Pacific Gateway Constructors		**Highway 91/17 Upgrade Project**	
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Title	Environmental Monthly Report	**Revision:**	1
Date Submitted to MoTI		11 September 2020	
Prepared by:	Stephanie Murphy, M.Sc., R.P. Bio. (Brybil)		

REVISION LOG

Version #	Date	Revised By	Approved By	Revised Section
0	09 September 2020	Stephanie Murphy, M.Sc., R.P.Bio	Patty Burt, RP Bio	
1	11 September 2020	Stephanie Murphy, M.Sc., R.P.Bio	Patty Burt, RP Bio	Minor edits in Section 2.1 Section 2.2

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CONTENTS

Appendices

1.0 INTRODUCTION

This report covers all activities between 01 to 31 August, 2020. During this period works occurred at River Road West, River Road East, Site D, Site E, Site F, L575 Area, L100 Area, the E01 Detour, the Sunbury Mounds, the Truck Parking Area, C01 Detour (portion of Site F), and Site G. For the purposes of this report, the following areas shall be defined as:

- River Road West = Portion of River Road West of Highway 17 (Includes L250, L275, L325, L350, part of L375)
- River Road East = Portion of River Road East of Highway 17 (Includes L450, L475, part of L375).
- Site F = around Burns Bog (includes L1160 and L1400)
- Site D = L475, L375 and L450
- Site E = L500
- E01 Detour = Portion of L910
- L575 Area = L575 onramp, L550 onramp (east portion), L500 (east of bridge abutment)
- L100Area = Highway 17
- Sunbury Mounds = Hwy 17 and 91C interchange (L525)
- Truck Parking Lot = near Site H
- C01 Detour = North edge of Site F along Hwy 91C
- Site G = Delta Nature Reserve

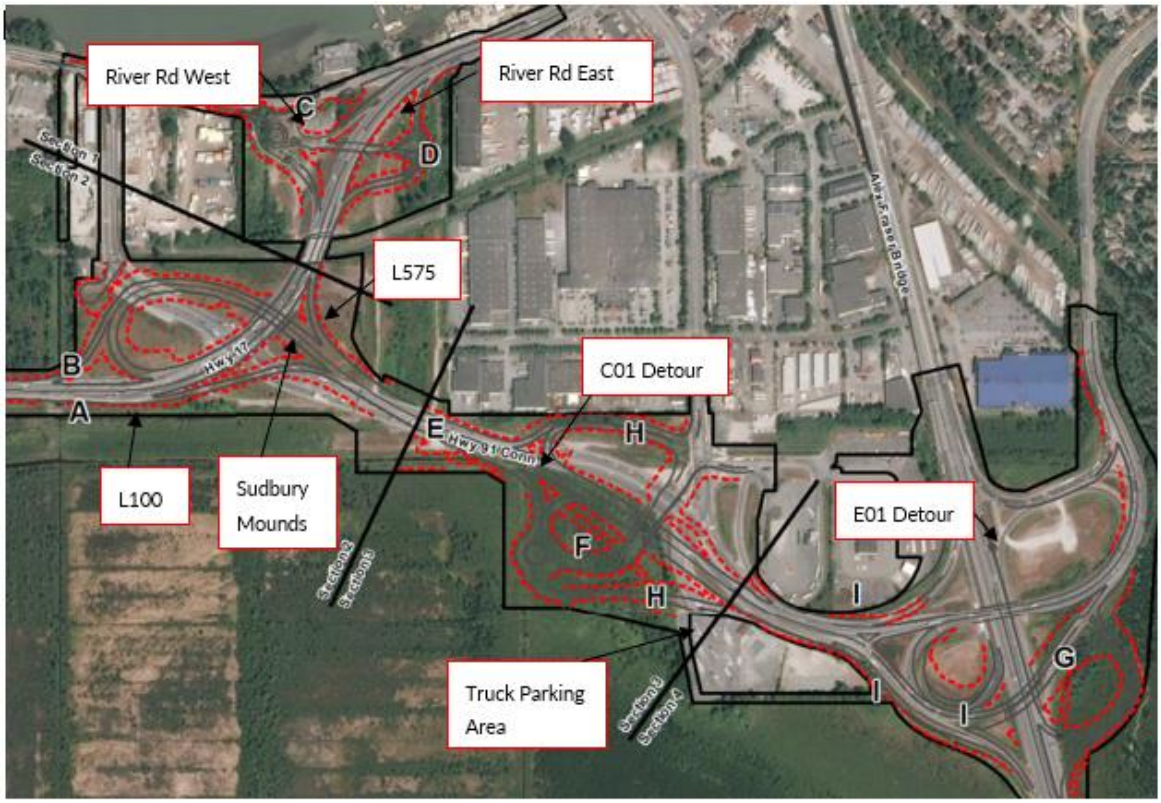


Figure 1: Approximate Work Area Locations

A Key Plan has been included showing the project alignments (See Appendix 1).

2.0 CONSTRUCTION ACTIVITIES

2.1 Activities for this Period

The following works took place within Section 1 in August 2020:

River Road West:

- trench excavation and installation of HDPE water main by Leverage Construction (sub-contractor)
- compaction testing of trench line;
- infilling cuts in asphalt with gravel and backfilling open trenches;

River Road East:

- completion of wildlife salvages adjacent to Silda Ditch (Site D);
- [redacted]

The following works took place in Section 2 in August 2020:

L575:

- pre-load and embankment fill placement and compaction using sand from Delta Aggregates (Photograph 1);
- relocation of on-site material;
- infilling wildlife crossing area;
- general excavation and compaction;
- removal of Japanese knotweed (*Fallopia japonica*) by Diamondhead.

L100:

- vegetation pruning and installation of isolation fencing along Highway 17 on North and South sides;
- completion of wildlife salvages at 96th St. Ditch on the east side of the culvert outlet (Site B);

Sunbury Mounds:

- completion of semi-annual groundwater and surface water quality monitoring by Hemmera Envirochem Inc.

The following works took place in Section 3 in August 2020:

Site E:

- installation of wildlife fencing near Silda Ditch.

