



**RETURN BIDS TO:**

**RETOURNER LES SOUMISSIONS À:**

Travaux publics et Services gouvernementaux  
Canada

Place Bonaventure, portail Sud-Est  
800, rue de La Gauchetière Ouest  
7<sup>ème</sup> étage

Montréal

Québec

H5A 1L6

FAX pour soumissions: (514) 496-3822

**INVITATION TO TENDER**

**APPEL D'OFFRES**

**Tender To: Public Works and Government Services  
Canada**

We hereby offer to sell to Her Majesty the Queen in right of  
Canada, in accordance with the terms and conditions set  
out herein, referred to herein or attached hereto, the goods,  
services, and construction listed herein and on any attached  
sheets at the price(s) set out therefor.

**Soumission aux: Travaux Publics et Services  
Gouvernementaux Canada**

Nous offrons par la présente de vendre à Sa Majesté la  
Reine du chef du Canada, aux conditions énoncées ou  
incluses par référence dans la présente et aux annexes  
ci-jointes, les biens, services et construction énumérés  
ici et sur toute feuille ci-annexée, au(x) prix indiqué(s).

**Comments - Commentaires**

**Vendor/Firm Name and Address**

Raison sociale et adresse du  
fournisseur/de l'entrepreneur

**Issuing Office - Bureau de distribution**

Travaux publics et Services gouvernementaux Canada  
Place Bonaventure, portail Sud-Est

800, rue de La Gauchetière Ouest

7<sup>ème</sup> étage

Montréal

Québec

H5A 1L6

<b>Title - Sujet</b> RÉHABILITATION FONDERIE ST-GERMAIN	
<b>Solicitation No. - N° de l'invitation</b> EF928-170307/A	<b>Date</b> 2016-08-11
<b>Client Reference No. - N° de référence du client</b> EF928-17-0307	<b>GETS Ref. No. - N° de réf. de SEAG</b> PW-\$MTC-035-13992
<b>File No. - N° de dossier</b> MTC-6-39082 (035)	<b>CCC No./N° CCC - FMS No./N° VME</b>
<b>Solicitation Closes - L'invitation prend fin</b> <b>at - à 02:00 PM</b> <b>on - le 2016-09-21</b>	
<b>Time Zone</b> Fuseau horaire Heure Avancée de l'Est HAE	
<b>F.O.B. - F.A.B.</b>	
<b>Plant-Usine:</b> <input type="checkbox"/> <b>Destination:</b> <input checked="" type="checkbox"/> <b>Other-Autre:</b> <input type="checkbox"/>	
<b>Address Enquiries to: - Adresser toutes questions à:</b> Lussier, Joël	<b>Buyer Id - Id de l'acheteur</b> mtc035
<b>Telephone No. - N° de téléphone</b> (514) 496-3862 ( )	<b>FAX No. - N° de FAX</b> ( ) -
<b>Destination - of Goods, Services, and Construction:</b> <b>Destination - des biens, services et construction:</b> MINISTERE DES TRAVAUX PUBLICS ET SERVICES GOUVERNEMENTAUX CANADA PL.BONAVENTURE,PORTAIL S-E,BUR.7300 800 RUE DE LA GAUCHETIERE O. MONTREAL Québec H5A1L6 Canada	

**Instructions: See Herein**

**Instructions: Voir aux présentes**

<b>Delivery Required - Livraison exigée</b>	<b>Delivery Offered - Livraison proposée</b>
.	
<b>Vendor/Firm Name and Address</b> Raison sociale et adresse du fournisseur/de l'entrepreneur	
<b>Telephone No. - N° de téléphone</b> <b>Facsimile No. - N° de télécopieur</b>	
<b>Name and title of person authorized to sign on behalf of Vendor/Firm</b> <b>(type or print)</b> <b>Nom et titre de la personne autorisée à signer au nom du fournisseur/</b> <b>de l'entrepreneur (taper ou écrire en caractères d'imprimerie)</b>	
<b>Signature</b>	<b>Date</b>

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## **PART 1 - GENERAL INFORMATION**

### **1.1 Security Requirements**

There is no security requirement associated with this project.

### **1.2 Statement of Work**

The Work to be performed is detailed under Annex A – Statement of work

### **1.3 Debriefings**

Bidders may request a debriefing on the results of the bid solicitation process. Bidders should make the request to the Contracting Authority within 15 working days from receipt of the results of the bid solicitation process. The debriefing may be in writing, by telephone or in person.

### **1.4 Trade Agreements**

The requirement is subject to the provisions of the North American Free Trade Agreement (NAFTA), and the Agreement on Internal Trade (AIT).

## **PART 2 - BIDDER INSTRUCTIONS**

### **2.1 Standard Instructions, Clauses and Conditions**

All instructions, clauses and conditions identified in the bid solicitation by number, date and title are set out in the *[Standard Acquisition Clauses and Conditions Manual](https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual)* (<https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual>) issued by Public Works and Government Services Canada.

Bidders who submit a bid agree to be bound by the instructions, clauses and conditions of the bid solicitation and accept the clauses and conditions of the resulting contract.

The 2003 (2016-04-04) Standard Instructions - Goods or Services - Competitive Requirements, are incorporated by reference into and form part of the bid solicitation.

### **2.2 Submission of Bids**

Bids must be submitted only to Public Works and Government Services Canada (PWGSC) Bid Receiving Unit by the date, time and place indicated on page 1 of the bid solicitation.

Due to the nature of the bid solicitation, bids transmitted by facsimile to PWGSC will not be accepted.

### **2.3 Former Public Servant**

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Contracts awarded to former public servants (FPS) in receipt of a pension or of a lump sum payment must bear the closest public scrutiny, and reflect fairness in the spending of public funds. In order to comply with Treasury Board policies and directives on contracts awarded to FPSs, bidders must provide the information required below before contract award. If the answer to the questions and, as applicable the information required have not been received by the time the evaluation of bids is completed, Canada will inform the Bidder of a time frame within which to provide the information. Failure to comply with Canada's request and meet the requirement within the prescribed time frame will render the bid non-responsive.

#### Definitions

For the purposes of this clause, "former public servant" is any former member of a department as defined in the [Financial Administration Act](#), R.S., 1985, c. F-11, a former member of the Canadian Armed Forces or a former member of the Royal Canadian Mounted Police. A former public servant may be:

- a. an individual;
- b. an individual who has incorporated;
- c. a partnership made of former public servants; or
- d. a sole proprietorship or entity where the affected individual has a controlling or major interest in the entity.

"lump sum payment period" means the period measured in weeks of salary, for which payment has been made to facilitate the transition to retirement or to other employment as a result of the implementation of various programs to reduce the size of the Public Service. The lump sum payment period does not include the period of severance pay, which is measured in a like manner.

"pension" means a pension or annual allowance paid under the [Public Service Superannuation Act](#) (PSSA), R.S., 1985, c. P-36, and any increases paid pursuant to the [Supplementary Retirement Benefits Act](#), R.S., 1985, c. S-24 as it affects the PSSA. It does not include pensions payable pursuant to the [Canadian Forces Superannuation Act](#), R.S., 1985, c. C-17, the [Defence Services Pension Continuation Act](#), 1970, c. D-3, the [Royal Canadian Mounted Police Pension Continuation Act](#), 1970, c. R-10, and the [Royal Canadian Mounted Police Superannuation Act](#), R.S., 1985, c. R-11, the [Members of Parliament Retiring Allowances Act](#), R.S. 1985, c. M-5, and that portion of pension payable to the [Canada Pension Plan Act](#), R.S., 1985, c. C-8.

#### Former Public Servant in Receipt of a Pension

As per the above definitions, is the Bidder a FPS in receipt of a pension? **Yes ( ) No ( )**

If so, the Bidder must provide the following information, for all FPSs in receipt of a pension, as applicable:

- a. name of former public servant;
- b. date of termination of employment or retirement from the Public Service.

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By providing this information, Bidders agree that the successful Bidder's status, with respect to being a former public servant in receipt of a pension, will be reported on departmental websites as part of the published proactive disclosure reports in accordance with [Contracting Policy Notice: 2012-2](#) and the [Guidelines on the Proactive Disclosure of Contracts](#).

#### Work Force Adjustment Directive

Is the Bidder a FPS who received a lump sum payment pursuant to the terms of the Work Force Adjustment Directive? **Yes** ( ) **No** ( )

If so, the Bidder must provide the following information:

- a. name of former public servant;
- b. conditions of the lump sum payment incentive;
- c. date of termination of employment;
- d. amount of lump sum payment;
- e. rate of pay on which lump sum payment is based;
- f. period of lump sum payment including start date, end date and number of weeks;
- g. number and amount (professional fees) of other contracts subject to the restrictions of a work force adjustment program.

For all contracts awarded during the lump sum payment period, the total amount of fees that may be paid to a FPS who received a lump sum payment is \$5,000, including Applicable Taxes.

## 2.4 Enquiries - Bid Solicitation

All enquiries must be submitted in writing to the Contracting Authority no later than 10 (ten) calendar days before the bid closing date. Enquiries received after that time may not be answered.

Bidders should reference as accurately as possible the numbered item of the bid solicitation to which the enquiry relates. Care should be taken by Bidders to explain each question in sufficient detail in order to enable Canada to provide an accurate answer. Technical enquiries that are of a proprietary nature must be clearly marked "proprietary" at each relevant item. Items identified as "proprietary" will be treated as such except where Canada determines that the enquiry is not of a proprietary nature. Canada may edit the question(s) or may request that the Bidder do so, so that the proprietary nature of the question(s) is eliminated, and the enquiry can be answered to all Bidders. Enquiries not submitted in a form that can be distributed to all Bidders may not be answered by Canada.

## 2.5 Applicable Laws

Any resulting contract must be interpreted and governed, and the relations between the parties determined, by the laws in force in Quebec.

Bidders may, at their discretion, substitute the applicable laws of a Canadian province or territory of their choice without affecting the validity of their bid, by deleting the name of the Canadian province or territory specified and inserting the name of the Canadian province or territory of their choice. If no change is made, it acknowledges that the applicable laws specified are acceptable to the Bidders.

## 2.6 Optional site visit

An optional site visit will be held in order for the Bidder or a representative of the Bidder, can visit the work site. Arrangements have been made for the site visit to be held at 1348, chemin du 10e Rang in St-Edmond-de-Grantham on **August 24th 2016** The site visit will begin at **10h00 AM**

Bidders must communicate with the Contracting Authority no later than **August 18<sup>th</sup> 2016** to confirm attendance and provide the name(s) of the person(s) who will attend otherwise access will be denied. Bidders will be required to sign an attendance sheet and provide an identification card with picture. Bidders who do not attend the optional site visit or do not send a representative will not be given an alternative appointment. However, bidders that did not attend the optional site visit will still be able to present a bid. Any clarifications or changes to the bid solicitation resulting from the site visit will be included as an amendment to the bid solicitation

## PART 3 - BID PREPARATION INSTRUCTIONS

### 3.1 Bid Preparation Instructions

Canada requests that Bidders provide their bid in separately bound sections as follows:

- Section I: Technical Bid (2 hard copies)
- Section II: Financial Bid (1 hard copy)
- Section III: Certifications (1 hard copy)

Prices must appear in the financial bid only. No prices must be indicated in any other section of the bid.

Canada requests that Bidders follow the format instructions described below in the preparation of their bid:

- (a) use 8.5 x 11 inch (216 mm x 279 mm) paper;
- (b) use a numbering system that corresponds to the bid solicitation.

In April 2006, Canada issued a policy directing federal departments and agencies to take the necessary steps to incorporate environmental considerations into the procurement process [Policy on Green Procurement](http://www.tpsgc-pwgsc.gc.ca/ecologisation-greening/achats-procurement/politique-policy-eng.html) (<http://www.tpsgc-pwgsc.gc.ca/ecologisation-greening/achats-procurement/politique-policy-eng.html>). To assist Canada in reaching its objectives, Bidders should:

- 1) use 8.5 x 11 inch (216 mm x 279 mm) paper containing fibre certified as originating from a sustainably-managed forest and containing minimum 30% recycled content; and
- 2) use an environmentally-preferable format including black and white printing instead of colour printing, printing double sided/duplex, using staples or clips instead of cerlox, duotangs or binders.

### **Section I: Technical Bid**

In their technical bid, Bidders should explain and demonstrate how they propose to meet the requirements and how they will carry out the Work.

### **Section II: Financial Bid**

Bidders must submit their financial bid in accordance with the Basis of Payment (see annex B). The total amount of Applicable Taxes must be shown separately.

## **3.2 GI08 (2014-06-26) Bid security requirements**

1. The Bidder shall submit bid security with the bid in the form of a bid bond or a security deposit in an amount that is equal to not less than 10 percent of the bid amount. Applicable Taxes shall not be included when calculating the amount of any bid security that may be required. The maximum amount of bid security required with any bid is \$2,000,000.
2. A bid bond (form [PWGSC-TPSGC 504](#)) shall be in an approved form, properly completed, with original signatures and sealed by the approved bonding company whose bonds are acceptable to Canada either at the time of solicitation closing or as identified in Treasury Board Appendix L, [Acceptable Bonding Companies](#).
3. A security deposit shall be an original, properly completed, signed where required and be either
  - a. a bill of exchange, bank draft or money order made payable to the Receiver General for Canada and certified by an approved financial institution or drawn by an approved financial institution on itself; or
  - b. bonds of, or unconditionally guaranteed as to principal and interest by, the Government of Canada.
4. For the purposes of subparagraph 3. a. of GI08
  - a. a bill of exchange is an unconditional order in writing signed by the Bidder and addressed to an approved financial institution, requiring the said institution to pay, on demand, at a fixed or determinable future time a sum certain of money to, or to the order of, the Receiver General for Canada;
  - b. if a bill of exchange, bank draft or money order is certified by or drawn on an institution or corporation other than a chartered bank, it must be accompanied by proof that the said institution or corporation meets at least one of the criteria described in subparagraph 4.c. of GI08, either by letter or by a stamped certification on the bill of exchange, bank draft or money; and
  - c. An approved financial institution is
    - i. a corporation or institution that is a member of the Canadian Payments Association as defined in the [Canadian Payments Act](#);
    - ii. a corporation that accepts deposits that are insured, to the maximum permitted by law, by the Canada Deposit Insurance Corporation or the "Autorité des marchés financiers";
    - iii. a corporation that accepts deposits from the public if repayment of the deposit is guaranteed by Her Majesty the Queen in right of a province;

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- iv. a corporation, association or federation incorporated or organized as a credit union or co-operative credit society that conforms to the requirements of a credit union which are more particularly described in paragraph 137(6) of the *Income Tax Act*; or
      - v. Canada Post Corporation.
  5. Bonds referred to in subparagraph 3. b. of GI08 shall be provided on the basis of their market value current at the date of solicitation closing, and shall be
    - a. payable to bearer;
    - b. accompanied by a duly executed instrument of transfer of the bonds to the Receiver General for Canada in the form prescribed by the Domestic Bonds of Canada Regulations; or
    - c. registered as to principal or as to principal and interest in the name of the Receiver General for Canada pursuant to the Domestic Bonds of Canada Regulations.
  6. As an alternative to a security deposit an irrevocable standby letter of credit is acceptable to Canada and the amount shall be determined in the same manner as a security deposit referred to above.
  7. An irrevocable standby letter of credit referred to in paragraph 6) of GI08 shall
    - a. be an arrangement, however named or described, whereby a financial institution (the "Issuer") acting at the request and on the instructions of a customer (the "Applicant") or on its own behalf,
      - i. is to make a payment to, or to the order of, the Receiver General for Canada as the beneficiary;
      - ii. is to accept and pay bills of exchange drawn by the Receiver General for Canada;
      - iii. authorizes another financial institution to effect such payment or accept and pay such bills of exchange; or
      - iv. authorizes another financial institution to negotiate against written demand(s) for payment provided that the terms and conditions of the letter of credit are complied with;
    - b. state the face amount which may be drawn against it;
    - c. state its expiry date;
    - d. provide for sight payment to the Receiver General for Canada by way of the financial institution's draft against presentation of a written demand for payment signed by the Departmental Representative identified in the letter of credit by his/her office;
    - e. provide that more than one written demand for payment may be presented subject to the sum of those demands not exceeding the face value of the letter of credit;
    - f. provide that it is subject to the International Chamber of Commerce (ICC) *Uniform Customs and Practice (UCP) for Documentary Credits, 2007 Revision*, ICC Publication No. 600, Pursuant to the ICCUCP, a credit is irrevocable even if there is no indication to that effect; and
    - g. be issued or confirmed, in either official language, by a financial institution which is a member of the Canadian Payments Association and is on the letterhead of the Issuer or Confirmer. The format is left to the discretion of the Issuer or Confirmer.
  8. Bid security shall lapse or be returned as soon as practical following
    - a. the solicitation closing date, for those Bidders submitting non-compliant bids; and
    - b. the administrative bid review, for those Bidders submitting compliant bids ranked fourth to last on the schedule of bids; and
    - c. the award of contract, for those Bidders submitting the second and third ranked bids; and
    - d. the receipt of contract security, for the successful Bidder; or
    - e. the cancellation of the solicitation, for all Bidders.

9. Notwithstanding the provisions of paragraph 8 of GI08 and provided more than three compliant bids have been received, if one or more of the bids ranked third to first is withdrawn or rejected for whatever reason then Canada reserves the right to hold the security of the next highest ranked compliant bid in order to retain the bid security of at least three valid and compliant bids.

## **PART 4 - EVALUATION PROCEDURES AND BASIS OF SELECTION**

### **4.1 Evaluation Procedures**

- (a) Bids will be assessed in accordance with the entire requirement of the bid solicitation including the technical and financial evaluation criteria.
- (b) An evaluation team composed of representatives of Canada will evaluate the bids.

#### **4.1.1 Technical Evaluation**

##### **4.1.1.1 Mandatory Technical Criteria**

- 1- La proposition devra obligatoirement inclure les points suivants sans toutefois s'y limiter :

La compréhension du mandat

- a) L'approche préconisée en spécifiant le type de traitement ou de disposition proposé  
b) L'identification des lieux de traitement/disposition des sols contaminés et des matières résiduelles

- 2- Un calendrier sommaire des travaux sous forme de figure ou tableau  
3- Bordereaux de soumission remplis et signés par une personne autorisée  
4- L'entrepreneur devra présenter une équipe de travail possédant l'expérience suivante et préciser leur(s) rôle(s). Une même personne pourrait assumer deux rôles. Un CV démontrant l'expérience requise pour chacune des ressources devra être joint à la soumission :

- a) un chargé de projet d'au moins 15 ans d'expérience dans la réhabilitation de terrain contaminé;  
b) un contremaître de chantier d'au moins 15 ans d'expérience réhabilitation de terrain contaminé;  
c) un expert habilité à fournir des attestations prescrites à la section IV.2.1 de la Loi sur la qualité de l'environnement; et,  
d) une personne possédant une formation technique ou universitaire dans un domaine lié à l'environnement avec un minimum de 7 ans d'expérience au cours de 15 dernières années en protection de l'habitat du poisson et en restauration des berges.

- 5- L'Entrepreneur devra fournir son numéro de licence de la régie du bâtiment du Québec (RBQ) et celle-ci devra demeurer valide durant toute la durée du mandat.

- 6- L'entrepreneur doit joindre à sa soumission une garantie de soumission conformément à l'IG08 - Exigences relatives à la garantie de soumission de la R2710T -Instructions générales - Services de construction - Exigences relatives à la garantie de soumission. (voir section 3.1)

#### **4.1.2 Financial Evaluation**

The price of the bid will be evaluated in Canadian dollars, Applicable Taxes excluded, FOB destination, Canadian customs duties and excise taxes included.

#### **4.2 Basis of Selection**

A bid must comply with the requirements of the bid solicitation and meet all mandatory technical evaluation criteria to be declared responsive. The responsive bid with the lowest evaluated price will be recommended for award of a contract.

### **PART 5 – CERTIFICATIONS AND ADDITIONAL INFORMATION**

Bidders must provide the required certifications and additional information to be awarded a contract.

The certifications provided by Bidders to Canada are subject to verification by Canada at all times. Unless specified otherwise, Canada will declare a bid non-responsive, or will declare a contractor in default if any certification made by the Bidder is found to be untrue whether made knowingly or unknowingly, during the bid evaluation period or during the contract period.

The Contracting Authority will have the right to ask for additional information to verify the Bidder's certifications. Failure to comply and to cooperate with any request or requirement imposed by the Contracting Authority will render the bid non-responsive or constitute a default under the Contract.

#### **5.1 Certifications Required with the Bid**

Bidders must submit the following duly completed certifications as part of their bid.

##### **5.1.1 Integrity Provisions – Required Documentation**

In accordance with the [Ineligibility and Suspension Policy](http://www.tpsgc-pwgsc.gc.ca/ci-if/politique-policy-eng.html) (<http://www.tpsgc-pwgsc.gc.ca/ci-if/politique-policy-eng.html>), the Bidder must provide the required documentation, as applicable, to be given further consideration in the procurement process.

##### **5.1.2 Federal Contractors Program for Employment Equity - Bid Certification**

By submitting a bid, the Bidder certifies that the Bidder, and any of the Bidder's members if the Bidder is a Joint Venture, is not named on the Federal Contractors Program (FCP) for employment equity "FCP Limited Eligibility to Bid" list available at the bottom of the page of the [Employment and Social Development Canada \(ESDC\) - Labour's](#) website

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([http://www.esdc.gc.ca/en/jobs/workplace/human\\_rights/employment\\_equity/federal\\_contractor\\_program.page?&\\_ga=1.229006812.1158694905.1413548969](http://www.esdc.gc.ca/en/jobs/workplace/human_rights/employment_equity/federal_contractor_program.page?&_ga=1.229006812.1158694905.1413548969)).

Canada will have the right to declare a bid non-responsive if the Bidder, or any member of the Bidder if the Bidder is a Joint Venture, appears on the "FCP Limited Eligibility to Bid" list at the time of contract award.

### 5.1.3 Status and Availability of Resources

The Bidder certifies that, should it be awarded a contract as a result of the bid solicitation, every individual proposed in its bid will be available to perform the Work as required by Canada's representatives and at the time specified in the bid solicitation or agreed to with Canada's representatives. If for reasons beyond its control, the Bidder is unable to provide the services of an individual named in its bid, the Bidder may propose a substitute with similar qualifications and experience. The Bidder must advise the Contracting Authority of the reason for the substitution and provide the name, qualifications and experience of the proposed replacement. For the purposes of this clause, only the following reasons will be considered as beyond the control of the Bidder: death, sickness, maternity and parental leave, retirement, resignation, dismissal for cause or termination of an agreement for default.

If the Bidder has proposed any individual who is not an employee of the Bidder, the Bidder certifies that it has the permission from that individual to propose his/her services in relation to the Work to be performed and to submit his/her résumé to Canada. The Bidder must, upon request from the Contracting Authority, provide a written confirmation, signed by the individual, of the permission given to the Bidder and of his/her availability. Failure to comply with the request may result in the bid being declared non-responsive.

### 5.1.4 GI07 (2015-02-25) Listing of Subcontractors and Suppliers

Notwithstanding any list of Subcontractors that the Bidder may be required to submit as part of the bid, the Bidder shall, within 48 hours of receipt of a notice to do so, submit all information requested in the said notice including the names of Subcontractors and Suppliers for the part or parts of the Work listed. Failure to do so shall result in the disqualification of its bid.

## PART 6 - RESULTING CONTRACT CLAUSES

### CONTRACT DOCUMENTS (CD)

1. The following are the contract documents:
  - a. Contract Page when signed by Canada;
  - b. Duly completed Bid and Acceptance Form and any Appendices attached thereto;
  - c. Drawings and Specifications;
  - d. General Conditions and clauses

Solicitation No. - N° de l'invitation  
EFA66-162822/A  
Client Ref. No. - N° de réf. du client  
EFA66-162822

Amd. No. - N° de la modif.  
File No. - N° du dossier  
MTC-6-39035

Buyer ID - Id de l'acheteur  
MTC035  
CCC No./N° CCC - FMS No./N° VME

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GC1 General Provisions – Construction Services	R2810D	(2016-04-04);
GC2 Administration of the Contract-	R2820D	(2016-01-28);
GC3 Execution and Control of the Work	R2830D	(2015-02-25)
GC4 Protective Measures	R2840D	(2008-05-12);
GC5 Terms of Payment	R2850D	(2016-01-28);
GC6 Delays and Changes in the Work	R2860D	(2016-01-28);
GC7 Default, Suspension or Termination of Contract	R2870D	(2008-05-12);
GC8 Dispute Resolution	R2882D	(2016-01-28);
GC9 Contract Security	R2890D	(2014-06-26);
GC10 Insurance	R2900D	(2008-05-12);

Allowable Costs for Contract Changes Under GC6.4.1 R2950D (2015-02-25);

Supplementary Conditions

- e. Any amendment issued or any allowable bid revision received before the date and time set for solicitation closing;
- f. Any amendment incorporated by mutual agreement between Canada and the Contractor before acceptance of the bid; and
- g. Any amendment or variation of the contract documents that is made in accordance with the General Conditions.

