interface liner required – Repairs to bog liner in DNR was required to maintain separation of bog water from mineralized highway and surface run-off water. Notification was provided to MOF in accordance with permit conditions.
- 27 April 2022: Elevated turbidity in Silda Ditch upstream – PGC provided information on instream works, elevated turbidity event and timeline for resolution. Notification was provided to MOF in accordance with permit conditions.

- 12 May 2022: Dewatering bag failure – Elevated turbidity water was released when a dewatering bag burst in the Burns Bog Perimeter Ditch. Notification was provided to MOF in accordance with permit conditions.
- 20 May 2022: Dewatering bag failure – Elevated turbidity water was released when a dewatering bag burst in the DNR Ditch. Notification was provided to MOF in accordance with permit conditions.
- 02 June 2022: Elevated turbidity water release – Turbid water was released when road plates isolating the work area failed, releasing elevated turbidity water to Silda Ditch (Environmental Incident Report). Notification was provided to MOF in accordance with permit conditions.
- 08 June 2022: Elevated turbidity water release – Pumping from two authorized locations was in progress when water quality in one pump location was observed to be elevated above acceptable levels and was halted. The second pumping location continued for approximately 2 hours, releasing elevated turbidity water to Silda Ditch (Environmental Incident Report). Notification was provided to MOF in accordance with permit conditions.
- 15 June 2022: Elevated turbidity in Burns Bog – During berm peat placement, elevated water levels and work activities resulted in elevated turbidity in Burns Bog outside of the isolated work area. Notification was provided to MOF in accordance with permit conditions.
- 20 July 2022: Fish kill in Silda Ditch – During work area isolation and dewatering following fish salvage completed by PGC, dead fish were identified in the area being dewatered, and it was determined they had been killed due to impingement on fish screen surrounding the pump (Environmental Incident Report). Notification was provided to MOF and DFO in accordance with permit conditions.
- 16 September 2022: Elevated turbidity in 96th Street Ditch due to Erosion – During water quality monitoring elevated turbidity was observed in 96th Street Ditch and was determined to be due to removal of an upstream ball plug isolating a previously contained pond. Notification was provided to MOF in accordance with permit conditions. Follow-up monitoring noted no erosion issues were observed and determined elevated turbidity was due to bacterial influence, follow-up information was provided to MOF.
- 04 November 2022: Elevated turbidity in Silda Ditch due to S4 Erosion – during SRE monitoring PGC observed a washout in S4 impacting water quality. Notification was provided to MOF in accordance with permit conditions, and additional information on corrective actions, follow-up monitoring and timeline for resolution were provided on 06 November and 08 November 2022.

PGC also provided information and comments to MOTI and MOF related to moderately elevated turbidity (greater than 8 NTU over background but less than 35 NTU) observed in the Silda Ditch Midstream area in Section 2 that was determined to be related to bacterial influence and not due to Project activities. Observations and follow-up were provided via email on 06 May 2022, 12 May 2022, 18 May 2022, 26 May 2022, 21 June 2022, 30 June 2022, 06 July 2022, 20 July 2022, 02 February 2023, 15 February 2023, and 28 March 2023.

4.3 NON-COMPLIANCE REPORTS

Non-compliance Reports (NCR) were generated for Project activities or issues that were not in compliance with the Project CEMP, DBA, or applicable approvals and permits.

Of the 187 total NCRs generated during the project, 16 NCRs, or 8.5%, related to Environmental issues were generated for PGC and PGC subcontractors:

- NCR 057 – Works conducted without the applicable EWP in place.
- NCR 068 – Works conducted without the applicable EWP in place. NCR 071 – Environmentally sensitive works (stream dewatering and pumping monitoring) conducted without a PGC Environmental Representative present. Corrective actions implemented included additional training and creation of a pumping checklist system and accompanying documentation.
- NCR 110 – Compliance reporting for elevated turbidity in Silda Ditch.
- NCR 112 – Recycled concrete material used on L2300 haul road.
- NCR 116 – Improperly installed ESC fencing at Sunbury Mounds.
- NCR 118 – Environmentally sensitive works (paving) completed without Environmental Representative on site.
- NCR 119 – Unauthorized pumping to 96th Street Ditch.
- NCR 120 – Release of elevated turbidity water to Silda Ditch.
- NCR 127 – PGC Subcontractor housekeeping.
- NCR 128 – PGC Subcontractor concrete management – Bridge Construction.
- NCR 131 - Compliance reporting for elevated turbidity water pumping into Silda Ditch.
- NCR 132 – Elevated turbidity water pumping into Silda Ditch.
- NCR 143 – Environmentally sensitive works (excavation) completed without installation of ESC fencing.
- NCR 146 – Fish kill in Silda Ditch.
- NCR 157 – Hazardous materials without secondary containment.
- NCR 158 – PGC Subcontractor concrete management – Bridge Construction.
- NCR 167 – Tack application without installation of appropriate catchbasin insert.
- NCR 173 – PGC Subcontractor concrete management – Curb installation.

All spills, incidents and non-compliances were consistently documented, reported, investigated and corrected. PGC conducted follow-up monitoring after release clean-up and/or issue correction to confirm appropriate actions had been taken and clean-up was complete. No residual impacts to environmentally sensitive areas, vegetation, fish or wildlife were observed from environmental issues or releases.

As a result of Project lessons learned and continual improvement, PGC adjusted and updated work procedures including:

- Modifications to internal pumping permit checklists to ensure that pumping was reviewed and approved by a PGC Environmental Representative before initiation and regularly during activities;
- Clarifications to mitigation measures for vehicle and equipment re-fueling;
- Updated and increased supervisor and crew member training on environmental issue notification and management;
- Reinforced that “all drips are spills” with crew members; and
- Implemented environmental deficiency tracking to report and resolve minor items such as ESC fencing repairs and evidence of minor erosion proactively before they became recordable environmental issues.

The Project has zero outstanding environmental issues.

4.4 SUMMARY OF OUTSTANDING ENVIRONMENTAL WORKS AND COMMITMENTS

Construction completion reports for amended WSA Approvals 2007749, 2007755, 2007770, 2007783 and 2007795 are scheduled for submission 1 December 2023.

Post-construction habitat effectiveness monitoring in accordance with the EEMP and amended WSA Approvals 2007749, 2007755, 2007770, 2007783 and 2007795 has begun in 2023, with the first monitoring report scheduled for submission 1 December 2023.

An annual performance verification report in accordance with AIP 14000 Schedule B Condition 4(b) and (c) will be completed and submitted to the Ministry of Environment by 31 March 2023. This report will complete the required second year of annual reporting (Condition 4(c)), following which a request may be submitted to the Director to consider amendment of the annual reporting requirement.

