



Pacific
Gateway
Constructors

Environmental Annual Report 2020

10 May 2021

		Highway 91/17 Upgrade Project	
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EXECUTIVE SUMMARY

The Highway 91/17 Upgrade Project will improve travel safety and efficiency on Highway 91, Highway 17 and the Highway 91 Connector and 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). The Project is part of the wider Highway 91/17 and Deltaport Way Upgrades. These upgrades will improve travel in the area and will reduce conflicts between local traffic, commercial vehicles and other travelers. The work is designed to complement the 72nd Avenue Interchange Project and the Alex Fraser Bridge Improvements Project.

In 2020, most of the clearing, grubbing, topsoil stripping, and placement of preload sand was completed within three sections of the Project (Sections 1, 3 & 4). Excavation work, installation of culverts, placement of preload sand (except for Section 1), placement of surcharge layer, permanent drainage installations, paving, line painting and sign installations are yet to be completed for all Sections of the Project.

A Construction Environmental Management Plan (CEMP) 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. In 2020, activities undertaken to support CEMP implementation included: development and implementation of 14 Environmental Work Plans (EWPs), obtaining required permits, wildlife salvages, vegetation surveys, environmental monitoring and reporting, and design refinements to reduce environmental effects of the Project. Estimated environmental effects of the Project have been reduced by approximately 40%, from the reference design, through design refinements.

Monthly environmental progress reports were prepared and have been forwarded to MoTI, the B.C. Ministry of Forests, Lands, Natural Resources Operations and Development (FLNRORD) and Fisheries and Oceans Canada (DFO). The 2020 Summary Report summarizes construction works and all related environmental aspects from April 30 to December 31, 2020.

All approvals for work, including those required under the *BC Water Sustainability Act* (WSA) applications and DFO, were obtained prior to the start of the Project works. As a condition of such approvals, the Project is required to identify offsets for Project-related instream, riparian and wetland impacts. To meet offsetting requirements, Pacific Gateway Constructors (PGC) prepared an Environmental Enhancement Mitigation Plan (EEMP), which has been shared with MoTI, Environmental Agencies, and Indigenous Groups for review and comments. Other required permitting included a General Wildlife Permit and Fish Salvage (FLNRORD)/Scientific Collection Permit (DFO) to salvage fish.

Rare and invasive plant surveys were completed under ideal conditions based on season and breeding bird surveys inside the nesting window were also completed prior to the start of construction. No rare plants were found, and invasive weeds were treated by PGC. Two federally listed Species at Risk were identified through the salvage efforts. The provincially Red-listed Pacific water shrew (*Sorex bendirii*) and the provincially Blue-listed Northern red-legged frog (*Rana aurora*) were salvaged and relocated.

Environmental daily and weekly reporting documented spills and issues that occurred during 2020 construction. There was a total of 37 environmental issues recorded, with 20 of those being environmental spills including one involving sediment laden water. As of 31 December 2020, there were 7 outstanding

issues. All spills have been addressed and, where necessary, remedial action undertaken to refine practices to avoid and respond to spills.

Known contaminated soils are located in areas within the Project footprint, specifically within Sections 1 and 2. Permits and approval applications have been prepared to support appropriate management of contaminated materials through an Approval in Principle with the Ministry of Environment (September 2020). Measures to mitigate and handle contaminated material are presented in the CEMP.

During archaeological investigations it was determined that the Project footprint overlaps archaeological sites. A Heritage Conservation Act (HCA) Section 12.4 was obtained 28 September 2020 and the existing Section 12.2 permits (under Golder) have been extended while a new 12.2 permit (by PGC/Kleanza) is currently under review. First Nation permits for both HCA 12.4 and 12.2 applications have been submitted to the Nations for review. Known sites have been discreetly marked in the field to prevent encroachment by heavy machinery and construction personnel. All personnel are aware of the known Archaeological sites within the Project footprint and the requirements of the Chance Find Procedures.

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. These upgrades are being 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 is guided by the Construction Environmental Management Plan (CEMP) which includes measures to avoid or address potential project-related effects and ensure compliance with Design Build SS 165 Protection of the Environment, project-related permits and approvals.

This document represents PGC's Annual (2020) summary of the implementation of environmental requirements associated with the CEMP and includes: a summary of construction activities completed up until December 31, 2020, an overview of delivery of key elements of PGCs environmental management approach, environmental issues identified, and mitigation measures, outstanding environmental works and commitments, pre-construction preparation (permitting, rare and invasive plant surveys, nesting surveys, fish and wildlife salvages), contaminated sites management, and archaeology and heritage resources.

2.0 WORKS COMPLETED TO DATE

All construction activities took place from 30 April 2020 to 31 December 2020. Fish and wildlife salvages took place in April, May, September and October prior to any clearing and grubbing in those areas. The Project has been subdivided into Sections 1 - 4 as illustrated in Figure 1. Construction works have been summarized below by these Sections.

2.1 SUMMARY OF CONSTRUCTION ACTIVITIES

Section 1 – River Road Interchange

All clearing and grubbing, topsoil stripping, placement of preload sand has been completed in Section 1. A detour near Silda ditch was completed and is in operation for construction of the underpass to occur on Highway 17. Temporary and permanent culvert installations have occurred for River Road ditch. Construction site isolation, fish and wildlife salvages, and pre-clearing nest surveys were completed prior to works. Approximately 4.63 ha of habitat has been disturbed in Section 1.

Section 2 – Sunbury Interchange

All topsoil stripping has been completed in Section 2, with some placement of preload, although much of the area has been untouched. Widening of Highway 17 at the western extent of the Project has occurred as well as the culvert extension on 96th Street ditch downstream of the highway, and a stormwater outfall and drainage south of the highway. Isolation, salvage and dewatering has been completed for the works on 96th Street ditch. Approximately 3.46 ha of habitat has been disturbed in Section 2.

Section 3 – Weigh Scale Access Interchange

All clearing and grubbing and topsoil stripping have been completed in Section 3. Burns bog has been isolated, salvaged and infilled with preload south of Highway 91C. Construction of Weigh Scale Road has not begun. Approximately 6.38 ha of habitat has been disturbed in Section 3.

Section 4 – Nordel Interchange

The majority of clearing and grubbing, and topsoil stripping has been completed in Section 4. Widening of the onramp heading south onto Highway 91 and preload placement near Delta Nature Reserve has occurred. Isolation and fish and wildlife salvage occurred prior to clearing and grubbing. Approximately 3.18 ha of habitat has been disturbed in Section 4.

Overall, excavation work, installation of culverts, placement of preload sand, placement of surcharge layer and permanent drainage installations has been completed in most areas. Paving, line painting and sign installations are yet to be completed for all Sections.

Offsetting for the Project has yet to commence but will be planned in areas as construction is completed and practical, and after the new road alignments are in operation. Currently the offsetting options are being revised after the initial review by MoTI, and will be submitted to FLNR once they are completed

Areas of habitat disturbance as well as upcoming work are presented in *Appendix 2*.