2. The documents identified by title, number and date above are incorporated by reference and are set out in the Standard Acquisition Clauses and Conditions (SACC) Manual, issued by Public Works and Government Services Canada (PWGSC). The SACC Manual is available on the PWGSC Web site: <https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual>

3. The language of the contract documents is the language of the Bid and Acceptance Form submitted.

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## **BID AND ACCEPTANCE FORM (BA)**

### **BA01 IDENTIFICATION**

Environmental remediation of the site of the former St-Germain Foundry located in Saint-Edmond-de-Grantham, Quebec

### **BA02 BUSINESS NAME AND ADDRESS OF BIDDER**

Name:

---

Address:

---

Telephone: \_\_\_\_\_ Fax: \_\_\_\_\_ PBN:

\_\_\_\_\_

E-mail address:

---

Industrial Security Program Organisation Number (ISP  
ORG#) \_\_\_\_\_

(when required)

### **BA03 THE OFFER**

The Bidder offers to Canada to perform and complete the Work for the above named project in accordance with the Bid Documents for the **TOTAL BID AMOUNT INDICATED IN APPENDIX 1.**

### **BA04 BID VALIDITY PERIOD**

The bid shall not be withdrawn for a period of sixty (60) days following the date of solicitation closing.

### **BA05 ACCEPTANCE AND CONTRACT**

Upon acceptance of the Contractor's offer by Canada, a binding Contract shall be formed between Canada and the Contractor. The documents forming the Contract shall be the contract documents identified in Contract Documents (CD).

### **BA06 CONSTRUCTION TIME**

The Contractor shall perform and complete the Work no later than March 31<sup>st</sup> 2018. Please consult section 5.1 on the Specification under "administrative General objectives" for identification of deliverables per financial years.

### **BA07 BID SECURITY**

The Bidder is enclosing bid security with its bid in accordance with GI08 - Bid Security Requirements of R2710T - General Instructions - Construction Services - Bid Security Requirements.

### **BA08 SIGNATURE**

Name and title of person authorized to sign on behalf of Bidder (Type or print)

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Signature

Date

**APPENDIX 1 - COMBINED PRICE FORM (1 page)**

- 1) The prices per unit shall govern in establishing the Total Extended Amount. Any arithmetical errors in this Appendix will be corrected by Canada.
- 2) Canada may reject the bid if any of the prices submitted do not reasonably reflect the cost of performing the part of the work to which that price applies.

**LUMP SUM**

The Lump Sum Amount designates Work to which a Lump Sum Arrangement applies.

- (a) Work included in the Lump Sum Amount represents all work not included in the unit price table.

1- Fixed Price		
Section No.	Description	Global Lump Sum <sup>(2)</sup>
11.2.1	Site organization and project monitoring	
11.2.2	Deforestation	
11.2.3	Deliverables	
11.2.4	Water management, treatment and disposal	
11.2.5	Fence removal	
11.2.6	Abandoned supply well dismantling and plugging	
11.2.7	Restoration and final clean-up of the site	

<b>LUMP SUM AMOUNT (LSA)</b> Excluding applicable tax(s)	
---	--

**UNIT PRICE TABLE**

The Unit Price Table designates Work to which a Unit Price Arrangement applies.

- (a) Work included in each item is as described in the referenced specification section.
- (b) The Price per Unit shall not include any amounts for Work that is not included in that unit price Item.

2- Unit Price						
Section No.	Description	Unit	Estimated Quantity (3) and (4)	Unit Price <sup>(2)</sup>	Total Cost <sup>(1)</sup>	Unit
11.3.1	Excavation, segregation, screening, transport and disposal/recovery of	t	750	\$		\$

	non-hazardous residual material (concrete slabs, foundations and others)				
11.3.2	Excavation, segregation, screening, temporary storage, transport and disposal/recovery of hazardous residual material	t	21,000	\$	\$
11.3.3	Excavation, segregation, screening, temporary storage, transport and disposal/recovery of soil "A-B"	t	2,400	\$	\$
11.3.4	Excavation, segregation, screening, temporary storage, transport and disposal of soil "B-C"	t	8,000	\$	\$
11.3.5	Excavation, segregation, screening, temporary storage, transport and disposal of soil "C-RESC"	t	11,500	\$	\$
11.3.6	Excavation, segregation, screening, temporary storage, transport and disposal of soil "≥ RESC"	t	2,500	\$	\$
11.3.7	Excavation, segregation, screening, temporary storage, transport and disposal of soil "≥ RESC dioxins and furans"	t	2,600	\$	\$
11.3.8	Excavation, segregation, screening, temporary storage, transport and disposal of soil "≥ RESC mixt"	t	2,500	\$	\$
11.3.9	Excavation, temporary storage	m3	800	\$	\$

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	and filling with excavated material from the site				
11.3.10	Filling with clean borrowed material	t	17,700	\$	\$

<b>TOTAL EXTENDED AMOUNT (TEA)</b> Excluding applicable tax(s)	
---	--

<b>TOTAL BID AMOUNT (LSA +TEA)</b> Excluding applicable tax(s)	
---	--





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**APPENDIX 4 - VOLUNTARY CERTIFICATION TO SUPPORT THE USE OF APPRENTICES**

*Note; The contractor will be asked to fill out a report every six months or at project completion as per sample "Voluntary Reports for Apprentices Employed during the Contract" provided at Annex C*

Name: \_\_\_\_\_

Signature: \_\_\_\_\_

Company Name: \_\_\_\_\_

Company Legal Name: \_\_\_\_\_

Solicitation Number: \_\_\_\_\_

Number of company employees: \_\_\_\_\_

Number of apprentices planned to be working on this contract: \_\_\_\_\_

Trades of those apprentices:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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## APPENDIX 5 – DEPARTMENTAL REPRESENTATIVE'S AUTHORITY

### Contracting Authority is :

Name : Joel Lussier

Title : Procurement Specialist

Department : Public Works and Government Services Canada

Division : Procurement, Quebec Region

Telephone : 514-496-3862

e-mail : joel.lussier@tpsgc-pwgsc.gc.ca

### Technical Authority is :

Name : \_\_\_\_\_

Title : \_\_\_\_\_

Department : \_\_\_\_\_

Division : \_\_\_\_\_

Telephone : \_\_\_\_ - \_\_\_\_ - \_\_\_\_\_

e-mail : \_\_\_\_\_

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## ANNEX B - CERTIFICATE OF INSURANCE (Not required at solicitation closing)

CERTIFICATE OF INSURANCE  
Page 1 of 2



Travaux publics et  
Services gouvernementaux  
Canada

Public Works and  
Government Services  
Canada

Description and Location of Work	Contract No.
	Project No.

Name of Insurer, Broker or Agent Code	Address (No., Street)	City	Province	Postal
Name of Insured (Contractor) Postal Code	Address (No., Street)	City	Province	
Additional Insured  <b><i>Her Majesty the Queen in Right of Canada as represented by the Minister of Public Works and Government Services</i></b>				

Type of Insurance	Insurer Name and Policy Number	Inception Date D / M / Y	Expiry Date D / M / Y	Limits of Liability		
				Per Occurrence	Annual General Aggregate	Completed Operations Aggregate
<b>Commercial General Liability</b>				\$	\$	\$
<b>Umbrella/Excess Liability</b>				\$	\$	\$
<b>Builder's Risk / Installation Floater</b>				\$		
<b>Pollution Liability</b>				\$ <input type="checkbox"/> Per Incident <input type="checkbox"/> Per Occurrence		Aggregate \$
<b>Marine Liability</b>				\$		

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<b>Aviation Liability</b>				\$ <input type="checkbox"/> Per Incident <input type="checkbox"/> Per Occurrence	Aggregate \$
<b>Insert other type of insurance as required</b>				\$	

**I certify that the above policies were issued by insurers in the course of their Insurance business in Canada, are currently in force and include the applicable insurance coverage's stated on page 2 of this Certificate of Insurance, including advance notice of cancellation / reduction in coverage.**

Name of person authorized to sign on behalf of Insurer(s) (Officer, Agent, Broker)  
 Telephone number

---

Signature  
 Date D / M / Y

**CERTIFICATE OF INSURANCE Page 2 of 2**

**General**

The insurance policies required on page 1 of the Certificate of Insurance must be in force and must include the insurance coverage listed under the corresponding type of insurance on this page.

The policies must insure the Contractor and must include Her Majesty the Queen in Right of Canada as represented by the Minister of Public Works and Government Services as an additional Insured.

The insurance policies must be endorsed to provide Canada with not less than thirty (30) days notice in writing in advance of a cancellation of insurance or any reduction in coverage.

Without increasing the limit of liability, the policies must protect all insured parties to the full extent of coverage provided. Further, the policies must apply to each Insured in the same manner and to the same extent as if a separate policy had been issued to each.

**Commercial General Liability**

The insurance coverage provided must not be substantially less than that provided by the latest edition of IBC Form 2100.

The policy must either include or be endorsed to include coverage for the following exposures or hazards if the Work is subject thereto:

- (a) Blasting.
- (b) Pile driving and caisson work.
- (c) Underpinning.

(d) Removal or weakening of support of any structure or land whether such support be natural or otherwise if the work is performed by the insured contractor.

The policy must have the following minimum limits:

- (a) **\$5,000,000** Each Occurrence Limit;
- (b) **\$10,000,000** General Aggregate Limit per policy year if the policy contains a General Aggregate; and
- (c) **\$5,000,000** Products/Completed Operations Aggregate Limit.

Umbrella or excess liability insurance may be used to achieve the required limits.

#### Builder's Risk / Installation Floater

The insurance coverage provided must not be less than that provided by the latest edition of IBC

Forms 4042 and 4047.

The policy must permit use and occupancy of any of the projects, or any part thereof, where such use and occupancy is for the purposes for which a project is intended upon completion.

The policy may exclude or be endorsed to exclude coverage for loss or damage caused by asbestos, fungi or spores, cyber and terrorism.

The policy must have a limit that is **not less than the sum of the contract value** plus the declared value (if any) set forth in the contract documents of all material and equipment supplied by Canada at the site of the project to be incorporated into and form part of the finished Work. If the value of the Work is changed, the policy must be changed to reflect the revised contract value.

The policy must provide that the proceeds thereof are payable to Canada or as Canada may direct in accordance with GC10.2, "Insurance Proceeds" (<https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual/5/R/R2900D/2>).

#### Contractors Pollution Liability

The policy must have a limit usual for a contract of this nature, but not less than **\$1,000,000** per incident or occurrence and in the aggregate.

#### Aviation Liability

The insurance coverage shall include Bodily Injury (including passenger Bodily Injury) and Property Damage, in an amount of not less than **\$5,000,000** per incident or occurrence and in the aggregate.

#### Marine Liability

The insurance coverage must be provided by a Protection & Indemnity (P&I) insurance policy and must include excess collision liability and pollution liability.

The insurance must be placed with a member of the International Group of Protection & Indemnity Associations or with a fixed market in an amount of not less than the limits determined

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by the *Marine Liability Act*, S.C. 2001, c. 6. Coverage must include crew liability, if it is not covered by the statutory requirements of the Territory or Province having jurisdiction over such employees.

The policy must waive all rights of subrogation against Canada as represented by Public Works and Government Services Canada for any and all loss of or damage to the watercraft however caused.

**Other types of Insurance**

To be inserted below according to specifics of project.

**Use separate page if needed.**



(Add rows as needed)

#### ANNEX D - LISTING OF SUBCONTRACTORS

In accordance with GI07 - Listing of Subcontractors and Suppliers of R2710T- General Instructions - Construction Services - Bid Security Requirements, the Bidder should provide a list of Subcontractors with his Bid.

The Bidder should submit the list of Subcontractors and for any portion of the Work valued at 20% or greater of the submitted Bid Price.

	Subcontractor	Division	Estimated value of work
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			

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**Englobe**

Soils Materials Environment

**Public Services and Procurement Canada  
Quebec Region**

**Project No.: R.057850.101**

**Former St-Germain Foundry  
Saint-Edmond-de-Grantham, Quebec**

**Specifications for Environmental Remediation Work**

July 22, 2016

O/Ref.: 045-P-0001686-0-01-240-RE-D-0100-00



**Public Services and Procurement Canada  
Quebec Region**

**Project No.: R. 057850.101**

**Former St-Germain Foundry  
Saint-Edmond-de-Grantham, Quebec**

**Specifications for Environmental Remediation Work**

045-P-0001686-0-01-240-01-RE-D-0100-00

Prepared by:



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Stéphane Cloutier, Eng.

Project Manager – Geoenvironnement

Verified by:



*Daniel Larose-Charette* 2016/07/22  
Daniel Larose-Charette, Eng., M. Sc.

Project Leader – Geoenvironnement



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Test results mentioned herein are only valid for the sample(s) stated in this report.

Englobe's subcontractors who may have accomplished work either on site or in laboratory are duly qualified as stated in our Quality Manual's procurement procedure. Should you require any further information, please contact your Project Manager."

REVISION AND PUBLICATION REGISTER		
Revision No.	Date	Modification And/Or Publication Details
00	2016-07-22	Final Version

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**APPENDIX H: Management Logical Diagram of Excavated Soil and Residual Material**

## CURRENT ABBREVIATIONS

<b>BTEX:</b>	Benzene, toluene, ethylbenzene and total xylenes
<b>CCDG:</b>	Cahier des charges et devis généraux
<b>CCME:</b>	Canadian Council of Ministers of the Environment
<b>CEAEQ:</b>	Environmental Analysis Centre of Expertise of the Province of Quebec
<b>CNESST:</b>	Commission of the Standards, Equity, Health and Safety of the Province of Quebec
<b>EQA:</b>	Environmental Quality Act of the Government of Quebec
<b>FMC:</b>	Groundwater criteria of the MDDELCC's Policy with respect to water <i>consumption</i>
<b>F&amp;O:</b>	Fisheries and Oceans Canada
<b>HM:</b>	Hazardous material
<b>IPE:</b>	Individual protection equipment
<b>LPRR:</b>	Land Protection and Rehabilitation Regulation of the Government of Quebec
<b>MAH:</b>	Monocyclic Aromatic Hydrocarbons
<b>MDDELCC:</b>	Quebec Ministry of Sustainable Development, Environment and Combating Climate Change
<b>MERN:</b>	Quebec Ministry of Energy and Natural Resources
<b>MMC:</b>	Metropolitan Montreal Community
<b>PAH:</b>	Polycyclic Aromatic Hydrocarbons
<b>PCB:</b>	Polychlorinated biphenyls
<b>PH C<sub>10</sub>-C<sub>50</sub>:</b>	Petroleum Hydrocarbons C <sub>10</sub> -C <sub>50</sub>
<b>PHC CWS:</b>	Canada-Wide Standard for Petroleum Hydrocarbons in Soil
<b>Phase I ESA:</b>	Phase I Environmental Site Assessment
<b>Policy:</b>	MDDELCC's Soil Protection and rehabilitation of Contaminated Sites Policy (1998 and subsequent modifications)
<b>REIMR:</b>	Regulation respecting the landfilling and incineration of residual material of the Government of Quebec
<b>RESC:</b>	Regulation on the landfilling of contaminated soil of the Government of Quebec
<b>RESIE:</b>	Groundwater criteria of the MDDELCC's Policy with respect to surface water resurgence or infiltration in sewers
<b>RM:</b>	Residual material
<b>RMD:</b>	Hazardous Waste Regulation of the Government of Quebec

<b>RSCTSC:</b>	Regulation respecting contaminated soil storage and contamination soil transfer stations of the Government of Quebec
<b>PSPC:</b>	Public Services and Procurement Canada
<b>SIH:</b>	Hydrogeological Information System
<b>VOC:</b>	Volatile organic compound

## 1.0 DEFINITIONS

---

**Mineralogic Analysis:** Test aimed to establish the percentage of residual material in a soil sample according to a protocol modelled from the LC 21-901 method of the Quebec Ministry of Transports (test to establish the composition of a recycled material containing plant mix and cement concrete residues).

**Consultant:** Environmental consulting business in charge of monitoring the environmental management activities of soil, residual material and groundwater concerned by this contract.

**Contractor:** Bidder of which bid was accepted by the Owner, his/her representatives, successors or beneficially interested as contracting party with the Owner and who is in charge of executing all the work.

**Invasive species:** A species that is not native to a specific location, but able to spread to a degree believed to cause damage to the economy, environment or human health. This type of harmful organism includes, besides plants, some animals, fungus and microorganisms which also pose a threat to biodiversity.

**Residual material:** Any residue issued from a production, transformation or use process, any substance, material or product or more generally any abandoned movable, including construction or demolition waste.

**Hazardous material:** Any material meeting the definition of hazardous material according to the RMD.

**Environment protection:** Prevention/control of contamination, pollution and habitat and environment disturbance during the construction. The prevention of pollution and damages to environment covers soil, water, air, and biological and cultural resources protection; it also includes the management of visual aesthetic, noise, as well as solid, chemical, gaseous and liquid waste, radiant energy, radioactive material and other pollutants.

**Soil:** Any natural material resulting from the bedrock under the influence of physical, chemical and biological processes. Fill material containing less than 50% of residual material mixed with soils that are considered to be soil. Are also considered soil the natural materials containing less than 50% of residual material that might be observed in or coming from the streambed or bottom of water body, commonly called sediments.

**Soil "A-B":** Any soil which maximum concentrations of contaminants are comprised in the "A-B" range of generic criteria of the MDDELCC's Policy;

**Soil "B-C":** Any soil which maximum concentrations of contaminants are comprised in the "B-C" range of generic criteria of the MDDELCC's Policy;

**Soil "C-RESC":** Any soil which maximum concentrations of contaminants exceed the "C" generic criterion of the MDDELCC's Policy and are lower than the applicable limit values of the RESC's Appendix I;

**Soil "≥RESC":** Any soil which one or several concentrations exceeding or meeting limit values of the RESC's Appendix I for one or several parameters others than dioxins and furans;

**Soil “≥RESC dioxins and furans”:** Any soil which one (or several) concentration(s) exceeding or meeting limit values of the RESC’s Appendix I only for dioxins and furans;

**Soil “≥RESC mixt”:** Any soil which one or several concentrations exceeding or meeting limit values of the RESC’s Appendix I for dioxins and furans, and other parameters;

**Clean Soil:** Any soil which concentrations of contaminants are lower than the MDDELCC’s “A” generic criterion and the CCME’s recommendations for an industrial usage;

**Soil geotechnically acceptable:** Any soil containing less than 2% of organic, non-putrescible and considered compactible material according to the CCDG.

## **2.0     CONTEXT**

---

PSPC wishes to perform an environmental remediation of the site of the former St-Germain Foundry located in Saint-Edmond-de-Grantham, Quebec. PSPC, the current owner of the strip of land, wishes to remove residual material from the site using segregation and excavate soil and sediments with concentrations non-complying with the remediation objectives (CCME recommendations for an industrial usage). The project aims to remove foundry residues, contaminated soil, and residual material to dispose of or recover them.

Services from a specialty Contractor are required to perform the environmental remediation work. The selected Contractor will act as the principal contractor and will ensure work will be performed in accordance with the specifications and regulations in force.

Generally, the Contractor selected for the work of the current mandate will have some flexibility in selecting the means and methods to use. In this regard, various options and scenarios to meet the project objectives might be valid. However, a solution combining remediation and recovery of the foundry residues could result in savings compared with a conventional approach.

Prior to undertaking work, the Contractor shall prepare documents describing his/her methodology and how it meets the specifications objectives. PSPC will submit comments following the review of documents. Verifying that expected results are reached and satisfying all the requirements enumerated to the specifications will be performed by the Consultant which services will be retained by PSPC. The functions of the Consultant which services will be retained by PSPC will namely include to ensure that mitigation measures comprised in the environmental review carried out for this project will be duly respected.

Should there be any conflicting requirements in this call for tenders, the strictest shall prevail.

The remediation work is scheduled to commence in mid-October 2016.

### 3.0 SITE DESCRIPTION

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The study site, located at 1348 10<sup>th</sup> Rang in Saint-Edmond-de-Grantham, is rectangular shaped and covers a total area of 47,730 m<sup>2</sup> approximately. The property under study is bounded by the 10<sup>th</sup> Rang to the west<sup>1</sup>. Residences or agricultural land are present on the properties located southwest and north, and a woodlot is located to the east and the south. David River flows approximately 600 m to the west of the site.

The study site was used as a foundry between 1977 and 2004. More specifically, activities from metal<sup>2</sup> recovery from various metal scrap such as electrical wires auto parts, accumulators, batteries were carried out on the site. The waste were stored directly onto the site's ground before being burned in a furnace or even in the open air with used oil or tires. The recovered metal were then sold and ashes resulting from burning operations (ash and slag) were either disposed of off-site, stored or buried on site.

The property is divided in three sectors. The sectors and some ditches crossing them are described hereafter.

#### **Fallow Land Sector**

The fallow land sector covers a surface area of approximately 16,000 m<sup>2</sup>. Generally, the fallow land sector includes the portion of the site located between the 10<sup>th</sup> Rang and the former working area. A road leading from the 10<sup>th</sup> Rang to the working area passes through the sector. During a visit carried out on April 2016, the northern portion of the fallow land was covered with tall dried grass and the southern portion had been mowed.

A barrier controls the access to the fallow land sector by the 10<sup>th</sup> Rang.

#### **Working Area of the Former Foundry Sector**

The working area of the former foundry is divided in two sectors covering a total area of approximately 25,000 m<sup>2</sup>, i.e. the receiving area where metal scrap loads were registered and the production sector where activities of metal smelting and recovery were carried out. A barrier separates the receiving sector from the production sector. The working area is bounded by the fallow land sector to the west and the woodlot sector is on the eastern and southern boundaries of this area.

The production sector is surrounded by a ditch which is partly extending in the receiving area. Some vegetation (fallow land and young trees) grows on the periphery of the production area.

The northern portion of the receiving area is wooded or covered with shrubs.

Some structures and infrastructures are still present in the working area, including, but not limited to, a septic tank and its associated piping (unknown condition), a drain collecting the southern and western portions of the peripheral ditch (unknown condition), several surface concrete slabs (approximately 650 m<sup>2</sup>) and the suspected presence of several building foundations.

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<sup>1</sup> The 10<sup>th</sup> Rang is considered to be North-South for the purposes of this document. The 10<sup>th</sup> Rang geographic orientation may differ in other reference documents.

<sup>2</sup> Mainly copper, lead, aluminum and white metal (lead and tin alloy)

Moreover, a former groundwater reservoir filled with sand is also present in the former production sector.

As part of the preliminary environmental remediation test carried out by Technorem in the autumn of 2015 (see section 4.0), a road surface enabling heavy trucks to circulate safely and efficiently has been set out between the access barrier of the working area and the Technorem's remediation test zone. The length of the road surface is 140 m and its width is 8 m.

Figure 3 shows the various structures still present in the working area as well as the location of the road surface.

### **Wooded Sector**

The wooded sector covers all the eastern to the southwestern part of the site.

### **Ditches**

An intermittent peripheral ditch surrounds the former foundry working sector. It is approximately 600 meters long, its average width is 2.63 m (varying between 1.30 m and 4.85 m), and its average height is 67.15 m (varying between 66.02 m and 67.99 m).

A common ditch with an approximate length of 140 m crosses the fallow land sector and collect the former foundry production sector to a ditch running along the eastern side of the 10<sup>th</sup> Rang West.

The surface water runs off from the peripheral ditch to the common ditch and then toward the ditch of the 10<sup>th</sup> Rang. According to the time of year, it is possible that the peripheral ditch is partly dry.

Figure 3 of Appendix A shows the location of the three ditches described above.