5.0 FISH & WILDLIFE SALVAGE RESULTS

Fish and wildlife salvages were completed over the course of Project activities, starting prior to Construction start. A total of 559 wildlife individuals were salvaged and relocated, and a total of 4,160 aquatic individuals were salvaged and relocated over the Project duration. A total of 68 invasive American bullfrog (*Lithobates catesbeianus*) were captured and euthanized in accordance with applicable wildlife permit conditions.

Wildlife salvage and relocation was completed under BC *Wildlife Act* General Permits SU20-601719 (2020-2021), SU21-622077 (2021-2022) and SU22-688123. Individuals of two species designated as Species at Risk were salvaged and relocated in 2020, consisting of four Pacific water shrew (*Sorex bendirii*, provincially Red-listed and SARA 1 – Endangered, 2002) and six Northern red-legged frog (*Rana aurora*, provincially Blue-listed and SARA 2 – Special Concern 2005)

Fish salvage and relocation was completed under BC *Wildlife Act* Fish Collection Permits SU20-614411 (2020-2022) and SU22-777619 (2022-2023), and federal DFO Scientific License XHAB-31-2020.

All animal handling was consistent with permit conditions, including those described in Live Animal Capture and Handling Guidelines for Wild Mammals, Birds, Amphibians and Reptiles, and in relevant publications

by the Canadian Council on Animal Care. Decontamination of field gear including traps, buckets, nets, waders, and boots was completed before and after the salvage, and followed the disinfection procedures outlined in the BC Ministry of Environment's Standard Operating Procedures: Hygiene Protocols for Amphibian Fieldwork. Salvage operations for small mammals followed the Best Management Practices for Pacific Water Shrew in Urban and Rural Areas and the Best Management Practices for Amphibian and Reptile Salvages in British Columbia for amphibian and reptile salvages.

All wildlife and fish species salvaged were relocated to the closest suitable habitat similar to where they were found. Pacific water shrew found on Section 3 in 2020 were relocated directly west of the Project area. Northern red-legged frogs found in 2020 were relocated southeast of where they were captured in Section 4. Wildlife salvaged in Section 2, Area E4 and E5 in 2021 were relocated directly northwest of the Project area. During water management works in Section 4 in May 2022, 15 tadpoles were relocated from a roadside ditch in the L2400 to the Delta Nature Reserve ditch. Additional fish salvages were completed from July 18-19, 2022, a total of 377 aquatic individuals were salvaged and relocated within Silda Ditch. During water management works in Section 4 in May 2022, 15 tadpoles were relocated from a roadside ditch in the L2400 the DNR.

Table 3. Wildlife and aquatic species salvaged from 2020 to 2023

Wildlife Species - Common Name	Scientific Name	Number of individuals
common shrews	<i>Sorex araneus</i>	319
vagrant shrews	<i>Sorex vagrans</i>	7
Townsend's shrew	<i>Sorex townsendii</i>	4
north American deer mouse	<i>Peromyscus maniculatus</i>	192
Townsend's vole	<i>Microtus townsendii</i>	5
Pacific water shrew	<i>Sorex bendirii</i>	4
creeping vole	<i>Microtus oregoni</i>	3
common vole	<i>Microtus spp</i>	2
common rats	<i>Rattus spp</i>	10
western terrestrial garter snake	<i>Thamnophis elegans</i>	10
American shrew mole	<i>Neurotrichus gibbsii</i>	1
birds	unidentified species	1 wren and 1 sparrow
Total Wildlife		559
Aquatic Species - Common Name	Scientific Name	Number of individuals
three-spined stickleback	<i>Gasterosteus aculeatus</i>	3,582
coho salmon	<i>Oncorhynchus kisutch</i>	8
carp	<i>Cyprinus carpio</i>	1
sculpin	<i>Cottoidea spp.</i>	2
northwestern salamander	<i>Ambystoma gracile</i>	321
long-toed salamander	<i>Ambystoma macrodactylum</i>	3
green frogs	<i>Lithobates clamitans</i>	21
northern red-legged frog	<i>Rana aurora</i>	6
American bull frog	<i>Lithobates catesbeianus</i>	68
Unidentified tadpole	--	108

loach spp	--	16
Tadpole	--	24
Total aquatic animals		4,160
Total individuals salvaged		4,719

6.0 CONTAMINATED SITES MANAGEMENT

Section 1 and 2: Contaminated material was managed via an Approval in Principle (AiP) and Notice of Independent Remediation (NIR) processes. In support of managing Contaminated Sites Regulation “waste levels” the design/build team was guided by two Remediation Plans for Sections 1 and 2, respectively. The Remediation Plans were developed based on preliminary investigations (Stage 1, 2 Preliminary Site Investigations, Detailed Site Investigations, Project Wide Contaminated Sites Management Plan, Environmental Work Plan, and Sunbury Connector Mounds Area Surface and Groundwater Monitoring Program). The AIP was signed and approved by Ministry of Environment on 30 June 2021.

In 2020, construction activity in Section 1 involved excavating contaminated material zone for bridge excavation, commenced in late November-2020. The following potential contaminants of concern were tested: metals, BTEX/VOCs/VH, LEPH/HEPH/EPH, and salinity, but excavation was paused when groundwater was encountered. Excavation was scheduled to resume in January with the mobilization of a water treatment facility. In 2021, Section 1 construction was nearing completion and final inspection was planned for November. Semi-annual groundwater monitoring and cap inspection was required for minimum two years per the terms of the AiP and Performance Verification Plan (PVP).

Section 2 construction continued through the end of 2021 and into early 2022, with the same monitoring and inspection requirements as in Section 1. During construction in Sections 1 and 2, Brybil presented PGC with technical memorandum (dated 29 March 2021) for managing soils and waste upon chance encounter and applying MOE-approved procedures stockpile sampling and characterization guidelines including but not limited to Technical Guidance #1. Brybil also provided PGC with a technical memorandum on 16 September 2021 approving project specifications for the replacement of an enviro liner product to be used throughout Sections 1 and 2. PGC implemented and followed the recommendations within those memos.

Construction activities in 2022 followed the CEMP and CSMP to meet environmental obligations and requirements. The ENV AiP Site 14000, issued 30 June 2021 was used to manage contaminated soils in targeted areas, with a focus on Remediation Plans and PVPs. The first annual AiP report was submitted in March 2022, and ongoing monitoring and inspections continued for the 2023 report. Areas outside of the AiP were managed under NIR using guidance from the CSMP and Remediation Plans prepared by Brybil (August 2020) for Sections 1 and 2, and by Core6 (August 2020) for Section 2 – Sunbury areas. Remediation closure reports have been submitted based on Substantial Completion.