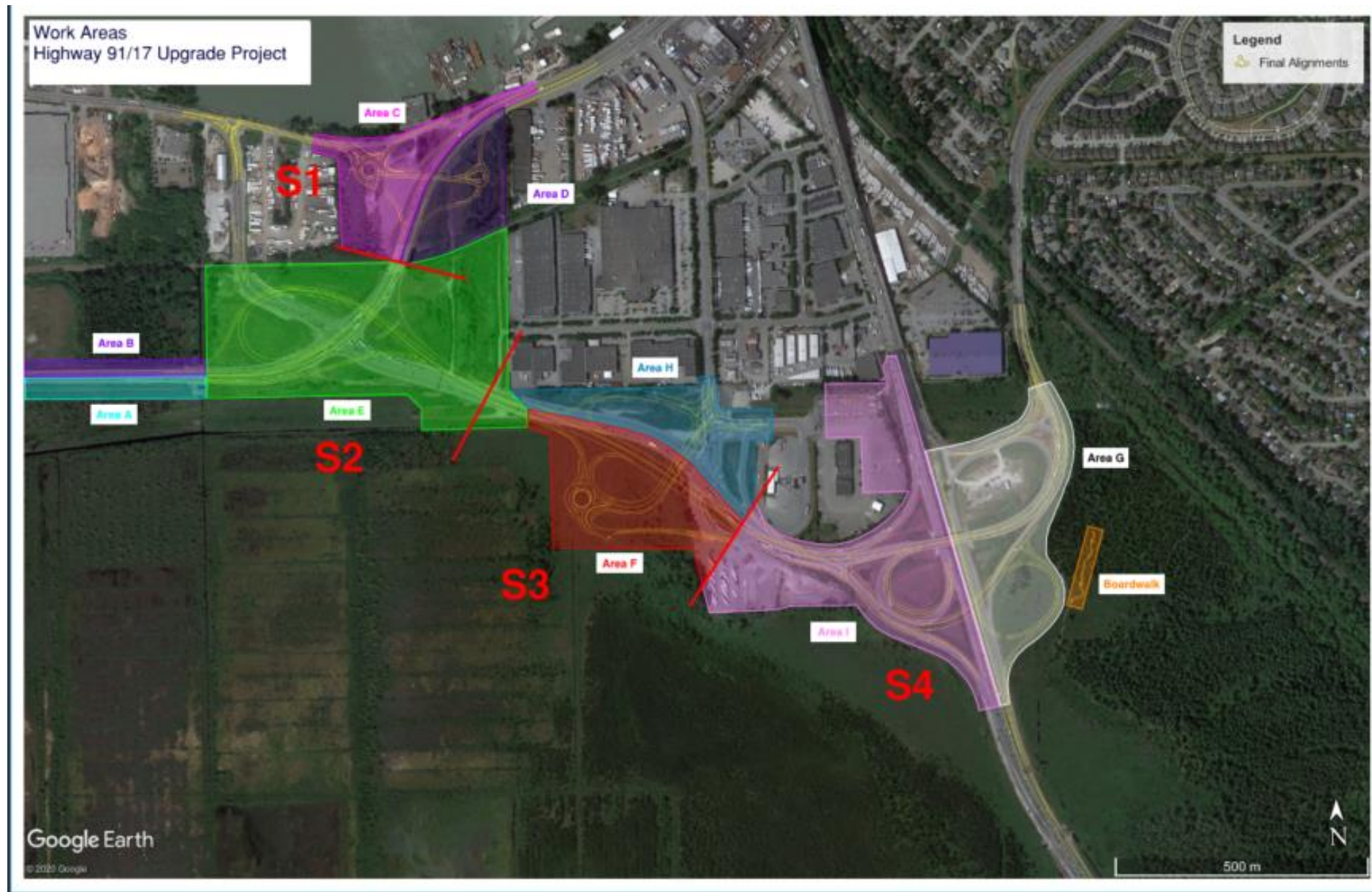


Figure 1: Approximate Work Area Locations

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 Project Environmental Assessment Certificate (EAC) Table of Commitments and Assurances, as presented in *Appendix 1*. This section provides a summary of the environmental management program that was implemented for the Project in 2020 and focuses on: CEMP development, permitting requirements, CEMP monitoring and reporting activities, and refinements to the project design undertaken to avoid or reduce environmental effects.

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 (Application), and the EAC for the South Fraser Perimeter Road Project (part of which overlaps with the Project).

The CEMP is a working document that addresses general mitigation measures for construction of the Project and includes 14 Environmental Work Plans (EWP) that were completed by PGC team. The CEMP was finalized 04 May 2020 prior to the start of construction. The CEMP has been 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 is a working document, changes were required early in the construction phase to address site specific conditions on the ground. 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).

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

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.
Appendix B:	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

Sub-Plan	Plan Summary
Air Quality and Dust Control Plan (AQDCP)	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.
Appendix C: Archaeological Chance Find Management Procedure (CFMP)	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.
Appendix D: Construction and Hazardous Waste Management Plan (CHWMP)	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.
Appendix E: Contaminated Sites Management Plan (CSMP)	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.
Appendix F: Contractor Awareness and Education Plan (CAEP)	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 to ensure proper awareness and education in relation to the various CEMP sub-plans. Monitoring the

Sub-Plan	Plan Summary
	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, debriefing, follow-up reporting and EMT members responsible for the implementation of the SMERP. In addition, the SMERP identifies relevant external contacts.

Sub-Plan	Plan Summary
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 PGC personnel 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
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	Daily Environmental Monitor
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
Andre Felicio, PGC (present)	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
Kyle D'Appolonia, RP Bio., AQP, MESL	Environmental Monitor	Weekly Environmental Monitor/auditor, preparing weekly EM reports
Dave Hayward, RP Bio., CPESC, Brybil	Environmental Lead	Preparation of the CEMP, EEMP, Obtain Permits and Approvals for all instream work and salvages, Monthly and Annual reporting
Brendan Reddington, MoTI	Environmental Project Coordinator	Review of all environmental submissions from the PGC and liaising with Agency staff and Stakeholders.

3.2 PERMITTING

Approvals for all instream and wetland/bog habitat impacts required to support work over 2020, have been obtained and are outlined in the Permit Tracking List in *Appendix 3*.

Permits under the *Water Sustainability Act (WSA)* for 9 distinct areas were obtained. Fisheries and Oceans Canada (DFO) were also requested to complete their review of the same 9 areas. In addition, a General Wildlife Permit and Fish Salvage/Scientific Collection Permit were obtained to allow for salvage activities to occur prior to clearing and grubbing and instream work.

As Project designs progressed, impacts were reduced in response to engagement with permitting agencies which was supported, in some cases, by providing additional design information to address questions from regulators. In addition, as part of the approvals conditions, MoTI had to offset for instream, riparian and wetland impacts that resulted from the Project. To meet these regulatory requirements, PGC prepared and submitted an Environmental Enhancement Management Plan (EEMP) that identifies habitat enhancement elements designed into the project to offset permanent footprint impacts resulting from the Project. The EEMP (April 2021) has been shared with MoTI, Environmental Agencies, and Indigenous Groups for review and comments.

No construction began prior to obtaining applicable permits and approvals, including a General Wildlife Permit and Scientific Collection Permit to salvage wildlife and fish. Rare and invasive plant surveys and breeding bird nest surveys inside the window of March 15 to August 15 were also completed prior to the start of construction. No rare plants were found, and invasive weeds were treated by PGC. Permit amendments, variance requests, and extensions were also required for work extending beyond approved dates.

As required under conditions of the WSA Approval granted for the Project, the Environmental Manager or Field Coordinator from PGC was always present during all day and night shifts to monitor construction activities and inspect the work sites according to the environmental requirements outlined in the CEMP, EWPs, Provincial (WSA) and Federal (*Fisheries Act*) legislation.

3.3 MONITORING AND REPORTING

Environmental monitoring and reporting, that supports CEMP implementation, is critical to ensure compliance with terms and conditions of 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 are provided by the Project auditor and the monthly reports are developed based on those summaries. The monthly reports are submitted to MoTI for review and filing. Annual reporting (this document) is provided to MoTI at the end of each year of construction.

Environmental monitoring and reporting did identify some minor environmental issues during the construction phase for the Project in 2020, though such events did not result in substantial negative environmental impacts and were fully mitigated through follow up undertaken as a result of environmental reporting (e.g., broken hydraulic lines, leaking machines, litter/garbage, minor sediment releases). Each minor issue was managed appropriately on the ground and opportunities for improvement were assessed

to reduce potential future occurrences. Additional information on specific environmental issues is provided in Section 4.0.

To support continual improvement in refining environmental practices, training and communication between environmental and construction staff occurs regularly to address the past and ongoing or potential issues. In 2020 environmental training included the use environmental advisory notices that were distributed on site and signed copies were scanned and filed on the SharePoint. Topics were chosen based on visual observations for possible and current issues on site.

3.4 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.

A number of 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 BC 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.

Additional improvements have been made throughout construction including, an amendment was requested under the WSA to expand the footprint in Section 4, however the request was soon rescinded as PGC was able to utilize excess peat material as part of their design thereby eliminating the need for an expanded footprint. In another case, the design team incorporated a liner into the bog interface to separate bog and non-bog water in Section 4.