Site F:

- rare plant survey completed;
- installation of isolation fence for the C01 detour and for the remainder of Site F

The following works took place in Section 4 in August 2020:

E01 Detour:

- detour opened to traffic and additional signage installed.

Truck Parking Lot:

- trench excavation, backfilling, and compaction for the installation of 150mm HDPE watermain.

Site G:

- rare plant survey completed;
- installation of wildlife fencing in Delta Nature Reserve along test area for peat sub-excavation and replacement with sand.

2.2 Upcoming Activities

Section 1:
At River Road West, the watermain relocation is on hold awaiting revised valve parts. Once the watermain installation is complete the following work will take place: protect/relocate gasline; place balance of embankment fill; place balance of preload; and construction of truck turnaround lane. [redacted] At River Rd East, stripping and placement of preload and embankment fill at Site D will occur following the completion of clearing and grubbing. Once detour W01, associated with these works at River Rd East, is implemented the following works will take place: utility relocations including ITS and existing storm line; and demo of the existing Highway 17 in preparation for ground improvement activities.

Section 2:
Upon complete of the wildlife and fish salvages in and around 96 St Ditch, installation of a concrete box culvert in 96 St Ditch will occur in mid-September. Wildlife salvages along the L100 and at Area E for the installation of a Fortis culvert are scheduled.

Section 3:
Once the wildlife and fish salvages are complete at the C01 detour area, detour construction will continue to shift the existing Hwy 91C south. Wildlife salvages for the remainder of Site F are scheduled to commence on 14 September and once complete, embankment and preload fills will be placed.

Section 4:
Once the wildlife salvage for the peat sub excavation and backfill at Site G is complete, this work will commence in mid-September. Isolation fencing for the remainder of Site G will be completed with wildlife salvage scheduled to commence on 23 September.

3.0 ENVIRONMENTAL ISSUES

3.1 Environmental Incidents

No Pacific Gateway Contractors (PGC) Environmental Incidents occurred during the reporting period. A Spill and Incident Tracker is provided in Appendix 2.

External Incidents
There were no external incidents during the reporting period.

3.2 Non-Compliance

No Environmental Non-Compliance Reports were issued or received during the reporting period.

Table 1: Non-Compliance Tracking

NCR #	Date Issued	Location	Description	Status

3.3 Non-Conformance

Nothing to report this period.

3.4 Opportunities for Improvement

Nothing to report this period.

3.5 Outstanding Environmental Issues

The following ongoing monitoring is being conducted (Table 2):

- New instances of Japanese knotweed growth and treatment with foliar application (project-wide).

Table 2: Environmental Issues Tracking Table

Item No	Date	Environmental Issue or Required Action	Corrective Action	Projected Closure Date	Open/ Closed	Comments
1	25 June	Sediment fence with accumulated material at River Road West	Remove material and repair fence	29 June	Closed 30 June	Discussed with Supervisor. Accumulated material has been removed.
2	25 June	Minor dust at E01 Detour	Area watered to suppress dust	25 June	Closed	Dust suppression ongoing.
3	25 June	Potential track out at River Road East and West	Install gravel access pad	14 August	Closed	Ongoing monitoring performed. Pads will be installed if required.
4	10 July	Japanese knotweed growth in topsoil stockpile at River Road West	Treat with foliar application	10 August	Closed	Ongoing treatment efforts.
5	10 July	Construction personnel smoking throughout site as opposed to designated areas	Reiterate policies regarding smoking	13 July	Closed	Policies have been reiterated. An environmental advisory will be issued.
6	10 July	Trash can at River Road West was left full on site	Trash was removed. Crews reminded that trash is to be removed daily	10 July	Closed	
7	13 July	Approximately 3 L of diesel spilt from light station onto pavement	Spill volumes collected with absorbent materials	13 July	Closed	Refueling procedures to be reviewed with construction crews to prevent over filling.
8	16 July	Damaged sediment fence at River Road West and E01	Fence needs to be repaired	20 July	Closed	Fence repaired, and areas swept for wildlife.
9	23 July	Concern noted with noise levels at E01	Noise monitoring will be carried out	19 August	Closed	Monitoring will commence once works are happening in that area
10	28 July	Less than 1 L of oil leaked from the track of a CAT D6K Dozer	Contained with drip trays and absorbent pads	28 July	Closed	Normal wear and tear of equipment.
11	29 July	Sediment fence needs attention at L575	Repair fence	14 August	Closed	Spoke with Superintendent, Foremen fixed
12	10 August	Monitor for new instances of Japanese knotweed growth-project wide	Treat with foliar application	30 August	Closed	Ongoing treatment efforts and monitoring.

4.0 ENVIRONMENTAL MONITORING AND INSPECTION RESULTS

The PGC Environmental Manager was present between 01 and 31 August 2020 to monitor and inspect Project activities during construction. Construction activities are guided by the environmental requirements outlined in the Construction Environmental Management Plan (CEMP) and Environmental Work Plans (EWPs) developed in accordance with the Environmental Assessment Certificate (EAC) and applicable permits, approvals and/or authorizations. In additional to daily monitoring performed by PGC, weekly monitoring was conducted by McElhanney's Environmental Monitor (EM).

McElhanney's EM visited the site on 07, 13, 19, and 28 August 2020 to measure compliance with the CEMP. McElhanney's EM met with environmental representatives from PGC after each audit to discuss observations which had been recorded.

4.1 Air Quality and Dust Control

A water truck was generally available as needed, but there were minimal active construction activities observed at the time of the site audits. Active work areas were not generating fugitive dust, noise, or excess exhaust (vehicles and equipment were turned off when not in use).

4.2 Noise and Vibration Management

Additional noise data was collected on 19 August 2020 as per Table 3 below.