Section 3 and 4: In 2020, contaminated materials were managed via NIR and removed from the site for disposal. Memorandums were completed in July 2020 and February 2021 which provided procedures for soil and process water management during stone column installation and excavation of a utility trench,

respectively. Characterization of suspected chloride contamination was done on an as needed basis. Disturbance of soil and/or water in other areas of Section 3 and 4 was minimal.

7.0 ARCHAEOLOGY AND HERITAGE RESOURCES

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8.0 SUMMARY

Substantial Completion of the Highway 91/17 Upgrade Project was reached on 30 November 2022, and the improved transportation system is now fully open for public use. Total completion of the Project is tentatively scheduled for 31 May 2023.

Through continual improvement practices and ongoing communications with Project team members, stakeholders and regulators, PGC continued to refine and optimize Project operations with the goal of reducing the potential for and impact of environmental issues. PGC promoted a culture of environmental awareness, protection and management through senior management support, staff and supervisor training, and implementation of lessons learned to predict risk areas and mitigate impacts of environmental issues.

Tracking project deficiencies had allowed PGC to monitor environmental problem areas and trends, and implement specific training and education measures to manage and prevent issues. Implementing lessons learned from previous Project experience also allowed PGC to proactively address potential environmental issues, such as training on wet weather site preparation, increased inspection frequency ahead of rainfall events, and provided backup and additional drip tray and spill supplies to ensure subcontractors have sufficient mitigation materials.

All changes in and about a stream were conducted in accordance with the applicable WSA Approvals and Notifications for instream and wetland/bog habitats. All non-compliances were reported to the provincial Water Manager in accordance with the terms and conditions of the Approval. Fish/wildlife salvage and relocation efforts were reduced as the PGC maintained existing fish and wildlife isolations in work areas. All salvages were completed under valid permits. Relocation and management of contaminated materials was completed in accordance with the *Environmental Management Act* Contaminated Sites Regulation and Approval in Principle 14000.

The Highway 91/17 Upgrade Project was completed in accordance with all Design-Build Agreement contractual conditions, permit requirements and obligations, and applicable Design Build Standard Specifications and Best Management Practices for the protection of the environment.

Construction of habitat enhancement and compensation areas has been completed in accordance with the EEMP and the terms and conditions of the WSA Approval Amendment. The post-construction monitoring and reporting period for enhancement and compensation areas began in 2023.

APPENDIX 1: STATUS OF COMMITMENT TABLE

Ref	Objective Commitments & Assurances	Timing	Delivered By	Status Update	
				Ongoing	Complete
1.0 Responsible Environmental Management					
1.1	Develop, implement, and maintain an Environmental Management Plan (EMP) for the Project to demonstrate how the design, construction and operation, including maintenance, of the Project: - Will be carried out to avoid or mitigate negative impacts; - Will be carried out in an environmentally responsible manner, in accordance with DBSS 165 [Protection of the Environment]; - Will employ Best Management Practices (BMPs3); and - Will comply with federal and provincial legislation, permits, approvals and authorizations, including the Environmental Assessment Certificate (EAC).	All phases	Contractor		X
1.2	Prepare and implement a Construction Environmental Management Plan (CEMP), (which is a component of the EMP), including relevant sub-plans, for the Project prior to the start of relevant construction activities.	Pre-construction	Contractor		X
1.3	Obtain required statutory permits, approvals, and authorizations before proceeding with construction that requires such permits.	All phases	Contractor		X
1.4	Adhere to the terms and conditions of the: EAC; federal screening report; the EMP; DBSS 165 [Protection of the Environment]; and any other applicable permits, licenses and approvals.	Pre-construction, construction	Contractor		X
1.5	Establish an Inter-Agency Environmental Review Committee (IAERC), in accordance with the Terms of Reference developed during Application review, to provide for agency review and comment on plans and designs prior to construction, including but not limited to: - Detailed design of stormwater management infrastructure; - Detailed vegetation and wildlife mitigation plans and mitigation monitoring plans; and - Environmental management plans.	Pre-construction, construction	MoTI / Contractor	N/A	
1.6	Provide all project related EMPs, including component EMPs, to applicable regulatory agencies in the IAERC for review and comment, at least 30 calendar days prior to the start of construction that requires such plans.	Pre-construction	Contractor	N/A	
1.7	Relevant sub-plans to be included in the CEMP will include those to address environmental issues identified in the Application and supporting documentation submitted to the EAO during the Application review, and described in the Application (Section 11, pg. 523), including but not limited to: - Agriculture Mitigation Plan; - Air Quality and Dust Control Plan; - Archaeological Mitigation / Monitoring Plan; - Construction and Hazardous Waste Management Plan; - Contaminated Sites Management Plan; - Contractor Awareness and Education Plan; - Environmental Monitoring Plan;	Pre-construction	Contractor		X

	<ul style="list-style-type: none"> - Fisheries Habitat Mitigation and Compensation Plan; - Health and Safety Plan; - Invasive Species Management Plan; - Noise and Vibration Management Plan; - Spill Management and Emergency Response Plan; - Surface Water Quality and Sediment Control Plan; - Wildlife and Habitat Management Plan. 				
1.8	Manage contamination encountered during project development, regardless of the current assessment of potential contamination, in accordance with applicable regulatory requirements.	All phases	Contractor		X
1.9	Prepare and implement an Operational Environmental Management Plan, prior to operation and maintenance activities. Provide the operational EMP to relevant reviewing and regulatory agencies, for review and comment, at least 30 calendar days prior to the onset of operation and maintenance activities.	Pre-construction	Contractor	TBD	
1.10	At a minimum, review the Wildlife and Habitat Management Plan and modify if required, three years post- construction and make a decision regarding the next review date and/or determine the closure date for the plan(s). The method for review, modification, and decision on closure of the plan(s) will be defined by the applicable regulatory agencies within the IAERC	Operations	Contractor	N/A	
2.0 Monitoring					
2.1	Ensure that environmental monitoring and reporting for the Project will be conducted, with respect to the terms and conditions of the EAC and other regulatory permits, approvals and authorizations as applicable.	Construction	Contractor	X	
2.2	Incorporate a monitoring component into all applicable sub-plans of the construction EMP developed for the construction phase of the Project.	Pre-construction	Contractor		X
2.3	Outline in each of the sub-plans of the construction EMP: <ul style="list-style-type: none"> - Rationale for monitoring; - Parameters to be monitored; - Monitoring program details; and - Required follow-up actions. 	Pre-construction	Contractor		X
2.4	The Owner will engage an Environmental Monitor for the construction phases of the Project to undertake environmental monitoring activities and oversee implementation of each of component plans of the EMP developed for the Project. The Environmental Monitor will monitor, evaluate, and report to the owner on construction activities and the effectiveness of the environmental management strategies and mitigation measures, with respect to the terms and conditions of the Application and other regulatory Permits, Approvals and Authorizations that may apply. The Monitor will be responsible for making onsite decisions and taking on-site action to avoid/respond to potential environmental effects which could include temporary stop work orders if necessary.	Construction	Contractor		X
2.5	Implement environmental quality management program through monitoring, auditing and reporting activities for the Project with respect to the terms and conditions of the EAC and other regulatory permits, approvals and authorizations.	All phases	Contractor		X
3.0 Incident Management					
3.1	Respond to environmental incidents, including spill incidents in accordance with the Emergency Response Plan to minimize effects and risks to the general public, on-site workers and the environment.	All phases	Contractor		X