4.0 ENVIRONMENTAL ISSUES

Environmental issues for the 2020 construction period have been tracked daily, weekly and monthly either by the PGC Environmental Manager, PGC Field Coordinator or MESL Environmental Monitor. Daily reports provided by the PGC supplement the weekly auditing activities which in turn feed into the monthly Environmental Reports (Brybil) to capture this information. In total there were 37 environmental issues that were used to improve and modify practices for 2020.

Of the 37 issues, environmental spills, that are defined as a release of a hydrocarbon product (or equivalent) to ground or water equaled 19. Fifteen of these spills were minor in nature (<1 L) while 4 ranged between 1.1 and 5 L. Items #3, #7, #11 and #20 listed on the spill tracking spreadsheet to the end of 31 December 2020 was reported to MoTI (*Appendix 4*).

An additional 18 environmental issues were identified during construction in 2020 that were minor and are not uncommon during the construction phase of road infrastructure, including for example: effectiveness of sit 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 easily corrected with increased equipment inspections, the installation of drip trays and increased monitoring efforts to advise the PGC on deficiencies.

Two of the 4 incidents that were reported to MoTI were also reported externally to Emergency Management BC and are as follows:

1. Item #3 occurred 17 September 2020 when 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.
2. Item #11 occurred on 26 October 2020 where emulsified bitumen migrating offsite to a drainage ditch. Emergency Management BC was notified (File Number 202551) and DFO.

In the case of the sediment laden water in Site G of Section 4 (Item #20), measures that were put in place included changes to the pumping system which corrected the issue by directing flow to sediment bags, which allowed the sediment to dissipate before reaching the watercourse. Crews were advised to be more cognizant of changing weather patterns to prevent this from happening in the future.

Hydrocarbon spills have been reduced by training staff to check all equipment regularly for leaks, drips and excess grease and having extra drip trays for placing under stationary and ideal machines.

As of 31 December 2020, 7 of these issues were outstanding (*Table 3*). All spills have been consistently documented and have been immediately cleaned up. All generated hazardous waste that been stored in marked drums, under cover and on pallets at the office laydown yard and removed and documented when volumes are warranted. Spills in higher profile areas are reinspected after cleanups were completed to make sure there are no further resulting issues. No residual impacts on aquatic life were detected during routine inspections. Changes were made on site to add additional spill kits, complete additional awareness training and removal of faulty equipment from site. More pre-site inspections were initiated on equipment arriving on site prior to works.

Based on repeated events during standard construction work practices encountered in 2020, PGC has implemented measures to ensure that environmental impacts are managed correctly. These measures include daily toolbox meetings commencing in 2021, increased communication between staff and their managers, increased spill training and education with wildlife encounters. A higher turnover of staff early on with the Project resulted in increased training procedures for all new staff.

Table 3: Outstanding Environmental Issues Tracking Table

Item No	Date	Environmental Issue or Required Action	Corrective Action	Projected Closure Date	Open/ Closed	Comments
29	02 December	Trash issue at Area E (MESL)		04 December	Open	Communicated with contractors
30	02 December	Drip trays had not been placed beneath some idle equipment, despite the trays being readily available (MESL)		04 December	Open	They are being used now
31	02 December	Flooding in Area C at L250 and S1 stockpile area	Water management	08 January	Open	Additional sediment fence has been installed. A drainage swale has been cut to provide a flow path to River Rd ditches. A check dam has been built prior to entry into River Rd ditch. Additional ESC is required on S1 slopes. Poly will likely be used a short-term solution.
32	09 December	Damaged or otherwise lacking CB inserts along River Road West (C)	Install new CB inserts once they have been received	08 January	Open	Additional catch basins have been ordered - foreman has been informed
33	15 December	Diesel spill (~2 L) near the office trailers	A large, specialized containment had been ordered (prior to the incident) for refuelling jerry cans at the office trailers	8 January	Open	Specialized containment arrived on site and will be constructed in early 2021. All Jerry cans will be stored securely over the holiday closure.
34	10 December	Increase in Noise Level Section 3	Monitor trend	8 January	Open	Next noise monitoring scheduled for early January to ensure levels return to normal when short duration work finishes.
35	16 December	Lacking spill trays or otherwise used incorrectly	Utilize spill trays as intended	08 January	Open	Ongoing issue which has been relayed to the PGC Enviro. Representative. Additional training will be provided in January.

5.0 SUMMARY OF OUTSTANDING ENVIRONMENTAL WORKS AND COMMITMENTS

A summary of remaining environmental works and commitments with a general timeline of when these will occur are presented in *Appendix 2*. As indicated in Section 1.1 of this report, all excavation work, installation of culverts, placement of preload sand (except for Section 1), placement of surcharge layer, permanent drainage installations, paving, line painting and sign installations are yet to be completed for all Sections of the Project site. Each section still has outstanding work to be completed and various activities are occurring concurrently.

Restoration and offsetting have been planned and will begin immediately after construction is completed. The schedule for the environmental offset construction is expected to occur after a majority of road construction has been completed (likely 2022 and 2023 based on Schedule 3 of the DBA Substantial and

total completion dates). Once approved, the schedule for implementation of the EEMP, and development of habitat offsetting, will be incorporated into the construction schedule.

6.0 FISH & WILDLIFE SALVAGE RESULTS

The federal *Species at Risk Act* (SARA) provides legal protection of wildlife and their habitats designated under Schedule 1 of SARA (SC 2002, c.29). The purpose of SARA is to prevent Canadian indigenous species, subspecies, and distinct populations from becoming extirpated or extinct, to provide for the recovery of endangered or threatened species, and to encourage the management of other species to prevent them from becoming 'at risk'. SARA makes it an offence in Sections 32 and 33 to kill, harm, harass, capture or take an individual of a listed species that is extirpated, endangered or threatened; possess, collect, buy, sell or trade an individual of a listed species that is extirpated, endangered or threatened, or its part or derivative; and damage or destroy the residence of one or more individuals of a listed endangered or threatened species or of a listed extirpated species if a recovery strategy has recommended its reintroduction. SARA protects species, their residences, and critical habitat.

Two Species at Risk were captured and relocated as part of the pre-construction salvage efforts. The presence of the Pacific water shrew (*Sorex bendirii*), a provincially Red-listed species (SARA 1-Endangered (2002)) and the Northern red-legged frog (*Rana aurora*), a provincially Blue-listed species (SARA 1-Special Concern (2005)) was confirmed within the Project area. One change to the salvage efforts were to increase checks from two to three checks per day, in an attempt to reduce the time wildlife were in traps and reduce mortality risk.

Salvage activities were conducted by PGC, as per the requirements of the Scientific Fish Collection Permit SU20-601411 & Wildlife Permit SU20-601719. All animal handling was consistent with permit conditions, including those described in Live Animal Capture and Handling Guidelines for Wild Mammals, Birds, Amphibians and Reptiles¹, and in relevant publications by the Canadian Council on Animal Care². 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 Fieldwork³. Salvage operations for small mammals followed the Best Management Practices for Pacific Water Shrew in Urban and Rural Areas⁴ and

¹ BC Ministry of Environment. 1998. Live Animal Capture and Handling Guidelines for Wild Mammals, Birds, Amphibians and Reptiles: Standards for Components of British Columbia's Biodiversity No. 3. Prepared by the Ministry of Environment, Lands and Parks, Resource Inventory Branch for the Terrestrial Ecosystem Task Force Resources Inventory Committee. December 1998. Version 2.0. Available at: <https://www.for.gov.bc.ca/hts/risc/pubs/tebiodiv/capt/assets/capt.pdf>

² Canadian Council on Animal Care. 2003. Guideline on: The Care and Use of Wildlife. Available at: <http://www.ccac.ca/Documents/Standards/Guidelines/Wildlife.pdf>

³ BC Ministry of Environment. 2008. Interim Hygiene Protocols for Amphibian Field Staff and Researchers. Prepared for the BC Ministry of Environment Ecosystems Branch. Available at: http://www2.gov.bc.ca/assets/gov/environment/plants-animals-and-ecosystems/wildlife-wildlife-habitat/wildlife-health/wildlife-health-documents/bc_protocol-amphibian_field_researchers.pdf

⁴ Best Management Practices for Pacific Water Shrew in Urban and Rural Areas. Craig et al. 2010.

the Best Management Practices for Amphibian and Reptile Salvages in British Columbia⁵ for amphibian and reptile salvages.