Table 3: Noise Data

Start Time	Location	Description	Ambient Noise	GPS	Baseline (Day)			Results (Day)		
					Avg. (dB)	Min. (dB)	Max. (dB)	Avg. (dB)	Min. (dB)	Max. (dB)
9:40:15	2	Sunbury Mounds (Section 2)	Vehicles (cars, trucks), construction activities	49.150210 Lat -122.933121 Long	60.5	48.0	78.7	61.3	47.9	75.0
10:30:48	4	Nordel Underpass South	Vehicles (cars, trucks), construction activities	49.144235 Lat, -122.939154 Long	60.4	43.9	81.5	61.0	56.0	84.4

4.3 Erosion and Sediment Control

Sediment control fences are installed at River Road West, River Road East, the E01 Detour, L575, and the L100 to prevent sediment run-off from clearing and grubbing activities, for the containment of preload, and for wildlife isolation (Photograph 2). On inspection by McElhanney, the silt fencing was in good overall condition, with most areas covered with sand pre-load and well contained. The remaining open ditches at River Road West are lined with filter fabric and polyethylene sheeting and equipped with evenly spaced check dams and sediment fencing along the banks.

River Road West, Highway 17 (near access point to River Road East), and the Highway 91 off ramp (near the E01 Detour) are routinely swept and, during site inspections, were observed to be in clean condition. Construction access pads were not observed and may be warranted to prevent track out onto paved surfaces, particularly at River Road East where trucks access from Highway 17. PGC noted minor tracking at River Road West on 7 August 2020 which was also documented during the site audit. As a result, road sweeping activities were increased, and no further issues were reported.

The L575 Area is equipped with rock access pads, as this is a high truck traffic area. The access pads were observed to be functioning as intended.

Approved inlet protection was installed in catch basins along the Highway 91 Connector, adjacent to the L575, and appeared to be in good condition.

Contingency supplies such as silt fencing were readily available on pallets near the site trailers.

4.4 Water Quality Management

The ditch segments along River Road West were salvaged and infilled. Residual water remains contained in segments which fluctuates with the tide.

PGC collected background water quality from Silda Ditch and the Fraser River Inlet over the course of several days in August. The results of this data collection are presented in Table 4.

Table 4: Background Water Quality

Site Code	Site	Date	Time	Water Temp (°C)	Dissolved Oxygen (mg/L)	Conductivity (mS/cm)	pH	TDS (ppt)	Turbidity (NTU)	Comments
WQ-1	Silda Ditch US	04/08/20	12:35	29.2	3.24	1.14	6.94	0.61	26.8	Baseline, low tide
WQ-2	Silda Ditch MS	04/08/20	12:26	22.9	3.79	0.92	7.19	0.46	28.7	Baseline, low tide
WQ-3	Silda Ditch DS	04/08/20	13:04	20.9	4.67	0.69	7.19	0.33	22.2	Baseline, low tide
WQ-4	Fraser River Inlet	04/08/20	13:24	21.2	7.53	0.16	7.63	0.08	73.4	Baseline, low tide
WQ-1	Silda Ditch US	10/08/20	8:32	17.3	3.80	0.66	7.16	0.33	7.93	Baseline, low tide
WQ-2	Silda Ditch MS	10/08/20	8:46	16.9	4.13	0.66	7.34	0.34	9.45	Baseline, low tide
WQ-3	Silda Ditch DS	10/08/20	8:19	17.0	4.86	0.63	7.38	0.31	8.28	Baseline, low tide
WQ-4	Fraser River Inlet	10/08/20	9:40	19.0	9.01	0.14	8.21	0.07	45.7	Baseline, low tide
WQ-1	Silda Ditch US	17/08/20	8:50	19.0	2.71	0.85	7.28	0.42	25.8	Low tide
WQ-2	Silda Ditch MS	17/08/20	8:30	20.0	3.55	0.63	7.42	0.31	17.4	Low tide
WQ-3	Silda Ditch DS	17/08/20	8:15	19.7	4.35	0.52	7.35	0.26	12.4	Low tide
WQ-4	Fraser River Inlet	17/08/20	9:24	18.8	7.50	0.35	7.63	0.17	347	Low tide
WQ-5	96th St Ditch Up	18/08/20	13:14	19.1	2.60	0.21	7.05	0.10	3.55	Low tide
WQ-6	96th St Ditch DS	18/08/20	12:56	19.6	4.29	0.29	7.45	0.15	12.5	Low tide
WQ-1	Silda Ditch US	24/08/20	8:48	17.8	1.07	0.73	7.15	0.36	79.3	Low tide
WQ-2	Silda Ditch MS	24/08/20	8:35	17.1	1.26	0.67	7.37	0.34	46.6	Low tide
WQ-3	Silda Ditch DS	24/08/20	8:15	17.1	2.08	0.62	7.42	0.31	44.4	Low tide

Site Code	Site	Date	Time	Water Temp (°C)	Dissolved Oxygen (mg/L)	Conductivity (mS/cm)	pH	TDS (ppt)	Turbidity (NTU)	Comments
WQ-4	Fraser River Inlet	24/08/20	9:11	18.5	6.47	0.15	8.02	0.07	30.5	Mid tide
WQ-5	96th St Ditch Up	24/08/20	11:40	20.9	0.62	0.16	6.54	0.08	4.38	Mid tide
WQ-6	96th St Ditch DS	24/08/20	9:45	18.4	6.27	0.15	7.21	0.07	27.1	High tide
WQ-7	L100 US	24/08/20	12:05	20.4	3.36	0.89	7.06	0.44	6.90	Mid tide
WQ-8	L100 DS	24/08/20	12:15	21.8	1.12	0.15	6.50	0.07	5.06	High tide
WQ-1	Silda Ditch US	26/08/20	12:15	22.6	1.26	0.87	7.25	0.43	46.1	Low tide
WQ-2	Silda Ditch MS	26/08/20	12:00	18.2	2.10	0.89	7.72	0.45	29.0	Low tide
WQ-3	Silda Ditch DS	26/08/20	11:30	16.9	4.42	0.50	7.82	0.25	9.58	Low tide

Results were received on 04 August 2020 for the water samples that were taken on 10 July 2020 at the locations in Figure 2. The data results were analyzed (A. Morrison, PEng, CSAP) and the conclusions are as follows:

