

**Construction Environmental Management Plan**  
**Rev 3.0**  
**Fraser Grain Terminal**  
**11041 Elevator Road, Surrey, BC**

Prepared for:  
**FWS Western Ltd.**  
275 Commerce Drive  
Winnipeg, MB R3P 1B3

Prepared by:  
**Hemmera Envirochem Inc.**  
18<sup>th</sup> Floor, 4730 Kingsway  
Burnaby, BC V5H 0C6

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- Figure 3 Site Plan with Areas of Environmental Concern
- Figure 4 Estimated Extent of Groundwater Contamination as of 2013 Investigation
- Figure 5 Estimated Extent of Soil Contamination as of 2013 Investigation
- Figure 6 Densification Plan
- Figure 7 Watercourse Classification Map

### **List of Appendices**

- Appendix A Project PER Permit
- Appendix B Project Schedule
- Appendix C Soil and Groundwater Management Plan
- Appendix D ISL Civil Drawings
- Appendix E Chance Find Procedure
- Appendix F Reportable Quantities
- Appendix G Traffic Management Plan
- Appendix H FWS Access Road Drawings

## REVISION TRACKING TABLES

**Table 1 Revision Tracking Table for Construction Environmental Management Plan**

Revision Number	Date Issued	Description	Prepared by (Initials)	Reviewed by (Initials)
0.0	June 29 2018	Construction Environmental Management Plan (CEMP) submitted to VFPA	KM	RT, MC
1.0	December 20 2018	CEMP revised to incorporate First Nations comments and PER permit conditions	KM	RT, MC
2.0	January 25, 2019	Key Project Participants added to Table 5. Updates made to groundwater measures	KM	RT, MC
3.0	April 9, 2019	CEMP revised to include access road construction	KM	RT, MC

**Table 2 Revision Tracking Table for Construction Environmental Management Plan Appendices**

Appendix	Revision Number	Date Issued	Description	Prepared by (Initials)	Ministry Review (Initials)
All	0.0	June 29 2018	Construction Environmental Management Plan (CEMP) Appendices submitted to VFPA	KM	RT, MC
E	1.0	Jan 7 2019	Chance Find Procedure updated based on First Nation's comments	EP, Kleanza	RT
G	1.0	Dec 20 2018	Traffic Management Plan added as Appendix G	FWS	
F	3.0	April 9 2019	FWS Access Road Drawings added as Appendix H	FWS	

## 1.0 INTRODUCTION

Hemmera was retained by FWS Group of Companies (FWS) on behalf of Fraser Grain Terminal Ltd.<sup>1</sup> (the Proponent) to prepare a Construction Environmental Management Plan (CEMP) for the proposed Fraser Grain Terminal Export Facility (the “Project”) to be located on 11041 Elevator Road in Surrey, BC (the “Site”). See **Figure 1** for Site location and construction boundary. The Project will be a new agri-products handling facility located on land adjacent to the Fraser Surrey Docks (FSD) facility. Parrish & Heimbecker currently operate an agri-products handling facility on FSD-leased property adjacent to the Site.

The Site is leased from Vancouver Fraser Port Authority (VFPA) by the Proponent and was formerly leased by Bekaert Canada Ltd. (Bekaert). Hemmera understands that the Project will serve as a trans-shipment storage location for bulk grain products, and will include loading and unloading infrastructure, storage silos, a transfer tower and gallery, and ancillary works.

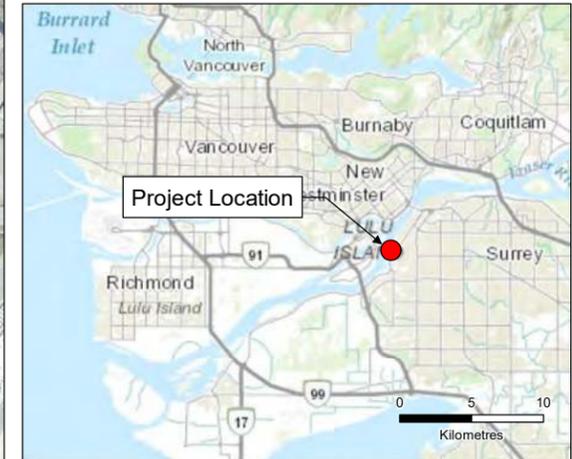
The CEMP is intended to address the potential for construction-related activities to impact environmental resources or members of the surrounding community. The CEMP has been prepared on behalf of the Construction Contractor, FWS, in accordance with Port guidance on Construction Environmental Management Plans (PMV 2015) and is based on the current environmental conditions of the Site, industry-standard environmental construction techniques, the scope of the proposed Project, and the assessments completed on the Site to date. Revision 1.0 of the CEMP, including the Chance Find Procedure (**Appendix E**) has been updated to include First Nations comments and the conditions of the Project PER permit 15-041 (**Appendix A**). If and when new information or changes to the proposed Project occur, the CEMP will be updated accordingly to reflect those changes.

The CEMP is intended to mitigate potential effects due to Project-related construction activities such as dust, noise, sediment control, spills, and hazardous wastes. The guiding principle of the CEMP is the protection of the environment during Project activities, and as such, all work will be carried out in accordance with the CEMP, applicable regulations, and with industry Best Management Practices (BMPs). Compliance with the CEMP will be a contractual requirement for the construction work on-site.

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<sup>1</sup> Fraser Grain Terminal Ltd. is a Canadian family-owned and operated grain company with more than 100 years of experience in agribusiness and locations across Canada. Serving more than 10,000 Canadian farmers and producers, we market grain to over 40 countries.

**Project Location and Construction Boundary**



**Legend**

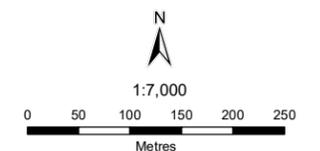
Site Boundary for Construction Works

**Notes**

1. This map is not intended to be a "stand-alone" document, but a visual aid of the information contained within the referenced Report. It is intended to be used in conjunction with the scope of services and limitations described therein.

**Sources**

- Aerial Image: City of Surrey, 2014



NAD 1983 UTM Zone 10N

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Path: S:\GIS\emissions\Project\2191-001\11041 Elevator Road\CPM\Fig1b\_2191\_001\_01\_Site Location\_Construction\_85014.mxd

## 2.0 PROJECT INFORMATION

### 2.1 PROJECT LOCATION

The Site is located at 11041 Elevator Road, in the City of Surrey, BC. Land title and Site information is provided below in **Table 1**.

**Table 1 Land Title Information**

<b>Civic Address</b>	11041 Elevator Road, Surrey, BC
<b>PID</b>	000-725-234
<b>Legal Description</b>	Parcel PT PCL L, Plan 6744, Section 34&35, Range 3W, New Westminster Land District, Except Plan 24820, & Portion of Lot 4 of LMP29318 (SEE 3340-97101-8 For Parent Folio Lease B-74-00), Lease/Permit/Licence # SUR360-07400F-001
<b>Registered Land Owner</b>	Crown Federal
<b>Area</b>	Approximately 10.3 hectares
<b>Zoning</b>	IL – Industrial
<b>Percent Site Coverage</b>	~71% covered with buildings, ~17% covered with asphalt or railway track, ~12% grassed or exposed soil/gravel

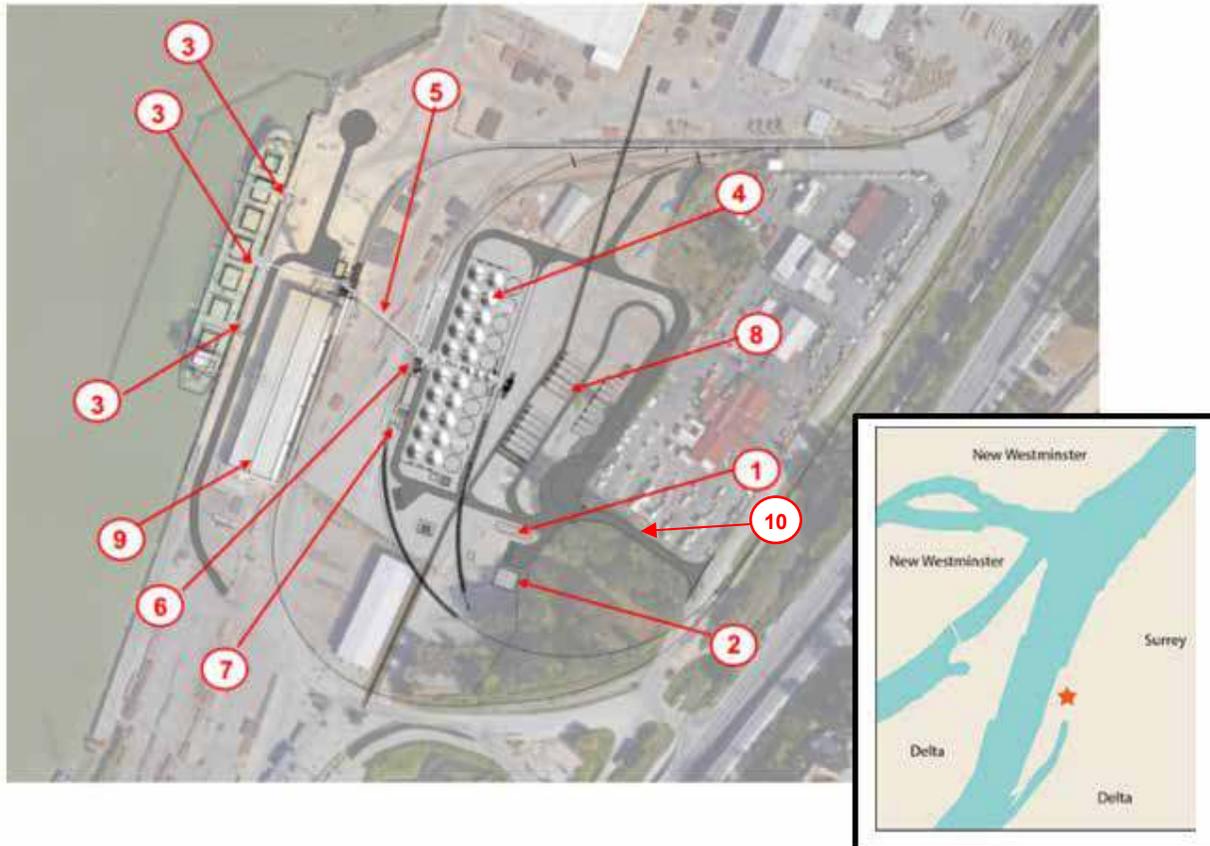
### 2.2 PROJECT DESCRIPTION

The Project will trans-ship up to 3.5 million tonnes per annum (Mt/a) grain products including wheat, barley, oil seeds, and pulses. Grain will be received by rail and either loaded directly to vessels or stored temporarily prior to loading. A small proportion of the total volume will be loaded to containers or trucks for local distribution. Layout of the new facility is shown below in **Figure 2** and includes state-of-the art grain handling features to minimize noise and dust. The 24-month construction period will follow demolition of two existing buildings<sup>2</sup>, and construction will include the following new components:

- Semi-loop rail track and loading track connected to the adjacent PARY.
- Rail unloading station and transfer tower with fully-enclosed conveying equipment and a built-in dust suppression system.
- Three (3) fixed tower shiploaders with telescoping spouts, each with dust reducing features during vessel loading, replacing existing shiploader mobile conveyors. Each tower will be supported on steel piles in the foreshore and land side shore area.
- 25 above-ground steel storage bins (20 x 3,500 MT, 4 x 400 MT and 1 x 710 MT)
- Ground densification for the silo and shiploader foundations using Rammed Aggregate Pier (RAP) densification. The foundation densification program for the silo area was developed to minimize potential movement of in-situ contamination plumes.
- Single integrated container, bulk truck, and rail loading facility and container storage yard.

<sup>2</sup> The demolition work is the subject of PER Application 15-255.