All wildlife and fish species salvaged were relocated to the closest habitat that was similar to where they were found. Pacific water shrew found on Section 3 were relocated directly west of the sites. Northern red-legged frogs were relocated south east of where they were captured in Section 4.

Fish and wildlife salvages took place in April, May, August for Sections 1 & 2; September for Sections, 1, 2 & 3, prior to construction beginning in those areas. From April 30 to October 30, 2020, there were 585 wildlife captured (Table 4). There were 3,138 aquatic individuals salvaged from May to October 2020 including. In total, 3723 wildlife and aquatic species were salvaged. 58 American bull frog (*Lithobates catesbeianus*) were removed from the site. Invasive wildlife was managed following the wildlife permit conditions. Additional fish salvages were completed in September and October, but no fish were captured.

Table 4: Wildlife and aquatic species salvaged from April to December 2020

Wildlife Species - Common Name	Scientific Name	Number of individuals
common shrews	<i>Sorex araneus</i>	273
vagrant shrews	<i>Sorex vagrans</i>	2
north American deer mouse	<i>Peromyscus maniculatus</i>	191
Townsend's vole	<i>Microtus townsendii</i>	3
Pacific water shrew	<i>Sorex bendirii</i>	4
creeping vole	<i>Microtus oregoni</i>	3
common vole	<i>Microtus spp</i>	1
common rats	<i>Rattus spp</i>	10
western terrestrial garter snake	<i>Thamnophis elegans</i>	7
birds	unidentified species	1 wren and 1 sparrow
Total Wildlife	585	
Aquatic Species - Common Name	Scientific Name	Number of individuals
three-spined stickleback	<i>Gasterosteus aculeatus</i>	2,786
coho salmon	<i>Oncorhynchus kisutch</i>	7
carp	<i>Cyprinus carpio</i>	1
sculpin	<i>Cottoidea spp.</i>	2
northwestern salamander	<i>Ambystoma gracile</i>	263
long-toed salamander	<i>Ambystoma macrodactylum</i>	3
green frogs	<i>Lithobates clamitans</i>	18
northern red-legged frog	<i>Rana aurora</i>	6
American bull frog	<i>Lithobates catesbeianus</i>	58
Total aquatic animals	3,138	
Total individuals salvaged	3,723	

⁵ Best Management Practices for Amphibians and Reptiles in Urban and Rural Environments in British Columbia. 2016. BC Ministry of Forests, Lands, Natural Resources, Operations and Development.

<http://a100.gov.bc.ca/pub/eirs/viewDocumentDetail.do?fromStatic=true&repository=BDP&documentId=13110>

7.0 CONTAMINATED SITES MANAGEMENT

Section 1 and 2: Section 1 and 2 contaminated material is managed via an Approval in Principle (AiP) for specific areas identified and Notice of Independent Remediation (NIR) processes for all other areas. In support of managing CSR “waste levels” otherwise referred to as “IL+” soils, the design/build team is 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 majority of these documents have been provided with the AiP application documents, which the AiP application was submitted to MoE on 04-September-2021. MoE advised that the application had been queued within the ministry for review in early December 2020.

In Section 1, construction activity associated with management of IL+ soils included excavation into the contaminated material zone for detailed bridge excavation commenced in late November-2020. Approximately 250m³ of material was stockpiled for characterization. The following potential contaminants of concern were tested: metals, BTEX/VOCs/VH,LEPH/HEPH/EPH, and salinity. Excavation into the contaminated zone was paused as groundwater was encountered. The groundwater in this area has known contamination. Excavation was scheduled to recommence in January with the mobilization of a water treatment facility to site. A Notice of Independent Remediation (NIR) was submitted for the excavation of this material as the AiP approval is pending. Construction works followed all relevant guidance documents prepared (and listed above) and also referred to MoE approved in situ and ex-situ sampling and characterization guidelines including but not limited to Technical Guidance #1.

Section 3 and 4: Contaminated materials in Sections 3 and 4 will be managed via NIR and all contaminated material will be removed from site and disposed of at a facility permitted to accept the material. A memorandum was completed in July 2020 to provide direction of procedures for soil and process water management during stone column installation in Section 3 and 4. No off-site disposal was needed for completion of this activity. Excavation of a utility trench along the south and west sides of 8099 Nordel Way is anticipated for May 2021. Two memorandums were started in 2020 and completed in February 2021; one detailing management of excavated soil and the second detailing management of groundwater for when the excavation takes place. To date the disturbance of soil and/or water in Sections 3 and 4 have been minimal.

8.0 ARCHAEOLOGY AND HERITAGE RESOURCES

All archaeological sites in B.C. are protected under the *Heritage Conservation Act* (RSBC 1996, c. 187)⁶. Protected archaeological sites may not be altered or changed in any manner without a permit. During archaeological investigations it was determined that the Project footprint overlaps three known archaeological sites. The site safety orientation included the Chance Find Procedures to ensure all

⁶ B.C. Heritage Conservation Act. 1996. https://www.bclaws.gov.bc.ca/civix/document/id/complete/statreg/96187_01

personnel are aware of the protocols. Workers are aware of the known Archaeological sites within the Project footprint. The Heritage Conservation Act (HCA) Section 12.4 was obtained 28 September 2020 and the existing Section 12.2 permits has been extended while the new submission is still under review. The associated First Nation permits for both HCA 12.4 and 12.2 applications have been submitted to the Nations for review. Known sites have been discreetly marked in the field to prevent encroachment by heavy machinery and construction personnel. Numerous artifacts were discovered by Golder, who provided direction on determining next steps to manage and document the newly identified extensions. Sand was placed over the sites under the supervision of Golder and Indigenous Groups for protection.

9.0 SUMMARY

Construction of the improved transportation system is on schedule and is planned to continue through 2021 and 2022 (with a substantial complete date of 30 November 2022) ending on 31 May 31 2023 (total completion date). PGC has reduced the number of significant environmental issues through increased awareness and training protocols for all staff.

Lessons learned from several small spills has indicated that additional spill training and an increase in mitigation supplies (including spill kits, drip trays) need to be available. As well, additional effort has been put in place for garbage pickup, recycling, storage, handling and disposal of contaminated material to reduce future impacts and near misses. Educating staff to anticipate rain, flooding, and changing conditions has also reduced environmental risk, ensuring that they are prepared for potential events.

A large number of fish and wildlife have been salvaged from the Project site with relocation sites identified in *Appendix 2*. Sections 2 and 3 will require additional salvage efforts as construction progresses into those areas. The general wildlife permit has been extended to include 2021.

Approvals for all instream and wetland/bog habitat impacts have been in place and are outlined in the Permit Tracking List in *Appendix 3*. Variances have been prepared for works that have extended beyond typical reduced risk windows in areas where impacts were mitigated (isolated areas, dry channels, etc.). One application amendment under the ESA was rescinded in Section 4 as the designs and methods changed and additional area for stockpiling was no longer required.

Offsetting for unavoidable effects on habitat, as approved by Project-related permitting, will occur at a later date as construction in areas are completed. Final offsetting designs are currently under review.