3.2	Include protocols, consistent with the BC Spill Reporting Regulation, for reporting spills to appropriate emergency response authorities, including; - The Provincial Emergency Program, in the case of any spills of reportable deleterious substances into waters frequented by fish, regardless of the amount of the spill; and - To adjacent property owners and occupiers, including local government, where utilities cross the highway and there is a potential for an incident to extend beyond the Project boundaries.	Pre-construction	Contractor		X
3.3	Train all field Project personnel regarding implementation of the Construction and Hazardous Waste Management and Spill Management and Emergency Response Plans.	All phases	Contractor		X
3.4	Incorporate relevant municipal contacts into the emergency contacts for the Construction and Hazardous Waste Management and Spill Management and Emergency Response Plans prepared for construction of the Project.	Pre-construction	Contractor		X
3.5	Follow applicable DBSS 165 and Canadian Council of Ministers of Environment codes and procedures if temporary fuel storage/fueling facilities are required during construction. Where there is a difference in standards, the most stringent measure for environmental protection will take precedence.	Construction	Contractor		X
4.0 Community Consultation					
4.1	Consult with local governments, stakeholders and the public during all stages of Project development.	Pre-construction; construction	MoTI, Contractor		X
4.2	Conduct community open houses and information sessions during the design review stage to obtain input on design refinements, during the preliminary and final design review stages.	Pre-construction	MoTI, Contractor	N/A	
4.3	Provide regular public information updates on the progress of construction, the schedule, and upcoming milestones.	Construction	MoTI, Contractor		X
4.4	Consult with the Corporation of Delta (CoD) and the City of Surrey (CoS) during all stages of project development and construction.	Pre-construction; construction	Contractor		X
4.5	Provide updated media information materials, as part of the Project commitment to making project information available to the public.	All phases	Contractor		X
4.6	Track project enquiries and responses.	All phases	Contractor		X
4.7	Discuss potential economic opportunities generated by the Project with participating First Nations throughout the Post-EA Certification, Design and Construction Phases of the Project.	Pre-construction; construction	MoTI, Contractor		X
4.8	Obtain input from participating First Nations to identify appropriate measures to mitigate potential project related impacts on their previously identified interests in relation to fisheries and habitat matters.	Pre-construction	Contractor		X
5.0 Stormwater Management					
5.1	Ensure that the design, construction and maintenance of stormwater management infrastructure for the Project takes an integrated approach to stormwater management and contributes to maintaining, or improving, drainage and water quality conditions directly adjacent to the corridor.	All phases	Contractor	TBD	
5.2	Design, construct and maintain stormwater management infrastructure, such that it to meets the performance objectives outlined in the Stormwater Management Plan Outline (July, 2007) and the Application. Monitoring of the infrastructure will be undertaken to confirm performance objectives are met or, if necessary, additional steps are taken to ensure performance objectives are achieved.	All phases	Contractor		X

5.3	Consult with municipalities adjacent to the new construction area such that the approach to the management of stormwater and drainage design is complementary to, and can be integrated with, adjacent municipal stormwater infrastructure.	Pre-construction	Contractor		X
5.4	Provide final designs for stormwater management infrastructure to relevant First Nations and reviewing and regulatory agencies for review and comment at least 30 calendar days prior to relevant construction activities in order to verify that the proposed infrastructure achieves agreed upon performance measures identified in the Stormwater Management Plan Outline (July 2007).	Pre-construction	Contractor		X
5.5	Drain stormwater and road runoff away from red and blue listed plant communities and do not construct integrated stormwater management infrastructure in such habitat areas.	Construction; operation	Contractor		X
5.6	Obtain input from participating First Nations regarding mitigation measures outlined in the stormwater and drainage plan and effective integration of those measures into the design and operation of the Project.	Pre-construction	Contractor		X
6.0 Agriculture					
6.1	Consult with the Agricultural Land Commission (ALC), Ministry of Agriculture and Lands (MAL), Delta Farmers' Institute (DFI), individual farm owners and the CoD, through all future stages of Project development, construction and operation, to ensure impacts to agricultural lands and operations are minimized where possible and appropriately addressed where impacts are unavoidable.	All phases	MoTI, Contractor		X
6.2	Obtain ALC approvals regarding areas within the Agricultural Land Reserve (ALR) required for the project, prior to construction.	Pre-construction	MoTI, Contractor		X
6.3	Develop and implement an Agricultural Mitigation Plan as outlined in the Application that identifies potential impacts to agriculture as a result of project construction activities and measures for avoiding and addressing such impacts where possible. The scope will include those measures outlined in the Application and the Agricultural Enhancement Strategy (April 2008), including but not limited to mitigation measures focused on: - Road access; - Drainage and irrigation; - Utilities; and - Maintaining the agricultural land base.	Pre-construction	Contractor		X
6.4	Finalize and implement specific agricultural enhancement initiatives, including but not limited to, compensation mechanisms focused on improving road access and drainage and irrigation, as part of the application process to the ALC and summarily as part of the Agricultural Enhancement Strategy (April 2008).	Pre-construction; construction	MoTI		X
6.5	Retain the services of a Professional Agrologist to: - Liaise with the owner, Design-Builder and farmer(s); - Oversee a consultation and dispute resolution process for individual farmers affected by the Project; and - Oversee monitoring and effectiveness of measures proposed to address impacts to agriculture during design, construction and operation.	All phases	MoTI		X
6.6	Avoid, to the extent possible, using agricultural lands outside of the Right-Of-Way (ROW), for staging areas. For all agricultural lands that are required for use as staging areas, implement construction BMPs (as noted in the Agriculture Mitigation Plan in the EMP) to manage potential construction related effects and restore lands to pre-construction condition, or better agricultural capability, upon completion of project works.	Pre-construction; construction	Contractor		X