- *The only exceedances of the Contaminated Sites Regulation (CSR) water standards are dissolved cobalt (WS-BB-01) and dissolved manganese (WS-96-02, WS-DP-01, WS-SD-01, and WS-SD-02). These results are likely due to the association with the presence of the adjacent highway.*
- *There are multiple exceedances of the BC Approved and Working Water Quality Guidelines (WQG):*
    - *pH is slightly low at WS-96-03 and WS-FB-01 to meet the marine and estuarine maximum aquatic life (AWm) guidelines.*
    - *Dissolved aluminum exceeds the freshwater aquatic life (AWf) maximum at 4 locations: WS-96-01, WS-93-03, WS-BB-01, and WS-DR-01.*
    - *Dissolved iron exceeds the AWf maximum at 5 locations: WS-96-01, WS-93-03, WS-BB-01, WS-BB-02, and WS-DR-01*
    - *10 of 11 locations exceed one or more the WQG for total metals including arsenic, beryllium, sodium, copper, iron, lead, manganese, nickel, and zinc. It is notable that the sample from the Fraser River is the highest in 7 of the 9 total metal concentrations.*
    - *Fecal coliforms exceed the AWf maximum at 5 locations: WS-96-01 and -03, WS-DP-01, WS-SD-01 and -02. The source of this exceedance is unknown but may be from small mammals in the area.*
    - *Pyrene exceeds the AWf maximum at 4 locations: WS-96-01 and -03, WS-BB-01, and WS-SD-02. As with cobalt and manganese, these results are likely due to the association with the presence of the adjacent highway.*

It should also be noted that total metals are associated with turbidity and the Fraser River has the highest total suspended solids and corresponding highest total metals in 7 of the 9 parameters as noted above.

Figure 1: Baseline water sampling locations, WQ-7 is grouped with WQ-5 and WQ-8. Samples were only collected at locations where work is being done.

Figure 2: Water sample locations for lab testing, 10 July 2020.

4.5 Wildlife and Habitat Management

Salvages

Brybil conducted wildlife salvages at River Road East and the east side of 96th St. Ditch from 10-23 August 2020 (Photographs 3 and 4). The august wildlife salvage results will be provided in next month's monitoring report. Fish isolation fencing was installed to isolate portions of the east side of 96 St Ditch. No fish salvage was conducted in August 2020.

Nest Surveys

Following the completion of the wildlife salvage, River Road East was cleared and grubbed of vegetation (Photograph 5). As these works were completed outside of the regional nesting window, a nest survey was not required.

Debris stockpiles are routinely covered (particularly over the weekend when the sites are inactive) to deter nesting activity. No nesting behavior was observed.

Wildlife Observations

A dead black-tailed deer (*Odocoileus hemionus*) was discovered on the side of Highway 17 near the L100 alignment. The cause of death was presumably traffic related and is not associated with activities undertaken by PGC. The roadkill was reported to Main Road and as of 07 August 2020 the carcass appears to have been removed from the shoulder. Wildlife observations during August 2020 are provided in Table 5.

Table 5: Wildlife Observations

Species	Date	Male / Female	Location
Garter snake (*Thamnophis sirtalis*)	4-Aug-20	Unknown	Site D
Black-tailed deer (*Odocoileus hemionus*) - deceased	6-Aug-20	Female	L100

4.6 Vegetation Management

Occurrences of Japanese knotweed were discoloured following foliar treatment (Photograph 6). PGC has developed a work plan based on the CEMP for removal methods and disposal options within the project footprint. Some occurrences of knotweed were treated with foliar application on 10 August. No new occurrences were detected.

An occurrence of Japanese knotweed at the L575 Area was excavated along with some occurrences at River Road. The knotweed was removed under the supervision of Diamondhead (Photograph 7). Plant matter and potentially contaminated material was bagged and secured in a trailer and will be managed by deep burial beneath the new roadway as per the Environmental Work Plan. An AQP was onsite during the removal of the plants to ensure that all knotweed and root structures are removed and to document work procedures implemented to prevent dispersal.

A rare plant survey was conducted by Brybil (accompanied by McElhanney) at Site F (Burns Bog) on 07 August 2020 and Site G (Delta Nature Reserve) on 19 August 2020. No rare plants were detected; however, numerous occurrences of invasive plant species were identified. The results of the rare plant survey are provided in Appendix 3.

4.7 Fisheries Habitat Management

No fish salvages were conducted in August 2020.

4.8 Construction and Hazardous Waste Management

A yellow wheelie bin is readily available at each active work location and mobile equipment are equipped with spill kits. PGC indicated that trash had been observed in one bin and personnel were subsequently reminded to keep these bins free of waste.

Hydrocarbon wastes are stored in labelled drums near the site office and are covered and protected from rain. These bins are collected by Tervita for disposal when they are about 75% full. All waste receptacles are labelled with appropriate signage and personnel have been reminded by PGC to sort wastes accordingly (Photograph 8).

Table 6: Hazardous Waste Storage and Disposal Tracking

Date (2020)	Location	Haz-Material Stored	Volume m^3	Comments	Date of Disposal
13 July	PGC Site Office Yard	Spent absorbents	N/A	Approximately 2-3 L of diesel was spilled on the pavement. Spent absorbents to be collected by Tervita.	TBD
28 July	L575 Preload Area	Spent absorbents	N/A	Less than 1L of oil to spill tray, absorbent pads used to mitigate spill to ground. Spent absorbent pads to be collected by Tervita.	TBD

4.9 Spill Management and Emergency Response

All refueling of equipment is done on flat surfaces away from water bodies, with a drip tray in place and special care is taken to prevent spillages to the environment. All equipment and vehicles on site are inspected daily to ensure that there are no leaks or defects. No fuel is stored on site.

PGC has retained Tervita for hazardous waste management and emergency spills. No Emergency Responses were recorded during this reporting period.

To meet the conditions of the Approval, equipment working near watercourses are equipped with environmentally sensitive hydraulic fluid. Stickers were ordered and delivered for equipment to indicate equipment that is utilizing

environmentally sensitive hydraulic fluid. Once those pieces of equipment have been dedicated to certain areas, they will be visually identified.