### **Current Site Conditions**

The studied site is currently unused, and all buildings still present on the site were demolished in the autumn of 2012. An electrical power supply line initiating in the 10<sup>th</sup> Rang is present on the site. An abandoned water supply well is present along the road from the 10<sup>th</sup> Rang to the working area. The condition of this well as well as the groundwater quality has not been assessed. Moreover, the possibility to restore and use this well has not been assessed either. No sanitary service is available on the site.

The topography of the site is relatively flat despite the presence of an elevation of nearly 2.0 m between the 10<sup>th</sup> Rang and the rear part of the site (eastern end).

Figure 1 of Appendix A shows the general location of the studied site, and the Figure 2 shows an aerial photo of the sectors described above.

## 4.0 BRIEF ENVIRONMENTAL REVIEW

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The study site has been the subject of several environmental characterization studies since 1993. The following sections summarize the relevant elements drawn from the previous studies conducted on the site.

A summary of the major studies conducted since 2010 is attached to Appendix B.

In summary, the various studies confirmed the presence of foundry residues and ashes up on all the working area. The average thickness of the residual material is 0.7 m and it ranges between from 0.15 m to more than 2.0 m. The foundry residues and ashes are a residual hazardous material according to the Quebec RMD since they reach levels of lead leaching exceeding the applicable standard of the regulation. Tests carried out on these residues indicated that they are not material containing asbestos.

Contaminated soil and contaminated sediments have been identified on the site. As the owner, PSPC took diligent actions to secure the site and manage the contamination present on the site. For this purpose, demolition, and environmental assessment and characterization work has been undertaken. Detailed characterizations enabled to delineate with more details the volumes of residual hazardous material and contaminated soil, the groundwater quality and its flowing conditions and the water surface and sediments quality. Moreover, the foundry residues characteristics have been studied with more details in order to get as much information as possible for the assessment of the remediation site options.

Following a preliminary remediation test conducted on one portion of the site at the end of 2015, 1,211 metric tons of residual hazardous material as well as 1,286 metric tons of contaminated soil were removed and disposed of off-site. The residual volumes listed hereafter are considered to be still remaining on the site:

- residual hazardous material: 11,079 m<sup>3</sup>;
- Soil with a contamination level exceeding the industrial recommendations of the CCME: 11 817 m<sup>3</sup>;
- Soil with a contamination level comprised in the “A-B” range of the criteria of the MDDELCC’s Policy: 4,344 m<sup>3</sup>;
- Soil with a contamination level comprised in the “B-C” range of the criteria of the MDDELCC’s Policy: 3,291 m<sup>3</sup>;
- Soil with a contamination level comprised in the “C-RESC” range of the criteria of the MDDELCC’s Policy: 4,774 m<sup>3</sup>;
- Soil with a contamination level meeting or exceeding the RESC limit values: 3,081 m<sup>3</sup>.

The groundwater is considered to be contaminated since concentrations for some parameters exceed the MDDELCC's Policy groundwater criteria and/or the applicable federal recommendations. With a few specific exceptions, all the potable water standards exceedances are limited to wells installed in the working area of the former foundry. Wells located at the site boundary do not show exceedances of the potable water quality regulation standards. The results from the water quality monitoring campaigns mentioned that the situation has been stable since 2011. The samplings collected by the MDDELCC from the potable water wells located close by, with the most recent in 2013, revealed that water from nearby private wells is not affected and is considered safe for human health.

The three ditches present on the studied site or in the immediate vicinity are considered as fish habitats.

## 5.0 MANDATE

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PSPC wishes to perform an environmental remediation of the site of the former Saint-Germain Foundry. The project aims at remediating the site by removing foundry residues, contaminated soil, and residual material for disposal or recovery. Since foundry residues reuse as raw material in an industrial process is possible, PSPC considers that a Contractor selecting the recovery option may have an advantage in a competition based on price with regard to the contractors who will propose an excavation/disposition conventional.

The Contractor is in charge of all the conception and execution works, and shall ensure the quality of the delivered product. He shall conceive and provide works, installations and infrastructures required to achieve the objectives efficiently.

The environmental remediation mandate includes the excavation, and transportation, as well as the management via treatment, disposal or recovery of all the hazardous residual material, all contaminated soil and sediments, and their by-products resulting from treatment in compliance with applicable laws, standards, and regulations. The mandate will also include a minimum restoring of the site.

**General and specific remediation requirements shall be achieved by the successful bidder.**

The general requirements to reach are identified at section 5.1. Specific requirements to some specific aspects of the project are identified in the relevant sections.

### 5.1 Remediation Objectives to Achieve

#### **General Technical Requirements**

- Soil present on the land at the end of the work shall meet the CCME recommendations for an industrial land, including the 2008 Canada-wide Standard for Petroleum Hydrocarbons (PHC CWS) in Soil ;
- No residual nor hazardous material shall remain on the land at the end of the work;
- Soil and residual material shall be managed in compliance with the working plan submitted by the Contractor and reviewed according to the PSPC's comments;
- The soil and residual material final management mode shall leave PSPC with no environmental responsibility and be environmentally friendly;
- The mitigation and restoring measures mentioned in this document shall be complied with for all the duration of the project;
- Works shall be carried out in compliance with the applicable federal, provincial, and municipal laws and regulations.

### **Administrative General Objectives**

- Total costs associated to the carried out work during the first phase will be \$5,000,000.
- The first phase shall be completed and invoiced on March 31 2017.
- The second and last phase of the work will commence on April 1 2017 and will have to be completed and invoiced before March 31 2018.

### **5.2 Work Description**

For bid purposes, PSPS plans environmental remediation work with the following scope:

- Location of underground infrastructures using the services of Info-Excavation and a specialised company, if necessary;
- Location on the land of the sectors and polygons to remediate;
- Set out the grid (see Figure 3 of Appendix A);
- When necessary, set out structures (overflow, cofferdam, etc.) and fishing activities allowing not to consider the peripheral ditch as a fish habitat;
- Installation of an equipment decontamination area;
- Excavation of hazardous residual material and contaminated soil (including sediments) on the whole study property according to the analytical results obtained within the previous environmental studies and organoleptic properties encountered during excavation work. Continuation until natural ground meets the remediation objectives;
- Segregation, screening and/or temporary piling by material type, followed by a follow-up on the material validation and classification, then management of excavated material after confirmation of its environmental and geotechnical quality by the Consultant;
- Decommissioning and plugging of an abandoned supply well present on the fallow land sector;
- Re-excavation if the analytical results of the samples collected from the bottom and walls of the excavation show exceedances of the remediation objectives or if residual material is encountered;
- Loading, transportation, and disposal of segregated soil not meeting the remediation objectives (according to the contamination level). Contaminated soil shall be disposed of off-site in a site authorized by Provincial authorities in Quebec or other Canadian province. In the latter case, a written attestation by the MDDELCC and other competent authorities of the province or receiving authority confirming that the interprovincial or international transfer of such soil is authorized shall be submitted to PSPC prior to the beginning of the work;

- Loading, transportation and treatment or off-site disposal of hazardous residual material. Hazardous residual material shall be disposed of off-site in a site authorized by Provincial authorities in Quebec or other Canadian province. In the latter case, a written attestation by the MDDELCC and other competent authorities of the province or receiving authority confirming that the interprovincial or international transfer of such material is authorized shall be submitted to PSPC prior to the beginning of the work;
- Assist the Consultant during the excavation bottoms and walls sampling, and for the temporary pilings, when needed;
- Management of water accumulated in the excavations, when needed, via pumping and temporary storage while waiting for results and a discharge permit, when applicable, water discharge if it meets applicable quality standards or treatment on site or off-site (recovery by a specialised firm) if it does not;
- Ditch dewatering prior to the sediments remediation;
- Sediments remediation;
- Ensure observation wells present on site remain operative;
- Fill excavations with soil from the site meeting remediation objectives, or borrow material free from contamination (concentrations below the MDDELCC "A" criterion and the CCME recommendations for an industrial usage);
- Levelling of the land after the work so the final line is similar to the neighbouring land;
- Restoration of the ditches;
- Follow-up on the excavated and disposed of quantities;
- Application of a worker health and safety plan for all the duration of the work;
- Comply with required environmental protection measures within the present mandate, and described in section 8.14;
- The Contractor shall obtain all permits required to execute the requested work with federal, provincial and municipal agencies, and pay the costs related thereto. PSPC was confirmed by F&O that all planned work did not require authorization nor permit under the Fisheries Act in cases where the specification mitigation measures are respected. The requirements associated with this confirmation are part of the documentation to which the Contractor, and his/her subcontractors and suppliers shall comply.

### **5.3 Logistical Considerations**

The Contractor shall adapt its schedule and sequence of work according to the municipal requirements and the period of year. Namely, the Contractor shall take into account the annual variations of groundwater and surface water, winter conditions, and constraints associated with the spring thaw.

It should be noted that the access road linking the 10<sup>th</sup> Rang to the production sector, and consequently to the main area that needs to be remediated, is quite narrow, and actually, it does not allow for two heavy vehicles to circulate on separate directions at the same time. The access road and the road surface present are not necessarily solid enough to support the machinery.

The Contractor shall plan logistics allowing the optimisation of off-site shipment material and minimizing costs and deadlines associated with their transportation. When appropriate, the Contractor is responsible for obtaining all permits and authorizations required for material transportation, and execution of activities.

No additional cost shall be charged to PSPC due to logistics considerations unplanned by the Contractor.

The Contractor shall be solely responsible for the work sequence. The Contractor shall take into consideration the possibility to work in winter conditions and the consequences of such conditions on the access to the site, on the segregation of material during excavation work, and on the transportation and disposal of excavated material. The work thus includes, but is not limited to, snow removal of the sectors to excavate as well as the access to the sectors. The Contractor shall also take into consideration the possibility that soil or residual material to manage are frozen when he will want to execute the work or that loading limits are applicable to material transportation during spring thaw. All claim due to the presence of frozen material or winter conditions will be deemed non-responsive.

## 6.0 LAWS, REGULATIONS AND OTHERS

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The retained Contractor shall execute the work in compliance with the most updated versions of applicable federal, provincial, laws, regulations, codes and guides, specifically, but not limited to:

### **Government of Canada:**

- Canadian Environmental Protection Act (S.C. 1999, c. 33);
- Species at Risk Act (S.C. 2002, c. 29);
- Act Respecting Threatened Or Vulnerable Species (E-12.01);
- The Federal Policy on Wetland Conservation;
- Transportation of Dangerous Goods Act;
- An Amended Transportation of Dangerous Goods Act, 1992;
- Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations (SOR/2008-197);
- Canadian Environmental Assessment Act (S.C. 2012, c. 19, s. 52);
- Regulations Designating Physical Activities (SOR-2012-147) ;
- Prescribed Information for the Description of a Designated Project Regulations (SOR-2012-148);
- Cost Recovery Regulations (SOR/2012-146);
- Fisheries Act (R.S.C. (1985), c. F-14);
- Canadian Environmental Quality Guidelines;
- Canadian Drinking Water Guidelines (Health Canada);
- Canada-wide standards for petroleum hydrocarbons (PHC) in soil (CCME);
- Canada-wide standards for petroleum hydrocarbons (PHC) in soil: Technical Supplement (CCME);
- A Federal Approach to Contaminated Sites;
- Guidance Manual for Environmental Site Characterization in Support of Environmental and Human Health Risk Assessment Volumes 1 to 4;
- Transportation of Dangerous Goods Regulations (SOR/2001-286);
- Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations (SOR/2005-149);
- Workplace Hazardous Materials Information System (WHMIS);
- Canada Occupational Health and Safety Regulations (DORS/86-304), Parts X, XII and XIV;
- Canada Labour Code – Part II (R.S.C. (1985), c. L-2);

- Canada Occupational Health and Safety Regulations (SOR-86-304);
- Canadian Electrical Code.

**Government of Quebec:**

- Act Respecting Threatened Or Vulnerable Species (E-12.01);
- Environment Quality Act (Chapter Q-2);
- Regulation respecting the quality of drinking water (Chapter Q-2, r. 40).
- Land Protection and Rehabilitation Regulation (CQLR, Chapter Q-2, r.37);
- Regulation Respecting the Burial of Contaminated Soils (Chapter Q-2, r.18)
- Regulation respecting contaminated soil storage and contaminated soil transfer stations (CQLR, Chapter Q-2, r. 46);
- Regulation respecting the landfilling and incineration of residual materials (CQLR, Chapter Q-2, r.19);
- Clean Air Regulation (Chapter Q-2, r. 4.1);
- Water Withdrawal and Protection Regulation (Chapter Q-2, r. 35.2).
- Soil Protection and Contaminated Sites Rehabilitation Policy (MDDELCC);
- Guide de caractérisation des terrains (MDDELCC);
- Guide d'échantillonnage à des fins d'analyses environnementales, Cahier 1 - Généralités (CEAEQ);
- Guide d'échantillonnage à des fins d'analyses environnementales, Cahier 2 – Échantillonnage des rejets liquides, Québec, (CEAEQ), 2009;
- Guide d'échantillonnage à des fins d'analyses environnementales, Cahier 3 - Échantillonnage des eaux souterraines (CEAEQ), mise à jour de 2011;
- Guide d'échantillonnage à des fins d'analyses environnementales, Cahier 5 - Échantillonnage des sols (CEAEQ) ;
- Guide d'échantillonnage à des fins d'analyses environnementales, Cahier 8 - Échantillonnage des matières dangereuses (CEAEQ);
- Mode de conservation pour l'échantillonnage des sols (CEAEQ);
- Mode de conservation pour l'échantillonnage des eaux souterraines (CEAEQ);
- Liste des méthodes suggérées pour la réalisation des analyses de laboratoire (MDDELCC);
- Lignes directrices sur l'évaluation des teneurs de fond naturelles dans les sols (MDDELCC);
- Lignes directrices pour le traitement des sols par biodégradation, bioventilation ou volatilisation (MDDELCC);
- Liste des centres régionaux de traitement de sols contaminés autorisés au Québec pour usage public (MDDELCC);
- Lieux commerciaux d'enfouissement sécuritaire de sols contaminés conformes au Règlement sur l'enfouissement des sols contaminés (MDDELCC);

- La gestion des matériaux de démantèlement – Guide de bonnes pratiques (MDDELCC);
- Guide de valorisation des matières résiduelles inorganiques non dangereuses de source industrielle comme matériaux de construction (MDDELCC);
- Regulation respecting hazardous materials (CQLR, Chapter Q-2, r. 32);
- Transportation of Dangerous Substances Regulation (CQLR, Chapter C-24.2, r.43);
- Act Respecting Occupational Health And Safety (CQLR, Chapter S-2.1);
- Regulation respecting occupational health and safety (Chapter S-2.1, r.13);
- Safety Code for the construction industry (Chapter S-2.1, r.4);
- Guide de la protection respiratoire (CNESST);
- Guide d'aménagement des ponts et des ponceaux dans le milieu forestier (MERN).

**Municipality of St-Edmond-de-Grantham:**

- *Rule establishing the separating distances to protect the artesian and surface wells, and governing usage and transportation on municipal roads of products likely to impair the water quality, the environment or the health and general well-being of the inhabitants of the municipality of St-Edmond-de-Grantham<sup>3</sup> (267-2011);*
- *Rule on the emptying of sludge from septic tanks<sup>4</sup> (212-2007).*

**Canadian Standards Association**

- Phase II Environmental Site Assessment CAN/CSA-Z769-00 (R2013)

In case of omissions or inconsistencies between the requirements, the most severe shall apply.

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<sup>3</sup> Translator note: Loose translation of the municipal rule.

<sup>4</sup> Translator note: Loose translation of the municipal rule.

## 7.0 TEMPORARY FACILITIES

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### 7.1 Office and installation of the work site

#### 7.1.1 *Requirements*

- Provide and install a work site facility. It shall be present on site for the duration of the project, and at least contain the following furniture and equipment:
  - One (1) sink;
  - One (1) microwave oven;
  - One (1) coffee maker;
  - One (1) kettle;
  - One (1) refrigerator;
  - Chairs and tables allowing twelve (12) persons to hold a meeting;
  - One (1) first aid kit clearly identified and located in an easily accessible place;
  - One (1) or several extinguishers and the fire-fighting equipment required by competent insurance companies, applicable codes and regulations, and Canada safety requirements in compliance with the applicable regulation;
- Provide and install a closed office in the work site facility available to the PSPC representative. Interior minimum dimensions of the office will be of 6 m long x 3 m wide x 2.4 m high. The office shall contain the following furniture and equipment:
  - Two (2) tables of 1 m x 2 m, five (5) chairs, 300 mm wide shelving units;
  - Two (2) cabinets with three (3) drawers;
  - One (1) bookshelves;
  - Four (4) clothes rail;
  - Shelves;
  - One (1) printer serving two (2) workstations.
- Provide and install on the site a sufficient number of sanitary facility in accordance with applicable orders and regulation;
  - Note that sanitary facilities provided by the Contractor will at least include one water point equipped with soap, nail brushes and towels.
- Smoking and eating food will be prohibited everywhere on the working place.

- Provide, maintain, and support the cost associated to the following temporary facilities for the duration of the work:
  - One (1) printer (including cartridges and paper).
  - Potable water supply to the work site office during the execution of the work, either from a water supply system or with drinking bottled water.
  - Weekly cleaning services to keep the premises clean;
  - Maintain at all times a temperature between 19 °C and 22 °C in the construction facility.
  - Provide paper towel and toilet paper;
  - Provide temporary electrical supply required for the execution of work;
  - Provide temporary lighting for all the duration of the work to ensure safety work areas.

## **7.2 Temporary structures**

### **7.2.1 *Requirements***

- Ensure design, installation, and maintenance of temporary structures required for the proper conduct of the work. The required structures include, but are not limited to:
  - Access roads;
  - Temporary storage areas;
  - Equipment cleaning areas;
  - Basins, surface for stockpiling and/or soil dewatering areas, etc.

## **8.0 WORK METHODOLOGY**

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All decisions made for the smooth conduct of the work and any decision impacting the project budget or schedule shall be taken in close collaboration with PSPC.

### **8.1 Meetings**

#### **8.1.1 Requirements**

- The Contractor shall be involved in a kick-off meeting which will take place at the Montréal PSPC's office following the contract award. The meeting will be used to discuss administrative procedures, approach and work methods, and responsibilities of each party.
- The Contractor shall be ready to provide all documents and information listed, and to discuss in items mentioned in section 8.1.2 during the project kick-off meeting.
- The Contractor shall be involved in progress meetings throughout the project. The initial frequency of the meetings will be on a bi-weekly basis. PSPC reserves the right to adjust the frequency upwards or downwards to ensure a better follow-up of the work. The meetings will be held in Montréal or on the work site; the choice will be to PSPC.

#### **8.1.2 Execution and follow-up**

The documents and information the Contractor shall be prepared to discuss and present during the kick-off meeting or next meetings are:

- Appointment of the official representatives of the participants involved in the work;
- Presentation of the project, approach, and work methods;
- Providing the team organisational chart, including the list of the representatives with their contact details (phone number, cell number and email);
- Working plan (including the project schedule) according to section 10.1 of the present document;
- Schedule of the applications for authorizations to applicable authorities;
- Management plan of the site facilities, construction signalling, offices, utilities services, and fences;
- Environment and sustainable development protection plan, according to section 10.1 of the present document;
- Health and Safety Plan according to section 10.2 of the present document;
- Proposed modifications, change orders, procedures, appropriate approvals, extensions of deadlines, overtime, and other administrative details;
- Monthly instalments requests, administrative procedures;
- Appointment of organisms and inspecting and testing firms;
- Insurance, insurance policies.

The Contractor shall be ready to discuss the following items during the project progression meetings:

- Agenda approval
- Approval of the minutes of the previous meeting
- Environment protection Execution of work
  - Record of the work carried out since the last meeting. Record of the work scheduled by the next meeting
  - Counting of carried out quantities
  - Documents and elements related to the quality control program (samples to provide, test results, analysis results, etc.)
  - Non-compliances
  - Remedial actions
- Health and Safety
- Protection of the environment
- Contract management
- Schedule
- Various

The Consultant is responsible to prepare the agenda for the project meetings. The project meetings will be led by the Consultant. The latter will draft the minutes for meetings. The Contractor representatives, its subcontractors and suppliers attending the meetings shall be empowered and authorized to intervene on behalf of the represented parties.

Copies of the minutes will be distributed to the attendees and to the parties not attending the meeting within three (3) business days following the meeting. Attendees will have two (2) business days to submit their written comments.

PSPC reserves the right to convene, with a 24-hour notice, when it deems necessary for the smooth conduct of the project, extraordinary meetings to which the Contractor shall attend, with subcontractors and suppliers whose presence is deemed appropriate by PSPC.

## **8.2 Working plan and health and safety plan**

### **8.2.1 Requirements**

- Prepare and submit a working plan as well as a health and safety plan showing compliance with the specifications;
- The working plan shall include the methodology, comply with the main stages of material management presented to the logic diagram of Appendix H and include items identified in section 10.1.
- The health and safety plan shall include all the items and approaches listed in section 10.2.

### **8.2.2 Execution and follow-up**

The logic diagram presented in the Appendix H summarizes the required steps for the management of the various material. Section 10 details the items to include to the working plan as well as the health and safety plan.

Two weeks after contract is awarded, the Contractor shall present the working plan as well as the health and safety plan.

Work shall commence after PSCPC's comments are included in a revised version of these plans.

## **8.3 Access to the site and notice of attendance**

### **8.3.1 Requirements**

- The Contractor shall control access to the site and ensure that all unauthorized persons or not wearing the required personal protection equipment do not enter the site;
- The Contractor shall inform the Consultant on his/her schedule and presence on site to the Consultant.
- The Contractor shall keep an up-to-date record of the visitors made accessible to the Consultant.

### **8.3.2 Execution and follow-up**

The regular working hours included between the mobilization and the demobilization of the Contractor are Monday to Saturday between 7:00 a.m. and 7:00 p.m. The Contractor shall obtain the required authorizations from the Municipality's representative for all the work performed outside the regular hours, including Sundays and statutory holidays.

The Contractor shall use his/her own personal transportation without PSCPC's support, and be responsible for all transportation related to the work. The starting date of the project shall be communicated to PSCPC as soon as possible, at least two weeks prior to the beginning of work.

## **8.4 Infrastructures location**

### **8.4.1 Requirements**

- The Contractor is responsible for the location of the public and private, underground or aerial utilities on the site.

- The Contractor is responsible for the maintenance and protection of any services or infrastructure present on the site.

#### **8.4.2 Execution and follow-up**

The Contractor shall contact all public and private bodies to locate underground services or infrastructures present on the site (Info-Excavation, the municipality, private locate services, etc.).

As soon as work begins, the Contractor shall contact the public utilities companies to be aware of the locations and protection measures of these services, as well as the work scheduled by these companies, and their achievement, when appropriate. The Contractor is responsible for all damage caused to the public services installations, and all repair work shall be at his own expense.

It should be noted that Hydro-Québec's aerial servitudes are present on the site.

### **8.5 Material and equipment**

#### **8.5.1 Requirements**

- The Contractor shall provide all the equipment required to perform work and ensure that all equipment work adequately.

### **8.6 Water management**

#### **8.6.1 Requirement**

- Except for a discharge in the isolated southern peripheral ditch prior to its remediation, but after required measures were implemented so the ditch is not considered as a fish habitat (two cofferdams installations and withdrawal of fish according to Appendix D's requirements), all water discharged by the Contractor shall meet the most severe criterion among the following criteria: AFC et RESIE, with the exception of dioxins and furans which shall present similar concentrations as the field blanks done by the Consultant at the beginning of field work. Table 5 of Appendix G summarizes criterion and digital values to comply with.
- All water discharged by the Contractor shall have a suspended material value below 25 mg/L.
- Any discharge of water shall be done protecting the environment and the aquifer quality used as a potable water source.
- Water management system (s) installed shall have the capacity to manage all pumped, diverted or generated during the remediation work.
- Prior to the first discharge, the Contractor shall obtain the permits required for managing and treating water. He/she shall also carry out all tests and analyses required by appropriate authorities and the specification.
- The Contractor shall, at all times, shall provide evidence that its effluents meet applicable standards and criteria upon PSPC's request or his/her representative.

- The Contractor shall demonstrate the absence of fish before dewatering the peripheral ditch or release of water in the peripheral ditch.