6.7	Consult with individual farm owners, as well as MAL, ALC, CoD, DFI and other stakeholders, to identify potential impacts to agricultural operations and infrastructure and ensure that such impacts are avoided, mitigated for, or appropriately addressed during future stages of design and construction of the Project. The scope of potential impacts to farm operations includes, but is not limited to: - Agricultural drainage; - Utilities; - Road Access; and - Pollinators.	Pre-construction; construction	MoTI; Contractor		X
6.8	Undertake reasonable measures to facilitate the consolidation of parcels of isolated agricultural lands, to promote continued agricultural use of such lands.	All phases	MoTI		X
6.9	Undertake reasonable measure to minimize potential loss of ALR lands, including existing farm(s) by: - Refining the Project footprint where feasible; & - Optimizing use of existing ROW.	Pre-construction; construction	Contractor		X
7.0 Air Quality					
7.1	Ensure that the construction works and operations for the Project are conducted in compliance with environmental permits and approvals and that all reasonable measures are taken to address project-related effects on air quality.	Construction, operation	Contractor		X
7.2	Develop and implement an Air Quality and Dust Control Plan for the construction phase of the project. The plan will: - Include an air quality monitoring program with thresholds, which if exceeded, will trigger the implementation of additional mitigation and corrective measures; - Commit to the best available, known and effective, measures for mitigating construction related air emissions, including diesel particulate matter (PM), as identified by relevant regulatory agencies. This would include, where practical, the use of diesel oxidation catalysts (DOCs) or diesel particulate filters (DPFs) on all on-road and off-road project equipment in combination with use of a B20 biodiesel blend; - Include an anti-idling policy for construction equipment and other vehicles associated with construction related activities; - Commit to fugitive dust minimization strategies (e.g. wheel wash and sweeping), and dust suppression techniques (e.g. watering) on roads; and - Identify site specific considerations, where applicable, such as proximity to sensitive environmental or human receptors.	Pre-construction; construction	Contractor		X
7.3	Provide the Air Quality and Dust Control Plan to Metro Vancouver, Environment Canada (EC), Ministry of Environment (MoE), Transport Canada, Health Canada (HC) and other relevant agencies for review and comment at least 30 calendar days prior to relevant construction activities.	Pre-construction	MoTI, Contractor		X
7.4	Avoid burning as a means for disposing of land clearing debris.	Construction	Contractor		X
8.0 Traffic Management					
8.1	Ensure that the design of the Project is integrated with local road networks, and that construction of the proposed project includes measures for avoiding or minimizing impacts to local road networks.	Pre-construction; construction	MoTI, Contractor		X
8.2	Prepare and implement a Traffic Management Plan in coordination with CoS and CoD to address construction related traffic conditions.	Pre-construction; construction	Contractor		X

8.3	Consult with the CoD, CoS, MoT district office, and other stakeholders to design and construct project infrastructure so that it is effectively integrated with existing and planned local road networks.	Pre-construction; construction	Contractor		X
9.0 Noise and Vibration					
9.1	Ensure that potential noise impacts associated with the project are considered and mitigation provided for during design, construction and operation of the project.	All phases	Contractor		X
9.2	Prepare and implement a Noise and Vibration Management Plan for the construction phase of the Project that will include specific mitigation measures, and locations where they will be applied to address construction related noise.	Pre-construction; construction	Contractor		X
9.3	Prepare a noise complaint protocol as part of the CEMP Noise and Vibration Management Plan to respond in a timely manner to concerns and complaints raised by residents and take reasonable actions to reduce the Project-related construction noise in question.	Pre-construction	Contractor		X
9.4	Provide the construction Noise and Vibration Management Plan to the CoS, CoD and other stakeholders for review and comment 30 calendar days prior to the onset of relevant construction activities.	Pre-construction	Contractor		X
9.5	Design and construct mitigation measures to address potential operational noise impacts on residential areas as part of the project according to the MoT Noise Policy (1993) [referenced as the Noise Policy in this Agreement].	Pre-construction; construction	Contractor	TBD	
9.6	Conduct noise monitoring at the baseline sites during the first year after construction is complete to assess the effectiveness of mitigation measures, with a commitment to further mitigation if necessary, technically feasible and practical.	Operation	Contractor		X
9.7	Consult with the CoD and CoS to look for opportunities to use tree planting and landscaping to mitigate potential visual, noise and air quality impacts.	Pre-construction; construction	Contractor	TBD	
9.8	Participate in meetings with affected communities and residents to address site-specific noise issues in the event that late evening or night time construction works prove necessary in the vicinity of residential areas.	Pre-construction; construction	Contractor		X
9.10	Perform pre-condition surveys to document existing state of buildings and facilities in the vicinity of SFPR construction activities as per standard geotechnical BMPs. This will form the baseline conditions, against which post-construction condition surveys will be carried out to assess any vibration impacts to buildings and facilities as a result of Project construction.	Pre-construction	Contractor		X
9.11	Monitor ground vibrations, as per standard geotechnical BMPs, adjacent to buildings to confirm that vibration levels are within ranges expected to avoid construction-related vibration.	Construction	Contractor		X
10.0 Contaminated Sites and Property Acquisition					
10.1	Ensure that potential site contamination is investigated and managed in compliance with the Contaminated Sites Regulation (Environmental Management Act), during all stages of project development including property acquisition, design and construction.	All phases	Contractor		X
10.2	Assess all Tier 1 and Tier 2 properties required for the ROW for potential contamination prior to construction and take steps, as required, to investigate and address site contamination that may exist.	Pre-construction; construction	MoTI; Contractor		X
10.3	Manage any contaminated groundwater encountered in accordance with the requirements of the Environmental Management Act and associated regulations.	Pre-construction; construction	MoTI; Contractor		X