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; - Fisheries Habitat Mitigation and Compensation Plan; - Health and Safety Plan;	Pre-construction	Contractor		X

	- 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: - 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;	Pre-construction	Contractor	X	

	- 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.				
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	TBD	
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	TBD	
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	TBD	
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	TBD	
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	TBD	
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	TBD	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	TBD	
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	TBD	
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	X	
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	TBD	
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	TBD	

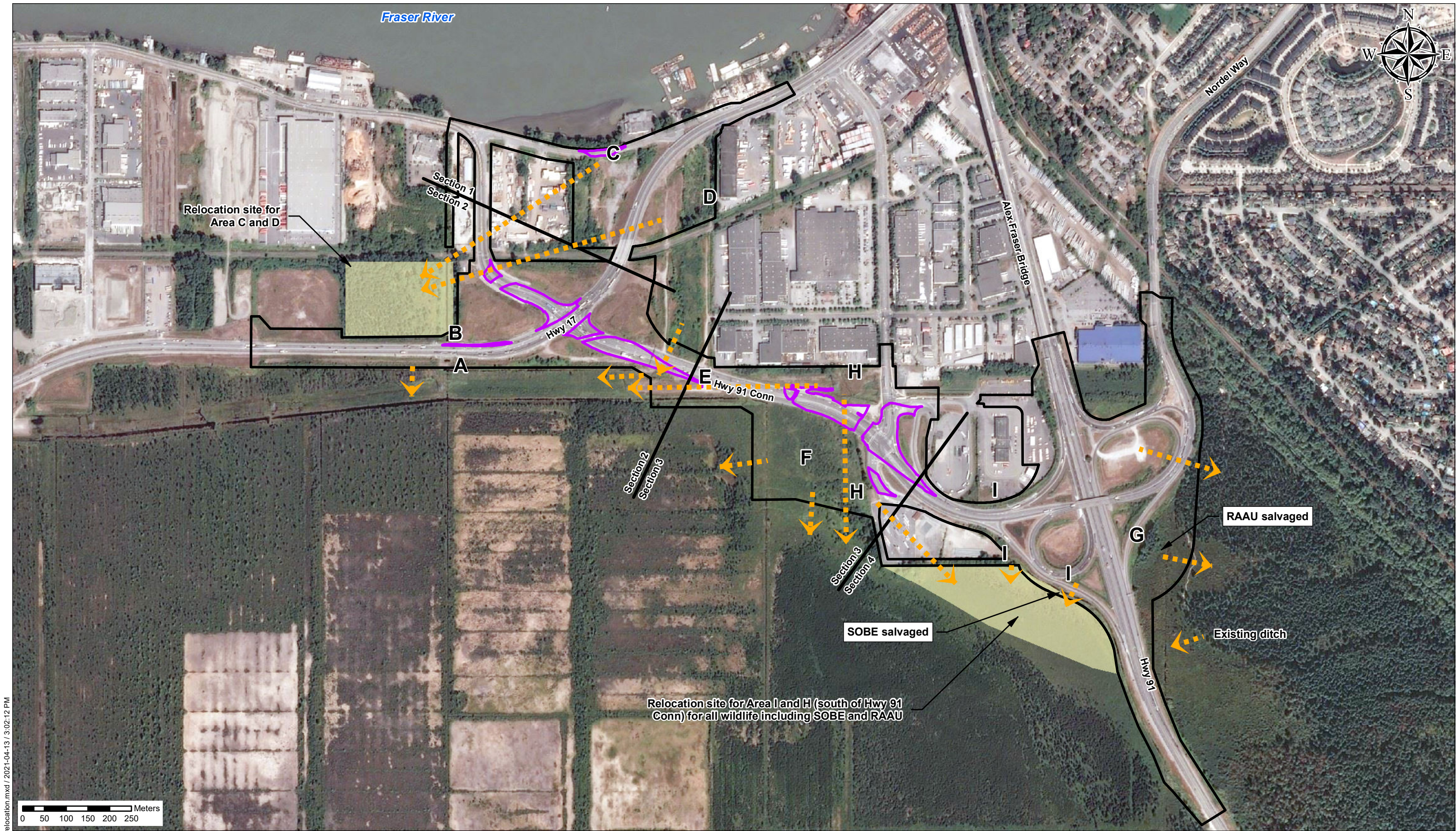
15.3	Consult with the reviewing agencies to finalize construction and post construction monitoring requirements related to Burns Bog including, but not limited to, those identified in the Vegetation and Wildlife Mitigation Monitoring Strategy (April 2007) [replaced by the SFPR Vegetation and Wildlife 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	TBD	
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	

15.9	Finalize an Air Quality Management Plan [currently known as SFPR Air Quality Management Plan (Burns Bog Segment)], in consultation with TC, EC and other IAERC members as appropriate, prior to commencing pre-loading activities around Burns Bog. This document will identify all technically and economically feasible mitigation measures to be implemented to prevent generation and transmission of dust during the pre-load and construction phases of the project.	Pre-construction	MoTI, Contractor		X
15.10	Collect a minimum of 4 months of baseline dust fall monitoring between June and September 2008. Following the collection of this information, the MoT will meet with TC and EC to discuss the baseline monitoring information collected and the approach for continued data collection, prior to the commencement of pre-loading activities around Burns Bog (i.e., north of the Highway 99 interchange and west of Nordel Way).	Pre-construction	MoTI		X
15.11	Work co-operatively with the Tsawwassen First Nation to maintain appropriate access for TFN members to Burns Bog to facilitate TFN's harvesting rights pursuant to the Tsawwassen Final Agreement.	All phases	MoTI, Contractor		X
15.12	Ensure that the development and operation of Stormwater management infrastructure does not compromise the ability to achieve hydrology mitigation objectives adjacent to Burns Bog.	All phases	MoTI, Contractor	TBD	
15.13	Implement the monitoring and follow-up activities identified in the Screening document, for a period of five years after the project has commenced operation, to ensure the effectiveness of mitigation measures related to aerial deposition, hydrology, and Sandhill crane in the vicinity of Burns Bog.	All phases	MoTI, Contractor	TBD	
16.0 Archaeology					
16.1	Ensure that the design, construction and operation of the Project is advanced in a way that avoids, or minimizes potential impacts to known archaeological sites, including the Nottingham Farm, St. Mungo and the Glenrose Cannery sites, as well as other sites that may be encountered during project planning and development.	All phases	Contractor		X
16.2	Work with participating First Nations who have identified related interests within the context of the ongoing environmental review process and the BC Archaeology Branch regarding investigation of unsurveyed areas within the Project area assessed as having archaeological potential at an appropriate level for an archaeological impact assessment and develop mitigation measures consistent with the BC Archaeological Impact Assessment Guidelines.	Pre-construction	MoTI, Contractor	X	
16.3	Obtain a valid Heritage Conservation Act Section 14 Heritage Inspection Permit with adequate provisions to address requirements for investigations and potential impacts to previously unrecorded archaeological sites should they arise. Immediately report previously undocumented archaeological sites that come to light during the construction phase of the Project to the BC Archaeology Branch and participating First Nations.	Pre-construction; construction	MoTI, Contractor	X	
16.4	Include required edits and revisions to the Application in the final Heritage Conservation Act Permit report.	Pre-construction	MoTI	X	
16.5	Work with the Musqueam Indian Band and other interested First Nations in developing a mutually acceptable Site Management Plan (SMP) for the Glenrose / St. Mungo area [currently known as Archaeological Impacts and Mitigation Strategy St. Mungo and Glenrose Cannery], to encourage the preservation of archaeological deposits through the protection and management of archaeological and heritage resources during planning, design, construction and operation phases of the SFPR project. The Plan will include, but not be limited to:	Pre-construction	MoTI	N/A	