- An administration building and maintenance shop, two control rooms, electrical rooms and container preparation area with fabric rain cover.
- Construction of an access road connecting Robson Road to the Project site. The road will be approximately 120 m long.
- Extension of Tracks 94, 95 and 96, and switch changes in the PARY. Track alignment lengths will be extended as follows: Track 94 by 888 m, Track 95 by 877 m, Track 96 by 907 m. This work is considered Phase 2 of the Project.



#	Description	#	Description
1	Administration Building	6	Rail Unloading Building
2	Maintenance & Sample Storage Building	7	Transformer
3	Tower Shiploaders	8	Container Storage Yard
4	Storage Silos	9	Existing JV Facility
5	Transfer Conveyor	10	Access Road

**Figure 2 Proposed Facility Components**

### 2.3 CONSTRUCTION EQUIPMENT

Major equipment to be used during construction is summarized in **Table 2** below.

**Table 2 Equipment to be Used by Construction Activity**

Construction Equipment	Construction Services	Civil Services (Water, Sewer System, Roads)	Storage Area			Receiving Area					Transfer System				Wharf				Rail Works (Main Loop and Spur Line)	Container Area		Railcar and Truck Loading Facility	Buildings		Utilities		Access Road	Clean Up		
			Storage Area Preparation	Storage Area Concrete	Storage Area Steel	Receiving Area Excavation and Piling	Receiving Area Concrete	Receiving Area Steel	Receiving Area Equipment	Receiving Area Building	Main Transfer Tower Concrete	Main Transfer Tower Steel and Equipment	Transfer System Piling and Concrete	Transfer System Steel and Equipment	Wharf Transfer Gallery; Piling and Concrete	Wharf Area; Water Side Piling and Concrete Works	Wharf Area; Rail and Steel Works	Shiploader Erection		Container Storage Areas	Container Loading Structure		Office Building	Maintenance Building	Mechanical Equipment Installation	Electrical Equipment Installation				
Rough terrain 30 T crane(s)	1			1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	*	*		
skid-steer loader(s)	1	2																1	2										2	2
forklift(s) 3 T capacity	1									1		1	1	1		1	1			1	1	1	1	1						
Miscellaneous cars and trucks for personnel and deliveries	M	M	M	M		M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M				M	M
5 T truck(s) with integral folding boom crane		2		1	1		1	1	1	1		1	1	1	1	1	1	1	1		1	1	1	1						1
5 T excavator(s)		2				2								1		1			1		1	1	1	1					2	
Compactors		2																											2	
Concrete saw			1			1								1		1			1		1	1	1	1						
Tower cranes				2																										
50 T crane				1																										
Concrete pump(s)				2			2				2		2	1	1						1	1	1	1						
Ready-mix concrete truck(s)				6			6				6		6	3	3					3	3	3	3	3						
Concrete vibrators				5			4				4		4	2	2					2	2	2	2	2						
Miscellaneous hand tools: hammers, impact wrenches, etc.				M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M		M	M	M	M						M
Welders				6	2	2	2	2	1		2		2	2		2	1			2	2	1	1							
200 T crawler crane				1							1		1	1																
200 T hydraulic crane				1																										
articulating boom lifts				2						2	2		1	1							1	1	1	1						
sheet pile driving unit (vibrator type)						1																								
pile driving unit (vibrator type)						1							1	1	1															
tieback anchor drill unit						1																								
dump trucks						4								2	2				2		2	2	1					4	1	
Jackhammer																			2				1							
Air compressor																			1											
Service barge and tug																	1													
Rail laying machine																			1											
Spreader/grader																			1	1									1	

M = miscellaneous

**Note:** the numbers in the table represent the number of construction equipment units required for the task.

\* = All equipment installation already covered by other events

## 2.4 PROJECT SCHEDULE AND STAGING

Construction is planned to start shortly after receipt of the Project permit from the VFPA. Construction is planned to commence once demolition activities<sup>3</sup> are complete and is anticipated to take approximately 24 months from mobilization to commissioning. **Appendix B** shows the proposed construction schedule for the Project.

Construction works have been planned according to functional areas of the Site such as storage, receiving, shipping, and container loading. Construction is anticipated to be sequenced as follows:

- Prepare for on-site construction:
  - Mobilize to site
  - Establish temporary services and power
- Demolition:
  - Demolition of Shed 4
  - Demolition of substation
  - Demolition of slab
- Main Project construction
  - Civil services
    - Remove existing utilities
    - Establish permanent storm sewer and interceptor
    - Install underground services
    - Roads and site development
  - Access road construction (See drawings in **Appendix H**)
    - Armour slope (riprap over geotextile)
    - Regrade existing 70m ditch (Ditch N in **Figure 7**) to 0.1% slope
    - Construction of asphalt road surface
    - Extension of the culvert approved under PER permit No. 15-041. The culvert will be extended by 25 m to connect to the west end of Ditch N
    - Tie-in to existing edge of pavement at Robson Road and other connections at the northern portion of the road
    - Construction of a concrete barrier curb on the north side of the road for drainage purposes
  - Main plant:
    - Soil densification (RAPs)

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<sup>3</sup> The demolition work is the subject of PER Application 17-035.

Receiving and unloading pit

Reclaim/transfer tunnel

Main storage silos

Piling for shipping and loadout

Steel bin assembly

Structural steel erection

Plant electrical

Container/rail/truck loading – steel & equipment install

Shiploader construction, including densification and removal of wharf sections to install foundations

Rail loop construction

Clearing, vegetation management, grubbing

Rail line install

Maintenance building construction

Administration building construction

Foundation

Install pre-fabricated building

Final site work and paving

Control building construction

- Commissioning:

Dry commissioning

Commissioning with grain

Testing

Note that removal of the existing shiploader is not part of the scope of this document. Phase 2 of rail construction would not need to be completed prior to Fall 2021.

## **2.5 SITE DESCRIPTION**

### **2.5.1 Site History**

The Site was historically vegetated and undeveloped, up until the early 1960's. In the mid-1960's, Titan Steel & Wire Corp. began developing the land for industrial manufacturing purposes and cleared much of the Site. Between the 1960's and late 1970's, the Site became progressively more developed including the construction of a steel facility and infrastructure associated with Fraser Surrey Docks. Few changes have occurred since the late 1970's except for the addition of a few paved areas (Hemmera 2013).

Site history related to contamination can be found in the investigative reports listed in Section 2.5.1 of the Soil and Groundwater Management Plan (**Appendix C**).

### 2.5.2 Present and Future Land Use

The Site is currently not active but contains infrastructure from the previous steel and wire manufacturing operation. The Site is located entirely on federal lands designated by the VFPA's Land Use Plan as Port Terminal (PMV 2014) and has operated as an industrial port facility since the early 1960s. Future use for the Site is likely to remain as Port Terminal.

### 2.5.3 Surrounding Land Use

The Site is bounded by Fraser Surrey Docks (FSD) to the north and west, by Elevator Road to the south, and a lumber facility (Western Cleanwood Preservers/ Surewood Forest Products) and Robson Road to the east. The Site is owned by VFPA and located on crown federal land.

### 2.5.4 Site Geology and Hydrogeology

The general stratigraphy of the Site is sand and some gravel to approximately 0.3 m below ground surface (bgs), underlain by sand to approximately 4.0 m bgs, underlain by sand and silt. Additional geotechnical detail is provided in **Attachment 7**.

Groundwater elevations indicate that the groundwater flow direction is generally to the west/northwest with a horizontal hydraulic gradient of approximately 0.004 m/m (0.4%). This corresponds with an available topographic map and the observed site topography. Based on previous monitoring events at the Site, groundwater is known to fluctuate with tidal and seasonal variations in the groundwater table elevation (Hemmera 2013a).

### 2.5.5 Weather and Climate

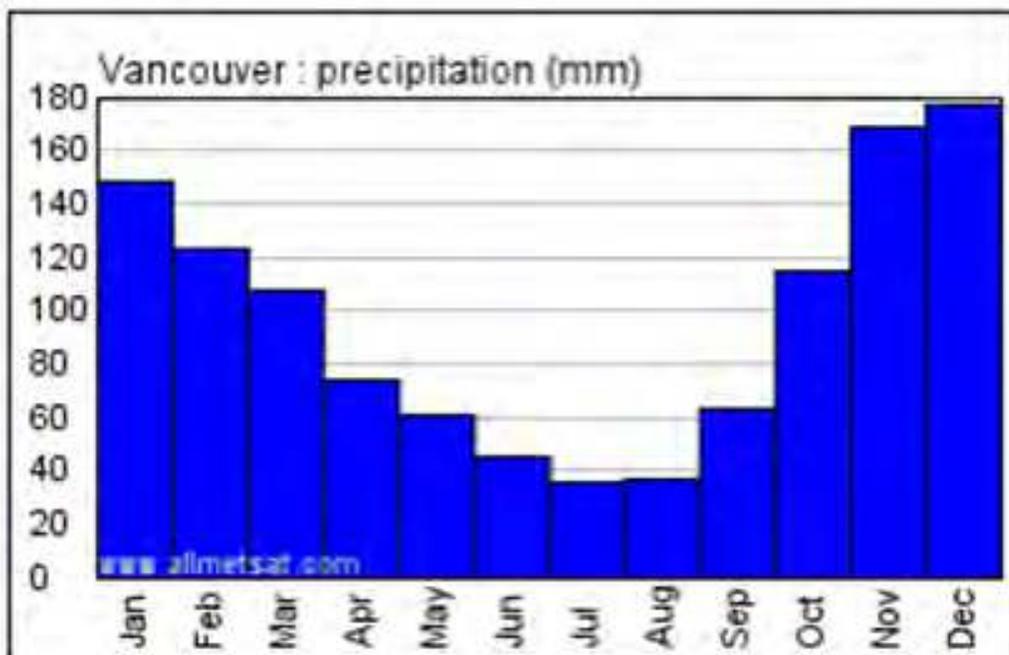
The Project is situated within the Pacific Maritime Pacific climate zone. A summary of weather and climatic conditions for this climate zone are summarized in **Table 3** and **Plate A** below. Vancouver International Airport was selected as the weather station most similar to the Site. Typical of this climate zone, the highest average annual precipitation (1113 mm) and associated runoff occurs during the winter months, and the driest months on average are July and August (~40 mm each month).

**Table 3 Project Site Climate Information**

<b>Climate Zone</b>	Pacific Maritime Ecozone
<b>Average Temperature Range</b>	5°C to 20°C
<b>Average Total Annual Precipitation</b>	1113 mm at YVR, 19km to the West

<b>Weather Forecasts</b>	www.weather.gc.ca www.theweathernetwork.com
<b>Weather Phone (Environment Canada)</b>	604.885.4100
<b>Weather Notices (Environment Canada)</b>	www.weatheroffice.pyr.ec.gc.ca/e-products

### Yearly [Annual], Average Precipitation Graph



Vancouver, British Columbia Canada

**Plate A Vancouver (YVR) Annual Average Precipitation**

#### 2.5.6 Site Contamination

This CEMP is based upon proposed construction activities at the Site and considers the current federal and provincial standards and practices for soil and groundwater management. Where construction will disturb soil and groundwater and where ground improvements are planned, appropriate management of contamination such as planning, handling and disposal will be conducted. Likewise, should the intended use of the Site be modified that may disturb soil and groundwater in new areas, or should regulatory standards change, this CEMP will be updated accordingly. For further information on the management of contaminated soil or groundwater, including remediation options, please reference the Soil and Groundwater Management Plan for the Site (**Appendix C**).

Based on previous investigations (Hemmera 2013a, Hemmera 2013b, Hemmera 2014), soil and groundwater contamination has been identified on the Site. Estimated extents of known soil and groundwater contamination are shown in **Figures 4 and 5** in relation to areas of required excavation.

Ground densification in the vicinity of the contamination plumes are specifically addressed in the Soil and Groundwater Management Plan. While this CEMP identifies known contamination at the Site, areas of unforeseen contamination may also exist. Hence, any intrusive activities at the Site should consider soil and groundwater management with the context of encountering potential contamination, and, all removed soil and groundwater should be appropriately stockpiled and tested on-site prior to reuse or disposal off-site.