10.4	Undertake risk assessment and remediation activities, as required, and manage potential contamination in compliance with the provincial Environmental Management Act and Contaminated Sites Regulation.	Pre-construction; construction	MoTI; Contractor		X
10.5	Should contaminated groundwater be identified along the route, include measures to control/mitigate the potential for impacts to surface water in future stormwater design.	All phases	MoTI; Contractor		X
10.6	Notify MoE of potential migration of contaminants from known or identified Tier 1 off-corridor properties of concern discovered during supplementary investigations or Project-related activities and use information to manage and mitigate contaminated sites issues prior to construction.	Pre-construction	Contractor		X
10.7	As part of the CEMP, the Contaminated Sites Management, Construction and Hazardous Waste Management and Spill Management and Emergency Response Plans, develop and implement a protocol for identifying and managing contaminated and potentially contaminated materials during the construction phase of the Project.	Pre-construction; construction	Contractor		X
11.0 Fisheries					
11.1	Ensure that all works and activities associated with the construction, operation and maintenance of the project are conducted in compliance with the <i>Fisheries Act</i> . This includes implementing mitigation measures and best management practices to ensure that the project does not cause any unauthorized harmful alteration, disruption or destruction of fish habitat, that the project does not cause any harm or mortality to fish, and that the project does not cause or result in the deposit of a deleterious substance of any type, including sediment, into a watercourse that is frequented by fish.	All phases	Contractor		X
11.2	Obtain an authorization under subsection 35(2) of the <i>Fisheries Act</i> for any unavoidable harmful alteration, disruption or destruction of fish habitat prior to relevant construction works or activities.	All phases	Contractor		X
11.3	Develop and construct fish habitat compensation measures that offset all project impacts to fish habitat. These fish habitat compensation measures will be constructed by the proponent as directed by Fisheries and Oceans Canada and in accordance with any s. 35(2) <i>Fisheries Act</i> authorizations.	Pre-construction; construction	Contractor		X
11.4	Implement appropriate measures to adequately mitigate the effects of the creation of impervious surfaces on volume of surface runoff, rate of runoff, and water quality. These will meet performance targets established in the Stormwater Management Plan Outline (July, 2007) for the project.	Pre-construction; construction; operation	Contractor		X
11.5	Establish and maintain riparian setback areas from drainage channels and watercourses in accordance with regulatory requirements.	Pre-construction; construction; operation	Contractor		X
11.6	Take all reasonable measures to prevent substances that may be harmful to fish from entering the aquatic environment at the construction sites in the proximity to fish and aquatic habitat, paying particular attention to discharges of suspended sediments, construction waste, handling of uncured concrete and other deleterious substances.	Construction	Contractor		X
11.7	Construct bridges for watercourse crosses in the vicinity of Delta Ravines (i.e. Norum, McAdam, Collings, Nelson View and Gunderson Creeks), as shown in plans attached to the Application (Technical Volume 1) and over a minimum 450 m portion of the Fraser Heights Wetlands, using the design and the construction methods outlined in the draft Fraser Heights Wetlands Bridge Preliminary Design Report.	Pre-construction; construction	Contractor	N/A	

11.8	Obtain input from the Musqueam Indian Band and other participating First Nations to identify appropriate measures to mitigate potential project related impacts on the identified interests of the Musqueam Band in relation to fisheries and habitat matters. Identify potential opportunities for mutually agreeable opportunities to assist in advancing the fisheries interests of the Musqueam Indian Band or other participating First Nations.	All phases	MoTI, Contractor		X
11.9	Review with the applicable regulatory agencies, including but not limited to DFO and MOE, proposals for compensation habitat, including opportunities for habitat to be constructed in advance of other Project construction (i.e. "habitat banking"), to determine the ratio of habitat types and to which drainage compensation will apply.	Pre-construction	Contractor		X
11.10	Follow BMPs in the construction of all new ditches and stormwater watercourses.	Construction	Contractor		X
11.11	Retain maintenance responsibility for compensation sites within the Project limits. For sites constructed in areas outside of the Project limits, establish site-specific agreements for access and maintenance with the relevant stakeholder/landowner.	Operations	Contractor	TBD	
12.0 Water Quality					
12.1	Ensure that the construction works and operations for the Project are conducted in compliance with environmental requirements and BMPs in order to avoid impacts to water quality.	All phases	Contractor		X
12.2	Develop and implement a Surface Water Quality and Sediment Control Plan and provide the plan for review and comment by relevant environmental agencies at least 30 calendar days prior to the start of relevant construction activities.	Pre-construction	Contractor		X
12.3	Sample water from potentially impacted drinking water wells to assess potential adverse effects to water quality associated with during construction and operation phases of the project. Provide sampling water quality data to the local health authority for review and comment.	Construction; operation	Contractor	NA	
12.4	The Surface Water Quality and Sediment Control Plan will at a minimum: - Identify requirements for additional water quality monitoring prior to and during construction to ensure preventative and mitigation measures can be taken as appropriate, to avoid impacts to water quality; - Identify potential water quality contaminants of concern generated by construction activities and associated preventative and mitigative measures; - Include a BMP maintenance plan to ensure BMPs implemented are functioning as designed and corrective actions are taken when required; and - Be submitted to the applicable regulatory agencies at least 30 calendar days prior to start of construction activities for review.	Pre-construction; construction	Contractor		X
13.0 Wildlife and Vegetation					
13.1	Ensure that the design, construction, and operation of the project, avoids where practical and technically feasible, impacts to vegetation and wildlife.	All phases	Contractor		X
13.2	Prepare and implement a Wildlife and Habitat Management Plan to avoid and, where necessary, mitigate potential impacts to vegetation, wildlife and wildlife habitat. Provide the Plan to relevant regulatory and reviewing agencies for review and comment at least 30 calendar days prior to relevant construction activities beginning. The Wildlife and Habitat Management Plan will include best practices including but not limited to those identified in the Application (Table 7.717, draft Wildlife Mitigation Crossing Plan (April 2007) [replaced by the Wildlife and Wildlife Habitat Mitigation Plan (September 2008)], and Zones of Influence memo (July 2007) [replaced by the Wildlife and Wildlife Habitat Mitigation Plan (September 2008)] in order to avoid, and where necessary, mitigate potential effects on	Pre-construction; construction	Contractor		X