### **8.6.2 Execution and follow-up**

- The Contractor shall provide the field blanks analytical results for dioxins and furans as the field work begins.
- The chemical analytical results for groundwater samples collected on the site (see Appendix B) indicate that a treatment could be required before proceeding to a discharge.
- The Contractor is responsible for managing the water generated during the execution of all the work. He shall take and implement all necessary procedures for managing and/or disposing efficiently the waste water from the activities (water pumped during excavation work, truck or equipment washing water, use of water for dust control, water generated from ground drainage, etc.), and from any other activities associated to this mandate.
- The Contractor is responsible for implementing all procedures required to efficiently treat the waste water so it meets the quality criteria or standards allowing discharge.
- The Contractor shall keep a detailed record of the discharged water results and provide it to the Consultant upon request. The record shall include the collecting point, and collecting date and time.
- The Contractor shall take all possible measures to mitigate the volumes of water to manage during the excavation work. For this purpose, he will have to consider the various periods of year when groundwater fluctuate. Table 1 of Appendix G summarizes the water levels recorded on the site during the work carried out during various periods of the year since 2012. It should be noted that these values are given as an indication only and that the water levels are likely to fluctuate according to the seasons and/or weather conditions.
- The Contractor is responsible for following-up of the effluents and treated or accumulated water, whether in the cleaning areas or elsewhere on the site. The results provided by the Contractor in order to plan the selected management modes (release to ditch, to the site surface, off-site treatment or disposal) shall vary according to the deadlines required for obtaining the analytical results.

The parameter analysed by the Contractor during the prior to discharge water monitoring will include at least:

- Metals (Al, Ag, As, B Cd, Cu, Cr, Mo, Ni, Pb, Sb, Ba, Co, Mn, Se, Na, and Zn)
- Mercury
- pH
- Dioxins and furans
- Ammonia nitrogen
- Chlorides
- Nitrites

- Nitrite and nitrate
- Fluorides
- Sulfides
- Suspended matter
- Petroleum Hydrocarbons C<sub>10</sub>-C<sub>50</sub>
- Polychlorinated Biphenyls

The Consultant shall collect water samples for control analyses purposes. The Contractor shall obtain the written authorization from the Consultant prior to proceed to any activity involving water management (treatment, pumping, accumulation). The Contractor shall plan delays to obtain the Consultant's written authorization. These delays could range between two and twelve days according to the verifications performed by the Consultant.

## **8.7 Material excavation and segregation**

### **8.7.1 *Requirements***

- Soil and residual material horizons present on the field shall be precisely segregated. The precision level of this segregation must be less than 10 cm;
- The excavated soil shall be segregated according to contamination level;
- All clean or geotechnically acceptable soil shall be re-used on the field;
- The excavation of contaminated soil present in the ditches shall meet the recommendations to perform work in a wet ditch and pumping of excavation water or dewatering of ditch listed in Appendix D.

### **8.7.2 *Execution and follow-up***

The Contractor shall proceed to selective excavation of the material according to the sectors and depths indicated in Tables 3 and 4 of Appendix G, and Figures 4 and 5 of Appendix A, or according to the Consultant's directives. It should be noted that thicknesses indicated in Tables 3 and 4 may vary. The Contractor shall consider that the quantities of material to excavate could differ from the quantities indicated in the bid form. Moreover, it is possible that re-excavations would be necessary to achieve remediation objectives.

The Contractor shall have the selected excavation method validated by the Consultant in order to limit as much as possible the mix of soil and residual material. The Contractor shall implement all means necessary to excavate and completely segregate the residual material, hazardous or not, and soils which contamination level is higher than the remediation objectives.

The Contractor shall carefully proceed to the selective selection of material with different geotechnical or environmental characteristics to avoid mixing unsuitable material to potentially re-usable material. The Contractor is responsible for all costs incurred by the loss of potentially re-usable material, including costs related to loading, transport, disposal and replacement with imported material in order to replace lost quantities. Likewise, the Contractor shall not submit any reclamation nor is entitled to any damages arising out of actions which may have led to the impossibility to re-use excavated material.

The Contractor shall consider that the Consultant will be present at all times during the excavation work, and that he may, at any time, stop the work in a given sector and proceed to observations, samplings and analyses, without the Contractor charging any additional fees. The Contractor shall assist the Consultant during sampling and exploratory trenches or drilling.

The buckets used shall enable the segregation of contaminated material, and a smooth bottom of the excavation to facilitate the collection of control samples.

The Contractor shall provide that the excavation of contaminated soil present in the ditches (sediments) will require the implementation of procedures and particular mitigation measures that he shall describe in detail in his/her working plan.

Remains of the ancient installations are still buried on the studied site. The mandate awarded to the Contractor involves the withdrawal, transportation, and disposal off-site of all found remains. Thus the Contractor shall have the equipment to saw, grind or break the remains (e.g. wood, metal, concrete).

Among the installations present on the site, a former groundwater tank which walls are made of concrete filled with soil, and septic tank which condition, wall material, and exact contents are unknown.

## **8.8 Temporary stockpiling**

### **8.8.1 Requirements**

- All material containing less than 60% of residual material shall be temporarily stockpiled and managed according to the logic diagram of Appendix H.
- The temporary stockpiling of soil shall be carried out so as not to contaminate clean sectors and as not to cause increased water content in stockpiled soil.

### **8.8.2 Execution and follow-up**

The non-contaminated or decontaminated sectors used as temporary stockpiling area for soil or residual material shall be initially characterized and restored to its initial state at the end of the work. The characterization activities prior to the stockpiling work, and at the end of the work, will be carried out by the Contractor at the latter's expense. In the eventuality where the stockpiling activities cause soil contamination, the Contractor shall proceed to the remediation of the site so it is restored to its initial condition, at his own expenses.

To facilitate sampling by the Consultant, the material temporarily stockpiled will be piled up to a volume not exceeding 100 m<sup>3</sup> and which maximal height will be of 1 m. The area surface of the stockpiling area shall consider the estimated quantities of soil and hazardous residual material to piled up, stockpiling specifications, delays caused by samples analyses, and the progression speed of the excavation work.

For temporary soil or residual material stockpiling purposes, the Contractor shall install a woven polyethylene protection membrane (or its equivalent) on all the surface area of the used stockpiling area. A woven polyethylene membrane will also be required at the end of each day of work to cover the temporarily stockpiled piles of material. Adequate ballasts shall be used to maintain all membranes in place.

The Consultant is responsible of the visual assessment of the residual material percentage present in the material temporarily stockpiled.

Once temporarily stockpiled, the material will be sampled by the Consultant. When required, there will be a three business waiting period before obtaining residual material percentage results (mineralogical analysis) following the reception of samples at the laboratory. The piles visually identified as soil, and piles identified as soil following the mineralogical analysis will be subsequently the subject of a chemical analysis by the Consultant. There will be an eleven day waiting period for the analytical results following the reception of the mineralogical analysis results or following the reception of samples at the analytical laboratory. The Contractor will not be able to claim any expenses resulting of the inherent delays associated to the sampling activities.

Once sampled, the Contractor shall cover all the piles and provide material and workforce required for the installation of protective membranes.

The Contractor shall provide workforce and equipment required for soil and other material handling operations in the stockpiling area.

The Contractor shall ensure that the temporary material stockpiling will not result in their dispersion on the site or outside the site. He shall provide that measures such as the use of sealed containers may be necessary for saturated soil or soil with a high content of water.

## **8.9 Transport of material**

### **8.9.1 Requirements**

- Soil and residual material shall have a water content below 50% prior to their transport off-site. If needed, the Contractor shall proceed to the soil or residual material drainage prior to transport;
- Before they are transported off-site, soil and residual material shall be free of free water, as demonstrated by the analytical method Détermination de la présence de liquide libre dans les résidus solides, MA. 110 – L. lib. 1.0, 2014-10-17 (révision 4), CAEAQ. (Identification of the presence of free liquid in solid residues)<sup>5</sup>

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<sup>5</sup> Translator note: Loose translation of the analytical method.

### **8.9.2 Execution and follow-up**

Each of the material loadings transported off-site shall be monitored by the Consultant, namely with transport manifests, signed by the latter and the Contractor, and weigh bills. Any loading, of any type, shall get out of the site without the Consultant signing a transport manifest to the driver.

Soil shall, among other things, be transported into a closed container or a sealed dump body equipped with a tarpaulin entirely covering the top of the body and the loading. The contaminated soil transport procedures laid down in clauses 17 and 18 of the *Transportation of Dangerous Substances Regulations* (Chapter C-24.2, r.43) must be followed by the Contractor.

The Contractor is responsible for retrieving the original transport manifests and weigh bills, and sending them to the Consultant on a daily basis. The bills shall indicate the name of the disposal site, the range of contamination of the material, the weight of the received material, the vehicle license number of the truck, and the date and time of the weighing.

The Contractor shall provide safe transport and transshipment without hindering with traffic on public roads. If it is necessary to install signalization to ensure users and workers safety during transport or transshipment, the Contractor shall meet the most recent version of the *Normes relatives à la signalisation des routes et des voies cyclables* du ministère des Transports du Québec (MTQ), Tome V – Signalisation routière (*Standards related to signalization on roads and bicycle ways*) of the Quebec Ministry of Transports)<sup>6</sup>.

The Contractor shall be solely responsible for the work sequence. The Contractor shall take into consideration the transport restrictions applicable to the spring thaw and winter conditions.

## **8.10 Disposal of contaminated soil and residual material**

### **8.10.1 Requirements**

- The Contractor shall indicate that he has permanently disposed of the contaminated soil and residual material present on the field in sites authorized by competent regulatory authorities, and meeting the Province of Quebec requirements, or, if applicable, according to the other provinces or jurisdictions equivalent regulations.

### **8.10.2 Execution and follow-up**

The nature and environmental quality of the material to dispose of are based on the results of previous characterization studies, visual observations by the Consultant, and tests to determine residual material percentage (mineralogical analysis) following their temporary piling up. In some cases (see logic diagram in Appendix H), samples will be collected on the field by the Consultant and submitted for chemical analyses. The logical diagram in Appendix H details the procedure used to classify the material to manage.

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<sup>6</sup> Translator note: Loose translation of the provincial standard.

The temporary stockpiling period of the material shall vary according to the delays required to obtain the chemical or mineralogical results (see section 8.8).

The main contaminants identified on the site during previous studies are the metals (Cd, Cu, Pb, Zn) as well as dioxins and furans. The material identified as soil will be analysed at least for these parameters.

All excavated soil to be disposed of off-site shall be sent to sites authorized by authorities with jurisdiction on the territory of the disposal site selected by the Contractor.

The Contractor shall be solely responsible for accepting soil and residual material to the selected disposal or recovery site. It should be noted that the level of contamination is not the only criterion for acceptability at a re-use, disposal, or treatment site. In fact, regulatory requirements or specific conditions to certain disposal sites may apply, for example to soil granulometry, hydraulic conductivity, their organic matter content, and type or proportions of debris in soil. In addition to these conditions, the operator of a disposal site may impose constraints related to the planned disposal period of material, the volumes involved or any other consideration to be specified when selecting a disposal site.

## **8.11 Filling and compacting**

### **8.11.1 Requirements**

- The volume deficit to reach the final level shall be completed adding clean soil or geotechnically acceptable borrowed material for which concentrations are below the criteria "A" of the MDDELCC or the CCME's Recommendations for a site with an industrial usage.
- The soil used for filling the excavations shall be compacted in 300-mm layer, densified to a minimum of 90 % of the maximum dry density measured by the modified Proctor test according to the NQ-2501-255 standard. The fill compaction should be performed in a way to ensure the material cohesion, and to minimize any potential compaction.

### **8.11.2 Execution**

The Contractor should favor re-using excavated clean soil and geotechnically acceptable on the field.

The re-use on the site of the soil geotechnically acceptable which level of contamination will be below the CCME Canadian recommendations for an industrial use, but also exceeding the level "B" of the criteria of the MDDELCC's Policy will be decided by PSPC.

The Contractor is responsible for demonstrating the environmental and geotechnical quality of the material from the borrow pits. He/she shall provide a confirmation of compliance to the geotechnical requirements for each type of material. These confirmations will be signed by an engineer specialised in material control.

The Contractor shall take all necessary precautions to ensure that the materials are protected from the rain, frost and snow during their temporary stockpiling, and during the filling work.

If before the end of the work the natural soil or a material layer already compacted undergo subsidence, alteration or a loss of compactness due to the circulation of equipment, bad weather, freezing and thawing, or any other cause, the Contractor will have to carry out the work, including off-site disposal of the affected material to his own expenses, if necessary.

## **8.12 Dismantlement and plugging of the abandoned supply well**

### **8.12.1 Requirements**

- The abandoned supply well shall be dismantled and plugged in compliance with the requirements of the Water Withdrawal and Protection Regulation.

### **8.12.2 Execution and follow-up**

Prior to the end of work, the Contractor shall dismantle and plug the well present along the road from the 10<sup>th</sup> Rang to the working area. The material used for this purpose shall not, in any case, be likely to affect the groundwater quality. In summary, the Contractor shall perform the following activities, but not be limited to:

- Clear the casing of the well to a minimum depth of 1 meter from the ground surface.
- Cut the casing at the base of the excavation.
- Fill the portion of the casing opened to the aquifer with a clean sand.
- Fill the remaining portion of the casing with bentonite or a cement-bentonite mix.
- Install a concrete plate at the top of the casing.
- Fill the excavation putting back in place soil initially excavated.

## **8.13 Restoring and final cleaning of the site**

### **8.13.1 Requirements**

- At the end of the work, the access road used shall include the following features:
  - Have a bearing capacity uniform and sufficient to support a twelve-wheel truck loaded to capacity;
  - Be restored to its initial state, i.e. be profiled so a twelve-wheel type of truck and a farm tractor circulate adequately and safely;
  - Have a lateral and longitudinal profile allowing surface drainage.
- The operational observation wells installed after 2011 that are still present on the site at the beginning of the work are still in place and operational.
- The equipment and material that may have been in contact with equipment and material likely to be contaminated have been decontaminated before they were removed from the site.

- At the end of the work, the site shall be free of any debris, exceeding tool or equipment.
- At the end of the work, the working area shall have a lateral and longitudinal profile allowing surface drainage.
- At the end of the work, the peripheral ditch shall have a lateral and longitudinal profile meeting the specifications indicated in Figure 6 of Appendix A as well as the specifications of Appendix D.
- The final profile of the site shall have a uniform surface, with no holes, bumps allowing water to accumulate.

### **8.13.2 Execution and follow-up**

Consultant shall approve work prior to the Contractor demobilizing all his/her equipment from the site.

The equipment shall be decontaminated at the equipment cleaning areas. Each piece of equipment shall be inspected by the Consultant after it has been decontaminated and before it is removed from the site and/or moved to clean zones. The Consultant reserves the right to require a more extensive decontamination, if deemed necessary. Soil and waste water resulting from the cleaning and decontamination activities accumulated on the equipment cleaning and decontamination areas are collected. Water is transferred toward a water storage and treatment facility which has a sufficient capacity in accordance with the requirements specified in section 8.6.

The Contractor is responsible for maintaining the access road from the 10<sup>th</sup> Rang West to the production area in an optimal state for the execution of the work. To this end, the Contractor shall proceed to the redevelopment of the pavement (enlargement, raising or other) with MG-20 type crushed aggregate meeting the requirements of the NQ 2560-114 standard. The MG-20 type aggregate shall meet the complementary manufacturing inherent characteristics of the standard NQ 2560-114 for the base, surface course, and shoulder material. If necessary, the Contractor shall ensure to respect neighbouring lands boundaries and right-of-way during the road enlargement work. If the Contractor damages a surface located outside the PSPC's property right-of-way during the execution of these work (e.g. neighbouring land, H-Q's right-of-way, municipal streets), he/she shall repair to his/her own expenses.

The Contractor shall implement necessary means and equipment to achieve the abovementioned objectives, including, without being limited to:

- Carry out a test to establish the bearing capacity (Clause 11.10.4 of the *CCDG*, Quebec Ministry of Transports) at the graveled road surface level to detect the presence of unstable zones that may have been generated after truck circulation during work. If such zones are detected, unstable material shall be excavated and replaced with MG-20 type crushed aggregate;
- Perform ground levelling with MG-20 type crushed aggregate in a way to fill up the depressions, and come up with an adequate and safe profiled surface.

The sector of the working area will be levelled. Its geometry and final level will ensure a proper drainage. If necessary, slopes shall be laid out to ensure runoff water proper drainage.

## **8.14 Protection of the environment**

### **8.14.1 Requirements**

- The Contractor shall take all required precautions not to spread contaminants inside or outside the working zone.
- The preparation measures for the site, including deforestation and erosion control measures implemented by the Contractor shall comply with the recommendations of the environmental effects assessment report under the *Canadian Environmental Assessment Act, 2012*, (Enviroservices 2016).
- The Contractor shall provide facilities and implement procedures and working methods enabling to meet and confirm the application of the mitigation and/or compensation measures presented in the environmental effects assessment report. A copy of these measures is reported in the table of Appendix E.
- The Contractor is responsible to apply all the mitigation measures planned in his/her working plan (see section 10.1).
- The Contractor shall install cleaning areas (decontamination) and ensure effective functioning of the equipment cleaning areas (decontamination). The cleaning areas shall enable to remove all contaminated materials from the surface of equipment in order to prevent contamination during transportation operations on- and off-site.
- The Contractor shall confine and properly manage waste water and materials resulting from the cleaning of equipment.
- The Contractor shall present the quality of the water he/she will use as dust control liquid (see section 8.6).
- The Contractor shall ensure to minimise nuisances caused by the remediation work (noise, dust, odours, etc.).
- The Contractor shall prevent the contamination of access roads and minimise the loss of excavated materials on the working areas or the circulation routes during their handling. He/she also shall remove immediately from the access roads any debris or materials that are likely to be contaminated, transport the removed materials and take them to a location approved by PSPC.
- The Contractor shall take all required measures to ensure the ditch is not considered as a fish habitat during work.
- The Contractor shall inspect and maintain in good condition all temporary fish control installations.
- The Contractor shall not perform work when peripheral ditch is considered as a fish habitat.
- The Contractor shall restore the ditch to its initial state (fish habitat).
- The Contractor shall perform work preventing erosion of the ditches banks.

- The Contractor shall proceed to water management (excavations, ditches, runoff, etc.) to ensure the protection of the environment and the protection of the potable water quality.

#### **8.14.2 Execution and follow-up**

When the project will be carried out, the excavation ditches shall be dewatered and kept dry. All ichthyological species shall be withdrawn prior to the beginning of dewatering work. Electro fishing from upstream toward downstream will ensure the success of this stage. Captured individuals shall be released into David River, downstream from the cofferdam. As far as possible, amphibians shall also be moved.

The Consultant mandated by PSPC shall ensure that the Contractor complies with the mitigation measures planned in his/her working plan. The environmental monitoring form taken from the screening report attached to Appendix F will be filled daily jointly by the Contractor's field supervisor and the Consultant.

The Consultant may collect soil samples for chemical analysis purposes on the traffic surfaces of the built and existing access roads, before, during, and after the execution of work. Clean soil that has been contaminated by the Contractor's activities shall be excavated, then disposed of with no extra charge for Canada.

### **8.15 Work monitoring**

#### **8.15.1 Requirements**

- To maintain the quality of work all along the project, the Contractor shall develop and apply an efficient quality control system. The quality control program accompanying the working plan should enable the Consultant to assess the quality of work.
- The Contractor shall give the Consultant access to his/her internal quality control reports. In addition, if he/she considers it necessary, the Consultant may him/herself proceed with sporadic quality controls when he/she has reasons to believe that the quality level is insufficient.

#### **8.15.2 Execution and follow-up**

The Consultant shall have access to the structures. If any part of the work or structure has been performed outside the project site, access to this location shall be ensured for all the duration of the work.

The Consultant reserves the right to conduct punctual checks, inspections and audits related to the quality of work. An environmental follow-up program will be implemented by PSPC during the performance of remediation work. The Consultant mandated by PSPC shall be responsible for its application. The program will include, among other things, the elements listed below:

- The monitoring of all the remediation work
- The sampling and analysis of piled up soil and residual material

- The sampling and analysis of excavation walls and bottoms
- The validation, with or without samples, of the results reported by the Contractor for the discharge follow-up of the water treatment system, when appropriate.
- Any follow-up or collection that is considered relevant by the departmental representative or the Consultant which will temporarily interrupt, if necessary, the excavation work.

Analytical results for excavation bottoms and walls, if necessary, shall enable to verify the environmental quality of the soil in place and to validate the retained remediation objectives. In this context, if the objectives are not achieved, re-excavation work will be required.

The frequency and number of samples collected are established by the Consultant. The Contractor shall provide the coordination required for collecting samples by the Consultant, as well as the analytical results waiting periods.

The Contractor shall consider the follow-up program and the deadlines that he/she may raise in evaluating and performing the work. He/she will not be able to claim any expenses resulting of the inherent delays associated to the environmental follow-up program.

The Consultant shall review the deliverables (see section 10). The latter shall demonstrate that the Contractor meet all the specifications requirements to PSPC's satisfaction. The Contractor shall provide time to revise the deliverables and the associated working methods according to comments provided by the Consultant.

The use of inspections and audits does not relieve the Contractor of his/her performance accountability and his/her responsibility to execute the work in compliance with the requirements of the quality control program and contract documentation

At the end of each day of work, a log shall be produced by the Consultant mandated by PSPC and countersigned by the Contractor representative on the field. The daily logs will be used as a basis for the payments to the Contractor.

## 9.0 HEALTH AND SAFETY

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### 9.1 Requirements

- The Contractor shall perform any tasks or obligations normally assigned to the principal contractor and to the employer under applicable health and safety laws and regulations.
- The Contractor shall take all necessary measures to ensure an efficient communication of the information related to health and safety matters on the field/worksite.
- The Contractor shall present an health and safety plan including the requirements listed in section 10.2.
- The contractor shall provide all the workers on the site with the IPE specified in his/her health/safety plan.

### 9.2 Execution

The Contractor shall consider the already known data. The Contractor shall, among other things, consider the possible presence of ammonia releases, particularly when excavating residual material located under the groundwater level.

The Contractor is responsible for his/her personnel, his/her construction vehicles, and his/her subcontractors involved in the project.

The retained Contractor shall execute the work in compliance with all applicable federal, provincial and municipal laws, regulations, codes, guides, and standards.

Security measures shall be applied, if needed, to protect the population, such as signs, cordons or fences aimed to delineate the sector where work is carried out.

Prior to the beginning of the work, the Contractor shall do the following tasks, namely:

- Provide PSPC and competent authorities with a safe planning of the work (Health and Safety plan specific to the work to be performed) and a mechanical certificate of inspection of the machinery used on the field. This specification will be applicable no matter how many workers are affected to the field.
- Ensure that all workers received required training and information to carry out safe work, and that all required tools and protection equipment are available and in compliance to the standards, laws, and regulations used.
- Meet at all times the dispositions of the *Act respecting occupational health and safety* and the Safety Code for the construction industry.
- Advise his/her workers on their right to refuse any work involving dangers for their health or safety.
- Monitor access to the workplace.

The Contractor shall maintain safe excavation slopes at all times.

In the event of any unforeseen incidents, the Contractor shall take all necessary measures, including the cessation of work, to protect workers and public health and safety, and communicate without delay with the Consultant.

Ultimately, the sanitary facilities provided by the Contractor shall at least include one water point equipped with soap, nail brushes and towels.

Smoking and eating food will be prohibited everywhere on the working place.

## 10.0 DELIVERABLES

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### 10.1 Working plan

#### 10.1.1 Requirements

- The Contractor shall submit a working plan presenting how he/she will meet or consider the objectives and requirements indicated in the present specifications. In his/her working plan, the Contractor shall indicate how he/she will apply the prescriptions of the present specifications to avoid any damage to the environment. The action plan shall be presented to PSPC for approval fourteen (14) days prior to the beginning of the work or according to any other deadline prescribed elsewhere in the present Contract. Deliverables shall be signed by all members of the working team.

#### 10.1.2 Working plan content

The working plan shall include a methodology and up to date schedule. The working plan shall include the treatment, disposal and recovery sites for residual material and contaminated soil, the associated authorizations as well as the excavations and ditches water management methodology to follow. The working plan will include an environmental emergency response plan. Examples of transport manifests shall be inserted in the appendices of the working plan. The work will start only once the PSPC's comments will have been included in the working plan.