To the extent feasible, this Project design has considered and minimized intrusion into areas of known contamination as identified in a Detailed Site Investigation (DSI) (Hemmera, 2014). Known contamination in both groundwater and soil are shown in **Figures 4 and 5** respectively in relation to proposed infrastructure and specifically excavation areas (outlined and specified with maximum depths of excavation below ground surface). For planning purposes, the following **Table 4** provides a summary of proposed excavations and anticipated contaminants that may be encountered in each.

**Table 4 Summary of Excavation Areas Relative to Known Areas of Contamination**

Excavation Area <sup>1</sup>	Likelihood of Soil Contamination Known Contaminant(s) <sup>2,3,4</sup>	Likelihood of Groundwater Contamination Known Contaminant(s)
<b>Reclaim Conveyor Tunnel (2.4m bgs)</b>	<b>Moderate</b> F1 to F3, Volatile Petroleum Hydrocarbons (VPH), Light Extractable Petroleum Hydrocarbons (LEPH), Heavy Extractable Petroleum Hydrocarbons (HEPH), Polycyclic Aromatic Hydrocarbons (PAH), Volatile Organic Compounds (VOC)	<b>High</b> Arsenic, Boron, Manganese, Zinc
<b>Boot Pit of Receiving and Reclaim Legs (8.4m bgs)</b>	<b>High</b> F1 to F3, Volatile Petroleum Hydrocarbons (VPH), Light Extractable Petroleum Hydrocarbons (LEPH), Heavy Extractable Petroleum Hydrocarbons (HEPH), Polycyclic Aromatic Hydrocarbons (PAH), Volatile Organic Compounds (VOC)	<b>Moderate</b> Arsenic, Boron, Manganese, Zinc
<b>Receiving Conveyor Tunnel (4.0 m bgs)</b>	<b>High</b> F1 to F3, Volatile Petroleum Hydrocarbons (VPH), Light Extractable Petroleum Hydrocarbons (LEPH), Heavy Extractable Petroleum Hydrocarbons (HEPH), Polycyclic Aromatic Hydrocarbons (PAH), Volatile Organic Compounds (VOC)	<b>High</b> EPHw10-19, LEPH, PAHs Volatile Organic Compounds (VOC)

**Source:** Hemmera 2014

- <sup>1</sup> See **Attachment 4A** for excavation areas
- <sup>2</sup> High - Excavation within footprint of known contamination
- <sup>3</sup> Moderate - Excavation near known contamination
- <sup>4</sup> Low - Excavation not located near known contamination

Currently, monitored natural attenuation has demonstrated that the dissolved metal groundwater plume is stable and not advancing to the Fraser River. RAPs are proposed as ground improvements for the new silo foundation. These RAPs will penetrate through portions of the groundwater plume. To limit potential movement of the groundwater plume and provide a safeguard against acidity being added to the

groundwater, grouted RAPs are proposed along the downgradient perimeter of the silo foundation (see **Section 6.7.3** and **Figure 6**).

The Regulatory Framework section (**Section 4.0**) below contains applicable contaminant standards and guidelines.

For the proposed Project construction program, regardless if there is a high, moderate or low possibility of contamination, appropriate handling and testing should be conducted. The Soil and Groundwater Management Plan (**Appendix C**) provides procedures to address any subsurface excavation or construction work. The following protocols will also be adhered to:

- 1) Where contamination is anticipated, all subsurface soil excavation work will be planned and managed (see **Appendix C, Section 4.1**). Where groundwater will be intercepted, this will also be managed.
  - a. Soil stockpiled and tested for either on-site reuse or off-site disposal.
  - b. Groundwater stored in tanks for testing and appropriate disposal.
- 2) If unforeseen contamination is encountered (e.g. visual indications of contamination, staining, sheen, odour):
  - a. Work will stop immediately and the area will be taped off;
  - b. The site superintendent or manager will be notified;
  - c. The EM will be notified;
  - d. A contaminated sites specialist (the specialist) will be consulted to determine if contamination is present;
  - e. If contamination is not present, continue work;
  - f. If contamination is present, survey the location, take detailed notes and photos, the specialist will take soil samples and conduct 3<sup>rd</sup> party analytical testing
  - g. The specialist will notify the site team (superintendents, managers, EM, etc.) once the contamination is confirmed; and,
  - h. The specialist will confirm any remaining remediation tasks necessary.
- 3) Existing groundwater monitoring wells within the FGT and FSD lease areas and listed in Condition 47 of Permit 15-041 will be:
  - a. Retained as feasible and will not be removed or decommissioned unless VFPA provides approval. The Contractor shall provide 10 days notice of intent to decommission.
  - b. Replaced, if damaged or decommissioned in accordance with a replacement well plan;
  - c. If decommissioned, done so in accordance with Appendix C of VFPA's CEMP Guideline.

### 3.0 CONTACTS AND RESPONSIBILITIES

#### 3.1 KEY PROJECT PERSONNEL

The following section describes key Proponent participants who will be involved with the Project throughout the construction phase. **Table 5** lists roles and contact information for the key Project participants.

**Table 5 Key Project Participants – Roles and Contact Information**

Name	Role/Company	Cell Phone Number
Casey McCawley	General Manager/FGT	604-868-1069
Tanya Hayes	Project Coordinator/FGT	604-312-3212
Andrew Smith	Project Manager/FWS	204-293-4071
Dale Rawn	Construction Manager/FWS	604-219-8418
Jason Day	Asst. Construction Manager/FWS	204-797-4207
Robin Taylor	Environmental Manager/Hemmera	604-230-2133
Katharine Scotton nts	PGL Environmental Consulta	778-772-7850
Melissa Hebert	Environmental Monitor	778-882-7259
Aegean Chan	Environmental Monitor	778-903-0306
Maverick Sadler	Environmental Monitor	604-719-7598
John Rithaler	Environmental Monitor	Office: 604-631-2211
Miranda Lewis	Environmental Monitor	Office: 604-631-2211

#### 3.2 PROPONENT/CONTRACTOR RESPONSIBILITIES

The Contractor will comply with the all legislation applicable to the Work, and with all permit conditions, including those of the PER permit 15-041 (**Appendix A**). As part of pre-construction preparation, the Contractor will review the CEMP in relation to their means and methods, and either modify their means and methods or refine the CEMP to ensure consistency of approach. As part of Project requirements, the Contractor's on-site employees, and subcontractors will adhere to the CEMP's environmental protection objectives:

- Assuring compliance with applicable regulations, licences and permit conditions;
- Assuring compliance with the CEMP for all employees, subcontractors and visitors on-site, and provide appropriate training on the CEMP;
- Work with the EM to identify the most suitable BMPs for each work activity and implement these BMPs;
- Communicate with the EM to coordinate their visits to assure CEMP compliance and responsible environmental protection;
- Identify imminent threats to the environment and respond to EM-identified environmental issues and concerns in a timely manner; and,

- When out of compliance with the CEMP, to rectify the issue as soon as reasonably possible, and ideally within 24 hours of notification from the EM.

### **3.3 INDEPENDENT ENVIRONMENTAL MONITOR RESPONSIBILITIES**

An Independent Environmental Monitor (IEM) will be retained by FGT. The IEM will report directly to VFPA and will obtain direction from VFPA on matters that arise during construction that are not described in the Project Permit 15-041 and cannot be resolved through discussion with FGT. The IEM will be responsible for reviewing environmental records for on-site construction activities for compliance with the CEMP and Permit 15-041. At a minimum, the IEM will have suitable education and knowledge demonstrating that they can be relied on to provide advice within their area of expertise. The IEM will have a minimum of five years of experience monitoring related construction activities in similar environments. The Contractor will provide unfettered access to all areas of the Project at any time as well as to any environmental compliance documentation requested by the IEM.

FGT will submit a Monitoring Work Plan that describes the following provisions:

- Name and qualifications of the IEM and IEM designates;
- Unfettered access for the IEM to the Project site and documents;
- IEM's authority to direct the Proponent to stop a construction activity that is causing an adverse environmental effect;
- Concurrent submission of compliance reports to FGT and VFPA within one week of site visits;
- A proposed schedule for site visits, with higher frequency during in-water works;
- How notice will be provided to FGT and VFPA for non-compliant activities or those having adverse, and unmitigated effects; and
- IEM's role on addressing Project matters not addressed in the Project Permit.

### **3.4 ENVIRONMENTAL MONITOR RESPONSIBILITIES**

On-site monitoring of the construction works is a key component for compliance to the CEMP. The Contractor's Environmental Monitor (EM) is an appropriately Qualified Environmental Professional (QEP) and will be available for activities that could affect environmentally sensitive areas during construction and intrusive soil work on-site. The frequency of visits will be dependent upon the work tasks for each day, but an EM will be present for any intrusive work (e.g., soil excavation or movement); full time for in-water works that have the potential to affect fish or fish habitat; installation, inspection, and maintenance of any erosion and sediment control measures; and at the start-up of any new phases of work. Typically, the EM will complete daily reports for each day on-site for internal distribution and will prepare monthly summaries for external distribution (permit/approval legislative body). The EM will have the authority to enact the CEMP

and will verify conformance with the CEMP, the applicable regulatory framework, and any Best Management Practices (BMPs) expected at construction sites.

Other tasks associated with the EM include, but are not limited to:

- Completing and submitting weekly environmental monitoring reports to the Proponent and VFPA, or more frequently as required.
- Participating in daily tailgate meetings and discussing relevant sections of the CEMP with the work crew for that given day/task;
- Communicating and coordinating with the Contractor for appropriate scheduling of on-site visits based on work tasks for the three-month look-ahead schedule;
- Halting work if the tasks planned are likely to cause negative impacts to the environment;
- Identifying when additional QEPs may be required;
- Monitoring the effectiveness of mitigation measures;
- Communicating with the Contractor on any issues with their work schedule or planned tasks that may have adverse environment effects (e.g., work outside fish window, or in areas with nesting migratory birds);
- Completing incidents reports (e.g., spills, stop work orders), and reporting incidents to the appropriate contacts on-site; and,
- Helping guide the Contractor in achieving a high standard of environmental management during Project construction.
- Preparing and submitting a environmental monitoring summary report to VFPA within 30 days of the conclusion of environmental monitoring for the Project.

An archaeological monitor will be on-site during excavations at depths greater than 3 m bgs, as described in Section 6.12 below.

Upon completion of the construction work on-site, the EM will prepare a final report that will document the work completed, any discharges from the Site (waste, spills, water, soil), as well as remedial actions taken to rectify any issues on-site. This report will be sent to VFPA and applicable regulatory agencies.

#### **4.0 REGULATORY FRAMEWORK**

The following section describes the regulatory and policy framework under which construction work on-site will be completed. As the Site is federally administered by VFPA, federal and VFPA regulations, policies and permit conditions are applicable to the Site. Discharges and wastes removed from the Site are subject to federal, provincial, municipal, and VFPA regulations and policies, as well as the conditions of PER permit 15-041.

Federal environmental legislation applicable to the Site is listed below as well as provincial legislation may be applicable where the Site or Project activities interface with non-federal land:

Federal:

- *Canada Shipping Act, 2001* (S.C. 2001, c.26).
- *Fisheries Act* (R.S.C. 1985, c. F-14).
- *Canadian Environmental Protection Act, 1999* (S.C. 1999 c. 33).
- *Migratory Birds Convention Act* (SC 1994, c. 22).
- *Species at Risk Act* (SC 2002, c. 29).
- *Transportation of Dangerous Goods Act* (S.C. 1992, C.34)

Provincial:

- *Water Sustainability Act* (SBC 2014, c. 154) and associated Water Sustainability Regulation (BC Reg. 36/2016).
- *Wildlife Act* (RSBC 1996).
- *Emergency Program Act, 1996*.
- *Environmental Management Act, Spill Reporting Regulation*. BC Reg. 263/90, including amendments up to B.C. Reg. 376/2008, effective December 9, 2008.
- *Environmental Management Act, Hazardous Waste Regulation, Table 1, Leachate Quality Standards*, amended April 1, 2009.
- *Environmental Management Act, Contaminated Sites Regulation (CSR)*. 2009 BC Reg. 375/96 (Effective April 1997 and amended July 1999, November 1999, February 2002, November 2003, and July 2004, July 2007), including amendments up to B.C. Reg. 4/2014, effective January 31, 2014.