	vegetation and wildlife. This plan will also identify protocols for the survey and salvage of vegetation and wildlife as appropriate and required.				
13.3	Develop and implement mitigation measures to avoid and minimize impacts to wildlife during construction and operation of the project including, but not limited to those measures identified in the Application (September, 2006), draft Wildlife Mitigation Crossing Plan (April 2007) [replaced by the Wildlife and Wildlife Habitat Mitigation Plan (September 2008)] and Zones of Influence Assessment memo (July 2007) [replaced by the Wildlife and Wildlife Habitat Mitigation Plan (September 2008)].	Pre-construction; construction	Contractor		X
13.4	During the design phase, MoTI will finalize its determination of the type and location of sound barriers to be constructed along the perimeter of Burns Bog. For the south-western alignment (adjacent to Crescent Slough), this design will include the construction of a solid sound barrier or a barrier that will provide equivalent mitigation. MoTI will ensure on-going consultation with TC, EC, MoE and other IAERC members as appropriate, during design regarding the proposed type and location of sound barriers to be installed around Burns Bog.	Pre-construction	MoTI, Contractor	TBD	
13.5	Consult with the MoE and the Canadian Wildlife Service (CWS) of Environment Canada, to identify suitable compensation, including but not limited to that identified in the Wildlife and Habitat Management Plan and Habitat Compensation Plan (February, 2007) [replaced by Habitat Compensation Plan (May 2007)], to address residual effects on vegetation and wildlife as a result of the Project.	Pre-construction	Contractor		X
13.6	Work with reviewing and regulatory agencies to develop and implement a comprehensive and long term Mitigation Monitoring Plan (MMP) [currently known as the SFPR Vegetation and Wildlife Mitigation Monitoring Plan], based on the Vegetation and Wildlife Mitigation Monitoring Strategy (April 2007) [replaced by the SFPR Vegetation and Wildlife Mitigation Monitoring Plan], to monitor the effectiveness of proposed mitigation measures in addressing Project-related effects on vegetation and wildlife, including species at risk. Data collection and monitoring in support of the implementation of the MMP will begin prior to construction and continue for a period of time, to be determined with relevant regulatory agencies, during operation. Information collected in relation to the MMP will be used to guide detailed planning of mitigation, assess the effectiveness of such mitigation, and determine where additional measures may be required. The MMP will include scientifically defensible thresholds or performance measures to facilitate the evaluation of the effectiveness of mitigation.	All phases	Contractor		X
13.7	Undertake site-specific vegetation surveys in accordance with the regionally supported Protocols for Rare Plants Surveys, to identify the presence and distribution of red- and blue-listed plants species prior to final design and construction. Provide information on the presence and distribution of such plant species to MoE for review and use the information to guide final design and construction to avoid or mitigate impacts to these species.	Pre-construction	Contractor		X
13.8	Avoid direct impacts to sensitive red and blue listed plant communities where possible and adhere to construction exclusion windows determined by regulators.	Construction	Contractor		X
13.9	Develop a plan for salvaging plants and seeds, for review by MoE, where impacts to red and blue listed plant species cannot be avoided, for replanting off-alignment.	Pre-construction	Contractor		X
13.10	Make all reasonable efforts to avoid impacts to confirmed streambank lupine habitat and confirmed stream bank lupine seed banks in the project corridor, as identified in consultation with the Streambank lupine recovery team, during design construction and operation of the Project. Where impacts to such areas cannot be avoided, work with the Ministry of Environment and the Streambank Lupine Recovery team to identify and carry	Construction	Contractor		X

	out appropriate mitigation measures including, but not limited to, the stockpiling of soil containing streambank lupine seeds.				
13.11	Undertake pre-construction bird nest surveys and restrict clearing during the breeding season. Pre- construction bird nest surveys will include, but not necessarily be limited to the following: - Conduct pre-construction raptor, heron or any listed species nest and roost tree surveys, consistent with applicable BMPs, to determine presence of active/inactive raptor and heron nests in the corridor and work scheduling with respect to the nest locations and applicable timing restrictions; - Prepare pre-construction bird nest survey protocols should works include clearing of vegetation during the general bird breeding time period as determined by MOE; - Conduct pre-construction bird nest surveys to the satisfaction of the MOE should the Design-Builder intend to seek approval from the MOE for vegetation clearing within the bird breeding time period (defined by MOE) in any year during the Term.	Pre-construction	Contractor		X
13.12	Consult with MoE on the development and implementation of an Invasive Species Management Plan to address potential effects of the project related to the spread of invasive plant and aquatic wildlife species within the project corridor.	Pre-construction; construction	Contractor		X
13.13	Include large mammal crossings adjacent to the perimeter of Burns Bog. The final number and location of wildlife crossings will be identified in the Wildlife Mitigation Crossing Plan [replaced by the Wildlife and Wildlife Habitat Mitigation Plan (September 2008)] which will be finalized in consultation with MoE and EC.	Pre-construction	Contractor		X
13.14	Follow the design criteria outlined in the MOT Manual of Aesthetic Design Practice and the MOT Landscape Policy and Design Standards that form the landscape and site restoration design criteria for the Project.	Pre-construction; construction	Contractor		X
13.15	Use data collected through the MoTI administered Wildlife Accident Reporting System to identify areas of increased wildlife collisions and to monitor direct effects on wildlife.	Operations	Contractor		X
13.16	Identify the location of sensitive wildlife habitats, including but not limited to habitat for species at risk, red and blue listed plant communities and high biodiversity habitats, on detailed design drawings in order to avoid or minimize potential effects to these areas.	Pre-construction	Contractor		X
14.0 Species at Risk					
14.1	Ensure that all reasonable measures are taken to avoid or lessen effects of the Project on listed wildlife species and their critical habitat and that potential effects that could occur are monitored. All mitigation and monitoring measures will be undertaken in a manner that is consistent with applicable recovery strategy and actions plans.	Pre-construction; construction	MoTI, Contractor		X
14.2	Undertake a salvage program for Pacific water shrew from, at a minimum, high and moderate-rated habitat adjacent to the SFPR. Other areas potentially requiring salvage will include lower-rated habitat, connected to higher-rated habitat, and will be determined in consultation with MoE and the PWS Recovery Team.	Pre-construction; construction	Contractor		X
14.3	Consult with MoE regarding the mitigation of potential effects on Pacific water shrew and take all practical steps to apply the most recent Pacific water shrew best management practices to address potential effects, including identifying additional opportunities to avoid direct effects to areas, designated as critical habitat by the PWS Recovery Team, during design, construction and operation.	Pre-construction; construction	Contractor		X
14.4	Consult with MOE to develop a mitigation and compensation strategy for Pacific water shrew, where opportunities are available, based on habitat quality and connectivity to	Pre-construction; construction	MoTI, Contractor		X