More specifically, the presented working plan shall include among other things:

- A plan showing the installations on the field, the Contractor's temporary facilities, and the Contractor's equipment maintenance facilities.
- The procedures to access the site.
- The deforestation measures and measures enabling to limit erosion to a maximum after the deforestation activities.
- Installation of structures to control the flow (cofferdam, overflow, etc.).
- Total or partial dewatering procedures of the ditches, including:
  - Pumping or diversion techniques and mitigation measures specific to these techniques.
  - Erosion control measures.
  - Specific requirements for the restoration of the site.
- A complete management mode for soil and residual material from the site. The methodology to be implemented by the Contractor for the management of contaminated material, and water, contaminated or not, including among other things:
  - The type and number of vehicles used and the material transport frequency.
  - The devices and methods for controlling dust, the devices and methods for controlling spills as well as the devices and methods for controlling the noise.
  - Measures to reduce sludge transport on public roads using vehicles, or runoff water.

- Excavated soil dewatering mechanisms, when appropriate.
- The work procedure to carry out work in drainage ditches.
- The treatment mechanisms used, including all inputs and outputs as well as the illustration of equipment and processes used for treating water or any other acceptable water management mode.
- Measures to restore the site to avoid erosion and sediment transport.
- Measures implemented for petroleum hydrocarbons and fuel supply.
- The description of methods and tests, their frequency, the person in charge, the requirements to meet and to be implemented to ensure good standards of practice for construction work during temporary structures construction (access road, transshipment area, dewatering area, drainage ditches, etc.).
- The description of methods and tests, their frequency, the person in charge, the requirements to meet and to be implemented to ensure the respect of performance requirements for the management of material (excavation, segregation, transport, temporary stockpiling, dewatering, absence of free water, disposal, filling, etc.).
- About the work in wet ditch, the working plan shall include at least the methodology and the mitigation measures for:
  - The access to the site
  - The deforestation
  - The total or partial dewatering of the ditches. The method shall include the following precisions:
    - Pumping or diversion technique(s) which will be used
    - Erosion control measures which will be implemented
    - Restoring method of the site
- Locations selected for the soil and hazardous residual material disposal and confirmations that these sites are authorized to receive these materials to be disposed of.
- Fuelling methods
- Maintenance of used equipment and machinery including the maintenance program of such equipment.
- Work sequence
- Work progress schedule
- A complete description of the Quality Control Program that will be implemented by the Contractor. In this Program, the Contractor shall describe the organisation and functioning of the system and include his/her methods and major control points.

The environmental emergency plan included in the working plan shall describe the means that are provided and that will be available in case of an environmental accident.

The plan shall include:

- The list of situations likely to constitute a danger for the environment
- Preventive measures related to dangerous situations.
- The various interventions and procedures to perform in case of a spill or an accident
- The list of persons, companies, organisms or any other authorities to contact in case of an emergency or spill as well as the description of the roles and responsibilities of each party.

The Contractor's working plan shall stipulate that he/she undertakes to manage permanently excavated soil, and if required, dewatered soil, into sites that are authorized by competent authorities in compliance with the MDDELCC's Policy, RSCTC, RESC and REIMR for the Province of Quebec, or with equivalent regulations of other jurisdictions, when appropriate.

## **10.2 Health and safety Plan**

### **10.2.1 Requirements**

- The Contractor shall present a health and safety plan specific to the activities to be performed. He/she shall also show supporting documents related to the applicable accreditations and proofs of training. The health and safety plan shall be presented to PSPC for approval, fourteen (14) days prior to the beginning of the work or according to any other deadline prescribed elsewhere in the present Contract. Deliverables shall be signed by all the members of the working team.

### **10.2.2 Health and safety Plan Content**

The health and safety plan which will be presented and implemented by the Contractor shall at least include:

- An evaluation of the activities in order to establish which ones involve risks, and the protection measures required to decrease the risks related to health and safety
- A monitoring program of the worker's exposure to lead, zinc, chromium, cadmium, and copper dusts as well as asbestos fibers when conditions are favourable to dust emission
- Specifications on the type of respiratory protection which will be required by the workers according to the conditions on the site
- A preventive maintenance and verification program for the filters of the cab power shovel ventilation system
- A list of the selected preventive measures taken by the Contractor and related to the IPE used on the site.
- The means that will be implemented on the site to ensure access to the emergency vehicles to the field.
- The communication means that will be provided to the power shovel operator and concerned workers to avoid opening the machinery windows and door.

### **10.3 Report on tracking costs and quantities**

#### **10.3.1 Requirements**

- The Contractor shall keep the quantities of handled residual material and soil up-to-date. Upon request, he/she shall be able to provide an updated count of the quantities present on the site and/or off-site. The Contractor shall advise PSPC's representative when 75 % of the budget will be spent, failing such, PSPC shall reserve the right not to pay if budget is exceeded. When the Contractor will have advised PSPC that 75 % of the budget has been reached, he/she will have to make sure that the remaining budget is sufficient to reach the objectives of the mandate.

#### **10.3.2 Content of the report on tracking costs and quantities**

- At the end of work, the Contractor shall compile and submit supporting documentation of the relevant handled quantities to the Consultant mandated by PSPC. Acceptable supporting documentation are the weigh bills for the items priced by weight, and the land, levelling or measurement surveys for the items priced by volume.

## **11.0 TERMS AND CONDITIONS OF THE MANDATE**

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### **11.1 Lighting and power supply**

Since there is no lighting on the site, the Contractor shall provide his/her own lighting and his/her own power supply according to his/her needs. It should be noted that a connection confirmation request has been addressed to Hydro-Québec, and that, following this request, it has been confirmed that a temporary connection was possible on the project site.

The costs incurred for the lighting and power supply shall be apportioned to all unit and lump sum price schedule.

### **11.2 Lump sum work**

The work not included in the schedule of unit rates and prices are subject to a lump sum agreement. The lump sum price will not be modified according to the quantities listed on the schedule, and it is divided in seven (7) cost items.

#### ***11.2.1 Site organization and project monitoring***

This item includes all the elements of the request for proposal for which the payment is not included in another measuring item. Particularly, this item includes the following elements, but is not limited to:

- Mobilization(s) and demobilization(s) of the field and related work
- All elements related to health and safety, including securing the excavation with fences between the end of the excavation work and its filling (snow fences are not allowed)
- Fees and expenses related to the site meeting
- Fees related to the project monitoring and management
- Living expenses of the Contractor's personnel and subcontractors
- The Contractor's communication expenses
- The underground infrastructure location
- The provisions and operation of tools enabling the cutting or clearing of the foundations of the buildings likely to be observed on the working area
- The costs associated to the machinery and personnel required to assist the Consultant in collecting samples from walls and bottoms of the excavation, and during the characterization of piled up soil, or soil in trenches, if applicable
- The material and personnel required to perform land survey
- The fees related to the application of required mitigation measures
- The implementation of environment protection measures
- The fees to obtain the permits and authorizations required to carry out the work
- The final cleaning of the site

### **11.2.2 Deforestation**

This item includes the workforce and all the necessary equipment to perform deforestation, grubbing, chipping, when appropriate, and disposal off-site in an authorized site for wood waste mentioned in section 8.15 of the present document.

### **11.2.3 Deliverables**

This item includes the drafting and revising, according to the Consultant and PSPC's comments, of the deliverables defined in section 10 of the present document, namely the working plan and the health and safety plan. Deliverables may be submitted in electronic format.

### **11.2.4 Water management, treatment and disposal**

This item includes the workforce and all the necessary equipment to manage water present on the site, such as water accumulated into the excavations, water from the ditch and soil dewatering, as well as water used to decontaminate the equipment used as part of the current work including, but without be limited to:

- The pumping
- The storage tanks
- The analyses showing the quality of the discharged water to a frequency deemed reasonable
- The treatment
- The transport
- The disposal of contaminated water to an authorized site in compliance with applicable laws and regulations.
- The cleaning of equipment used for the water management
- The costs to obtain all required permits and authorizations
- A demonstration enabling to establish the quality of the water of the supply well present on the property should the well be used.

### **11.2.5 Fence removal**

This item includes the workforce and all the necessary equipment to perform removal and off-site disposal in a site authorized by the MDDELCC of the fence separating the receiving sector from the production sector. The removal of this fence bases is also payable at the Fence Removal item.

### **11.2.6 Abandoned supply well dismantling and plugging**

This item includes the workforce and all the necessary equipment to perform the dismantlement and plugging of an abandoned supply well according to the directives of the *Water Withdrawal and Protection Regulation*.

### **11.2.7 Restoration and final clean-up of the site**

This item includes the workforce and all the necessary equipment to restore and clean up the site, including, but not limited to, the restoration of the access road and peripheral ditches as well as levelling, earthmoving and any other related activity so the work sectors are restored according to the performance requirements described to the specifications.

## **11.3 Unit price work**

Quantities presented in the schedules were extracted and derived from the existing information, and are presented for proposal purposes. Quantities will be adjusted according to the work effectively carried out following the presentation of evidence. PSPC will only pay for the expenditures effectively incurred. The unit price work is divided in ten (10) cost items.

### **11.3.1 Excavation, segregation, screening, transport and disposal/recovery of non-hazardous residual material (concrete slabs, foundations and others)**

Breaking, shattering, segregation, excavation, transport and disposal/recovery of non-hazardous residual material (concrete slab, foundations and others) will be measured using metric tons units of disposed residual material. The unit price will include, but will not be limited to, all the material, workforce and equipment required for the off-site disposal of residual material, including mobilization, transport and demobilization of equipment in order to achieve the eventual recovery of the material, loading, and off site-transport of the residual material to be disposed of, the necessary expenses to obtain required permits and authorizations, as well as the cost associated to any related activity.

### **11.3.2 Excavation, segregation, screening, temporary storage, transport and disposal/recovery of hazardous residual material**

Excavation, segregation, screening, temporary storage, transport and disposal/recovery off-site of hazardous residual material will be measured using metric tons units of disposed dangerous residual material. The unit price will include, but will not be limited to, all the material, workforce and equipment required for the off-site disposal of hazardous residual material, including mobilization, transport and demobilization of equipment in order to achieve the eventual recovery of the material, excavation, segregation, loading, transport toward the temporary storage site, temporary storage, installation of protective tarps for the piles, re-loading and off site-transport of the hazardous residual material to be disposed of, the necessary expenses to obtain required permits and authorizations, as well as the cost associated to any related activity.

### **11.3.3 Excavation, segregation, screening, temporary storage, transport and disposal/recovery of soil "A-B"**

Excavation, segregation, screening, *temporary storage*, transport and off-site disposal of soil "A-B" will be measured using metric tons units of disposed/recovery of soil "A-B". The unit price will include, but will not be limited to, all the material, workforce and equipment required to dispose off-site soil "A-B", including mobilization, transport and demobilisation of equipment in order to achieve the eventual recovery of the material, excavation, segregation, loading, transport toward the temporary storage site, temporary storage, installation of protective tarps for the piles, re-loading, and transport off-site of the soil "A-B" to be disposed of, the necessary expenses to obtain the required permits and authorizations, as well as the cost associated to any related activity.

### **11.3.4 Excavation, segregation, screening, temporary storage, transport and disposal of soil "B-C"**

Excavation, segregation, screening, temporary storage, transport and off-site disposal of soil "B-C" will be measured using metric tons units of disposed of soil "B-C". The unit price will include, but will not be limited to, all the material, workforce and equipment required to dispose off-site soil "B-C", including mobilization, transport and demobilisation of equipment in order to achieve the eventual recovery of the material, excavation, segregation, loading, transport toward the temporary storage site, temporary storage, installation of protective tarps for the piles, re-loading, and transport off-site of the soil "B-C" to be disposed of, the necessary expenses to obtain required permits and authorizations, as well as the cost associated to any related activity.

### **11.3.5 Excavation, segregation, screening, temporary storage, transport and disposal of soil "C-RESC"**

Excavation, segregation, screening, temporary storage, transport and off-site disposal of soil "C-RESC" will be measured using metric tons units of disposed of soil "C-RESC". The unit price will include, but will not be limited to, all the material, workforce and equipment required to dispose off-site soil "C-RESC", including mobilization, transport and demobilisation of equipment in order to achieve the eventual recovery of the material, excavation, segregation, loading, transport toward the temporary storage site, temporary storage, installation of protective tarps for the piles, re-loading, and transport off-site of the soil "C-RESC" to be disposed of, the necessary expenses to obtain the permits and authorizations required as well as the cost associated to any related activity.

### **11.3.6 Excavation, segregation, screening, temporary storage, transport and disposal of soil "≥ RESC"**

Excavation, segregation, screening, temporary storage, transport and off-site disposal of soil "≥ RESC" will be measured using metric tons units of disposed of soil "≥ RESC". The unit price will include, but will not be limited to, all the material, workforce and equipment required to disposed off-site soil "≥ RESC", including mobilization, transport and demobilisation of equipment in order to achieve the eventual recovery of the material, excavation, segregation, loading, transport toward the temporary storage site, temporary storage, installation of protective tarps for the piles, re-loading, and transport off-site of the soil "≥ RESC" to be disposed of, the necessary expenses to obtain required permits and authorizations, as well as the cost associated to any related activity.

**11.3.7 Excavation, segregation, screening, temporary storage, transport and disposal of soil “≥ RESC dioxins and furans”**

Excavation, segregation, screening, temporary storage, transport and off-site disposal of soil “≥ RESC dioxins and furans” will be measured using metric tons units of disposed of soil “≥ RESC dioxins and furans”. The unit price will include, but will not be limited to, all the material, workforce and equipment required to dispose off-site soil “≥ RESC dioxins and furans”, including mobilization, transport and demobilisation of equipment in order to achieve the eventual recovery of the material, excavation, segregation, loading, transport toward the temporary storage site, temporary storage, installation of protective tarps for the piles, re-loading, and transport off-site of the soil “≥ RESC dioxins and furans” to be disposed of, the necessary expenses to obtain required permits and authorizations, as well as the cost associated to any related activity.

**11.3.8 Excavation, segregation, screening, temporary storage, transport and disposal of soil “≥ RESC mixt”**

Excavation, segregation, screening, temporary storage, transport and off-site disposal of soil “≥ RESC mixt” will be measured using metric tons units of disposed of soil “≥ RESC mixt”. The unit price will include, but will not be limited to, all the material, workforce and equipment required to disposed off-site soil “≥ RESC mixt”, including mobilization, transport and demobilisation of equipment in order to achieve the eventual recovery of the material excavation, segregation, loading, transport toward the temporary storage site, temporary storage, installation of protective tarps for the piles, re-loading, and transport off-site of the soil “≥ RESC mixt” to be disposed of, the necessary expenses to obtain required permits and authorizations, as well as the cost associated to any related activity.

**11.3.9 Excavation, temporary storage and filling with excavated material from the site**

Excavation, temporary storage and filling with excavated material from the site will be measured using cubic meters units of re-used material temporarily stockpiled. The unit price will include, but will not be limited to, all the material, workforce and equipment required for the excavation of these material, their transport, the temporary storage, the installation of protective tarps for the piles, the re-loading, the loading from the temporary storage site, the unloading, installation and compacting by 30-centimeter layer as well as the cost associated to any other related activity.

**11.3.10 Filling with clean borrow material**

This item will be measured using metric tons units confirmed by a weigh bill of the imported loadings of borrow material required to finalize the filling of the excavations. The unit price will include, but will not be limited to, the provisions of clean borrow material, all the material, workforce and equipment required for their transport, unloading, installation and compacting by 30-centimeter layer as well as the cost associated to any other related activity.

## 12.0 PROVIDED DOCUMENTS

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One copy of the following documents will be provided to the Contractor:

- Biogénie, February 2010. *Évaluation environnementale de site Phase II complémentaire, Ancienne fonderie située au 348 10e Rang, Saint-Edmond-de-Grantham, Québec, Reference ZY9478-001-610, Final Report, 146 p.*
- SNC Lavalin Environnement, February 2012. *Évaluation environnementale de site – Phase I, Ancienne Fonderie Saint-Germain, 1348, 10<sup>e</sup> rang, Saint-Edmond-de-Grantham, Dossier 608578, Rapport final, 230 p.*
- Franz Environnement inc., September 2012. *Caractérisation environnementale de l'eau souterraine et de l'eau de surface, Ancienne Fonderie St-Germain, 1348, 10e Rang, Saint-Edmond-de-Grantham, Québec, Project No. 2288-1101, Final Report 235 p.*
- LVM inc., March 2013a, *Caractérisation environnementale de site phase II, Ancienne fonderie Saint-Germain, 1348, 10e Rang, Saint-Edmond-de-Grantham, Final Report, Ref.: 045-P-0001686-0-01-230-HG-R-0200-00.*
- LVM inc., March 2013b, *Options de réhabilitation et/ou de gestion des sols et des matières résiduelles, Ancienne fonderie St-Germain, 1348, 10e Rang, Saint-Edmond-de-Grantham, Final Report, Ref.: 045-P-0001686-0-01-230-RE-R-0100-00.*
- LVM, March 2014, *Suivi 2013 de la qualité environnementale de l'eau souterraine et de surface, Ancienne Fonderie St-Germain, 1348 du 10e Rang, Saint-Edmond-de-Grantham, Project 045-P- 0001686-0-01-250-HG-R-0100-00, Final Report, 367 p.*
- LVM inc., May 2015, *Essai-pilote – Traitement des matières résiduelles dangereuses et des sols, Ancienne fonderie St-Germain, 1348, 10e Rang, Saint-Edmond-de-Grantham, Final Report, Ref.: 045-P-0001686-0-01-232-RE-R-0100-01, 178 p.*
- LVM, July 2015, *Suivi 2014 de la qualité environnementale de l'eau souterraine et de surface, Ancienne Fonderie St-Germain, 1348 du 10e Rang, Saint-Edmond-de-Grantham, Project 045-P- 0001686-0-01-255-HG-R-0100-00, Final Report, 314 p.*
- Technorem, May 2016a, *Essai préliminaire de réhabilitation environnementale de l'ancienne fonderie St-Germain à Saint-Edmond-de-Grantham, Québec – Final Report, PR15-63, 521p.*
- Technorem, May 2016b, *Options de réhabilitation et/ou de valorisation des matières résiduelles - Ancienne fonderie St-Germain à Saint-Edmond-de-Grantham, Québec, Final Report, 28p.*
- WSP, March 2016, *Évaluation des risques d'exposition aux poussières pouvant contenir du plomb et/ou de l'amiante lors de la réalisation de certaines tâches, Ancienne fonderie Saint-Germain, 151-00080-22.*
- EnviroServices inc., June 2016a. *Évaluation des effets environnementaux en vertu de la Loi canadienne sur l'évaluation environnementale 2012. Projet de réhabilitation de la Fonderie Saint-Germain à St-Edmond-de-Grantham. 398-061.*
- EnviroServices inc., June 2016b. *Validation de l'habitat du poisson, Fonderie Saint-Germain – 1348,10e Rang à Saint-Edmond-de-Grantham, Dossier : 398-061, 30 p.*
- CNRC, May 2016. *Revalorisation des résidus de l'ancienne fonderie St-Germain, située à Saint-Edmond-de-Grantham (Québec) Rapport technique, 67 pages.*

- HDS, May 2012, Inventaire des matières dangereuses résiduelles, Fonderie St-Germain, 1348, 10ème rang, Saint-Edmond-de-Grantham (Québec), HDS-7281-1, 64 p.
- HDS, August 2012, Addenda - Inventaire des matières dangereuses résiduelles, Fonderie St-Germain, 1348, 10ème rang, St-Edmond-de-Grantham (Québec), HDS-7281-1, 2p.
- HDS, January 2013, SURVEILLANCE DES TRAVAUX DEDÉMOLITION, Fonderie St-Germain, 1348, 10ème rang, St-Edmond-de-Grantham (Québec), HDS-7281-8, 152 p.

### **13.0 CONFIDENTIALITY OF THE INFORMATION**

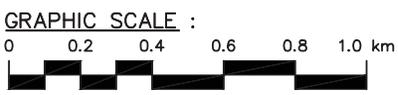
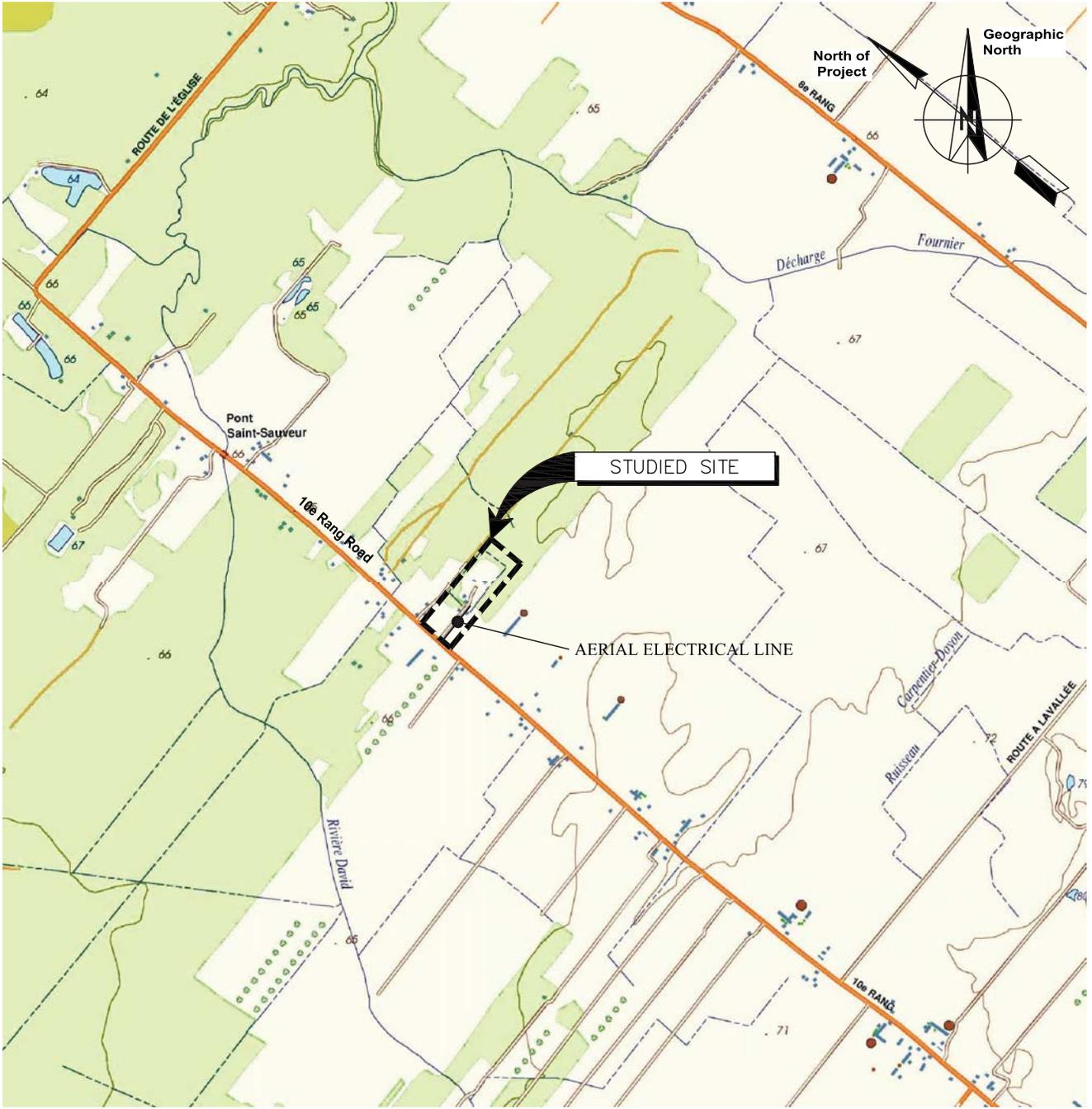
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Any information received and documents produced as part of the present mandate remain the sole property of PSPC. The Contractor shall not communicate, replicate or refer to the consulted or produced documents within this mandate without the prior written consent by PSPC. This measure applies to any form of documents, including electronic formats. PSPC reserves the right to use freely the documents produced by the Contractor.