The Contractor is responsible for:

- Having all required permits necessary to undertake the construction,
- Having all required permits necessary to undertake intrusive soil work and transport and handling of soils and wastes from the Project off-site, and
- Compliance with the terms and conditions of these permits.

## 5.0 POTENTIAL INTERACTIONS

Potential interactions between Project construction and the biophysical and socio-economic environment are identified in **Table 6**.

**Table 6 Potential Interactions between Project Construction and the Environment**

Project Component/Activity during Construction Phase	Key Areas of Potential Interaction								
	Terrestrial Biophysical	Aquatic Biophysical	Soil and Groundwater	Air Quality	Noise	View and Shade	Lighting	Traffic	Archaeological Resources
Site preparation, including vegetation clearing	X					X			X
Use of mobile equipment (forklifts, trucks, vehicles)	X	X		X	X			X	
Regrading of Ditch N for access road		X		X					X
Construction of asphalt road surface				X	X				
Excavations, including installation of trémie concrete plugs and dewatering	X	X	X						X
Installation of marine piles, including removal of existing asphalt material, removal of mesh and slope protection material, vibratory pile driving, impact pile driving, reinstallation of slope protection material, and pouring of concrete caps	X	X			X				
Installation of rammed aggregate piers for ground densification			X	X	X				X
Removal and processing of concrete slab			X	X	X				
Erection of shiploading structure on the wharf	X								
Pouring of concrete slabs, walls, trench and pits		X	X				X	X	
Installation of storage silos	X				X	X			
Installation of steel frame tower, buildings	X				X	X			
Installation of extensions / realignments of rail lines, rail loop, security fence and gates	X			X				X	
Potential leaks, spills from construction equipment / vehicles		X	X						
Generation of construction waste and soil removal			X	X	X				
Construction traffic				X	X			X	
Demobilization from the site	X	X							

## 6.0 PROJECT MITIGATION MEASURES AND ENVIRONMENTAL SPECIFICATIONS

Mitigation measures and environmental specifications for the Project are outlined below.

### 6.1 GENERAL PRACTICES

All work on-site will be conducted in a manner that limits adverse effects to the public and environment; and that is consistent with accepted industry standards, BMPs, and applicable regulations. The following lists the general practices which will be completed on-site during Project work:

- All Site personnel, employees, contractors, and subcontractors will be required to review the CEMP and guidelines and be familiar with CEMP components that are applicable to their work, and comply with the CEMP;
- All work on-site will include environmental protection measures in each work plan to proactively mitigate the potential for negative effects on the environment and safeguard the public;
- Appropriate supplies (e.g., spill kits, first aid equipment, erosion and sediment control supplies and equipment) will be kept in accessible locations on-site to respond to emergencies in a timely manner, and appropriate training will be conducted for employees of the Site in the use of this equipment. Training records will be maintained, and kept up-to-date as the Project progresses with each new phase;
- Work will be scheduled, as much as possible, to avoid negative impacts to the public and environment (e.g., avoid migratory bird nesting and fish windows, avoid loud and noisy construction activities at night, ensure no adverse weather-related stormwater runoff, etc.); and,
- The Contractor will review the work tasks weekly with the EM to ensure they are in compliance with the CEMP, BMPs, and all applicable regulations and standards, especially when transitioning to new phases of the Project.
- The Contractor will either remove from the Project site all abandoned utilities or cap all abandoned utilities that conflict with the Project, both underground and aboveground. At locations of connection to municipal work (i.e. at property lines), the abandoned utilities will be capped.

### 6.2 SITE ACCESS, MOBILIZATION, AND LAYDOWN AREAS

All construction access for transport of construction materials to and from the Site is anticipated to be truck-based. Equipment and supplies will be brought to the Site, while any debris, wastes, and impacted soil will be removed to appropriately licensed facilities.

The main access point will be Elevator Road via the Tannery Road Interchange, with trucks using Robson Road to then move onto the South Fraser Perimeter Road (SFPR). A construction traffic management plan will be prepared by the Contractor. Trucks will follow the applicable laws and regulations regarding the loading and transport of their materials, (e.g., *Transportation of Dangerous Goods Act*), and any other applicable regulations. **Figure 1** shows the Project location and construction boundary. The existing access will be used for trucking materials on- and off-site until the new access road is complete. At that point, the

access road will be the main point of access to the site. of the Application. Construction laydown areas are shown in FWS Drawing P012 in **Attachment 4A** of the Application.

### **6.3 AIR QUALITY**

The objective of air quality management is to minimize air emissions associated with Site construction and intrusive soil activities. This includes mitigation for air emissions such as vehicle/equipment exhaust, dust, and vapours associated with on-site activities to avoid adverse health, safety, nuisance, and other environmental effects. The following air management actions will occur on-site:

- Equipment and vehicles will be turned off when not in use, and can only idle if it will be used within a reasonable amount of time (e.g., 5 minutes). Exceptions include mobile light plants for Site lighting, mobile dewatering equipment, and any health and safety equipment required for safe operation of the Site during construction;
- All construction equipment and vehicles will be well-maintained. Maintenance logs will be updated, and daily logs completed following inspections to ensure they are in good working order;
- Dust-generating activities (e.g., earthworks) will be monitored and managed during dry periods and periods of high wind to avoid generation and transport of dust off-site. Suppression agents (e.g., water) may be used in instances where work cannot be rescheduled to a more appropriate time, following VFPA acceptance of suppression agent and application method prior to its use on-site. Run-off due to use of suppression agents should be contained and treated as necessary;
- Stockpiled soil will be kept in an appropriate laydown area, covered with poly, and active stockpiles will be secured (e.g., covered with anchored poly) at the end of each shift; where stockpiles will be left inactive for several weeks or more, the method of securing them will be appropriate for preventing sedimentation and weed establishment (e.g., hydroseeding or more permanent cover);
- All trucks leaving the Site with soil will be covered to prevent dust generation and loose gravel release to the roadway;
- Regular Site cleaning with a water truck and sweeper will be completed to keep the on-site roads clear of dust-generating material; and,
- Truck wheels will be washed down prior to leaving the Site to avoid tracking material (i.e. soil, debris, wastes) off-site.

### **6.4 NOISE AND VIBRATION**

Noise generation and vibrations resulting from equipment and associated activities during construction will be addressed by the Contractor through the following mitigation measures:

- Equipment and vehicles will be turned off when not in use and can only idle if it will be used within a reasonable amount of time (i.e. 5 minutes). Exceptions include mobile light plants for Site lighting, mobile dewatering equipment, and any health and safety equipment required for safe operation of the Site during construction;

- Hours of work on-site will be consistent with VFPA guidance (i.e., between 07h00 to 20h00, Monday to Saturday). No construction will take place on Sundays or holidays. These hours will not be modified without prior approval from VFPA. To request permission to conduct activities outside of these hours, a request must be made to VFPA no less than 20 days prior to the desired start date. will;
- Speed limits will be enforced on-site to limit noise and any trucks or equipment that are not in good condition will be removed from service; and,
- The affected community and municipality will be notified of the nature and likely duration of any particularly noisy operations that may be forthcoming, such as trucking, impact pile driving, concrete crushing and when it will be necessary to work outside daytime and early evening hours.
- During pile driving activities, terrestrial noise monitoring will be conducted by:
  - using sound pressure levels measured 15 m from pile driving equipment;
  - measuring 1-hr LAeq and 1 min LAFmax levels and occurrence frequency from a representative location within the community; and
  - documenting results in environmental monitoring reports.

## 6.5 MACHINERY AND EQUIPMENT

The work on-site will require various equipment and machinery to complete the tasks including excavation, stockpiling, transportation, and construction. The Contractor will:

- Submit a list of equipment and machinery to be used on-site, including the equipment type, fuel type, year of manufacture, and engine power rating to the Proponent and VFPA prior to mobilization to Site;
- Keep equipment in good working order with no leaks, excess oil or grease, and complete and document daily checks on each piece of equipment prior to operation;
- Provide the machinery and equipment maintenance log to the EM and review on a regular basis;
- Refuel equipment in accordance with **Section 8.0** of the CEMP.
- Keep spill kits readily available on-site at all times in accordance with **Section 7.3** and **8.0** of the CEMP.
- Operate equipment in accordance with air quality controls identified in permits and **Section 6.3** of the CEMP.
- Train Site personnel in the use of and the locations of the spill kits in accordance with **Section 7.3** of the CEMP.

Any non-road diesel equipment will comply with the Port of Vancouver Transportation guidance (Port of Vancouver 2015).

## 6.6 EROSION AND SEDIMENT CONTROL

Erosion and sediment control will be implemented on-site to isolate the work area, decrease the amount of soil particle detachment, and avoid or minimize any potential sediment-laden runoff resulting from construction activities from entering a waterbody or encroaching onto adjacent properties or roadways.

Erosion and sediment control measures are shown in ISL drawings C-13 and C-14 in **Appendix D**. These measures will be implemented, maintained, and inspected when Project activities such as clearing vegetation, moving soil, excavating, grading, or placing fill, and other activities have the potential to disturb ground and/or contribute sediments to nearby waterbodies. The Contractor will communicate the concept of “no erosion = no sedimentation” to all Site workers.

The Contractor will implement the following mitigation measures to prevent erosion and manage sediment during construction, as determined with the EM to be applicable:

- Give priority to erosion source control techniques over sediment control techniques as erosion control techniques are more effective and cheaper in the long run.
- Apply erosion and sediment control (ESC) measures as soon as soil disturbance or vegetation clearing has occurred. Erosion control measures include, but are not limited to: straw mulching, erosion control blankets, mats, rock lined channels, and polyethylene sheeting;
- Install sediment control measures in sedimentation-prone areas, such as: sediment fences, pumping and diverting, and settlement ponds and basins;
- Make ESC materials available and easily accessible for use on-site;
- Train Contractor on-site staff in the use, installation, and maintenance of ESC measures. The EM will review installation and approve placement and use prior to work beginning;
- Where possible, schedule earthworks to be conducted and completed during dry weather. When significant wet weather is predicted or encountered, erect additional control measures promptly to minimize erosion potential;
- Minimize areas of exposed soil at any one time by:
  - Planning and phasing construction activities;
  - Retaining vegetation as much as possible; and,
  - Stabilizing any exposed soils as soon as possible using temporary erosion control measures or planting long-term vegetation (if during the appropriate time of year).
  - Direct sediment-laden flow to the existing detention pond.
- Remove and dispose of temporary erosion and sediment control measures when no longer required, as determined by the EM.

- Manage on-site run-off by directing water to an existing detention pond. No changes are proposed to the pond. No discharge of petroleum hydrocarbons, solvents, heavy metal particulate, concrete, or other deleterious substances that could be deemed harmful to fish under the *Fisheries Act* is permitted. If water is discharged from the Site, the EM will verify that the water meets the appropriate water quality standards (civic, provincial, municipal, federal). Discharge to another property requires permission from the property owner and tenure holders. Water quality at discharge points will have pH levels of 6.0 – 8.5 and have a turbidity of  $\leq 10\%$  of background levels. Background levels will be determined by obtaining turbidity values upstream of the Site.
- Do not track mud or excavated materials onto civic lands or streets.

Erosion and sediment control measures specific to the management of contamination are described in the Soil and Groundwater Management Plan in **Appendix C**.

## **6.7 CONTAMINATED SOIL AND GROUNDWATER MANAGEMENT**

Contaminated soil and groundwater has been identified on-site during previous intrusive investigations of the Project site (Hemmera 2014), and as such, trenching and excavation works on-site may encounter impacted soil and/or groundwater. All excavated material will be retained temporarily on-site to be sampled and managed accordingly for re-use on-site or off-site re-use or disposal. **Figures 4 and 5** show the estimated plume areas (i.e. extent of the soil and groundwater contaminants) overlaid with the footprint of the infrastructure. For further information on the management of contaminated soil or groundwater, including remediation options, please reference the Soil and Groundwater Management Plan for the Site (**Appendix C**). At a minimum, the Contractor shall manage soil and potentially contaminated groundwater as follows.