	surrounding habitat. Undertake sampling program, where required, to determine the presence and distribution of Pacific water shrew to support detailed design of mitigation.				
14.5	Detailed design of wildlife crossing mitigation for southern red-backed vole (RBV) will be conducted assuming the presence of RBV in high and moderate rated habitat identified in the EA. Monitoring of the use of wildlife crossing structures will include provisions for assessing the use of such structures by RBV.	Pre-construction	Contractor	N/A	
14.6	Undertake a review of local museum specimens to confirm the distribution of <i>Sorex rowheri</i> within the Lower Fraser Valley. Where possible, use findings to support detailed design of mitigation.	Pre-construction	Contractor		X
14.7	Use information obtained through the Mitigation Monitoring Plan [currently known as the SFPR Vegetation and Wildlife Mitigation Monitoring Plan (February 2008)] to support detailed planning of mitigation to address potential noise, visual and collision effects of the project on barn owl. Undertake long term monitoring of the effectiveness of such mitigation as part of the implementation of the Mitigation Monitoring Plan [currently known as the SFPR Vegetation and Wildlife Mitigation Monitoring Plan (February 2008)].	All phases	Contractor	N/A	
14.8	Use information obtained through the Mitigation Monitoring Plan [currently known as the SFPR Vegetation and Wildlife Mitigation Monitoring Plan (February 2008)] to support detailed planning of mitigation, including pre-construction salvage where appropriate, to address potential effects of the project, including those related to collision and changes in hydrology, on red-legged frog and western toad. Undertake long term monitoring of the effectiveness of such mitigation as part of the implementation of the Mitigation Monitoring Plan [currently known as the SFPR Vegetation and Wildlife Mitigation Monitoring Plan (February 2008)].	All phases	Contractor		X
14.9	Consult with MOE to plan and undertake at least one preconstruction, one construction and two operational inventories of at-risk aquatic insects in habitat known to or suspected of supporting such species and potentially affected by the project, including but not necessarily limited to the Fraser Heights Wetland, to confirm the findings of the environmental assessment and to monitor potential impacts of the project on aquatic insects.	All phases	Contractor	N/A	
14.10	Consult with the Canadian Wildlife Service to develop and implement a Mitigation Monitoring Plan [currently known as the SFPR Vegetation and Wildlife Mitigation Monitoring Plan] to monitor and assess the effectiveness of measures proposed to avoid or mitigate potential effects on Sandhill Crane. The Plan will identify: - species habitat requirements; - existing conditions in the project area; - potential project related effects and mitigation; - core indicators for assessing the effectiveness of mitigation; and - proposed study methodology and data interpretation and reporting protocols.	Pre-construction; construction	MoTI	N/A	
15.0 Burns Bog					
15.1	Avoid potentially significant impacts to hydrological and ecological values associated with Burns Bog (i.e. alignment refinements to avoid ecological and hydrological values, development of hydrological mitigation that meet the hydrologic objectives identified).	All phases	MoTI, Contractor		X
15.2	Consult with the MV, CoD, MoE, EC, and the Burns Bog Management Planning Committee (BBMPC) and Scientific Advisory Panel (SAP) to ensure design, construction and operation of the Project complements long term management objectives established for the Burns Bog Ecological Conservation Area.	All phases	Contractor		X

15.3	Consult with the reviewing agencies to finalize construction and post construction monitoring requirements related to Burns Bog including, but not limited to, those identified in the Vegetation and Wildlife Mitigation Monitoring Strategy (April 2007) [replaced by the SFPR Vegetation and Wildlife Mitigation Monitoring Plan]. Monitoring requirements with respect to Burns Bog will include but not be limited to those relating to: air quality, water quality, water levels, red-listed plant communities, and wildlife	Construction, operation	Contractor		X
15.4	Share environmental data from Burns Bog collected as part of the development of the SFPR project, with agencies responsible for the management of the Burns Bog Ecological Conservancy Area in order to support the implementation of the long-term management plan for the Bog.	All phases	Contractor		
15.5	Design, construct and operate hydrology mitigation infrastructure, to mitigate potential effects of the project on the hydrology of Burns Bog, in a way that meets the following performance objectives: - Site specific solutions – the design, construction and operation of hydrology mitigation will be based on, and take into account, site specific conditions. - Compatibility between highway water management and bog water management – Providing for active water level controls in the Bog that are independent of SFPR-related water management. - Prevention of mineral migration into the Bog. – Where indicated, providing a low permeability barrier between the SFPR highway ditch and the lagg ponds/ditches by: using material to construct the berm that supports appropriate vegetation on the berm and prevents the introduction of mineral material into the Bog; and maintaining hydraulic gradients so that Type 1 bog waters flow toward the highway at all times. - Resilience – Providing a design that is sufficiently robust to maintain and actively manage water levels under average and extreme conditions and if Bog conditions change. - Highway and mitigation construction does not preclude future restoration of Burns Bog – Providing flexibility of design that allows, for example, for future water control structures that allow for raising of water level as part of future bog restoration. - Holistic design – Hydrology mitigation concepts are designed in way that ensure they will be compatible with, and help achieve multiple, mitigation requirements. As the design of hydrology mitigation is advanced, it will be documented in a Hydrology Work Plan [currently known as Hydrology Workplan (Burns Bog)]. This document will be finalized prior to commencement of pre-load activities around Burns Bog.	All phases	MoTI		X
15.6	Pre-load activities around Burns Bog, including areas north of the Highway 99 interchange and west of Nordel Way, will not commence until TC (and other decision-making authorities as required) has reviewed and is satisfied with the final Hydrology Work Plan and the status of the hydrology mitigation design.	Pre-construction	MoTI		X
15.7	Provide opportunities for the active involvement of agencies responsible for the management of the Burns Bog Ecological Conservancy Area, and the Scientific Advisory Panel (SAP), in the design, construction and operation of project related works adjacent to Burns Bog including but not limited to those proposed as mitigation for potential project related effects.	All phases	MoTI, Contractor	TBD	
15.8	Consult with MV, CoD, EC and MoE on the development of a water balance model and a drainage model to support the design, construction and operation of hydrology mitigation infrastructure adjacent to Burns Bog and support implementation of the Burns Bog Ecological Conservancy Area Management Plan.	Pre-construction	Contractor	TBD	

18.1	Obtain regulatory approval related to crossings of designated Navigable Waters pursuant to the Navigable Waters Protection Act (NWPA), including but not necessarily limited to, McAdam Creek, Collings Creek, Manson Canal, and Crescent Slough, prior to commencement of works.	Pre-construction, construction	MoTI, Contractor	N/A	
19.0 Socio-economic					
19.1	Mitigate potential Project-related visual/lighting impacts through use of screening, fencing and landscaping in consultation with local government. Use dark-sky compliant lighting for the Project.	Pre-construction, construction	Contractor	TBD	
19.2	Manage potential impacts to emergency response services by: - Ensuring emergency response plans (including a Spill Response Management and Emergency Response Plan) are in place during the construction phase of the Project, and updated annually, at a minimum; - Consulting first responders in Traffic Management Plan development; and - Consulting with local fire departments to ensure adequate access.	Pre-construction, construction	Contractor		X
20.0 Rail					
20.1	Avoid or minimize potential impacts from Project works and activities to rail corridors.	All phases	Contractor		X
20.2	Notify Transport Canada of project works as required under the <i>Notice of Railway Works Regulations</i> . Notify the public and affected stakeholders in accordance with the <i>Railway Safety Act</i> .	All phases	Contractor	TBD	
20.3	Comply with Canadian transportation standards and regulations as well as the design specifications of the respective railway with regard to vertical and horizontal railroad clearance of new or upgraded infrastructure.	Pre-construction	Contractor	TBD	
20.4	Minimize railroad closures during construction.	Construction	Contractor		X

APPENDIX 2: ENVIRONMENTAL SPILL AND INCIDENT TRACKING SPREADSHEET

APPENDIX 3: PERMIT TRACKING