4.10 Contaminated Sites Management

The Approval in Principle (AiP) Application Package for Sections 1 and 2 has been substantially completed and reviewed by the design team and Province. The full AiP application is scheduled for submission to BC Ministry of Environment and Climate Change Strategy on 04 September 2020.

The mechanism for managing onsite contamination in Section 3 and 4 is being determined. Clearing, stripping and grubbing, and preloading has commenced in various locations at the project site, and the contractor has been advised to follow the Project Wide - Contaminated Sites Management Plan (CSMP) in all areas (excluding the AiP areas).

5.0 ENVIRONMENTAL PERMITS

5.1 Status Update

The FLNRORD Approval for Site F, G and I were received on 19 August 2020. Received an Order under Approval 2007795 (Site D) for the change in works with the storm outfall into Silda Ditch.

The FLNRORD Approval for Site H was received on 21 August 2020.

A Permit Tracker is provided in Appendix 4.

5.2 Permit Conditions Tracking

A Permit Conditions Tracker is included as Appendix 5 outlining all DFO and WSA permit terms and conditions.

5.3 Status of the Table of Commitments and Assurances

The status of completed and ongoing commitments in the Table of Commitments and Assurances is provided in Appendix 6.

6.0 SITE PHOTOS

Photo 1. Most working surfaces are covered with sand preload such as the L575 (28 Aug 20)

Photo 2. Location: Looking northeast from SFPR towards the L100. Description: Sediment fencing had been erected serving dual purpose as ESC measures and wildlife isolation (07 Aug 2020).

Photo 3. Sherman trap at River Road East (13 Aug 20).

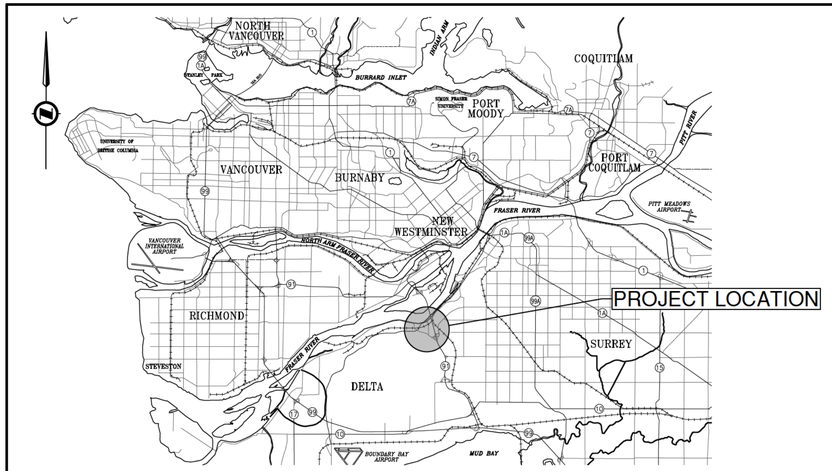
Photo 4. Pitfall trap at River Road East (13 Aug 20).

Photo 5. Areas which had been salvaged at River Road East were cleared and grubbed (28 Aug 20).

Photo 6. Location: Looking down at a Japanese knotweed sprout at River Road West. Description: Newly identified sprouts were treated by Diamondhead (19 Aug 20).