### **6.7.1 Soil**

In all areas where soil will be excavated, the following techniques will be used to manage contamination:

- Excavated soils will be segregated and stockpiled according to anticipated soil contaminant classifications
- Soil stockpiles will be covered with plastic in an appropriate temporary soil storage area, which has a continuous impermeable surface and appropriate grading to assist in managing run-off during periods of rainfall. The Project will not include any permanent stockpiles;
- The temporary soil storage area will be bermed to control any run-off, and have appropriate water control needed as necessary (i.e. pumps and tanks available if needed);
- Stockpiles will be tested to verify soil quality and determine management options (e.g., potential for re-use).
- Once soil is classified, it will be either disposed off-site at an appropriate disposal location, or reused as appropriate based on analytical results, and under the direction of an appropriately trained Qualified Environmental Professional (QEP);
- Any water encountered in open excavations will be treated as contaminated until analytical data shows otherwise. Excavations will be dewatered and water pumped into holding tanks. Water should be treated appropriately if/as necessary prior to discharge. Any permits for discharge should be received prior to discharge, or prior to removal.

### 6.7.2 Groundwater Management

Where groundwater is encountered in open excavations, the following techniques will be used to manage contamination:

- Where worker safety necessitates, sheet piling will be installed for excavations. Sheet piling will be driven around the perimeter of the planned excavation and the area inside the sheet pile walls will be excavated.
- Excavated material will be stockpiled on site as above.
- Where possible, there will be no active dewatering as the excavation proceeds to reach the target depth. If dewatering is required, appropriate storage and containment will be on-site to advance the dewatering process.
- Upon reaching the prescribed depth, a trémie concrete plug will be poured to plug the bottom of the excavation.
- Once the trémie plug has set, the excavation will be dewatered.
- Water will be stored in storage tanks and samples submitted for laboratory analysis.
- Based on analytical results, stored water will be discharged on-site (with treatment if required to achieve applicable regulatory discharge requirements), or transported off-site at a treatment plant having permits to receive such water.

Water in the excavation will be pumped out and sent to a treatment system to satisfy the BC Ministry of the Environment and Climate Change Strategy discharge requirements for discharge to a storm drain or ditch. Prior to discharge of any water from the Site to a stormdrain or ditch, the applicable discharge permits will be obtained from the BC Ministry of the Environment and Climate Change Strategy.

In addition, the Contractor will not discharge water from excavations to stormwater systems or the environment, without a VFPA-accepted dewatering and discharge plan. The accepted plan will include water quality results.

Excavation and backfilling will be accomplished using standard excavation equipment such as excavators, backhoes, and dump trucks. Excavations planned within the site are shown in **Attachment 4A**.

### 6.7.3 Rammed Aggregate Piles

Currently, monitored natural attenuation has demonstrated that the dissolved metal groundwater plume is stable and not advancing to the Fraser River. RAPs are proposed for the new silo foundation which penetrate through portions of the groundwater plume. The primary concern from an environmental standpoint are to limit potential movement of the groundwater plume and that groundwater quality is not adversely affected by acidity due to the new materials being installed into the groundwater environment. To minimize potential groundwater plume movement, grouted RAPs are proposed along the downgradient perimeter of the silo foundation (see **Figure 6**). Details on the approach to minimizing groundwater plume movement are as follows:

- A Groundwater Monitoring Plan will be submitted for VFPA review and acceptance 60 days prior to completion of the pile installation. The plan will include a proposed schedule of monitoring and reporting based on pile installation schedule.
- Aggregate material will be tested prior to being brought to the Site. The aggregate material will be tested for metals, acid-generating potential, mineralogical composition, to confirm that it does not contain acid-generating minerals.
- The grout materials will also be verified for chemical composition that will contribute to neutralizing/buffering pH to circumneutral to basic conditions (e.g. a carbonate-based grout).
- The grouted RAPs will be installed along the down gradient perimeter and the northern perimeter (i.e. shown as job north on **Figure 6**) of the slab foundation for the silos. Grouted RAPs will be installed using pressure injection of grout.
- Working from north to south, grouted RAPs will be installed first to develop a subsurface “wall” of grouted aggregate material that may buffer pH and precipitate any induced dissolved metals movement. This should also minimize the displacement of impacted groundwater down-gradient in the direction of groundwater flow.
- *In situ* groundwater monitoring (field parameters – pH, temperature, conductivity, alkalinity, redox, dissolved oxygen, and metals) will be carried out weekly at selected downgradient monitoring well locations during pile installation to monitor potential induced movement of the plume. If groundwater plume movement is suspected, bi-weekly samples will also be collected for laboratory analysis to correlate with groundwater (field) monitoring results. Duration of monitoring of the groundwater plume will be 3 years unless it can be demonstrated through modeling or other means that changes to the plume are unlikely to adversely affect aquatic receivers. Further detail on the groundwater monitoring program is included in the Soil and Groundwater Management Plan (**Appendix C**).

## 6.8 VEGETATION AND WILDLIFE MANAGEMENT

Vegetation and wildlife management by the Contractor during construction will minimize effects to wildlife and vegetation during construction-related activities. Specifically, the Contractor will plan Site activities to:

- Fence areas containing protect any rare plants and rare plant habitats:
- Manage non-native invasive (e.g., invasive, or noxious plants),
- Install snow fencing to protect trees and tree roots out to the drip zone,
- Provide a 5 m setback from watered ditches and watercourses, as feasible<sup>4</sup>;
- Plan work to occur in the least risk timing windows for fish and sensitive wildlife (e.g., nesting birds), and
- Minimize the potential for human-wildlife conflicts during Project construction.
- Culvert installation at Ditch N will occur when the ditch is not wetted.

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<sup>4</sup> A 5 m setback from Ditch N may not be possible for the construction of the access road and culvert extension. The ditch is expected to be wetted only during sustained periods of rainfall during fall and winter months. Construction of the access road will be scheduled to occur in the dry months, i.e., when there is no flow in Ditch N which is classified as a Class C watercourse (i.e., non-fish-bearing).

All environmentally sensitive areas will be delineated on construction drawings and in the field with a framed snow fence with a “no-go” status communicated to all site workers “No-go” zones are areas in which no activity will take place without prior approval of the Proponent. The framed snow fence will be maintained by the Contractor to remain in place during the construction phase. An environmental constraints drawing will be included as part of the construction drawings prior to construction in collaboration with the Contractor.

*Species At Risk Act (SARA)*-designated critical habitat for streambank lupine in the Project area adjacent to Elevator Road will be managed in accordance with the SARA permit obtained for this area. The Contractor will update the CEMP with the permit conditions once they are available. The streambank lupine critical habitat will be identified as a no-go zone until mitigation has been identified in the permit.

The Contractor will implement mitigation measures to manage vegetation and wildlife during construction:

- Limit areas of vegetation clearing and flag clearing boundaries.
- Mitigation measures as required by the SARA permit for critical habitat for streambank lupine in the Project area adjacent to Elevator Road.
- Implement a replanting plan for the revegetation of disturbed areas with appropriate seed mix and native plant species with the following parameters:
  - Replant or reseed areas to be revegetated with native plant species, and/or an approved seed mix.
  - Plant shrub stock that is at least 1.5 m tall.
  - Landscaping plans should include a mix of fruiting and flowering native species.
- Minimize duration of exposed soils in disturbed areas to what is necessary to complete the work and manage in accordance with Section 6.6 of the CEMP.
- Fence and clearly sign retained and replanted areas of vegetation to prevent encroachment of equipment during construction.
- Implement an invasive species management plan with the following general parameters:
  - Dispose of invasive plant material appropriately.
  - Remove invasive plant species prior to fruit / seed pod development to prevent spread and regrown of seeds.
  - Inspect vehicles for plant material prior to entering site and use truck wash station to prevent the spread of invasive plant species.
  - Ensure any soil or fill coming onto the site is free of noxious weeds.
- Comply with the requirements of the *Species at Risk Act*, the *Migratory Birds Convention Act*, Recovery Plan for Streambank Lupine in BC (Environment Canada 2016) and all other applicable laws, legislation
- Conduct works in accordance with best management practices (BMPs) provided at the MoE's Guidelines and BMPs website (MoE 2012) including *Best Management Practices for Raptor Conservation During Urban and Rural Land Development in BC*.

- Schedule vegetation removal to occur within the least risk work window for breeding birds (September 1 and February 28). If this is not possible, conduct a pre-clearing survey using a QEP in advance of any works. If this is not possible, conduct a pre-clearing survey using a QEP immediately in advance of any works.
- If evidence of active bird nests is detected during the pre-clearing survey, the QEP will propose appropriate measures (e.g., suitable buffers around nests).
- Work areas will be kept clear of all wildlife attractants (i.e. garbage). Food and food waste will be removed from the Site at the end of each day.
- Implement a wildlife education program, including identification of sensitive habitat features and species that may be found onsite, as part of worker orientation.

### **6.9 CONCRETE WORKS AND GROUTING**

Concrete works and grouting management by the Contractor will prevent untreated concrete and grouting effluent from reaching and adversely affecting the receiving aquatic environment. The Contractor will plan and implement mitigation measures during construction:

- Completely isolate all concrete, cement or grout work from any water for a minimum of 48 hours after placement.
- Prevent any water that contacts uncured or partly cured concrete during activities like wet curing or equipment washing from directly or indirectly entering any watercourse, including drainage ditches.
- Do not deposit, directly or indirectly, concrete, cement, mortars and other Portland cement or lime-containing construction materials into or about any watercourse.
- Provide containment facilities for the wash-out water from concrete delivery trucks, concrete pumping equipment, and other tools and equipment.
- Keep a carbon dioxide (CO<sub>2</sub>) tank with regulator, hose and gas diffuser readily available to neutralize concrete-affected effluent that could reach fish-bearing waters (e.g., via drains) and train workers in use of this equipment.

### **6.10 CONCRETE CRUSHING**

The existing Bekaert concrete building slab and foundations of the former Bekaert building will be removed. The following procedures are typical for concrete crushing in the local area:

- Demolish foundation concrete utilizing hydraulic hammers on excavators.
- Remove and stockpile reinforcing steel for recycling with a 48" diameter magnet attachment.
- Crush concrete rubble to 6" well graded aggregate and stockpile all crushed material, including <2mm fines.
- Complete concrete crushing with mobile primary jaw crusher fed by excavator.
- Stockpile crushed concrete aggregate.

The existing slab concrete will be tested for contamination, prior to removal. Clean concrete will be crushed on-site, stored temporarily then used as road subbase, directly under paved areas. Any excavated material will be tested and stored temporarily on site. Tested material that is determined to be clean will be re-used on site, where possible or hauled off site (see Section 6.11). Contaminated materials will be handled according to the CEMP. If concrete crushing is to be conducted on site, dust and air emissions will be managed in accordance with WCB and Health Canada criteria.

#### **6.11 MATERIAL RE-USE ON-SITE**

The concrete slab foundation could be beneficially re-used as sub-grade for road and driving surfaces, following the crushing process. Tested material that is acceptable for re-use will be placed and compacted into the road subbase and then covered with 100mm of 19mm crushed gravel to be used as a working surface during construction.

Based on correspondence with VFPA, the Contractor's use and management of recycled concrete aggregate (RCA) on-site will comply with the following:

- A Groundwater Monitoring Plan will be submitted for VFPA review and acceptance 60 days prior to completion of the RCA installation. The plan will include a proposed schedule of monitoring and reporting based on RCA installation schedule.
- Not be buried deeper than 1 m above the high-water table, as measured from the maximum seasonally high water table
- Placed RCA will be overlaid with a final impervious surface (such as asphalt, geotextile, or concrete)
- Proven by a geotechnical engineer or other qualified consultant to meet the site's geotechnical requirements
- Surface water will be diverted away from the buried RCA
- Free of coatings (asphalt, tar, etc.) and debris such as metal, wood, plastics
- Tested and, in accordance with federal and provincial guidelines and standards, shown to be clear of potential constituents of concern and contain <2% asbestos (chrysotile) by mass
- Fine fraction (<2mm) RCA will be prevented from entering storm drains and other pathways to watercourses.