## **APPENDIX A**

### **FIGURES**

10 cm  
5  
4  
3  
2  
1  
0



**SOURCE :**  
 - MRN TOPOGRAPHIC MAP, 31H15-0102,  
 SAINT-GERMAIN-DE-GRANTHAM.

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Filename: G:\0451P-0001686\_Fonderie Saint-Germain\25\_CAD\OTP\_0-01-241-01\Version anglaise\045-P-0001686-0-01-241-01-RE-0101-00.dwg

Client	<b>PUBLIC SERVICES AND PROCUREMENT CANADA</b>
Project	<b>REMEDIATION OF THE ST-GERMAIN FOUNDRY - QUEBEC REGION 2015-2016</b>  1348 10th RANG, SAINT-EDMOND-DE-GRANTHAM (QC)
Title	<b>FIGURE 1 GENERAL LOCATION OF THE SITE</b>

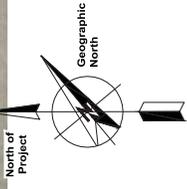
		<b>Englobe Corp.</b> 1080, Beaver Hall Hill, suite 200 Montréal (Québec) H2Z 1S8 Phone : 514.281.5151 Fax : 514.657.8120	
Prepared <b>S. Cloutier, P. Eng.</b>	Discipline <b>ENVIRONMENT</b>	Project Manager <b>D. Larose-Charette, P. Eng.</b>	
Drawn <b>F. Boudreau</b>	Scale <b>1 : 20,000</b>	Révision date :	
Checked <b>D. Larose-Charette, P. Eng.</b>	Date <b>2016-07-19</b>		
Serv. char. <b>045</b>	Project <b>P-0001686</b>	Wbs <b>0 01 240</b>	Disc. Type <b>RE D</b>
		Drawing No. <b>0101</b>	Rev. <b>00</b>

10 cm



LEGEND:

- 1 FALLOW SECTOR
- 2 WORKING AREA OF THE FORMER FOUNDRY (RECEIVING AREA)
- 3 WORKING AREA OF THE FORMER FOUNDRY (PRODUCTION AREA)
- 4 WOODED SECTOR
- ==== DITCH



<b>CLIENT</b> PUBLIC SERVICES AND PROCUREMENT CANADA	
<b>PROJECT</b> REMEDIATION OF THE ST-GERMAIN FOUNDRY - QUEBEC REGION 2015-2016 <small>1348 10th RANG, SAINT-EDMOND-DE-GRANTHAM (QC)</small>	
<b>TITLE</b> FIGURE 2 ILLUSTRATION OF THE VARIOUS SECTORS OF THE SITE	

<b>Project Manager</b> D. Larocque-Charette, P. Eng.	
<b>Discipline</b> ENVIRONMENT	<b>Scale</b> 1 : 1,500
<b>Drawn</b> F. Boudreau	<b>Date</b> 2016-07-19
<b>Checked</b> D. Larocque-Charette, P. Eng.	<b>Sequence No.</b> of

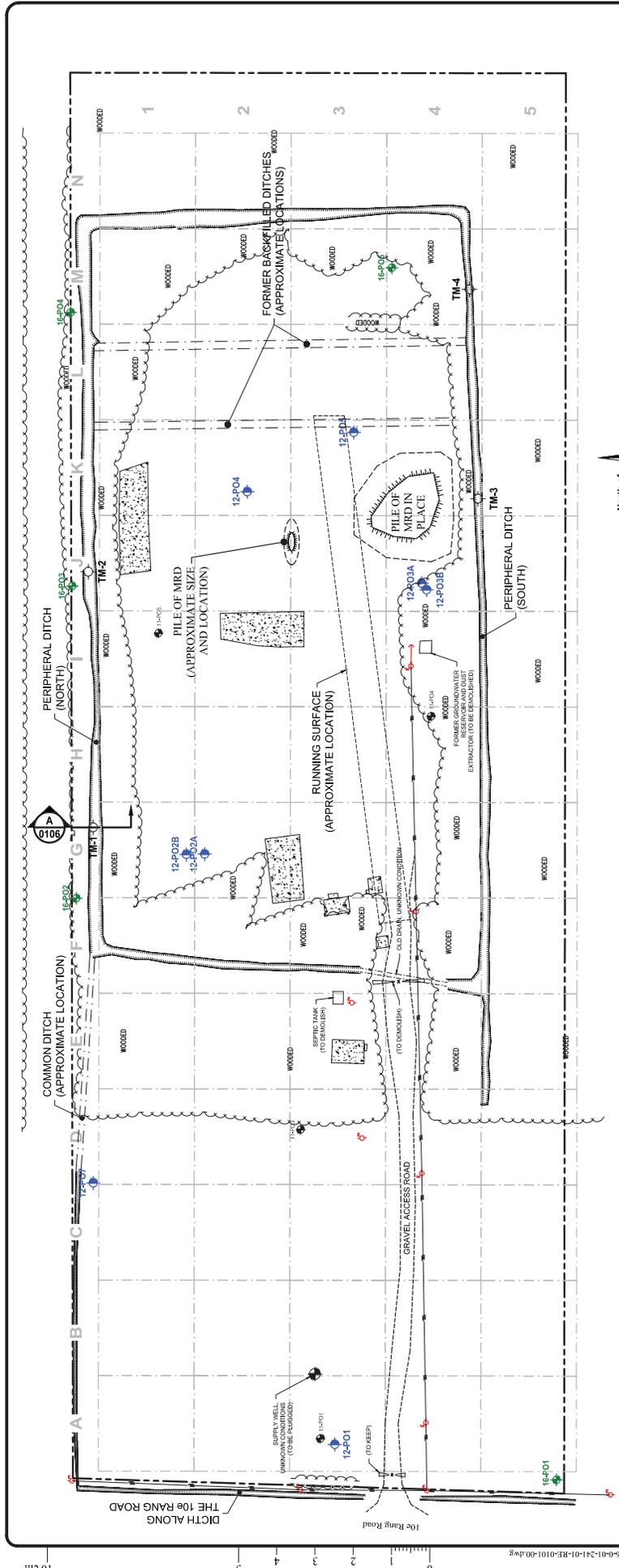
<b>Project</b> 045 P-0001688	<b>Wks.</b> 001	<b>Disc.</b> 241	<b>Type</b> RE	<b>Drawing No.</b> ID 0102	<b>Rev.</b> 00
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Englobe Corp.  
 1080, Beaver Hill Hill, suite 200  
 Montreal (Quebec) H3Z 1S8  
 Tel : 514 657 8120 Fax : 514 657 8120



References : SNC-LAVALIN ENVIRONNEMENT, NUMÉRO: 608578-000-0350, DATE: 2011-11-01.

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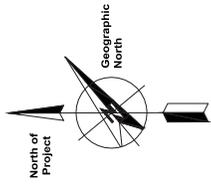
Client: PUBLIC SERVICES AND PROCUREMENT CANADA  
 Project: REMEDIATION OF THE ST-GERMAIN FOUNDRY - QUEBEC REGION 2015-2016  
 1348 106 RANG, SAINT-EDMOND-DE-GRANTHAM (QC)  
 Title: FIGURE 3 CURRENT SITE CONDITIONS

**Englobe Corp.**  
 1060, Beaver Hill Hill, suite 200  
 Montreal (Quebec) H2Z 1S8  
 Tel: 514 653 8120 Fax: 514 653 8120

Project Manager: D. Larocque  
 Discipline: ENVIRONMENT  
 Scale: 1:1000  
 Date: 2016-07-19

Prepared by: S. Chénier, P. Eng.  
 Drawn by: F. Boudreau  
 Checked by: A. Larocque, P. Eng.

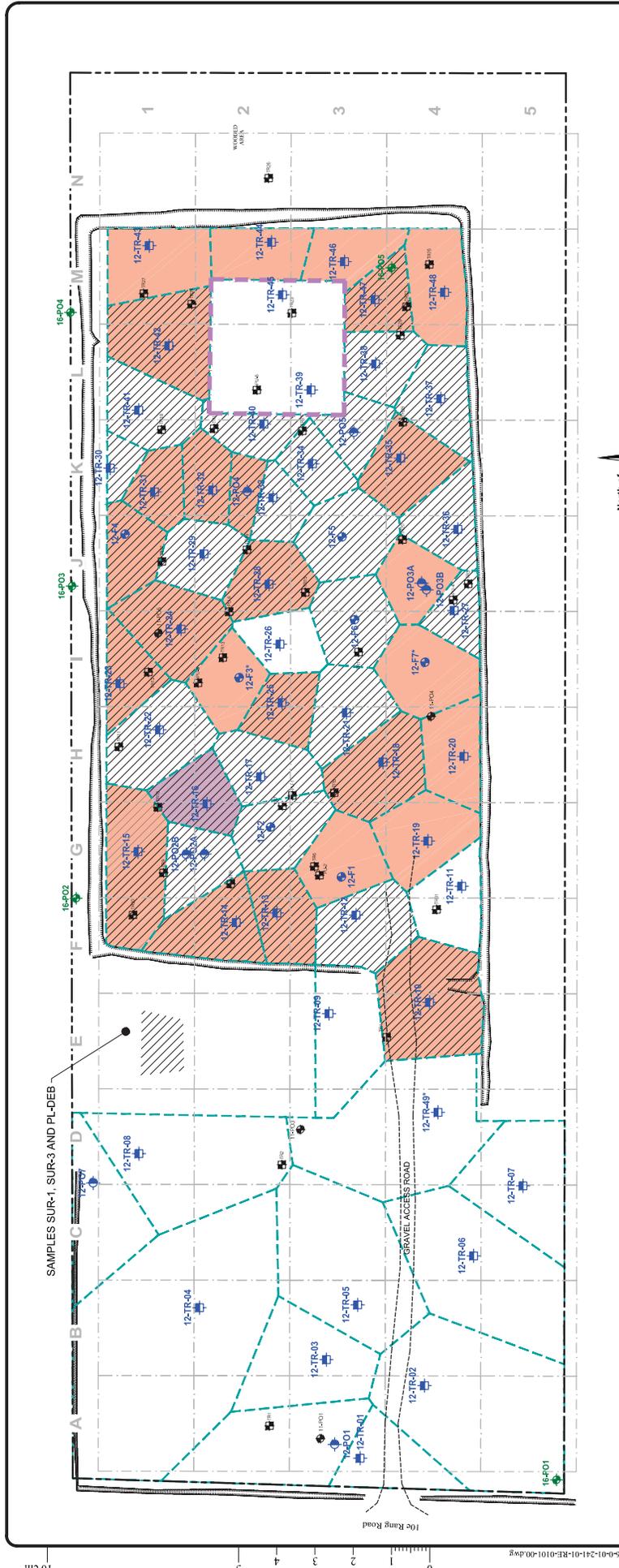
Project No.: 045 P-0001686  
 Drawing No.: 0103  
 Rev.: 00



References: SNC-LAVALLIN ENVIRONNEMENT, NUMÉRO: 608578-000-0350, DATE: 2011-11-01.

- LEGEND:
- CONCRETE SLAB PRESENT ON THE SURFACE SITE (TO BE DEMOLISHED)
  - PROPERTY LINE
  - DITCH
  - GATE - FENCE
  - EXISTING UTILITY POLE
  - AERIAL ELECTRICAL LINE
  - WOOD LINE
  - GRID
  - OBSERVATION WELL (ENGLOBE, 2016)
  - METAL ROD (APPROXIMATE LOCATION) (LVM, 2012)
  - OBSERVATION WELL (LVM, 2012)
  - OBSERVATION WELL (FRANZ ENV., 2011)

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**Client**  
PUBLIC SERVICES AND  
PROCUREMENT CANADA

**Project**  
REMEDIATION OF THE ST-GERMAIN  
FOUNDRY - QUEBEC REGION 2015-2016  
1348 10th RANG, SAINT-EDMOND-DE-GRANTHAM (QC)

**Title**  
FIGURE 4  
LOCATION OF SURVEYS AND CONTAMINATED AREAS  
ON THE GRID

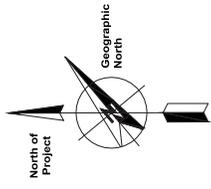
**Englobe Corp.**  
1080, Beaver Hill Hill, suite 200  
Montréal (Québec) H2Z 1S8  
Tél. : 514 653 8120  
Fax : 514 653 8120

**Project Manager**  
D. Larose-Chénier, P. Eng.

**Discipline** ENVIRONMENT  
**Scale** 1:1000  
**Date** 2016-07-19  
**Sequence No.** of

**Prepared by** S. Chénier, P. Eng.  
**Drawn by** F. Boudreau  
**Checked by** A. Larose-Chénier, P. Eng.

**Project** 045 P-0001686  
**Wks.** 0  
**Disc.** Type  
**Drawn No.** 0104  
**Rev.** 00



- SOILS > COME (PCH PWS (1): INDUSTRIAL USAGE)
- SOILS > COME (OTHER THAN PCH PWS (1): INDUSTRIAL USAGE)
- SOILS < COME (INDUSTRIAL USAGE)
- PRESENCE OF RESIDUAL HAZARDOUS MATERIAL
- GRID
- TESTING AREA (TECHNOREM INC., MARCH 2016)

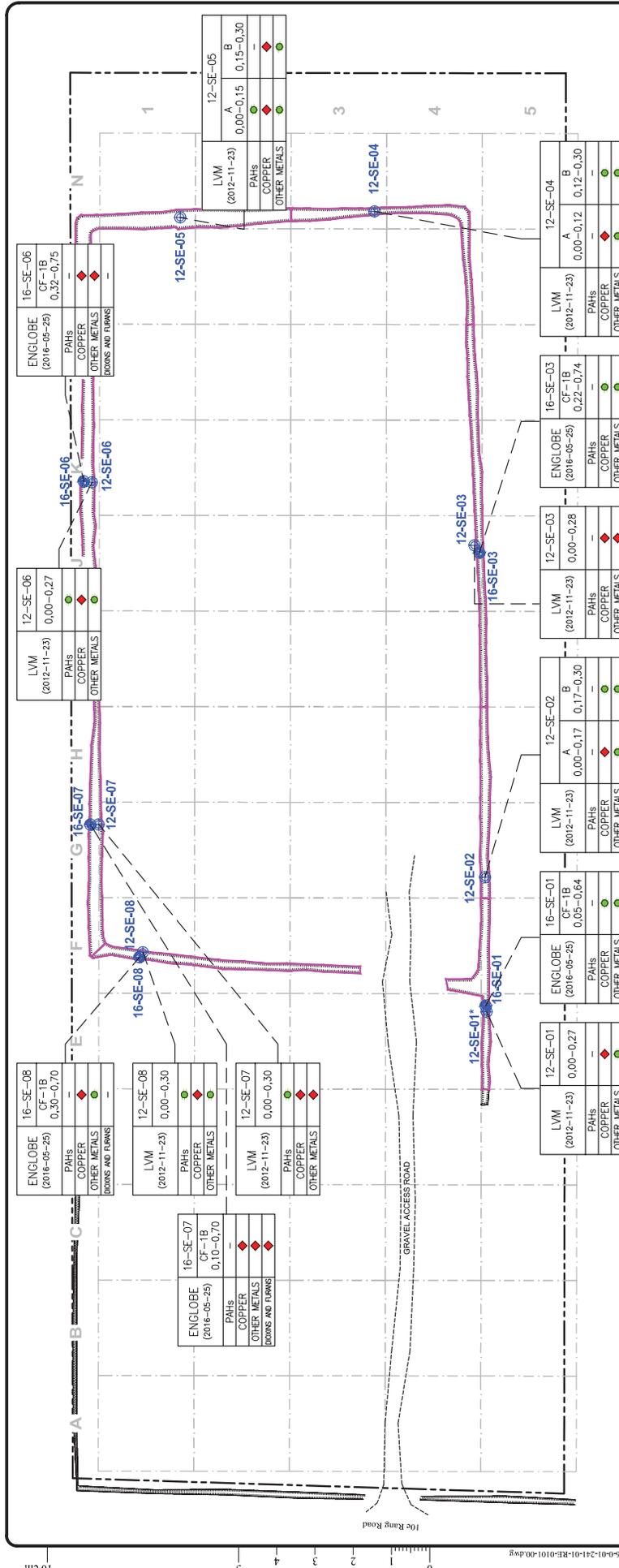
- LEGEND:**
- OBSERVATION WELL (ENGBLOBE 2016)
  - TEST PIT (LVM, 2012)
  - OBSERVATION WELL (LVM, 2012)
  - DRILLING (LVM, 2012)
  - APPROXIMATE LOCATION
  - OBSERVATION WELL (FRANZ ENV., 2011)
  - WELL (BIOGÉNIE, 2009)
  - WELL (MDELCC, 1993)
  - PROPERTY LINE
  - DITCH

**NOTE:**  
1. PCH CWS: CANADA-WIDE STANDARD FOR PETROLEUM HYDROCARBONS.



**References**  
SNC-LAVALIN ENVIRONNEMENT,  
NUMÉRO: 608578-000-0350, DATE: 2011-11-01.

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PUBLIC SERVICES AND  
PROCUREMENT CANADA

**Project**  
REMEDIATION OF THE ST-GERMAIN  
FOUNDRY - QUEBEC REGION 2015-2016

**Title**  
1348 10th RANG, SAINT-EDMOND-DE-GRANTHAM (QC)

**FIGURE 5  
SEDIMENTS QUALITY  
(FEDERAL RECOMMENDATIONS)**

**Englobe Corp.**  
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Tél. : 514 653 8120

**Project Manager**  
D. Larocque-Charette, P. Eng.

**Discipline** ENVIRONMENT  
**Scale** 1 : 1,000  
**Date** 2016-07-19

**Project** 045 P-0001686 [0]1241  
**Disc.** Type  
**RE ID** 0105 00

**LEGEND:**

- SEDIMENT COLLECTING POINT (ENGLOBE, 2016)
- ⊕ SEDIMENT COLLECTING POINT (LVM, 2012)
- \* APPROXIMATE LOCATION
- PROPERTY LINE
- ▬ DITCH
- ▭ AREA OF INFLUENCE — DITCH

**SEDIMENT SAMPLE**

INTERVAL OF DEPTH (m)  
EXECUTED BY: COMPANY  
(DATE)

ANALYSED PARAMETERS  
PAHs  
COPPER  
OTHER METALS  
DIOXINS AND FURANS

FEDERAL RECOMMENDATIONS (CCME):

- NOT ANALYZED
- < COME (INDUSTRIAL USAGE)
- ◆ > COME (INDUSTRIAL USAGE)

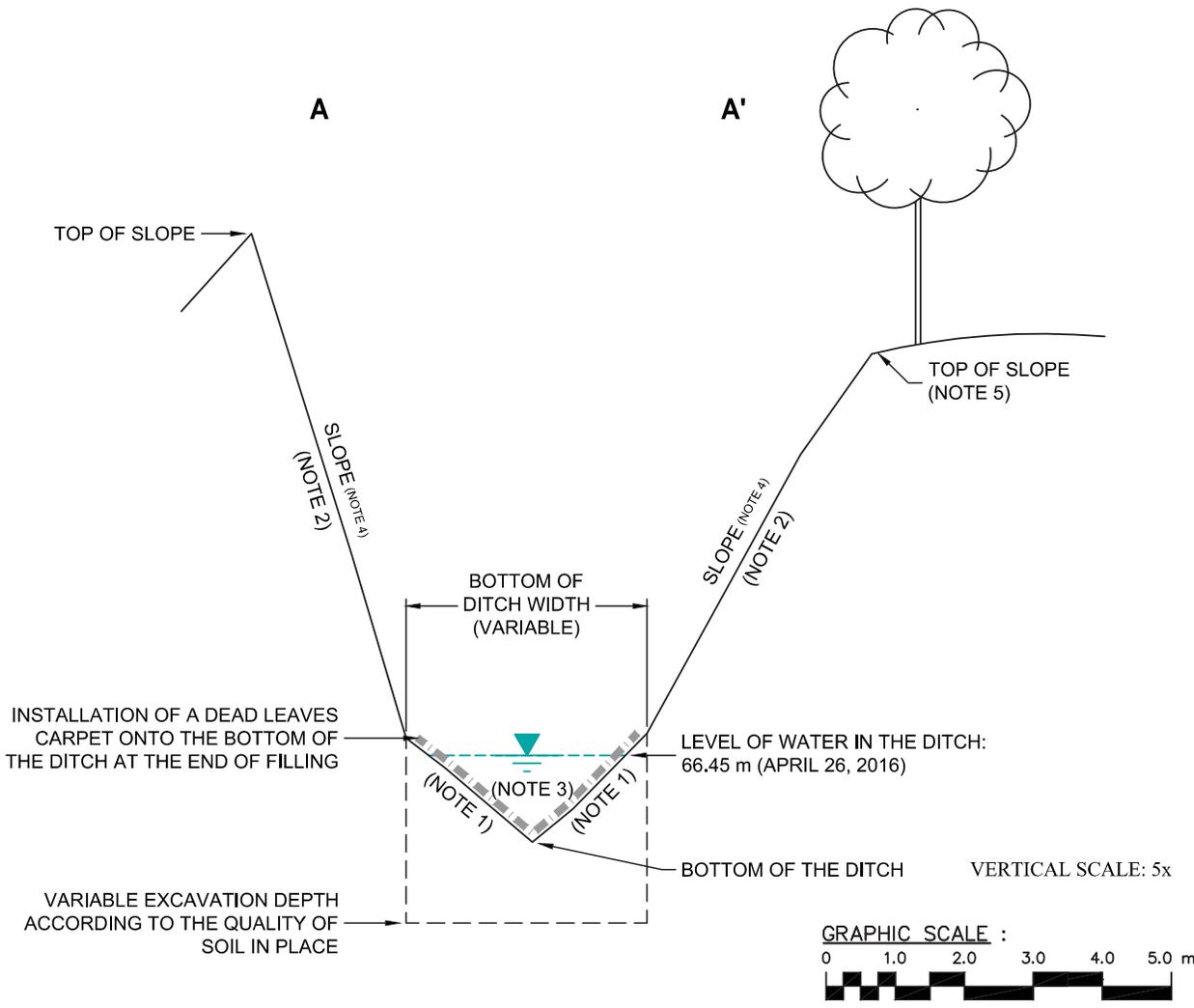
Sample ID	Company	Interval (m)	PAHs	Copper	Other Metals	Dioxins and Furans
16-SE-06	ENGLOBE (2016-05-25)	CF-1B 0,32-0,75	◆	◆	◆	◆
12-SE-06	LVM (2012-11-23)	0,00-0,27	◆	◆	◆	◆
16-SE-07	ENGLOBE (2016-05-25)	CF-1B 0,10-0,70	◆	◆	◆	◆
12-SE-07	LVM (2012-11-23)	0,00-0,30	◆	◆	◆	◆
16-SE-08	ENGLOBE (2016-05-25)	CF-1B 0,30-0,70	◆	◆	◆	◆
12-SE-08	LVM (2012-11-23)	0,00-0,30	◆	◆	◆	◆
16-SE-01*	ENGLOBE (2016-05-25)	CF-1B 0,05-0,64	◆	◆	◆	◆
12-SE-01	LVM (2012-11-23)	0,00-0,27	◆	◆	◆	◆
16-SE-02	ENGLOBE (2016-05-25)	CF-1B 0,05-0,64	◆	◆	◆	◆
12-SE-02	LVM (2012-11-23)	0,00-0,27	◆	◆	◆	◆
16-SE-03	ENGLOBE (2016-05-25)	CF-1B 0,22-0,74	◆	◆	◆	◆
12-SE-03	LVM (2012-11-23)	0,00-0,28	◆	◆	◆	◆
16-SE-04	ENGLOBE (2016-05-25)	CF-1B 0,00-0,12	◆	◆	◆	◆
12-SE-04	LVM (2012-11-23)	0,00-0,12	◆	◆	◆	◆
16-SE-05	ENGLOBE (2016-05-25)	CF-1B 0,00-0,15	◆	◆	◆	◆
12-SE-05	LVM (2012-11-23)	0,00-0,15	◆	◆	◆	◆



**References**  
SNC-LAVALIN ENVIRONNEMENT,  
NUMÉRO: 608578-000-0350, DATE: 2011-11-01.

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10 cm  
5  
4  
3  
2  
1  
0



**NOTES:**

1. THE GEOMETRY (LEVEL AND WIDTH) OF THE BOTTOM OF THE DITCH MUST BE RETURNED TO ITS ORIGINAL STAGE, FILLING WITH THE SAME TYPE OF SOIL AND GRANULOMETRY THAN THE ORIGINAL SOIL.
2. THE BANKS OF THE DITCH MUST BE RETURNED TO THEIR ORIGINAL STAGE WITH A SLIGHT SLOPE SIMILAR TO THE ONE THAT WAS PRESENT PRIOR TO THE WORK.
3. THE PERIPHERAL DITCH WATER MUST FLOW TOWARD THE COMMON DITCH AND THE BOTTOM OF THE DITCH MUST INCLUDE A SLIGHT SLOPE SIMILAR TO THE ONE THAT WAS OBSERVED PRIOR TO THE WORK.
4. THE CONTRACTOR MUST TAKE ALL MEASURES REQUIRED OR SPECIFIED TO ENSURE THE STABILITY OF THE DITCH ONCE THE WORK IS COMPLETED. THE SHORES MUST BE RESTORED USING RECOGNIZED SOIL-STABILIZATION TECHNIQUES BY VEGETATION, WHICH TAKE INTO ACCOUNT STABILITY, SENSIBILITY TO EROSION, SLOPE'S GRADE AND HEIGHT.
5. AT THE SLOPE'S TOP (NORTH SIDE OF THE PRODUCTION AREA), NATIVE TREES (WITH THE EXCEPTION OF ASH), WITH A DIAMETER OF AT LEAST 5 cm AT A HEIGHT OF 1.4 m ABOVE THE GROUND SHOULD BE PLANTED 5 METERS APART. A STAKE AND ANTI-RODENT PROTECTION MUST BE PLACED ON EACH TREE.