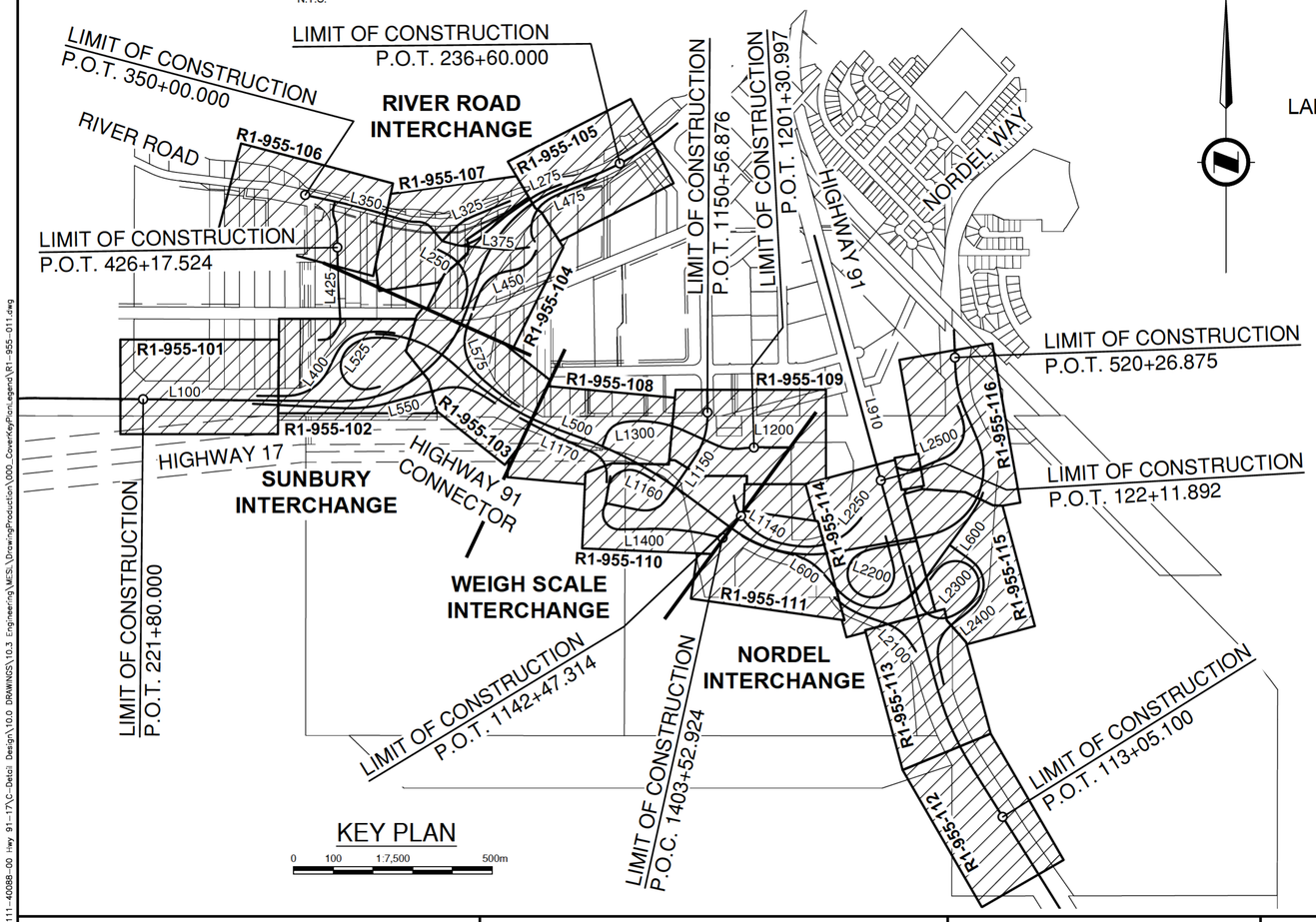
	
Photo 7. Location: Looking down towards the Highway 91 Connector. Description: An isolated occurrence of Japanese knotweed prior to removal and bagging for deep burial at a later date (07 Aug 20).	**Photo 8.** Location: Waste bin near site offices. Description: All waste bins were labelled and secured (19 Aug 20).

APPENDIX 1: KEY PLAN DRAWING



LOCATION MAP

N.T.S.



KEY PLAN

0 100 1:7,500 500m

BRITISH COLUMBIA

Ministry of Transportation and Infrastructure

PROJECT NO. 08900

HIGHWAY 91/17 UPGRADE PROJECT DESIGN BUILD

HIGHWAY 17 - STA. P.O.T 221+80.000 - STA. P.O.C. 236+60.000

1.480 km

HIGHWAY 91 - STA. P.O.T 113+05.000 - STA. P.O.T. 122+11.892

0.907 km

LANDMARK KILOMETRE INVENTORY - SOUTH FRASER PERIMETER ROAD: HWY 99 - 136 ST
SEGMENT 3134 (EAST)
km 8.92 to km 10.23
SEGMENT 3135 (WEST)
km 9.67 to km 12.17

LANDMARK KILOMETRE INVENTORY - HWY 91 ANNACIS: RTE99 - NORDEL I/C
SEGMENT 3002 (NORTH)
km 7.10 to km 7.85
SEGMENT 3003 (SOUTH)
km 0.00 to km 0.75

LANDMARK KILOMETRE INVENTORY - HWY 91 ANNACIS: NORDEL I/C - JCT 91A
SEGMENT 3030 (NORTH)
km 0.00 to km 0.27
SEGMENT 3050 (SOUTH)
km 3.61 to km 3.88

ROADWAY DESIGN

SCALE AS SHOWN

CAD FILENAME R1-955-011

PLOT DATE 2020-02-14

REV	DATE	REVISIONS	NAME
A	2020-02-14	30% INTERIM DESIGN SUBMISSION	D. DULAY

Pacific Gateway Constructors

McElhanney

SEAL

DATE

BRITISH COLUMBIA

MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE
SOUTH COAST REGION
HIGHWAY ENGINEERING AND GEOMATICS

D. DULAY Eng.L., P.L. (Eng)
ENGINEER OF RECORD
DATE 2020-02-14

DESIGNED V. MAK DATE 2020-02-14
QUALITY CONTROL T. SMILJANIC DATE 2020-02-14
QUALITY ASSURANCE D. DULAY DATE 2020-02-14
DRAWN E. YANG DATE 2020-02-14

HIGHWAY 91/17 UPGRADE PROJECT

KEY PLAN

CONTRACTOR FILE NUMBER	PROJECT NUMBER	REG	DRAWING NUMBER	REV
2111-40088-00	08900	1	R1-955-011	A

PLOT DATE: 2020/02/14 N:\Proj\2111-40088-00 Hwy 91-17\C-Detail Design\10.0 DRAWINGS\10.3 Engineering\MES_\DrawingProduction\000_CoverKeyPlan_legend\R1-955-011.dwg