	- a summary of existing information (archaeology and oral history); - summary of existing site conditions; - site management objectives (short, medium and long term); and - site management strategies (preconstruction, construction, post-construction phases).				
16.6	Develop and implement an archaeological mitigation program focused on intact archaeological deposits that includes systematic data recovery (excavation) and archaeological monitoring for the St. Mungo and Glenrose Cannery Sites. Develop methodology and sample size with input from the Archaeology Branch and First Nations. Obtain Heritage Conservation Act Section 14 Heritage Investigation Permits and Section 12 Alteration Permits prior to mitigation and/or alteration of known archaeological sites.	Pre-construction, construction	Contractor	N/A	
16.7	Work with the Musqueam Indian Band and other interested First Nations in establishing a final design for the SFPR segment in the Glenrose / St. Mungo area focused on minimizing potential project related impacts on identified archaeological resources.	Pre-construction,	MoTI, Contractor	N/A	
16.8	Work with the Musqueam Indian Band and other interested First Nations to further explore options/opportunities to establish appropriate First Nation recognition and/or interpretation measures in relation to the Glenrose / St. Mungo sites.	All phases	MoTI	N/A	
16.9	Undertake appropriate archaeological site impact mitigation measures, including construction monitoring and systematic data recovery (i.e., an archaeological excavation), at the St. Mungo and Glenrose Cannery archaeological sites and support these measures with field programs that involve the Musqueam Indian Band and other interested First Nations as appropriate. The proposed mitigation strategy will be based on an archaeological site management plan for the St. Mungo, Wet Site and Glenrose Cannery archaeological sites currently under development in conjunction with representatives of the Musqueam Indian Band.	All phases	MoTI, Contractor	N/A	
16.10	Report the discovery of previously undocumented archaeological sites that may come to light during the construction phase of the SFPR project to the British Columbia Archaeology Branch and interested First Nations. Engage an archaeologist to investigate and assess such sites under the terms and conditions of a Heritage Conservation Act permit.	All phases	Contractor	X	
16.11	Provide opportunities for members of the Musqueam Indian Band and other interested First Nations to participate in field programs supporting the implementation of archaeological site mitigation measures.	All phases	MoTI, Contractor	X	
16.12	Notify and invite First Nations to participate in specified archaeological work that is to occur at identified archaeological sites within their respective asserted traditional territories.			X	
17.0 Heritage					
17.1	Ensure that the design, construction and operation of the proposed project is advanced in a way that avoids, or minimizes potential impacts to heritage buildings	All phases	MoTI, Contractor	X	
17.2	Consult with the Delta Heritage Advisory Commission and the Surrey Heritage Committee to define heritage interests and work with the Delta Museum and Archive to develop a photo record and inventory of potentially affected heritage houses.	Pre-construction, construction	Contractor	N/A	
17.3	Prior to construction, undertake pre-condition surveys with respect to heritage buildings, as further described in commitment 9.9.	Pre-construction	Contractor	N/A	
17.4	Avoid, where practical and technically feasible, direct impacts to heritage buildings.	All phases	Contractor	NA/	
18.0 Navigable Waters					

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: HABITAT REMOVAL STATUS, OUTSTANDING WORK, AND WILDLIFE RELOCATION



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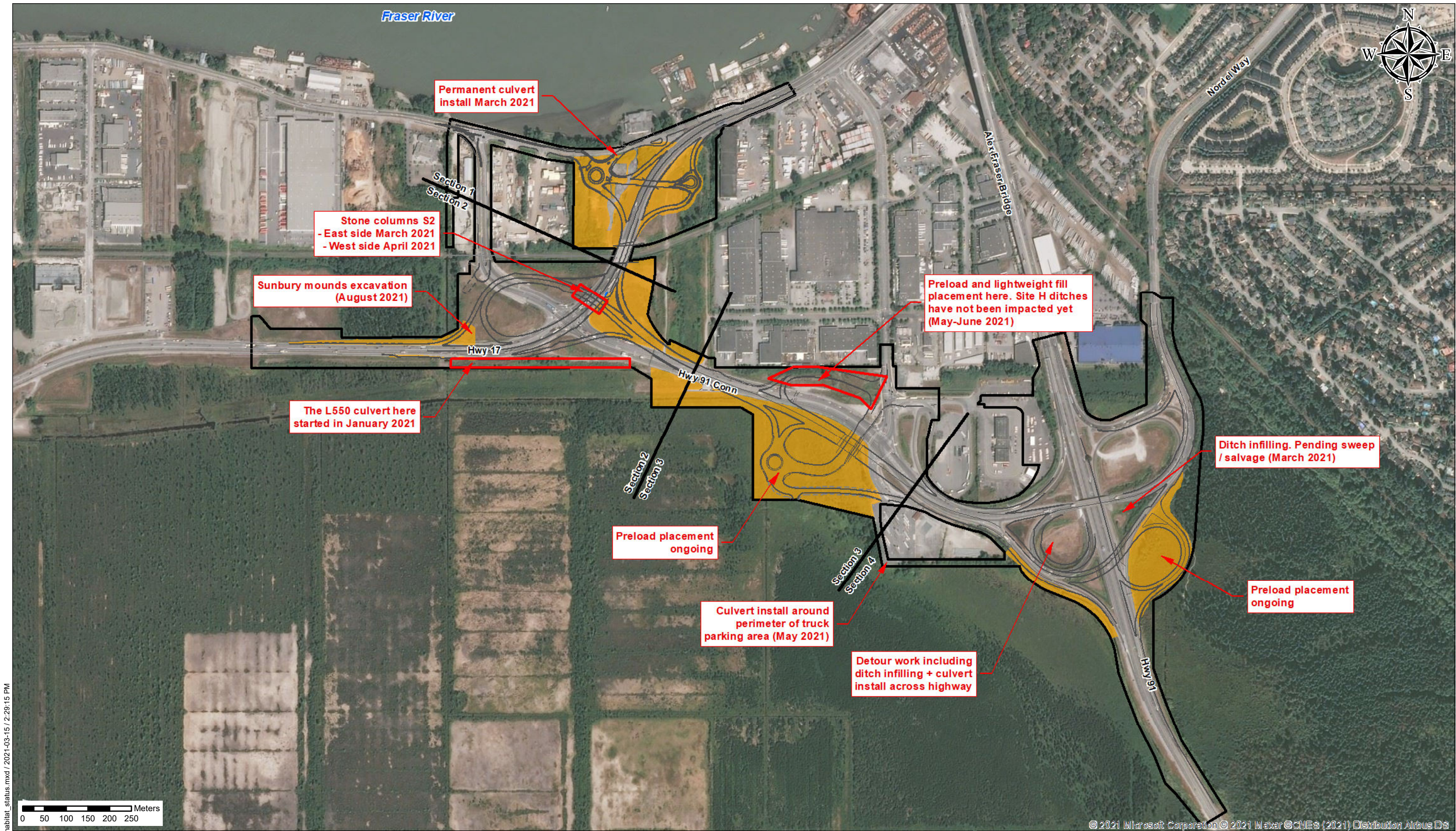
Species at Risk