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Client	<b>PUBLIC SERVICES AND PROCUREMENT CANADA</b>
Project	<b>REMEDIATION OF THE ST-GERMAIN FOUNDRY - QUEBEC REGION 2015-2016</b>  1348 10th RANG, SAINT-EDMOND-DE-GRANTHAM (QC)
Title	<b>FIGURE 6 CROSS-SECTION - PERIPHERAL DITCH RESTAURATION</b>

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Prepared <b>S. Cloutier, P. Eng.</b>	Discipline <b>ENVIRONMENT</b>	Project Manager <b>D. Larose-Charette, P. Eng.</b>	
Drawn <b>F. Boudreau</b>	Scale <b>1 : 100</b>	Révision date :	
Checked <b>D. Larose-Charette, P. Eng.</b>	Date <b>2016-07-19</b>		
Serv. char. <b>045</b>	Project <b>P-0001686</b>	Wbs <b>0 01 241</b>	Disc. Type <b>RE D</b>
		Drawing No. <b>0106</b>	Rev. <b>00</b>

Filename: C:\045\IP-0001686\_Fonderie Saint-Germain\25\_CAD\OTF\_9-01-241-01\Version anglaise\045-IP-0001686-0-01-241-01-RE-0106-00.dwg

## **APPENDIX B**

### **SUMMARY OF PREVIOUS STUDIES**

**SNC Lavalin Environnement, February 2012 (File 608578)**



## **EXECUTIVE SUMMARY**

At the request of the Environmental Services Directorate of Public Works and Government Services Canada – Quebec Region (PWGSC), SNC-LAVALIN INC., Environment Division (SLE), has been commissioned to perform an environmental site assessment.

The site in question covers an area of approximately 133,601 m<sup>2</sup> and is located at 1348 10e Rang, Saint-Edmond-de-Grantham, Quebec. It contains a collection of buildings and equipment associated with the former Saint-Germain foundry. The foundry is no longer in operation.

The site is located in a primarily agricultural and residential area. The property is bounded to the south by 10e Rang. There are residences on the properties southeast, south, southwest and west of the site.

According to the available information, the site was used for agriculture until the late 1960s. Industrial operations began at the site in 1974. At the time, the main activity was the recovery of metals. In the early years, the company purchased scrap metal items, such as electrical wire, car parts and batteries, to recover the copper, lead, aluminum and white metal they contained.

In response to complaints from neighbours about fumes and odours coming from the site, government officials required the property owner to obtain a certificate of authorization and to stop burning electrical wire outdoors. The company Fonderie Saint-Germain Inc. obtained a certificate of authorization in January 1980.

Between 1980 and 1982, environmental protection inspectors observed on multiple occasions that the company was not complying with the conditions of the certificate of authorization and was still lighting open fires. As a result, the company was sent a formal notice on August 5, 1981.

Richard Fortin and Lucie Bégin Fortin reportedly acquired the business of «Fonderie Saint-Germain», as well as the site under study, in August 1992. From 1998 to 2006, «Fonderie Saint-Germain» was served with four notices of violation, primarily concerning the accumulation of hazardous waste (slag) and the fact that the air emission treatment system was not operational. «Fonderie Saint-Germain» went bankrupt and was dissolved on February 9, 2006.

In light of the site's history, the following activities are believed to have potentially affected the quality of the soil, groundwater and surface water:

1. Operation of a foundry (smelting of aluminum and white metal)
2. Burial of slag from foundry operations and use of such slag as a fill material
3. Piling of waste materials, hazardous waste and demolition waste

4. Handling, storage and disassembly of batteries to recover lead
5. Open fires (copper wire, tires, used oil)
6. Handling, storage and use of used oil
7. Handling, storage and use of petroleum products
8. Storage of wastewater and sludge
9. Handling, storage and use of chemicals
10. Presence of buildings and equipment containing undocumented construction materials and components
11. Air emissions from a furnace and an incinerator without gas treatment

On the basis of the information obtained in the Phase I environmental assessment, a number of environmental issues that could affect the quality of the soil and groundwater were identified. Consequently, characterization work (Phase II) is required in order to

12. complete the characterization of the soil and slag to better determine the extent of the contamination and the volume of material affected;
13. complete the characterization of the groundwater in the areas where significant environmental issues have been identified and at the downgradient boundary of the property;
14. complete the characterization of the surface water in the ditch encircling the working area; and
15. characterize and calculate the volume of the materials from which the buildings and the remains of the old equipment (furnaces) are built.

If remediation is warranted at this site, prepare a soil and slag management program including : mitigation measures to be applied to limit groundwater and surface water contamination, recommended demolition methods for the buildings, and procedures for demolition waste and old equipment disposal.

**HDS, May 2012 (Ref.: HDS-7281-1)**





## **EXECUTIVE SUMMARY**

Following a request from Public Works and Government Services Canada (PWGSC), an inventory of hazardous materials was performed by Hudon Desbiens St-Germain Environnement inc (HDS Environnement) on the site of the former St-Germain Foundry located on 1348, 10<sup>ème</sup> rang, in Saint-Edmond-de-Grantham (Québec). To complete this inventory, two (2) site visits were performed in order to identify potential hazardous materials to be sampled and to inventory the other hazardous materials present.

A total of twenty-four (24) potential asbestos-containing material (PACM) samples were collected and analyzed for asbestos fibers. Moreover, six (6) residual materials samples were collected and analyzed according to the provincial *Regulation respecting hazardous Materials*.

The characterization results confirmed the presence of asbestos-containing materials (ACMs) in two (2) of the analyzed samples. Chrysotile asbestos fibers were observed in these two (2) samples at concentrations from 1-5% (roughcast on walls and ceiling in the scale building) to > 90% (absorbing material in the workers building).

Leaching tests according to the *Regulation respecting hazardous Materials* revealed the presence of residual hazardous materials (RHMs) in the three (3) former furnaces abandoned on site. These materials consist of ashes and/or slag. Considering all firebricks and other coatings inside the furnaces and other spare parts from the furnaces (connectors, pieces of piping), about 66 metric tons (m.t.) of RHMs are present on the site.

Other hazardous materials were identified during this inventory:

- ❑ halocarbons in two (2) small cooling units;
- ❑ mercury in one (1) thermostat, one (1) lamp (potentially) and one (1) ballast, and potentially PCBs in one (1) other ballast;
- ❑ other RHMs such as paints, solvents, waste oils, petroleum products or unidentified materials.

The main recommended measures for managing and handling these RHMs, including recommendations for health and safety at work are presented in this report. The handling of these RHMs should cost about 89 100 \$.

**Franz Environment inc., September 2012 (Project No. 2288-1101)**



## EXECUTIVE SUMMARY

Franz Environnement Inc. (FRANZ) was mandated by Public Works and Government Services Canada (PWGSC) in October 2011 to perform a groundwater and surface water Phase II environmental site assessment (ESA) of the former St-Germain foundry site located at 1348, 10<sup>th</sup> Rang in Saint-Edmond-de-Grantham, Quebec.

The Phase II ESA was performed in order to verify both the groundwater and surface water quality at the limits of the former foundry activities. The contaminants of concern included heavy metals, cyanide, fluorides and phenolic compounds that were identified in the previous studies. The noted contamination extended to the southwest property limits (downgradient of the former foundry activities).

The Phase II ESA work performed included the drilling of five boreholes all of which were converted to monitoring wells. Groundwater samples were then collected from the five newly installed monitoring wells (11PO-1 to 11PO-05) and from two existing monitoring wells (PZ-3 and PZ-4). Additionally, three surface water samples were collected from the ditches surrounding the former foundry production area and along the 10<sup>th</sup> Rang.

The soil samples collected (11 including 2 duplicates) were analyzed for petroleum hydrocarbons F1-F4, petroleum hydrocarbons C<sub>10</sub>-C<sub>50</sub>, polycyclic aromatic hydrocarbons (PAHs) and metals (silver (Ag), arsenic (As), barium (Ba), cadmium (Cd), chrome (Cr), copper (Cu), tin, (Sn), manganese (Mn), molybdenum (Mo), nickel (Ni), lead (Pb), selenium (Se), zinc (Zn) and mercury (Hg)) The analytical soil chemistry results obtained for the 9 samples collected indicated metal concentrations which exceed the CCME recommendations for agricultural land usage. Additionally, two of the nine samples indicated metal concentrations exceeding the MDDEP C threshold limit value and in some cases exceeding the values in Appendix I of the RESC. These results confirm that soils exceeding the applicable criteria were noted in the former production area of the St-Germain foundry but not along the 10<sup>th</sup> Rang. Since the objective of the study was to verify both the groundwater and surface water quality, the soil impacted zones were not defined.

The groundwater analytical results for the 8 samples collected (including the duplicate sample) from the newly installed and previously installed monitoring wells indicated metal, dioxins and furans, cyanide, sulfur and/or fluoride concentrations which exceeded the *Health Canada Recommendations for Potable Groundwater Quality*, exceeded the *Federal interim Groundwater Quality Guidelines* for agricultural site usage for the "direct contact with soils", for the "freshwater aquatic life", for "irrigation", for "livestock" and for "wildlife watering" exposure pathways, exceeded the MDDEP *Potable Groundwater Quality Regulation*, exceeded the MDDEP *Potable Water Criteria* on which alert threshold values were applied (10 %, 20 % and 50 %) and/or the MDDEP *Surface Water or Sewer Water Discharge Criteria*. The estimated

**HDS, January 2013 (Ref.: HDS-7281-8)**





## **EXECUTIVE SUMMARY**

Following a request from Public Works and Government Services Canada (PWGSC), Hudon Desbiens St-Germain Environnement inc (HDS Environnement) has performed demolition and cleaning site follow-up activities at the former St-Germain Foundry located on 1348, 10<sup>th</sup> rang, in Saint-Edmond-de-Grantham (Québec). These activities were performed from October 22<sup>nd</sup> to November 2<sup>nd</sup> 2012 and also on November 21<sup>st</sup> 2012.

The demolished and disposed infrastructures included seven (7) buildings, one (1) hunting camp, an above ground tank, a rotative smelter, a vaulted smelter, a longitudinal smelter and finally the remaining of a copper-wire smelter. These infrastructures were in bad condition. The main objective was to proceed to the demolition of these infrastructures and to the site cleaning.

At first, five (5) samples were collected to classify specific materials including the content of three (3) concrete pits (water and sediment). These samples were analyzed by an accredited laboratory for their conformity to the Quebec Regulation Respecting Hazardous Materials or their total metal content.

The hazardous material and demolition waste management program and the health and safety program prepared by Demvar were transmitted to HDS Environment and were reviewed prior to the beginning of demolition and site cleaning activities. Surveillance and documentation activities were performed by HDS Environment during the whole length of Demvar works on the site. At the request of PWGSC, environmental follow-up forms were completed on a weekly basis and no major irregularity was noted. The activities included demolition of building and infrastructures, materials segregation, cleaning and installation of a polyethylene membrane on the slag pile, repair of the link fence, site cleaning and disposal of hazardous and non hazardous residual materials.

The supervision of activities involving the handling of asbestos-containing materials (low risk and high risk activities) was performed by HDS Environment. The low risk activities involved bagging absorbent materials containing asbestos and the high risk activities consisted in removing asbestos containing roughcast located on the walls and ceiling of the balance building. Air sampling for airborne asbestos fibers was performed as requested and the results were in compliance with the Quebec *Safety Code for Construction Works*.

The type and quantity of materials that were disposed off site were quantified using the disposal bills provided by Demvar. These materials included concrete, demolition materials, slags, ashes, tires, metal, asbestos-containing materials, halocarbons,



petroleum products, solvents, paints and hazardous materials (water and sediment) from the three (3) concrete pits. All these materials were forwarded to authorized sites and the total quantity is estimated at 500 tons.

**LVM inc., March 2013a (Ref.: 045-P-0001686-0-01-230-HG-R-0200-00)**



## EXECUTIVE SUMMARY

LVM was mandated by Public Works and Government Services Canada (PWGSC) to carry out a Phase II Environmental Site Assessment (Phase II ESA) on the property of a decommissioned foundry located at 1348, 10<sup>e</sup> Rang in Saint-Edmond-de-Grantham which corresponds to lots 966 and 977 of the cadastre of the county of Grantham, Registration Division of the county of Drummond.

The investigated site is of rectangular shape and occupies a total area of 133 601 m<sup>2</sup>. The topography of the site is relatively flat. Although the investigated site is located in an agricultural zone, the site is mostly forested. From 1977 to 2004, a portion of the site was occupied by a foundry. This portion of the site was used to recuperate scrap metals, mostly copper, lead, aluminum and white metal, from various waste materials (electrical wires, auto parts, accumulators, batteries, etc.) These waste materials were stored directly on the ground before being burned in a furnace or outside with used oil or old tires. The recuperated metals were then sold. The cinders resulting from the smelted metal, (scoria) were disposed off-site, stored or buried on-site.

The investigated site is divided in three sectors: one is undeveloped, one is forested and the other one corresponds to work area, where reception and production of materials and waste took place.

The undeveloped sector is located between the work area and 10<sup>e</sup> Rang. The work area of the old foundry is subdivided into two sectors: the reception sector, where the scrap metals were arriving at the foundry and the production sector, where the smelting and the recuperation of metals was performed. The production sector was bordered by a ditch. Finally, the forest sector, which has never been developed, covers the entire northern portion of the investigated site which represents roughly 75% of the property.

Currently, the investigated site is not being used and the buildings have been decommissioned in the fall of 2012, before the start of the current Phase II ESA.

The work plan of this Phase II ESA was based on the information gathered from the Phase I ESA conducted by SNC-Lavalin (2012) which identified several environmental concerns for soil and groundwater quality, especially on the old foundry's work area sector of the investigated site.

The field work conducted within the scope of this study took place from October 31<sup>st</sup> until December 6<sup>th</sup>, 2012. The description, sampling and chemical analysis of soils, residual waste, groundwater, surface water and sediments allowed the description of the stratigraphic and hydrostratigraphic context and the study of the physical and chemical quality of the different sampled matrices.



In total, 70 soundings were drilled from which 16 consisted of boreholes, 49 of exploratory test pits and five of manual boreholes. Nine of the boreholes were instrumented with monitoring wells in order to intercept groundwater. Eight sediment samples, 14 surface soils samples to assess the presence of airborne contamination, 14 groundwater samples and two surface water samples were collected. With the exception of surface soil samples which were mostly taken from the forested sector, most of the field work took place on the undeveloped sector and the old foundry's work area sector of the investigated site.

The soil stratigraphy of these two sectors differs. In the undeveloped sector, the first stratigraphic unit corresponds to a layer of peat followed by a fill material with variable proportions of silt, sand and silty-sand. In the sector of the old foundry's work area, the first stratigraphic unit corresponds to a surficial fill material which consists of fine sand, silty-sand with traces of loose gravel with variable proportions of residual waste or a layer of residual waste (with a thickness varying from 0.15 m to 1.98 m, depending on the different soundings realized in the context of this study but a thickness up to 2.50 m was obtained at one location according to the study conducted by Biogénie (2010)). These layers of residual waste have been identified in more than 75% of the soundings drilled by LVM in this sector. Under the fill material, directly under the peat or below the layer of residual material, the natural soil is composed of fine sand with traces of silt, followed by the bedrock in both sectors. The bedrock was intercepted at depths varying between 4.27 m and 6.10 m. The manual boreholes were realized on the other side of the ditch bordering the old foundry's work area and no residual waste was observed there.

Residual waste has been characterized separately from soils. The particle size of the residual waste is associated to a sandy silt with some loose gravel and traces of clay. The relative proportions of residual waste are composed of 5% to 24% of natural aggregates, 69% to 95% of scoria and < 1% à 15 % of various wastes.

According to the stratigraphic information gathered from the sampling, three hydrostratigraphic units have been considered on the investigated site. The first unit is composed of filling material and residual waste present on the old foundry's work area. The second unit corresponds to the natural soil while the third unit corresponds to the bedrock. During the measurements of the groundwater levels of November 29, 2012, the groundwater level was located below the first hydrostratigraphic unit. Therefore, no groundwater flow has been noted in the first unit. The groundwater of the second hydrostratigraphic unit would flow mostly towards the west, at a speed varying from 2.5 m to 5.2 m per year while the groundwater of the third hydrostratigraphic unit would flow towards the south-west at a speed varying between 0.9 m and 57.0 m per year.

The residents living in the vicinity of the investigated site use private wells as their supply of drinking water. Also, according to the information gathered, there would be 20 drinking water wells located in an approximative one kilometre radius around the old foundry's work area sector. However, from these 20 wells, only 11 are situated downgradient with respect to the presumed direction of groundwater flow from the investigated site.

In the light of the stratigraphical and hydrogeological context of the investigated site, the following receptors, all situated downgradient with respect to the presumed direction of groundwater flow from the site, have been identified:

- ▶ drinking water wells located in a 1 km radius from the old foundry's work area;
- ▶ ditch bordering the old foundry's work area, one located along 10<sup>e</sup> Rang and one situated on agricultural lands located to the west of the investigated site;
- ▶ David River.

### **Soils**

All analyzed soil samples collected from the undeveloped sector and on the sides of the old foundry's work area, on the other side of the bordering ditch, are below the maximum limits.

The results of the analysis performed on soil samples collected from the undeveloped sector and on the other side of the ditch bordering the old foundry's work area of the investigated site all indicated concentrations below the federal and provincial legislation's maximum acceptable limits for a site with an agricultural and residential vocation. The soil is therefore compatible with the actual use of the property.

The results of the analysis performed on soil samples collected from the old foundry's work area indicated concentrations above the federal and provincial legislation's maximum acceptable limits for a site with an agricultural and residential vocation. The soil at this location is therefore not compatible with the actual use of the property.

The results of the analysis performed on surface soil samples collected from the forested sector of the investigated site indicated that several samples of soil showed concentrations above the provincial and federal legislation's maximum acceptable limits for a site with an agricultural vocation. Therefore, the soil from this sector is not compatible with the actual or planned use of the property. The contamination in this sector is considered to originate from the transport of contaminants through air.

Based on estimates and according to federal legislations, the following volumes of soil have been estimated:

- ▶ 3,943 m<sup>3</sup> in the A-B range of the MDDEFP's criteria;
- ▶ 3,183 m<sup>3</sup> in the B-C range of the MDDEFP's criteria;
- ▶ 3,634 m<sup>3</sup> with concentrations exceeding the C criteria of the MDDEFP's criteria but below the criteria defined in appendix 1 of the RESC;
- ▶ 3,058 m<sup>3</sup> with concentrations exceeding the criteria defined in appendix 1 of the RESC;
- ▶ 12,551 m<sup>3</sup> of residual waste characterized as hazardous waste as per the RMD.

The estimates of soils volume based on federal recommendations are presented in the report.



Based on the characterization data, only airborne contaminated surface soils are found outside the foundry's work area.

### **Residual waste**

The results of the leachate analysis performed on samples of residual waste collected from the sector of the old foundry's work area indicate lead concentrations exceeding RMD standard. Therefore, the residual waste is considered as an hazardous waste according to the RMD.

The results obtained in this study confirm the ones of Biogénie's (2010) report.

### **Groundwater**

Since some concentrations exceed provincial and federal legislations criteria, standards and recommendations, the groundwater of the investigated site is considered contaminated.

The approximate extent of groundwater where concentrations exceed provincial criteria for at least one parameter has an estimated surface area of 16,000 m<sup>2</sup>. The approximate extent of groundwater where concentrations exceed the different federal legislation recommendations for at least one parameter has an estimated surface area varying between 11,000 m<sup>2</sup> and 30,500 m<sup>2</sup>. The north-western and western limits of the extent of impacted groundwater could not be assessed.

There is a real or anticipated impact at the ditch bordering the old foundry's work area. Also, it is interpreted that the following receptors can potentially be impacted by groundwater: the ditch situated on the agricultural lands located to the west of the old foundry's work area; the potable water wells located west of the old foundry's work area and: River David. However, no potential impact is foreseen on the ditch located along 10<sup>e</sup> Rang and the potable water wells located at the south-west of the investigated site, including the one potable water well installed on the property located at 1 350 10<sup>e</sup> Rang.

### **Surface water**

Since some concentrations exceed both provincial and federal legislation criteria and recommendations, the surface water of the investigated site is considered contaminated

### **Sediments**

All the sediments samples collected on the investigated site showed at least one metal concentration above MDDEFP's B criteria; in this respect the sediments are considered to exceed the maximum acceptable limits for a site with an agricultural and residential vocation.

**LVM inc., March 2013b (Ref.: 045-P-0001686-0-01-230-RE-R-0100-00)**



## EXECUTIVE SUMMARY

LVM was mandated by PWGSC to carry out a Phase II ESA on the property of a decommissioned foundry located at 1348 10<sup>e</sup> Rang in Saint-Edmond-de-Grantham which corresponds to lots 966 and 977 of the cadastre of the county of Grantham, Registration Division of the county of Drummond. The information gathered from the latter study was used for the baseline of this report, which now consists of presenting to PWGSC rehabilitation options and/or management options for the environmental concerns associated with the investigated site.

The investigated site is of rectangular shape and occupies a total area of 133,601 m<sup>2</sup>. The topography of the site is relatively flat. Although the investigated site is located in an agricultural zone, the site is mostly forested. From 1977 to 2004, a portion of the site was occupied by a foundry. This portion of the site was used to recuperate scrap metals, mostly copper, lead, aluminum, and white metal, from various waste materials (electrical wires, auto parts, accumulators, batteries, etc.) These waste materials were stored directly on the ground before being burned in a furnace or outside with used oil or old tires. The recuperated metals were then sold. The cinders resulting from the smelted metal (scoria) were disposed off-site, stored or buried on-site.

Based on estimates calculated in the supplementary Phase II ESA, the following volumes of contaminated soils were estimated:

- ▶ 3,943 m<sup>3</sup> in the A-B range of the MDDEFP's criteria;
- ▶ 3,183 m<sup>3</sup> in the B-C range of the MDDEFP's criteria;
- ▶ 3,634 m<sup>3</sup> with concentrations exceeding the C level of the MDDEFP's criteria but below the standard define in appendix 1 of the RESC;
- ▶ 3,058 m<sup>3</sup> with concentrations exceeding the stanard define in appendix 1 of the RESC;
- ▶ 12,551 m<sup>3</sup> of residual materials characterized as hazardous materials as per the RMD.

Although the estimated volume of hazardous residual materials was roughly 33 % lower than expected, the quantities on-site along with the contaminated soils make up a cost of rehabilitation of \$9.6 M (Option n<sup>o</sup> 1) for site rehabilitation through excavation and off-site disposal to commercial sites. LVM has conducted a literature review and contacted organizations and businesses in order to find other available options. The principals other available options are:

- ▶ soil washing;
- ▶ solidification/stabilization;
- ▶ valorization;
- ▶ risk analysis.

Various scenarios for each options have been considered and evaluated (i.e.: re-use or non-reuse of excavated materials on-site, excavation or soil management, risk analysis), including a cost-analysis varying between \$800 K to \$5.9 M:

- ▶ option n° 2A - Excavation, disposal of soils <RESC, soils >RESC and hazardous residual materials washing, and re-use on site (\$5.8 M);
- ▶ option n° 2B - Excavation, disposal of soils <RESC, soils >RESC and hazardous residual materials washing, re-use on site (soils), and disposal of non-hazardous residual material in an engineered landfill (\$5.9 M);
- ▶ option n° 2C - Excavation, hazardous residual materials washing, disposal of non-hazardous residual materials in an engineered landfill, and risk analysis (soils) (\$5.1 M);
- ▶ option n° 3 - Excavation, solidification/stabilization (soils and hazardous residual materials), re-use on site (soils and hazardous residual materials), and risk analysis (\$4.9 M);
- ▶ option n° 4 - Excavation et valorization (no cost available);
- ▶ option n° 5- Risk analysis (\$800 K).