APPENDIX 2: SPILL AND INCIDENT TRACKER

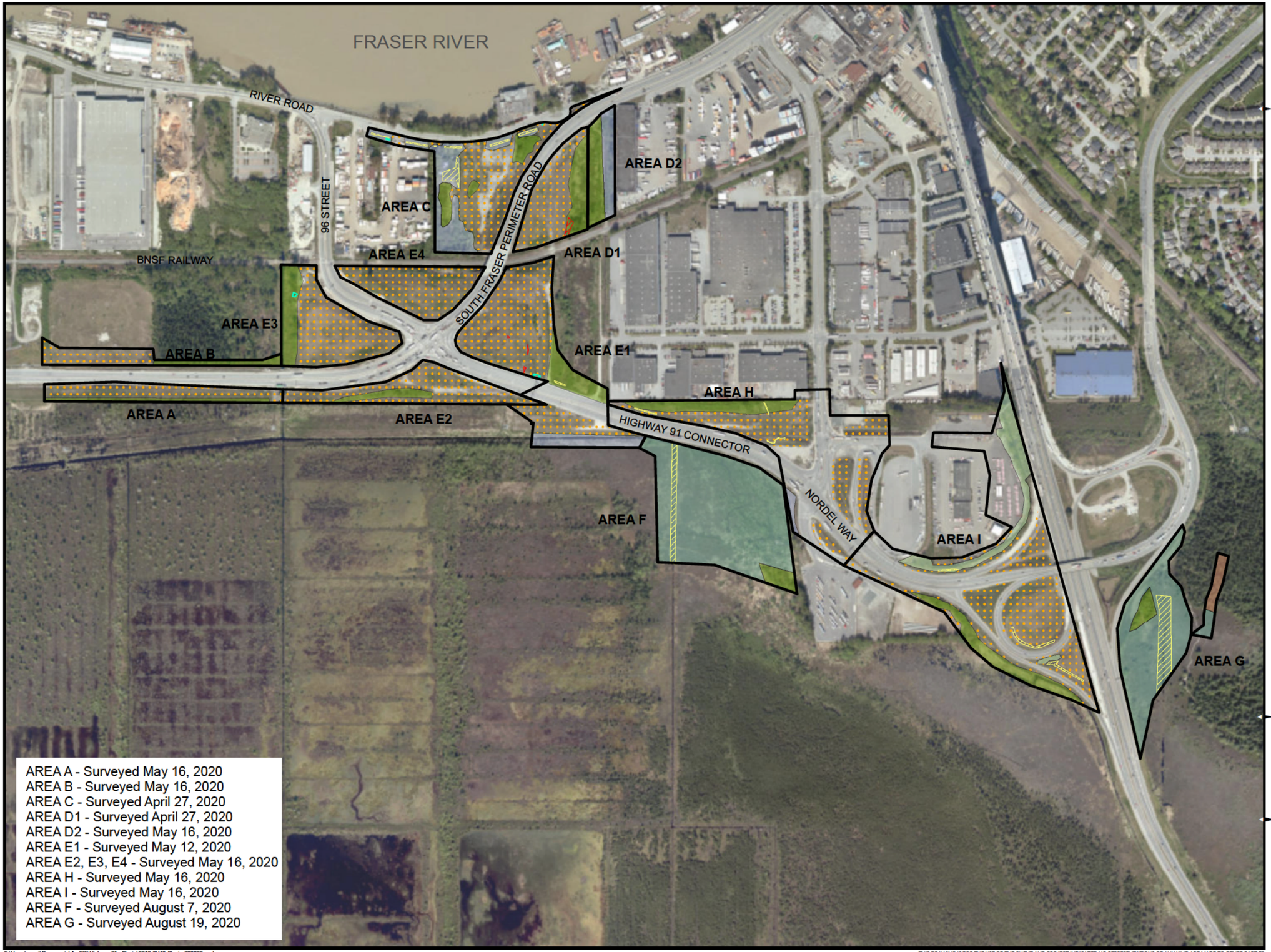
HWY 91/17 SITE
Environmental Spill and Incident Tracking

Incident #	Date Of Event	Date Reported	Date Initial Notification Issued	Shift	Approx ime	Contractor	Sub Contractor	Silo	Classification	Description of Event	Location	Fluid Amount (L)	Fluid ype	ype of Equipment	Causal Factors	Action aken	Corrective Actions Date Comp ete
1	13-Jul-20	13-Jul-20	1 -Jul-20	N ght	18:01 - 18:30	PGC	National Rentals		Spill (1.1L-5L)	Diesel spill to ground- paved sur	PGC Site Office Yard	2	Diesel	Light p ant	Inadequate Procedures	A ter the sp ll was reported at approximately 23:00 absorbent pads were placed on the surface in an attempt to absorb most of the surface diesel. Th s was repeated two times. The contaminated pads were removed, and a granular absorbent sand was placed on the spill to absorb any other res dual d esel from the spi l site. The contamina ed gravel was then removed by using a broom and a shovel. Contaminated absorbent pads and contaminated so ls were placed in separate designated drums for proper disposal by a service provider.	
2	28-Jul-20	28-Jul-20	28-Jul-20	N ght	2:01-2:30	PGC	NA		Minor sp ll (<1L)	Oil spill to ground - pre-load	L575 Pre oad Area	<1	Oil	CAT D6K Dozer	Normal wear and tear on moving machine parts-unforseen circumstances.	D iptray placed under area of concern - Absorbent pads used to mitigate spill to g ound and to remove hydro-carbons from drip tray.	

SUMMARY

otals	Unit/Value	otal
Total Volume	L	2
Total Sp lls	#	2
Class fication		**otal**
Minor Sp ll (<1L)	#	1
Spill (1.1L-5L)	#	1
Large Sp ll (5.1L-99.9L)	#	0
S gn ficant Spill (To water or >100L)	#	0
Total	#	2
Fluid ype		**otal**
Hydraulic	#	0
Antifreeze	#	0
D esel	#	1
Oil	#	1
Gaso ine	#	0
B ack Water	#	0
Glycol	#	0
Unknown	#	0
Total	#	2

APPENDIX 3: RARE PLANT SURVEY RESULTS



AREA A - Surveyed May 16, 2020
AREA B - Surveyed May 16, 2020
AREA C - Surveyed April 27, 2020
AREA D1 - Surveyed April 27, 2020
AREA D2 - Surveyed May 16, 2020
AREA E1 - Surveyed May 12, 2020
AREA E2, E3, E4 - Surveyed May 16, 2020
AREA H - Surveyed May 16, 2020
AREA I - Surveyed May 16, 2020
AREA F - Surveyed August 7, 2020
AREA G - Surveyed August 19, 2020

BRYBIL

BRITISH COLUMBIA
Ministry of Transportation and Infrastructure

Legend

Proposed Alignment

Surveyed Vegetation

Species/Community at Risk

- Lodgepole Pine/Sphagnum Bog Forest

Federally Regulated Weeds

- Japanese Knotweed
- Yellow Flag Iris
- Canada Thistle - High Density

Seeded/Invasive Plants

- Previously Disturbed - Grass, Blackberry, Tansy, Thistle & Others

Native Vegetation

- Young Deciduous Forest - Red Alder, Black Cottonwood, Paper Birch
- Tall Shrub Swamp - Hardhack, Sitka Sedge, Common Cattail
- Planted Coniferous Forest - Western Red Cedar, Douglas Fir
- Wetland/Riparian - Salmonberry, Bracken Fern, Common Cattail

0 100 200 300 m

SURVEY RESULTS

BC Ministry of Transportation and Infrastructure
Highway 91/17 Upgrades

At Risk and Invasive Plant Survey

AE PROJECT No.	2019-2V42
DATE	2020 SEPTEMBER
SCALE*	1:7,000
COORD. SYSTEM	NAD 1983 UTM Zone 10N
REV	05
DESCRIPTION	ISSUED FOR INFORMATION
DRAWN BY	JC
CHECKED BY	SB

ESRI World Imagery: Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community; Roads: Statistics Canada, 2018; Railway: Government of Canada, 2018; Hydrography: Altalis Ltd., 1996.