SOBE Pacific water shrew
RAAU Northern red-legged frog

PROJECT NO.: 2019-2V42
DATE: April 2021
DRAWN BY: BdJ

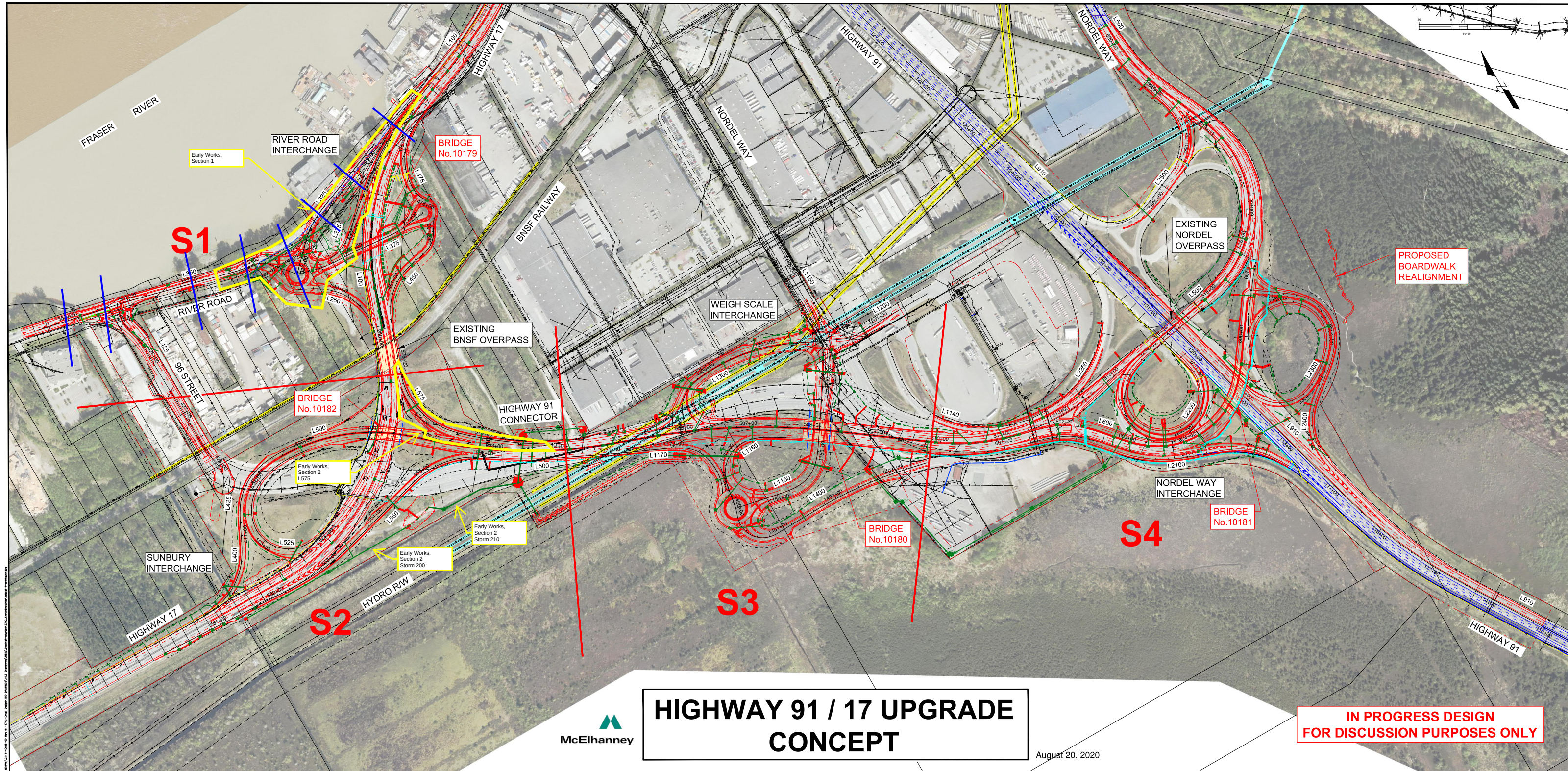
FIGURE 2: RELOCATION SITES

Ministry of Transportation and Infrastructure
Highway 91/17 Upgrade Project



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APPENDIX 3: PERMIT TRACKING

This file has been provided as stand-alone Excel worksheet.

APPENDIX 4: ENVIRONMENTAL SPILL AND INCIDENT TRACKING SPREADSHEET

HWY 91/17 SITE Environmental Spill and Incident Tracking																	
Incident #	Date Of Event	Date Reported	Date Initial Notification Issued	Shift	Approx. Time	Contractor	Sub-Contractor	Silo	Classification	Description of Event	Location	Fluid Amount (L)	Fluid Type	Type of Equipment	Causal Factors	Action Taken	Corrective Actions Date Complete
1	13-Jul-20	13-Jul-20	14-Jul-20	Night	18:01 - 18:30	PGC	National Rentals		Spill (1.1L-5L)	Diesel spill to ground- paved surface	PGC Site Office Yard	2	Diesel	Light plant	Inadequate Procedures	After the spill was reported at approximately 23:00 absorbent pads were placed on the surface in an attempt to absorb most of the surface diesel. This was repeated two times. The contaminated pads were removed, and a granular absorbent sand was placed on the spill to absorb any other residual diesel from the spill site. The contaminated gravel was then removed by using a broom and a shovel. Contaminated absorbent pads and contaminated soils were placed in separate designated drums for proper disposal by a service provider.	
3	17-Sep-20	17-Sep-20	17-Sep-20	Day	12:01-12:30	PGC	NA		Minor spill (<1L)	Oil spill to water	CO1 Detour	<100ml	Oil	Godwin pump	The spill tray had filled with water because when the pump is in operation, the pump discharges air as water is pumped (Dri-Prime pump). Seals can wear over time, and water can be drawn into this hose in addition to air. Water was drawn through this 1" hose and had discharged into the spill tray.	Clean up efforts commenced immediately. Booms were placed in the water. Spill pads were placed around the source, in the spill tray and in the water course. The sand/soil material along the bank was shoveled. All used spill material and contaminated soil was placed in hazardous waste disposal bags. These bags were brought to the hazardous waste storage area in the laydown. The pump has been taken out of service and will be inspected by a mechanic. The watercourse will be monitored for any residual oil.	
4	23-Sep-20	23-Sep-20	Norm (Binns) informed verbally	Night	24:31-1:00	PGC	Nordel Trucking		Minor spill (<1L)	Oil leak on paved road surface	CO1 Detour	<500ml	Oil	Dump truck	Oil leaked occurred onto the road surface when a truck was busy offloading gravel onto the CO1 road shoulder.	A spill was caused by one of the Nordel trucks while delivering gravel to the CO1 site. Oil was tracked out over a large area on Highway 91. Immediate action was taken and the truck was taken out of service. Kitty litter sand and spill pads were used to absorb excess liquid from the road surface. The road sweeper was called to remove and sweep the road- all the contaminated kitty litter sand was successfully removed. Some residual staining remains on the road surface.	
5	29-Sep-20	30-Sep-20	Jordan Jeffares (Binns) verbally	Day	12:01-12:30	PGC	Quattro Constructors		Spill (1.1L-5L)	Oil spill to ground - pre-load	River Road West (Area C) to the east of water main installation	2	Hydraulic oil	Pipe fusing machine	Normal wear and tear on moving machine parts- unforeseen circumstances.	Machine turned off, driptrays and absorbent pads placed under areas of concern. Machine covered with poly overnight until it can be removed from site.	
6	7-Oct-20	7-Oct-20	Jordan Jeffares (Binns) verbally	Day	13:01-13:30	PGC	NA		Minor spill (<1L)	Oil leak on machine	E01 laydown area	<500ml	Hydraulic oil	Excavator	Normal wear and tear on moving machine parts- (hydraulic boom fitting) unforeseen circumstances.	The operators stopped the machine immediately and notified the supervisor. Spill trays were placed under the excavator. A mechanic was called to site to safely move the excavator to prevent any additional leaks. Additional spill containment materials were placed on the ground around the excavator to protect the ground during removal and cleaning of the excavator. No oil was found on the ground, and no watercourses were nearby. The machine was repaired. All used spill materials were placed in the hazardous waste segregation area at the PGC site office.	
7	9-Oct-20	9-Oct-20	Norm Richard	Night	2:01-2:30	PGC	NA		Minor spill (<1L)	Oil leak on owner operated excavator	EO2 detour	<200	Hydraulic oil	Excavator	Normal wear and tear on moving machine parts- (hydraulic seal) unforeseen circumstances.	The operators stopped the machine immediately and notified the supervisor. The MoTI representative, Norm Richard, was notified. The machine was turned off and spill trays were placed under the excavator. This is an owner operated machine and an inspection revealed the root cause of the problem. A mechanic will be called to site to safely replace the damaged seal of the excavator to prevent any additional leaks. With exception of the drip-tray no additional spill containment materials were placed on the ground around the excavator as no fluid was spilled on the ground surface. The drip tray remains under the faulty area as a measure to prevent any fluid from dripping on the sand until the repairs have been completed. All contaminated sand from the insides of the track were placed in the hazardous waste segregation area at the PGC site offices.	
8	16-Oct-20	16-Oct-20	Norm Richard- Directly after incident	Night	3:31-4:00	PGC	All Roads		Minor spill (<1L)	After a recent rain event emulsified bitumen (Tack Coat SS1) liquid diluted with rainwater and migrated off-site into a nearby waterfilled ditch that is connected to the Burns Bog.	CO1 detour	<100	Emulsified bitumen bond liquid	Handheld spray bottle	Excess Tack Coat SS1- (emulsified bitumen bond liquid) was left on the newly paved asphalt surface. After a recent rain event the liquid diluted with rainwater and migrated off-site into a nearby waterfilled ditch that is connected to the Burns Bog.	White absorbent pads were placed on the surface to absorb excess surface liquid. An absorbent boom-sock was used to contain and absorb additional liquid that migrated underneath the concrete barriers. A sweeper vac truck was deployed immediately after the incident to safely remove all remaining surface liquid from the asphalt. The Environmental Representative used absorbent pads and a boom-sock to remove a brown oily residue from the surface of the water filled ditch. All contaminated pads were placed into a plastic bag for proper disposal by the PGC service provider.	
9	20-Oct-20	20-Oct-20	Jordan Jeffares	Day	9:31-10:00	PGC			Minor spill (<1L)	Sheen observed on surface of water in trench tie in location	River Road West	<50ml	unknown hydrocarbon	unknown	unknown	White spill pads were placed on the surface of the water to remove the sheen. Spill pads were bagged and placed in a hazardous waste bag for proper disposal. The Province's Representative was notified. The surrounding area was inspected for any signs of hydrocarbons.	
10	22-Oct-20	22-Oct-20	Jordan Jeffares	Day	11:01-11:30	PGC			Minor spill (<1L)		8100 Nordel Way		sewage				