A groundwater monitoring program will be initiated during construction and will include newly installed monitoring points upgradient (3 wells), within (2 wells) and downgradient (3 wells) of areas where RCA has been placed. The existing downgradient monitoring wells MW14-2, MW13-46 and MW13-48 will be included in monitoring program with the newly installed wells, assuming the condition of these wells is adequate, otherwise the replacement wells will be installed. The monitoring program will be started concurrent with placement of RCA and continue throughout construction on a quarterly basis until

construction is completed, and twice annually, capturing winter and summer seasons for three years post-completion. If no variations attributable to the RCA are detected in groundwater (i.e. significant changes in pH, mobility of dissolved metals, and increased availability/mobility of other contaminants), the monitoring program will cease after three years post-completion. If variations are detected, the monitoring program will be renewed on an annual basis until groundwater quality has sufficiently returned to, or is continuing to, return to former monitoring and chemical concentrations.

## 6.12 MARINE WORKS

The Fraser River shoreline bordering the Project is characterized by the Fraser River Estuary Management Program (FREMP) as “green coded” or low productivity for fish habitat (FREMP 2015). Gunderson Slough, located south of the Project site, is a large backwater feature in the Fraser River with high value rearing habitat for out-migrating juvenile Pacific salmon. Ditch S, which parallels Elevator Road, hydraulically connects the Project site with Gunderson Slough.

Marine works management by the Contractor will minimize potential effects to aquatic resources during construction-related activities (e.g., removal/reinstallation of slope protection material, impact pile driving). Marine construction-related activities will take place from marine-based rigs as well as from land.

The Contractor will plan and implement mitigation measures during construction:

- Conduct piling and all construction activities within the Fraser River during the least-risk fisheries work window specified by DFO for the region unless otherwise agreed upon by DFO. The prescribed work window for the Project area corresponds to the Fraser River Estuary (Oak Street Bridge and George Massey Tunnel to Mission Bridge) and is June 16 to February 28 (DFO 2014).
- Conduct visual and hydrophone monitoring during aquatic impact piling to monitor water quality and potential for fish kill. If sound pressures over 30 kPa are measured, or distressed, injured or dead fish are observed following the initiation of pile driving, work will be halted immediately and measures (e.g., bubble curtain) implemented to reduce the sound.
- During pile driving activities, follow *Best Management Practices for Pile Driving and Related Operations* (BCMPDCA and DFO 2003).
- When impact pile driving or other intrusive marine works are required, employ a qualified EM to conduct visual and hydrophone monitoring prior to and during impact pile driving to monitor marine mammals and propose mitigation as necessary. Impact pile driving activities will not start until the EM confirms that no marine mammals are present in the vicinity of the work area. If marine mammal(s) are observed during impact pile driving activities, work will cease until the animal(s) have left the vicinity.
- All work will comply with the requirements of the federal *Fisheries Act*, and all other applicable laws, legislation, and best management practices.

- Project notifications/change approvals under the *Marine Act* will be submitted before works may begin.
- BMPs defined in Section 7 of the *Standards and Best Practices for Instream Works* (MWLAP 2004) and Sections 3 to 7 of the *Land Development Guidelines for the Protection of Aquatic Habitat* (Chilibeck, Chislett, & Norris 1993).
- Undertake removal and reinstallation of slope protection material at low tide whenever possible.
- Use barge-based equipment with the assistance of divers to remove and reinstall slope protection material.
- If feasible, stockpile removed slope protection material on a barge and reinstall once piles are installed.
- Undertake a post-installation survey to determine if any material has spilled over the edge of the containment sheet pile wall. If so, remove accumulated material.
- Barges or other vessels will not ground on the foreshore or river/seabed or otherwise disturb the foreshore or river/seabed (including disturbance as a result of vessel propeller wash).
- Implement turbidity monitoring during removal/reinstallation of slope protection material and pile driving activities in the Fraser River in accordance with BC Water Quality Guidelines (MOE 2016). If guidelines are exceeded, additional turbidity management measures will be undertaken such as modified activity, or installation of silt curtains.
- Manage fuel and spill response in accordance with **Section 7.3** and **8.0** of the CEMP.
- Manage erosion and sediment control in accordance with **Section 6.6** of the CEMP.
- Store fuels in secondary containment Manage vegetation clearing and re-vegetate or seed exposed soils quickly in accordance with **Section 6.6** and **6.8** of the CEMP.
- Any discharge of wastewater to a watercourse or the City of Surrey drainage system must meet all provincial and municipal water quality guidelines.
- Maintain equipment in accordance with **Section 6.5** of the CEMP.
- All work will comply with the requirements of the federal *Fisheries Act*, the provincial *Water Sustainability Act* and all other applicable laws, legislation, and best management practices.

### **6.13 ARCHAEOLOGICAL RESOURCES**

Ground-disturbance activities will be managed by the Contractor to present adverse effects to archaeological resources during construction. A portion of the Project footprint has been identified as having moderate to high potential for containing archaeological resources. Excavations within areas of moderate to high archaeological potential which exceed the minimum 3 m depth of fill across the Project area present archaeological risk. During construction, these excavations will be monitored (field investigation) by a professional archaeologist. Areas with excavations greater than 3 m below ground surface requiring archaeological monitoring include:

- Receiving Conveyor Tunnel, excavated to 4.575 m Depth below surface below ground surface (bgs).

- Boot Pit of Receiving and Reclaim Legs, excavated to 8.365 m bgs.
- Reclaim Conveyor Tunnel Concrete slab, excavated to 2.4 m bgs.

The excavation depth of water and sewer lines will vary between approximately 1.0 m and 2.0 m in depth and, given the set 3 m depth threshold, archaeological monitoring is not required. Electrical utility manholes are often constructed deeper than the linear infrastructure and should be monitored if they will exceed the 3 m depth threshold.

The Contractor will implement procedures for the inadvertent discovery of heritage resources (i.e., a chance find) in accordance with the Chance Find Procedure (see **Appendix E** of this CEMP).

#### **6.14 SENSITIVE HABITAT FEATURES AND SPECIES**

Sensitive habitat features and species will be managed by the Contractor during construction to minimize adverse effects on sensitive habitat features and species due to the Project. Mitigation measures are identified in **Section 6.8**. In addition, the EM will be notified immediately if sensitive species or encroachment on sensitive habitats are observed during construction and the EM may identify additional mitigation as appropriate to the activity and sensitive feature encountered.

Sensitive habitat features present include:

- Adjacent to the site, the aquatic and riparian habitats of Gunderson Slough are considered to be of high value and very sensitive.
- Critical habitat for streambank lupine, a plant species at risk, has been documented to occur at the Site. The Contractor will comply with permit conditions relating to streambank lupine as required for construction.

## **7.0 EMERGENCY RESPONSE**

The Emergency Response Plan to be prepared and implemented by the Contractor for construction will identify the potential hazards on-site, develop systems for preventing accidents including appropriate training, provide mechanisms for minimizing risks, loss and damage from any incidents, and provide an incident management structure to guide response activities in the event of an accidental release. The Emergency Response Plan will include an appropriate spill response communication plan, procedures, spill tracking and reporting, and records of the facility inspections.

The Contractor will ensure that all Site personnel are aware of the Emergency Response Plan, have been trained in its implementation, and are capable of following through with the Emergency Response Plan in the event of an emergency response.

## 7.1 EMERGENCY COMMUNICATION

The following table, **Table 7**, outlines the Project's emergency contacts. The initial reporting will be completed to the Contractor's Site Foreman who will immediately take the role of Incident Commander and will communicate the incident as required.

**Table 7 Emergency Contacts**

<b>Project:</b>	Fraser Grain Terminal
<b>Location:</b>	11041 Elevator Road, Surrey, BC
<b>Hospital:</b>	Surrey Memorial Hospital 13750 96 <sup>th</sup> Ave, Surrey, BC Non-Emergency: 604-588-3381
<b>Ambulance:</b>	911 Non-Emergency: 604.660.6897
<b>Police:</b>	911 Non-Emergency: 604.599.0502
<b>Fire:</b>	911 Non-Emergency: 604.542.6700
<b>VFPA Operations Centre:</b>	604.665.9086
<b>Local Authorities (Provincial Emergency Coordination Centre/MOE):</b>	1.800.663.3456
<b>Canadian Coast Guard Spill Reporting:</b>	1.800.889.8852
<b>WorkSafeBC:</b>	Monday to Friday, 8:30 am -4:30 pm: 604.276.3100 or 1.888.621.7233 After Hours: 1.866.922.4357
<b>Emergency Water Problems – City of Surrey:</b>	Monday to Friday, 8:30 am -4:30 pm: 604.591.4152 After Hours: 604.591.4431
<b>Emergency – BC Hydro:</b>	1.888.769.3766
<b>Emergency – Fortis BC:</b>	1.800.663.9911 (24 Hour Emergency Line)
<b>Emergency - Telus</b>	604.310.2255
<b>FGT General Manager</b>	Casey McCawley - 604-868-1069
<b>FGT Project Coordinator</b>	Tanya Hayes – 604-312-3212
<b>FWS Project Manager</b>	Andrew Smith - 204-293-4071
<b>FWS Construction Manager</b>	Dale Rawn - 604-219-8418
<b>FWS Asst. Construction Manager</b>	Jason Day - 204-797-4207
<b>FWS Site HSE Coordinator</b>	Jessica Wright – 604-614-0287

## 7.2 ENVIRONMENTAL EMERGENCY PLAN

The Site will contain various dangerous goods, hazardous wastes, or hazardous chemicals for use in the day-to-day operations of the construction work. The Contractor will ensure that materials on-site will be

appropriately labelled as per WHMIS or the *Transportation of Dangerous Goods Act*, and will be stored in an appropriate area of the Site. These materials include, but are not limited to:

- Diesel;
- Gasoline;
- Propane;
- Various lubricants; and,
- Contaminated soil.

The Contractor will amend the list of materials as new products are brought on-site or old products are withdrawn from use on-site and will update MSDS sheets to be kept on Site and attached to the CEMP accordingly. To mitigate the potential for spills of any of these products on-site, the Contractor's equipment will be maintained in good working order, and Contractor materials will be stored in appropriate containers/storage areas. All Contractor personnel present at the Site will be trained in the Emergency Response Plan and will be aware of the risks on-site for releases to the environment. Any release will be reported to the on-site EM and the Incident Commander who will determine the course of action required to mitigate and clean-up any release.

### **7.3 SPILL RESPONSE PLAN**

In the event of a release of any deleterious substances (i.e. hydrocarbon products) on-site, the Contractor will implement the follow procedures:

1. Ensure Safety
  - Ensure that Site personnel are safe from the release, as well as the public, equipment, property, and environment are at no other immediate risk due to the release.
  - Wear appropriate personal protective equipment (PPE) to manage the release.
  - Take a step back and re-evaluate the situation. Do not rush and ensure you are adequately protected before entering a spill area with appropriate knowledge (i.e., check MSDS for spilled product).
  - Notify people in the immediate vicinity of the incident.
  - Ensure there are no ignition sources in the area if the spill is a flammable material.

2. Remove Source
  - Act quickly to reduce the amount of product spilled and the environmental impact where possible.
  - Close valves, shut off equipment, or plug any holes/leaks as appropriate.
  - Stop the flow at its source.
3. Secure the Area
  - Limit access to the spill area.
  - Prevent unauthorized entry onto the Site.
4. Contain the Spill
  - Prevent migration of the spill off-site, into any water bodies, or into any drainage structures (i.e. storm sewers).
  - Use sorbent materials (i.e. booms or pads) to contain the spill, or where appropriate soil berms to contain it.
  - Spill kits should be located on-site within 100 m of any hazardous material storage area, and should be readily accessible in the event that they are needed.
  - If necessary use a dyke or any other method to prevent the migration of the material.
  - Attempt to minimize the contamination on-site.
5. Notify and Report
  - Notify the appropriate internal managers of the spill.
  - Notify the Provincial Emergency Coordination Centre (1-800-663-3456), as required (review reportable levels table included in **Appendix F**).
  - Provide details of the spill to any other external agency.
  - Complete the internal incident report.