C:\Users\carsz\Documents\ArcGIS\Highway 91 - Plants\2019-2V42_Plants_200830.mxd

APPENDIX 4: PERMIT TRACKER

McElhanney

APPENDIX 5: PERMIT CONDITIONS TRACKER

Provided as an Excel Spread Sheet

APPENDIX 6: STATUS OF TOCA COMMITMENTS 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	Pre-construction, construction	MOTI / Contractor	N/A	

	- Environmental management plans.				
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; - 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.	Pre-construction	Contractor	X	
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	Pre-construction	Contractor	X	

	- Required follow-up actions.				
2.4	The Owner will engage an Environmental Monitor for the construction phases of the Project to undertake environmental monitoring activities and oversee implementation of each of component plans of the EMP developed for the Project. The Environmental Monitor will monitor, evaluate, and report to the owner on construction activities and the effectiveness of the environmental management strategies and mitigation measures, with respect to the terms and conditions of the Application and other regulatory Permits, Approvals and Authorizations that may apply. The Monitor will be responsible for making onsite decisions and taking on-site action to avoid/respond to potential environmental effects which could include temporary stop work orders if necessary.	Construction	Contractor	X	
2.5	Implement environmental quality management program through monitoring, auditing and reporting activities for the Project with respect to the terms and conditions of the EAC and other regulatory permits, approvals and authorizations.	All phases	Contractor	X	
3.0 Incident Management					
3.1	Respond to environmental incidents, including spill incidents in accordance with the Emergency Response Plan to minimize effects and risks to the general public, on-site workers and the environment.	All phases	Contractor	X	
3.2	Include protocols, consistent with the BC Spill Reporting Regulation, for reporting spills to appropriate emergency response authorities, including; - The Provincial Emergency Program, in the case of any spills of reportable deleterious substances into waters frequented by fish, regardless of the amount of the spill; and - To adjacent property owners and occupiers, including local government, where utilities cross the highway and there is a potential for an incident to extend beyond the Project boundaries.	Pre-construction	Contractor	X	
3.3	Train all field Project personnel regarding implementation of the Construction and Hazardous Waste Management and Spill Management and Emergency Response Plans.	All phases	Contractor	X	
3.4	Incorporate relevant municipal contacts into the emergency contacts for the Construction and Hazardous Waste Management and Spill Management and Emergency Response Plans prepared for construction of the Project.	Pre-construction	Contractor	X	
3.5	Follow applicable DBSS 165 and Canadian Council of Ministers of Environment codes and procedures if temporary fuel storage/fueling facilities are required during construction. Where there is a difference in standards, the most stringent measure for environmental protection will take precedence.	Construction	Contractor	X	
4.0 Community Consultation					
4.1	Consult with local governments, stakeholders and the public during all stages of Project development.	Pre-construction; construction	MoT, 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	MoT, Contractor	N/A	
4.3	Provide regular public information updates on the progress of construction, the schedule, and upcoming milestones.	Construction	MoT, 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	MoT, 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	TBD	
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	TBD	
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	MoT, Contractor	X	
6.2	Obtain ALC approvals regarding areas within the Agricultural Land Reserve (ALR) required for the project, prior to construction.	Pre-construction	MoT, 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	Pre-construction	Contractor	X	

	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.				
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	MoT	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	MoT	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	MoT; 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	MoT	X	
6.9	Undertake reasonable measure to minimize potential loss of ALR lands, including existing farm(s) by: - Refining the Project footprint where feasible; and - 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;	Pre-construction; construction	Contractor	X	

	- 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.				
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	MoT, 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	MoT, 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		
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	MoT; 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	MoT; 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	MoT; 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	MoT; 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 Fisheries Act. This includes implementing mitigation measures and best management practices to ensure that	All phases	Contractor	X	

	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.				
11.2	Obtain an authorization under subsection 35(2) of the Fisheries Act 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) Fisheries Act 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	MoT, 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		
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	TBD	
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 vegetation and wildlife. This plan will also identify protocols for the survey and salvage of vegetation and wildlife as appropriate and required.	Pre-construction; construction	Contractor	X	
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, MoT 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. MoT will ensure on-going	Pre-construction	MoT, Contractor	TBD	

	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.				
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 plants 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		
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 out appropriate mitigation measures including, but not limited to, the stockpiling of soil containing streambank lupine seeds.	Construction	Contractor	X	
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;	Pre-construction	Contractor	X	

	- 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.				
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 MOT administered Wildlife Accident Reporting System to identify areas of increased wildlife collisions and to monitor direct effects on wildlife.	Operations	Contractor	TBD	
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	MoT, 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	TBD	
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 surrounding habitat. Undertake sampling program, where required, to determine the presence and distribution of Pacific water shrew to support detailed design of mitigation.	Pre-construction; construction	MoT, Contractor	TBD	
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 *Sorex rowheri* within the Lower Fraser Valley. Where possible, use findings to support detailed design of mitigation.	Pre-construction	Contractor	TBD	
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	MoT	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	MoT, 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	Construction, operation	Contractor	X	

	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				
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	MoT	TBD	
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	MoT	TBD	
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	MoT, 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	MoT, 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	MoT		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	MoT, Contractor	TBD	
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	MoT, 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	MoT, 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	MoT, 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	MoT, Contractor	X	
16.4	Include required edits and revisions to the Application in the final Heritage Conservation Act Permit report.	Pre-construction	MoT	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	Pre-construction	MoT	N/A	

	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: - 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,	MoT, 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	MoT	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	MoT, 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	MoT, 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	MoT, 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	MoT, 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 *Notice of Railway Works Regulations*. Notify the public and affected stakeholders in accordance with the *Railway Safety Act.*	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	