HWY 91/17 SITE Environmental Spill and Incident Tracking																	
Incident #	Date Of Event	Date Reported	Date Initial Notification Issued	Shift	Approx. Time	Contractor	Sub-Contractor	Silo	Classification	Description of Event	Location	Fluid Amount (L)	Fluid Type	Type of Equipment	Causal Factors	Action Taken	Corrective Actions Date Complete
11	26-Oct-20	26-Oct-20	Jordan Jeffares	Day	15:31-16:00	PGC			Minor spill (<1L)		E01 laydown road under Nordel Way overpass	<500ml	Hydraulic fluid	Skid steer	Operator backed over skid steer hydraulic line which caused crimped fitting to detached from hose and leak.	The operator stopped the machine immediately and notified the supervisor. The MoTI representative was notified. The leak from the sweeper attachment hydraulic line was fully isolated with spill pads and the fitting will be replaced before using this machine. Fluid leaked only on to the top of the skid steer sweeper attachment and no fluid was spilled on the ground surface. The equipment was located on pavement away from any watercourses. All contaminated spill pads and sand from sweeper was placed in the hazardous waste segregation area at the PGC site offices.	
12	3-Nov-20	3-Nov-20	3-Nov-20	Day	11:31-12:00	PGC			Minor spill (<1L)	Sheen on puddle beside pump	Section 2 at Fortis crossing culvert	<10ml	unknown hydrocarbon	pump/generator	residue left on equipment during maintenance, rain mobilized contaminate to adjacent puddle	spill pads used to clean puddle, berm built to prevent run off to ditch. Secondary containment ordered.	
13	6-Nov-20	6-Nov-20	6-Nov-20	Day	14:01-14:30	PGC			Minor spill (<1L)	Leak during equipment inspection	Nordel Way Laydown	<1L	hydraulic fluid	hydraulic dump trailer	equipment failure during pre-mob inspection	inspection paused and fluid cleaned up	
14	16-Nov-20	16-Nov-20	16-Nov-20	Day	13:01-13:30	PGC	Green belt		Minor spill (<1L)	Sheen found at light plant	Truck stop L1400 entrance	<500ml	Diesel		Residue left under lightplant during refueling rain mobilized and a sheen developed	Some of the runoff entered the catch basin, however the majority was contained and cleaned after the incident was reported. Absorbent socks placed at the source of the contamination and near the catch basin to prevent further migration of diesel into the stormwater system. Spill Pads were also placed on the pavement to absorb the diesel residue and disposed of in the contaminated waste containment area.	
15	27-Nov-20	27-Nov-20	27-Nov-20	Night	00:31-1:00	PGC			Minor spill (<1L)	Hydraulic line burst	hwy 99 richmond	<1L	Hydraulic fluid	Excavator	Excavator loading trucks had hydraulic line rupture	equipment immidiation shut down, and clean up commenced. Excavator taken out of service for repairs.	
16	29-Nov-20	30-Nov-20	1-Dec-20	Night	23:31-24:00	PGC	Delta Aggregate		Minor spill (<1L)	Tipper truck bucket hydraulic failure	Area F- preload	<1L	Hydraulic fluid	Tipper truck	Hydraulic failure	Contaminated soil removed- all contaminated areas cleaned. Surfaces wiped down with absorbent pads.	
17	3-Dec-20	3-Dec-20	3-Dec-20	Day	11:31-12:00	PGC			Minor spill (<1L)	Fitting failure on excavator	Area G - E01 laydown, northwest corner	<500ml	Hydraulic fluid	Excavator	Normal wear and tear on moving machine parts (hydraulic hose fitting) unforeseen circumstances.	Hydraulic fluid noticed and machine was shut down immediately. Supervisor was notified. Spill contained in excavator bucket, no fluid contacted the ground. Spill tray was placed underneath bucket and fluid on the machine was cleaned with spill pads. Machine taken out of service until the mechanic can repair broken fitting.	
18	15-Dec-20	15-Dec-20	15-Dec-20	Day	6:31-7:00	PGC			Spill (1.1 L - 5L)	Overfilling of Jerry cans	PGC Site Office Yard	1-2 L	Diesel	Diesel fuel tank	Overfilling of jerry cans during low light conditions	At approximately 07:00am, diesel was spilled on the pavement during the refueling of jerry cans. The incident happened at the PGC yard/laydown area an unknown amount of diesel found its way to the catch basin inlet. An absorbent sock was placed over the catch basin previously which absorbed most of the spill before entering the catch basin. This incident occurred during a rain event and special care was taken to mitigate the incident as effective as possible. It is estimated that between 1-2 liters of diesel was spilled. All contaminated materials (kitty litter, absorbent pads) were taken to the PGC waste management area for safe disposal.	
19	19-Dec-20	21-Dec-20	19-Dec-20	Day	13:01-13:30	PGC			Minor spill (<1L)	Fitting failure on roller	S2 L550 preload	<1L	Hydraulic fluid	Roller	Normal wear and tear on moving machine parts (hydraulic hose fitting) - unforeseen circumstances.	Equipment was shut down immediately and a spill tray was placed underneath. Sand contaminated with hydraulic fluid was removed from preload. Mechanic was called in for repair. He tightened the loose fitting on the hydraulic hose. Waste from spill tray was cleaned and moved to hazardous waste storage at office laydown.	21-Dec-20
20	18-Dec-20	22-Dec-20	18-Dec-20	Day	1:01-1:30	PGC				Sediment laden water entered DNR	S4 Site G	unknown quantity of water	Sediment laden water		High water levels and work was not re-evaluated based on changes conditions in the DNR	Work immediately stopped. Sand berm construction the contain water. Dewatering plan developed.	
21	4-Jan-21	4-Jan-21	5-Jan-21	Night	20:31-21:00	PGC	Delta Aggregate		Minor spill (<1L)	Hydraulic line broke	S3 L1400	<500mL	Hydraulic fluid	Rock truck (Volvo T-13)	Normal wear and tear on moving machine parts (hydraulic line); unforeseen circumstances.	Leaking hydraulic line noticed during pre-shift inspection. Operator shut down the machine immediately and placed spill pads on the leak source and on the ground below the leak. Machine was parked with its box up how leak was found and in the locked position. A spill tray was placed below the leak, and contaminated pads and sand below were removed for disposal. Mechanic repaired the broken line in the morning (05 Jan 2021).	5-Jan-21

SUMMARY			
Totals	Unit/Value	Total	
Total Volume	L	4	
Total Spills	#	29	
Classification		Total	
Minor Spill (<1L)	#	16	
Spill (1.1L-5L)	#	2	
Large Spill (5.1L-99.9L)	#	0	

HWY 91/17 SITE
Environmental Spill and Incident Tracking

Incident #	Date Of Event	Date Reported	Date Initial Notification Issued	Shift	Approx. Time	Contractor	Sub-Contractor	Silo	Classification	Description of Event	Location	Fluid Amount (L)	Fluid Type	Type of Equipment	Causal Factors	Action Taken	Corrective Actions Date Complete
Significant Spill (To water or >100L)		#	0														
Total		#	18														
Fluid Type		Total															
Hydraulic		#	0														
Antifreeze		#	0														
Diesel		#	3														
Oil		#	5														
Gasoline		#	0														
Black Water		#	0														
Glycol		#	0														
Unknown		#	2														
Total		#	19														