## 8.0 FUEL MANAGEMENT PLAN

The Contractor will manage all fuel-related activities to prevent accidental fuel releases. Designated fueling areas during construction are shown in the Traffic Management Plan for the Project (**Appendix G**). At a minimum, the Contractor will employ the following practices during Site work:

- All equipment and vehicles will be in good working order with no leaks, excess oil or grease, and daily checks completed and recorded on each piece of equipment prior to operation;
- Refueling of equipment will occur at least 30 m from any water body, drainage ditch, or storm sewer, where possible. All refueling will be completed with a spill kit in the immediate vicinity, and personnel should be trained in the use of spill kits on-site;
- Spill kits should be readily available on-site at all times and well stocked with a list of materials included in each kit included in the kit. All Site personnel should be trained in the use of and the locations of the spill kits in case of a release on-site;

- All fuel will be stored at least 30 m from any water body, drainage ditch, or storm sewer;
- All fuel storage containers will be kept in secondary containment with a capacity 110% greater than the storage container, will be visibly flagged, protected from any accidental machine or vehicle strikes and routinely maintained to ensure that containment capacity is not exceeded.

Any release will be reported to the on-site EM and the Incident Commander as outlined in **Section 7.0**.

## **9.0 WASTE MANAGEMENT**

All wastes generated by the Contractor on-site will be labelled and disposed of appropriately by the Contractor. These wastes will range from hazardous materials to construction debris (e.g., waste pavement) and garbage resulting from the construction work on-site, and all will require varied disposal/treatment. Prior to disposal, the Contractor may collect samples as required to characterize the waste for appropriate disposal.

The Contractor will ensure that all hazardous waste generated by the Project is manifested prior to removal from Site, and will ascertain that all facilities receiving wastes are licenced for acceptance of the material that is being disposed of. Further, the Contractor will check that all waste disposal and transport follows the applicable regulations.

The Contractor will prepare a Waste Management Report that documents the percentage of construction material diverted from landfills.

## 10.0 CLOSURE

This Work was performed in accordance with Subcontract No. 522601 Hemmera Envirochem Inc. (“Hemmera”) and Parrish & Heimbecker c/o FWS Group of Companies (“Client”), dated August 20, 2018 (“Contract”). This Report has been prepared by Hemmera, based on work conducted by Hemmera, for sole benefit and use by the Client and Fraser Grain Terminal Ltd. In performing this Work, Hemmera has relied in good faith on information provided by others, and has assumed that the information provided by those individuals is both complete and accurate. This Work was performed to current industry standard practice for similar environmental work, within the relevant jurisdiction and same locale. The findings presented herein should be considered within the context of the scope of work and Project terms of reference; further, the findings are time sensitive and are considered valid only at the time the Report was produced. The conclusions and recommendations contained in this Report are based upon the applicable guidelines, regulations, and legislation existing at the time the Report was produced; any changes in the regulatory regime may alter the conclusions and/or recommendations.

Report prepared by:  
**Hemmera Envirochem Inc.**

***ORIGINAL SIGNED***

Kimberly Milligan , M.Env  
Environmental Specialist

Report peer reviewed by:  
**Hemmera Envirochem Inc.**

***ORIGINAL SIGNED***

Robin Taylor, MRM, EP  
Senior Environmental Assessment Manager

Report peer reviewed by:  
**Hemmera Envirochem Inc.**

***ORIGINAL SIGNED***

Michael Choi, P. Eng.  
Senior Reviewer, Site Assessment and Remediation

## 11.0 REFERENCES

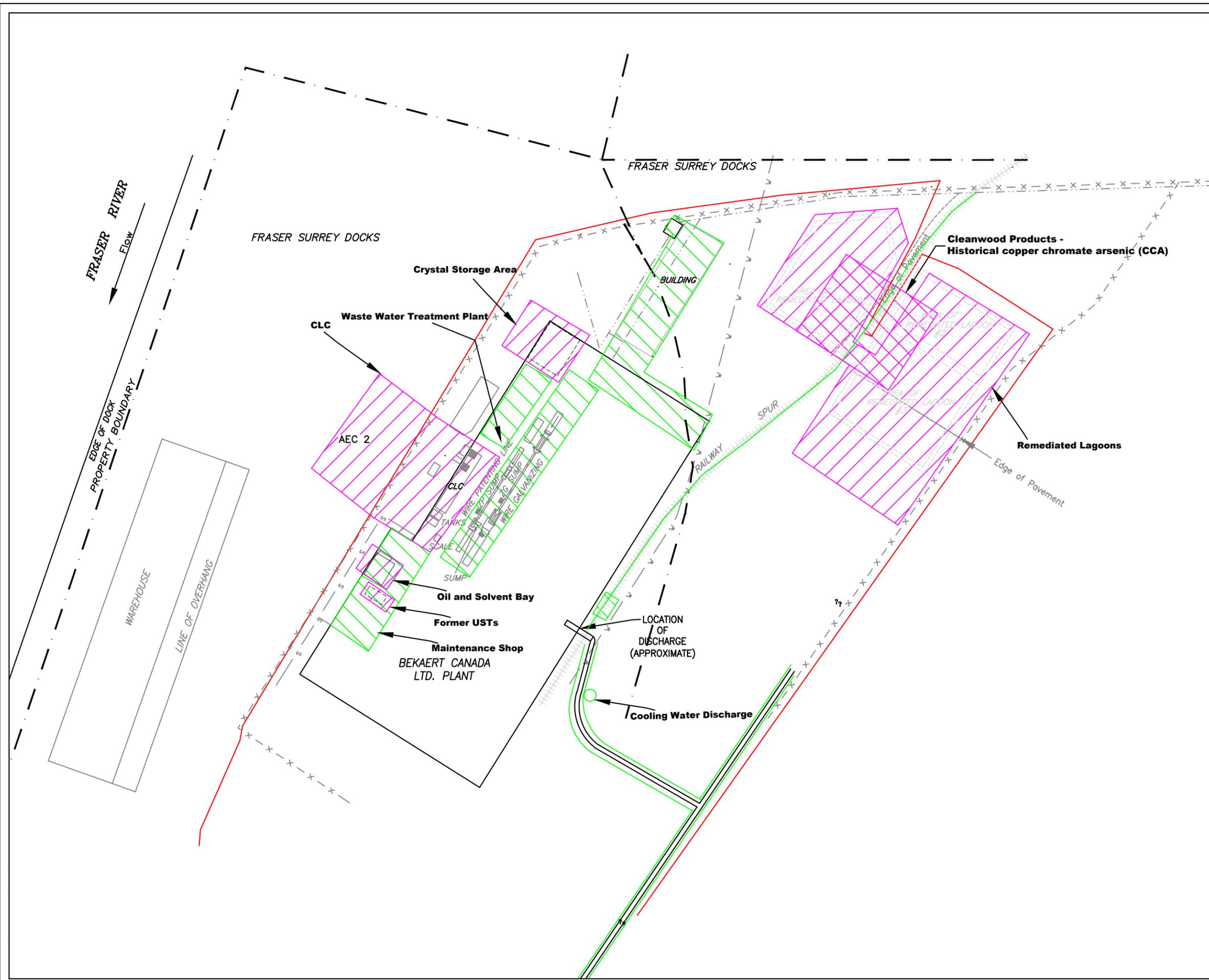
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- British Columbia Contaminated Sites Regulation (BC CSR). BC Reg. 375/96 (Effective April 1997 and amended July 1999, November 1999, February 2002, November 2003, and July 2004, July 2007), including amendments up to B.C. Reg 4/2014, effective January 31, 2014.
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- Hemmera, 2014. FINAL REPORT Detailed Site Investigation - 11041 Elevator Road, Surrey, BC, March 27, 2014.
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# FIGURES

**Site Plan with  
Areas of Environmental Concern**

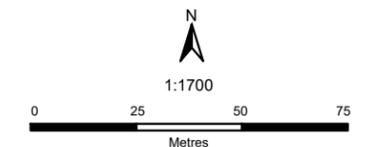
**Legend**

- AEC - Area of Environmental Concern
- APEC - Area of Potential Environmental Concern
- Property Boundary (Approximate)
- Fence
- Gas Line (Approximate)
- Sewer Line (Approximate)
- Water Line (Approximate)



**Notes**

1. Figure and monitoring wells are approximate and not to scale.
2. CLC = Cleaning Line Containment Line
3. This map is not intended to be a stand-alone document, but a visual aid to the information contained within the referenced Report. It is intended to be used in conjunction with the scope of services and limitations described therein.



NAD 1983 UTM Zone 10N

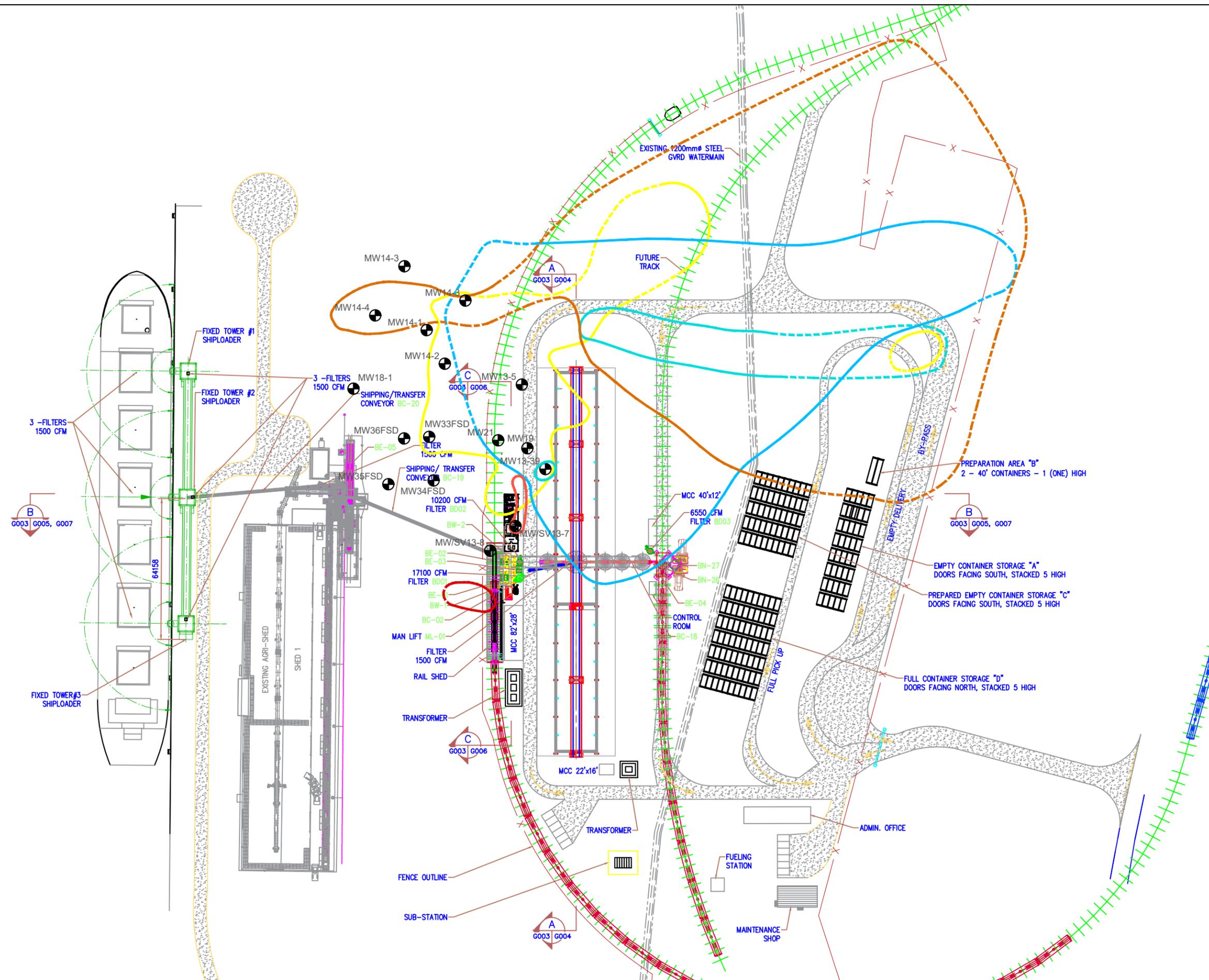
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Path: S:\Geomatics\Projects\8929001\10\Drawings\CEMP\Fig\_2191\_001\_01\_CELP\_SitePlan\_APECS\_180515.dwg

Estimated Extent of Groundwater Contamination  
as of 2013 Investigation

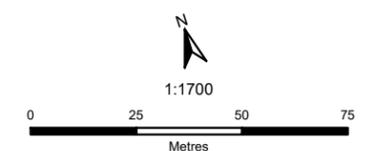
Legend

- MNA Monitoring Well
- Extent of Groundwater Contamination
- Arsenic
- Boron
- Hydrocarbons
- Iron
- Manganese
- Zinc
- Dashed = Estimated



Notes

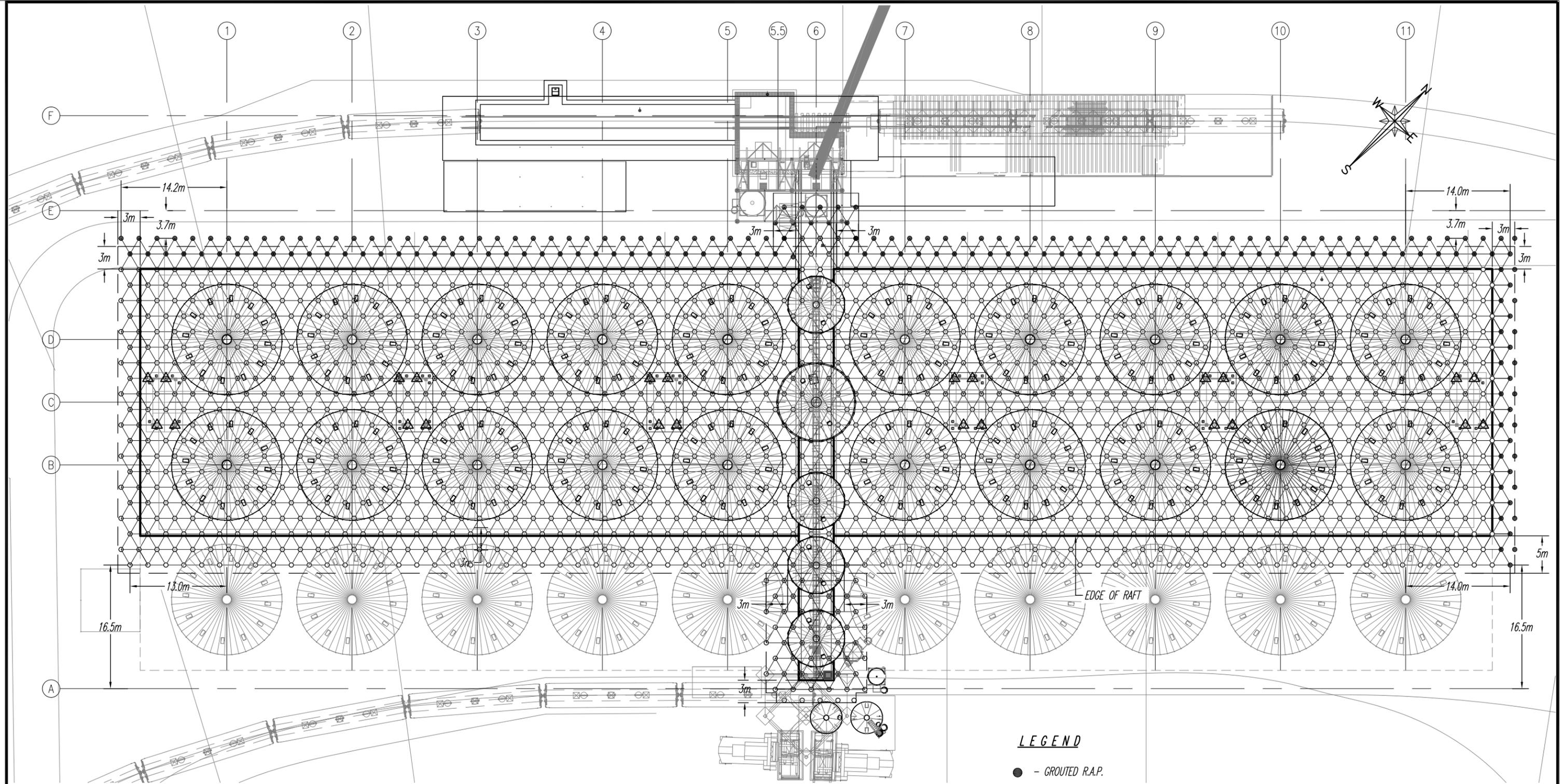
1. All mapped features are approximate and should be used for discussion purposes only.
2. This map is not intended to be a "stand-alone" document, but a visual aid of the information contained within the referenced Report. It is intended to be used in conjunction with the scope of services and limitations described therein.



NAD 1983 UTM Zone 10N  
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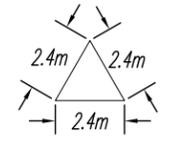


**NOTES:**

1. GROUTED AND UNGROUTED R.A.P. INSTALLATION PHASING PER ENVIRONMENTAL CONSULTANT.
2. SEE STRUCTURAL DESIGN FOR TENSION TIE DETAILS AND LOCATIONS.

**LEGEND**

- - GROUTED R.A.P.
- - UNGROUTED R.A.P.
- △ - UNGROUTED R.A.P. C/W TENSIONS TIES



ORIGINAL PAPER SIZE 11"x17"

REFERENCE:  
**FWS INDUSTRIAL PROJECTS CANADA LTD.**  
 PROJECT No.: 08-17-075C  
 PROJECT DATE: 03/15/2018

**GEOPACIFIC**  
 VANCOUVER KALLOOBS CALGARY

1779 W. 76th Avenue  
 Vancouver, B.C. V6P 6P2  
 F 604.439.0922  
 F 604.439.9159

DATE: **MARCH 28, 2018**

DRAWN BY: <b>M.S.</b>	APPROVED BY: <b>K.B.</b>	REVIEWED BY: <b>K.B.</b>
SCALE: <b>1:500</b>		

**FRASER GRAIN TERMINAL**  
 FRASER SURREY DOCKS, SURREY, B.C.  
**DENSIFICATION PLAN**

FILE NO.: **15657**

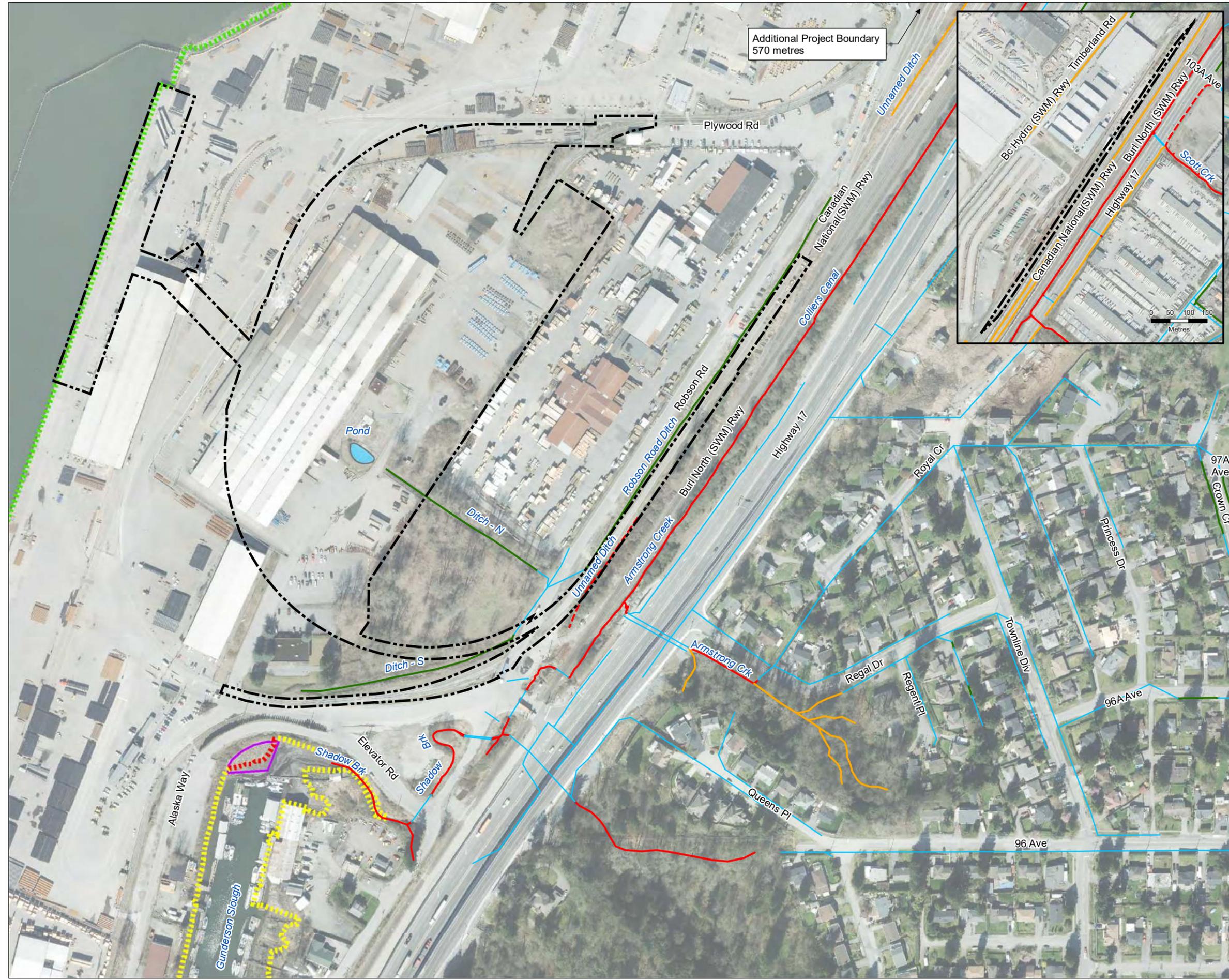
DWG. NO.: **G-D1B**

REVISIONS:

A. MAY 11, 2018 - Pile arrangement, future piles
B. NOVEMBER 19, 2018 - New tank layout
C. DECEMBER 6, 2018 - Dimensions from GL to corner piles

D. DECEMBER 11, 2018 - Notes, extra piles

**Watercourse Classification Map**



**Legend**

Site Boundary

City of Surrey Watercourse Classification

- A: Watercourse inhabited by fish year round
- AO: Watercourse inhabited by fish during the overwintering period
- B: Non-fish-bearing watercourse but contributes or potentially contributes significant food/nutrient inputs to downstream fish populations
- C: Non-fish-bearing watercourse that does not contribute significant food/nutrient value to downstream fish populations

Fraser River Estuary Management Program Habitat Classification

- High productivity habitat
- Moderate productivity habitat
- Low productivity habitat

Fraser River Estuary Management Program - Habitat Compensation Sites

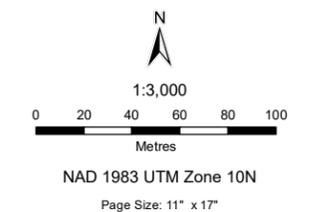
- Gunderson Slough Habitat Bench
- Drainage Mains

**Notes**

1. This map is not intended to be a "stand-alone" document, but a visual aid of the information contained within the referenced Report. It is intended to be used in conjunction with the scope of services and limitations described therein.

**Sources**

- Open Channels: City of Surrey Mapping Online System
- Habitat Classification & Compensation Sites: Fraser River Estuary Management Program
- Aerial Image: City of Surrey, 2014



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