Based on the information gathered and points of discussion raised in the last March 11<sup>th</sup> meeting with representatives of PWGSC, the options proposed by LVM at this stage are as followed:

- ▶ option n° 2B - Excavation, disposal of soils <C, soils >C and hazardous residual materials washing, re-use on site (soils) and disposal off-site of non-hazardous residual material in an engineered landfill;
- ▶ option n° 2C - Excavation, hazardous residual materials washing, disposal off-site of non-hazardous residual materials in an engineered landfill, and risk analysis (soils);
- ▶ option n° 4 - Excavation et valorization.

In order to go forward with the project, LVM recommends the following activities:

- ▶ run small-scale pilot tests in order to ascertain the applicability and feasibility of new technologies available (i.e.: Clean Earth, Solumet) and to evaluate the costs of implementing these new technologies;
- ▶ run large-scale test pilots before the beginning of the fieldwork by inviting new technologies promoters in order to ensure the technologies efficiency and achieve the rehabilitation objectives; it should include the essential elements to face the unknown factors associated with the use of technologies in order to formally assess the real cost of the project.

**LVM, March 2014 (Ref.: 045-P- 0001686-0-01-250-HG-R-0100-00)**



## EXECUTIVE SUMMARY

LVM inc. was mandated by Public Works and Government Services Canada to realize, in 2013, an environmental monitoring of the groundwater and surface water towards the former St-Germain foundry located at 1348 du 10<sup>e</sup> Rang in Saint-Edmond-de-Grantham, Quebec. This environmental monitoring follows a Phase II Environmental Site Assessment performed on the site by LVM in Fall 2012.

The investigated site is of rectangular shape and occupies a total area of 133,601 m<sup>2</sup>. The topography of the site is relatively flat. Although the investigated site is located in an agricultural zone, the site is mostly forested. The south part of the investigated site was used as a foundry from 1977 to 2004. The property is divided in three sectors: an undeveloped sector, the former foundry sector (reception and production areas) and a forested sector.

The fieldworks within the frame of this study were realized in three sampling campaigns: in Spring (April 22<sup>nd</sup> to 24<sup>th</sup>), in Summer (August 28<sup>th</sup> to 30<sup>th</sup>) and in Fall 2013 (November 20<sup>th</sup> to 22<sup>nd</sup>). For each sampling campaign, groundwater was collected in monitoring well 11-PO1, 11-PO2, 11-PO5, 12 PO1, 12-PO2A and B, 12-PO3A and B, 12 PO4, 12-PO5, 12-PO6 and 12-PO7. Surface water was collected at two locations in the ditch surrounding the former foundry area (13-ES5 and 13-ES6).

Three hydrostratigraphic units are present on the investigated site. The first unit consists in fill and residual material and was identified in the sector of the former foundry (production area) and would be partially saturated during the year. The second unit corresponds to native soils and the third unit would be the bedrock and both are always saturated. Following the three monitoring campaigns realized in 2013, the groundwater in the second unit flows to a speed varying between 2.8 m and 5.8 m per year, mainly towards west direction, except for the northeastern sector of the production area of the former foundry. In the sector of the former foundry, in November 2013, the flow direction was reversed whereas a part of the flow was in eastern direction. The groundwater of the third unit would flow towards southwest for every 2013 sampling campaign at a speed varying between 1.3 m and 79.7 m per year.

The residents living in the vicinity of the investigated site use private wells as their drinking water supply. Also, according to the information gathered, there would be 20 drinking water wells located in approximately one kilometer radius around the former foundry area. However, from these 20 wells, only 11 wells are located downgradient of the presumed groundwater flow direction from the investigated site.

Based on the stratigraphic and hydrogeological context, the following receptors, all located downgradient of the presumed groundwater flow direction from the site were identified:



- ▶ Drinking water wells located in a 1 km radius from the former foundry;
- ▶ Ditch bordering the former foundry sector, ditch bordering the 10e Rang and ditch located on agricultural lands to the west of the investigated site;
- ▶ David River.

Since some concentrations are exceeding the groundwater criteria of the MDDEFP Policy (metals, ammonia nitrogen, fluorides, nitrites, nitrates and nitrites, chlorides, dioxins and furans) since the beginning of the environmental monitoring, the groundwater is considered to be contaminated regarding the MDDEFP Policy. Because many parameters concentrations (metals, fluorides, nitrites, nitrates and nitrites, pH and chlorides) are exceeding the Guidelines for Canadian Drinking Water Quality from Health Canada, to the Canadian Environmental Quality Guidelines (hereafter – CEQG) from the CCME as well as Guidance Document on Federal Interim Groundwater Quality Guidelines for federal contaminated sites for agricultural lands since the beginning of the environmental monitoring, the groundwater is considered contaminated regarding to the applicable federal context. With some exceptions, all the exceeding concentrations were noted for the monitoring well located in the former foundry sector.

For groundwater, the analytical results obtained for each sampling campaign in 2013 as well as analytical results of Fall 2012 are similar even though some variations are noted, except for concentrations obtained in monitoring well 11-PO5 in August 2013. At this monitoring well, important concentration variations were noted. However, during the November 2013 sampling campaign, the concentrations obtained in monitoring well 11-PO5 became again similar to those obtained in April 2013 and Fall 2012. No particular field element allowed to explain the significant concentrations variations towards monitoring well 11-PO5 in August 2013. The pursue of the 2014 environmental monitoring will allow to observe if the same variations will be noted in August 2014.

The presumed extent of the groundwater with concentrations exceeding the groundwater criteria for Drinking water and Seepage into surface water or infiltration into sewer of the MDDEFP Policy and for standards of the Quebec Regulation respecting the quality of drinking water, for at least one parameter, vary between 12,775 m<sup>2</sup> and 38,545 m<sup>2</sup>. Concerning the federal guidelines, the presumed extent of the groundwater with concentrations exceeding to different recommendations at least vary between 12,600 m<sup>2</sup> and 29,800 m<sup>2</sup>. The different contamination plumes would move towards northwest and southwest directions. The northwestern, western and eastern limits of the extents could not be assessed.

Based on the analytical results obtained during 2013 environmental monitoring, there would be a real or anticipated impact at the ditch bordering the former foundry production area. However, there would not be any real or anticipated impact on the potable water wells located in a 1 km radius of the former foundry, towards the ditch bordering the 10<sup>e</sup> Rang, to the ditch located on agricultural lands located to the west of the former foundry and to David River. However, a potential impact would be to consider the ditch located on the agricultural lands and towards the potable water wells located west from the former foundry production area and to the David River. This situation was

observed during the 2013 environmental monitoring and is identical as the situation described in Fall 2012.

Given the fact that some metals and fluorides concentrations are exceeding the criteria «Protection de la vie aquatique (effet aigu)» from the Critères de qualité de l'eau de surface of MDDEFP» as well as CCME Water quality guidelines for the protection of aquatic life - freshwater since the beginning of the environmental monitoring, the surface water in the ditch bordering the investigated site is considered to be contaminated.

Altogether, the analytical results for surface water obtained at point 13-ES5 showed concentrations similar to those in the other 2013 environmental monitoring and are generally lower than the concentrations observed in November 2012. The number of parameters exceeding of the criteria of the Critères de qualité de l'eau de surface from MDDEFP and CCME guidelines is however similar between the three 2013 sampling campaigns as well as for the Fall 2012 sampling campaign. The analytical results at 13-ES6 in April and November 2013 showed similar concentrations whereas the concentrations obtained in August 2013 are higher.

The sampling point 13-ES5 showed as many exceeding for the MDDEFP criteria and the CCME guidelines as for the sampling point 13-ES6 for the April and November 2013 sampling campaigns. In August 2013, there are a few more concentrations exceeding, at sampling point 13-ES6.

Because there is a surface water divide towards the ditch bordering the former foundry production area in the northwest sector, the surface water to the two sampling surface water point 13-ES5 and 13-ES6 would not have an hydraulic link. Based on the analytical results, the surface water is contaminated from one side or the other of the surface water divide.

**LVM inc., May 2015 (Ref.: 045-P-0001686-0-01-232-RE-R-0100-01)**



## EXECUTIVE SUMMARY

After the presentation in a LVM report of various rehabilitation options to manage contaminated soils and hazardous residual materials of the former foundry, it was recommended to run small-scale pilot tests in order to treat contaminated soils and hazardous residual materials. LVM was mandated by Public Works and Government Services Canada (hereafter - PWGSC) to coordinate and manage the small-scale pilot tests carried out by CleanEarth to treat soils showing metals concentrations in excess of the *Regulation respecting the burial of contaminated soils*' (hereafter - RBCS) Schedule I and hazardous residual materials.

Samples used for the small-scale pilot tests were collected by LVM in 20-liter buckets at the former foundry site and sent directly to CleanEarth facilities. These soils and hazardous residual materials originated from the test pits dug on September 3<sup>rd</sup>, 2013, and from the pile located on the investigated site. The test pits were located beside the test pits made in the Fall of 2012 (e.g., 12-TR-48, 12-TR-42 and 12-TR-16). These test pits were selected because the soils and hazardous residual materials present were representative of the soils and hazardous residual materials found in the work area of the former foundry.

Based on analytical results of treated soils and residual materials following the CleanEarth process, the main conclusions are as follow:

- ▶ contaminated soils showing concentrations exceeding RBCS' Schedule I standards cannot be treated to reach the B generic criteria of the Ministry of Sustainable Development, Environment and Combatting Climate Change (hereafter - MDDELCC) Soil Protection and Contaminated Sites Rehabilitation Policy (hereafter - Policy) for metal parameters because soil matrices contain a significant volume of residual material (metallic residue);
- ▶ analytical results provided by CleanEarth for residual materials showed concentrations below the Regulation respecting hazardous materials (hereafter - RRHM) for all metal parameters. Therefore, hazardous residual materials could be treated in order to be declassified as non-hazardous residual materials. Analytical results obtained by LVM are identical to those of CleanEarth for the rock samples (SA-1) and gravel size fraction (SA-2) and represent approximately 16 % in weight of the treated residual materials. However, the analytical results obtained by LVM for the samples associated to sand (SA-3) and silt/clay (SA-4) size fractions still indicated concentrations above the RRHM' standards for lead. Since analytical results obtained by LVM and CleanEarth are not identical for hazardous residual materials, it is not possible to confirm that all the hazardous residual materials can be treated and declassified as non-hazardous residual materials.

Even though it is not possible to confirm all hazardous residual materials can be treated by CleanEarth, it has been agreed with the PWGSC representative to update cost estimates for options # 2A, 2B and 2C, namely the options where contaminated soils and hazardous residual material washing where evaluated in the LVM report (March 2013b).



Estimated cost for the treatment of 12,550 m<sup>3</sup> of hazardous residual materials on the investigated site is 170 \$ / m.t. This cost includes mobilization/demobilization in the Montreal area of CleanEarth's treatment equipment and treatment of hazardous residual materials. This unit cost takes into consideration that hazardous residual materials are already stockpiled where treatment will take place. This cost does not include site preparation, hazardous residual material excavation as well as management of metallic residue which would be sorted from the hazardous residual materials following the treatment.

The updated costs for the three options are as follow:

- ▶ modified # 2A option - Excavation, disposal of <RBSC and ≥RBSC soils, hazardous residual materials washing and re-use on site (8.85 M\$);
- ▶ modified # 2B option - Excavation, disposal of <RBSC and ≥RBSC soils, hazardous residual materials washing and disposal in an engineered landfill (8.85 M\$);
- ▶ modified # 2C option - Excavation, hazardous residual materials washing and disposal in an engineered landfill and risk analysis (soils) (6.75 M\$).

Estimated costs established before undertaking the small-scale pilot test for the three options were respectively of 5.8 M\$, 5.9 M\$ and 5.1 M\$.

The estimated cost increase for each of the modified #2 options is due to cost increase for hazardous residual material treatment following CleanEarth' small-scale pilot tests, inability to treat soils above the RBCS' Schedule I standards, disposal of these soils in a MDDELCC authorized facility, disposal of metallic residue in a MDDELCC authorized facility following hazardous residual material treatment, which represent approximately 20 % in weight of these materials, and additional need for backfill.

LVM recommends the implementation of a large-scale pilot test prior to the works to ensure treatment efficiency and to meet rehabilitation objectives. A wider range of technology developers should be invited to perform a large-scale pilot test. This pilot test should include every required element to answer all uncertainties related to the treatment in order to confirm officially the project's real cost.

**LVM, July 2015 (Ref.: 045-P- 0001686-0-01-255-HG-R-0100-00)**



## EXECUTIVE SUMMARY

LVM, a division of EnGlobe Corp. (hereafter «LVM») was mandated by Public Works and Governmental Services Canada to realize, during 2014, a groundwater and surface water environmental monitoring campaign at the former St-Germain foundry site located at 1348, 10e Rang in Saint-Edmond-de-Grantham, Québec.

Fieldworks within this environmental monitoring campaign were conducted during two sampling events, one of which during summer 2014 (from September 15th to 17th) and the other one during fall 2014 (November 24th to 26th). For each sampling event, groundwater was collected in monitoring wells 11-PO1, 11-PO2, 11-PO5, 12 PO1, 12-PO2A & B, 12-PO3A & B, 12 PO4, 12 PO5, 12-PO6 and 12-PO7. Surface water was collected at two locations in the ditch surrounding the former foundry production area (14 ES5 and 14-ES6) only during the fall 2014 sampling event. These sampling locations were dry during summer 2014 sampling event.

Three hydrostratigraphic units are present on the investigated site. The first unit consists in fill and residual material and was identified in the sector of the former foundry production area and would be partially saturated yearly. The second unit corresponds to native soils and the third one to the bedrock and both are always saturated. Based on both sampling events realized in 2014, the second unit's groundwater flows to a speed varying between 4.5 m and 9.4 m per year, mainly towards west direction (between the southwest and the northwest). The third unit's groundwater flows towards west direction, during the September 2014 sampling event, and towards southwest-west direction, during the November 2014 sampling event, at a speed varying between 1.1 m and 65.0 m per year.

Residents living in the vicinity of the investigated site use private wells as their drinking water supply. Also, according to the information gathered, there would be 20 drinking water wells located in an approximately 1 km radius around the former foundry production area, but only 11 of these wells are located downgradient from the investigated site.

Based on the stratigraphic and hydrogeological context, the following receptors were identified:

- ▶ Drinking water wells located in a 1 km radius from the former foundry production area and downgradient of the presumed groundwater flow direction from this area;
- ▶ Ditch bordering the former foundry production area, ditch bordering the 10e Rang and ditch located on agricultural lands to the west of the investigated site, downgradient of the presumed groundwater flow direction from the former foundry production area;
- ▶ David River, downgradient of the presumed groundwater flow direction from the former foundry production area.

Since some concentrations are exceeding the Quebec Ministry of Sustainable Development, Environment and Combating Climate Change (hereafter «MDDELCC») Soil Protection and



Contaminated Sites Rehabilitation Policy (hereafter «Policy»)’s groundwater criteria (metals, ammonia nitrogen, fluorides, nitrites, nitrates and nitrites, chlorides) since the beginning of the environmental monitoring, the groundwater is considered to be contaminated in regards to the MDDELCC Policy. In addition, since many parameters concentrations (metals, fluorides, nitrites, nitrates and nitrites, pH and chlorides) are exceeding the Health Canada’s Guidelines for Canadian Drinking Water Quality, the Canadian Council of Ministers of the Environment (hereafter «CCME»)’s Canadian Environmental Quality Guidelines, as well as the Guidance Document on Federal Interim Groundwater Quality Guidelines for Federal Contaminated Sites for agricultural lands since the beginning of the environmental monitoring, the groundwater is considered contaminated in the former foundry production area regarding to the applicable federal context. With some exceptions, all the exceeding concentrations were noted for the monitoring wells located in the former foundry production area.

Overall, the analytical results obtained for each of the 2014 groundwater sampling event, as well as those from fall 2012 and from the 2013 environmental monitoring are similar, even though some fluctuations are noted, such as in monitoring well 11-PO5. However, since concentrations were lower during the summer sampling event and that the groundwater level is deeper during this period of the year, the groundwater level decrease might be related to the significant concentration fluctuations in this monitoring well. Since there are groundwater level fluctuations in the other wells located in the former foundry production area, the concentrations should have been decreasing as well, but there were few fluctuations. Pursue of the environmental monitoring will allow to observe if the same fluctuations will be noted during the summer of 2015.

The presumed extent of the groundwater with concentrations exceeding the MDDELCC Policy’s Drinking Water and Seepage into Surface Water or Infiltration into Sewers groundwater criteria and the Quebec Regulation Respecting the Quality of Drinking Water standards, for at least one parameter (except manganese), covers most of the former foundry production area, but are not observed in the fallow sector. Concerning the federal guidelines, the presumed extent of the groundwater with concentrations exceeding different recommendations, for at least one parameter, covers part of the former foundry production area and most of the investigated site, depending on the recommendations considered. The different groundwater contamination plumes would move towards northwest and southwest directions and the northwest and east limit extent of each of the plumes could not be assessed. The presumed plume extents are considered minimal.

Based on the analytical results obtained during the 2014 environmental monitoring, there would be a real impact at the ditch bordering the former foundry production area. However, there would not be any real or apprehended impact on the potable water wells located in a 1 km radius of the former foundry production area, to the ditch bordering the 10e Rang, to the ditch located on agricultural lands located to the west of the investigated site and to the David River. However, a potential impact would be consider to the ditch located on the agricultural lands, northwest of the former foundry production area, towards the potable water wells, southwest of the investigated site

and west of the former foundry production area, and to the David River. This situation observed during the 2014 environmental monitoring is identical as the situation described in fall 2012 and during the 2013 monitoring.

Given the fact that some metals, fluorides and dioxins & furans concentrations are exceeding the MDDELCC Criteria for Water Quality's Protection of Aquatic Life criteria (acute effect), as well as the CCME Water Quality Guidelines for the Protection of Aquatic Life (freshwater) since the beginning of the environmental monitoring, the surface water in the ditch bordering the investigated site is considered to be contaminated.

Altogether, concentrations obtained at point ES5 during 2013 and 2014 are similar, but generally lower than those observed in November 2012, while concentrations obtained at point ES6 in 2013 and 2014 are also similar, except for the ones obtained in August 2013 which were higher. Although some fluctuations were noted for one sampling event to another, no upward or downward trend was observed. The number of parameters exceeding the MDDELCC Criteria for Water Quality and the CCME Water Quality Guidelines for the Protection of Aquatic Life for the same sampling point is however similar between the sampling events since the beginning of the environmental monitoring.

Based on the available analytical results, the surface water would also be contaminated on both sides of the drainage divide.

Based on the analytical results, it is recommended to pursue, during 2015, the groundwater and surface water environmental monitoring and to schedule three sampling events (spring, summer and fall).

**WSP, March 2016 (Project No.: 151-00080-22)**



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## SUMMARY

In December 2015, WSP Canada Inc. (WSP) was mandated by Public Works and Government Services Canada (PWGSC) to evaluate the risk of exposure to lead-containing dust and asbestos fibres so as to determine, as a preliminary test, if said risk must be accounted for during preparation of the tender documents for the environmental rehabilitation of the St. Germain Foundry in St-Edmond-de-Grantham.

The site is divided into three (3) sections: grassed section, old foundry worksite, and wooded section. The old foundry worksite, the southern part of the site, was used as a foundry from 1977 to 2004. Scrap metal stored on the soil surface were burned in-place and the cinders (scoria), predominantly contaminated by lead, were disposed of off-site or buried on-site. All buildings on-site were demolished in 2012. Nevertheless, significant quantities of debris of varying natures (cinders, foundry waste, scrap metal, etc.) remain on-site.

Based on information received from PWGSC and a Phase II Environmental Site Assessment report produced by LVM and dated March 2013, WSP developed a strategy by which to evaluate the risks of exposure to dust containing lead and four (4) other metals (cadmium, chrome, copper, and zinc) as well as to asbestos fibres for two (2) workers: the excavator operator and the supervisor working in the old foundry worksite section. Three (3) tasks were evaluated: loading trucks with humid and piled waste materials, disturbance of half-dry and piled waste materials, and loading trucks with half-dry and piled waste materials. Air samples for analysis of the specified contaminants were collected on the individuals during the shift of December 15, 2015.

The results indicated that the concentrations of lead, cadmium, chrome, copper and zinc were very low in the dust and were below the accepted exposure limits. Consequently, there is no significant risk of exposure and the work execution is compliant with the regulatory requirements applicable.

Where the duration of the task being performed allowed for sampling of an adequate volume of air, the asbestos fibre concentrations measured were also low and below the accepted exposure limits. Consequently, there is no significant risk of exposure and the work execution is compliant with the regulatory requirements applicable.

During the tasks where the volume of air that could be sampled was below the required volume, the remaining conclusion is that no asbestos fibres were detected. So as to reach the limit of detection, the sampling would need to be repeated whereby an adequate air volume would be sampled.

WSP made certain recommendations of preventive action which could be employed in order to reduce the risk of exposure to contaminated dust if activities which will create dust are planned. These actions are principally related to environmental supervision and worker protection.

**Technorem, May 2016a (Ref.: PR15-63)**



## EXECUTIVE SUMMARY

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The site of the former Saint-Germain foundry, located at 1348, 10<sup>e</sup> Rang in Saint-Edmond-de-Grantham (Quebec), was used for metal recycling between 1977 and 2004. Scrap metal was stored directly on the ground before being burnt. Site management was under PWGSC responsibility since 2010. Previous environmental studies conducted at the site between 2010 and 2015 revealed the presence of soil with metal concentrations exceeding applicable criteria, and groundwater impacted by metals, ammoniacal nitrogen, fluorides, nitrites and nitrates, and pH.

The objective of the rehabilitation preliminary test was to collect scientific data in order to evaluate the most appropriate option for managing/rehabilitating soils exceeding CCME Recommendations (Industrial use) and hazardous residual materials relative to the Hazardous Material Regulation (*Règlement sur les matières dangereuses: RMD*). Following option analysis, soil excavation to generic criteria was retained as the best way to meet project objective. Criteria of the MDDELCC *Politique de protection des solset de rehabilitation des terrains contaminés* (Soil Protection and Impacted Land Rehabilitation Policy of the Quebec Ministry of Sustainable Development, Environment and Fight against Climate Change) and of the *Règlement sur l'enfouissement des sols contaminés* (RESC; Impacted Soil Burying Regulation) were used to determine the site for impacted soil disposal.

Activities performed in fall 2015 firstly included: the digging of 39 test pits distributed over the former foundry site, eight (8) leaching tests (Quebec and Ontario) on residual materials, and four (4) microscope analyses on representative samples (soil, residual material and mixtures of both). Then, field work completed between November 5, 2015 and January 20, 2016 included: the excavation of 1,378 m<sup>3</sup> of soil and residual materials, the segregation, temporary stockpiling and sampling of the various materials, the chemical analysis of 63 soil samples and the microscope analysis of 15 samples of residual material, the collection of 13 samples from the bottom and walls of excavation to confirm attainment of rehabilitation objective, the offsite disposal of 1,286 metric tonnes of impacted soil and 1,211 metric tonnes of hazardous materials, the sampling of water in the excavation and transfer of 40,000 L of water into trenches excavated for this purpose, and the backfilling of the excavation with clean soil from the outside (2,898 metric tonnes) and stockpiled clean soil, and levelling and compaction.

Microscope analysis revealed that natural materials in samples of soil and residual material were dominantly sand with lesser silt and gravel. Residual materials were mainly fragments of slag, concrete, glass, fabrics, plastic, rubber, organic matter and fibers. Proportions of residual materials varied between 32 and 60 % in 12 out of 13 samples.

The analytical results for the 25 soil samples collected from stockpiles showed that 13 samples had metal concentrations above RESC Annex I value, five (5) samples exhibited concentrations between RESC Annex I value and C Criteria of the MDDELCC Policy, and six (6) samples displayed concentrations in the Policy BC range. The results of leachate test on eight (8) samples from stockpiles all exceeded the RMD

criterion for lead. The results for metals in the samples collected from the final bottom and walls of the excavation were in the Policy AB range. The 18 samples collected at the bottom (under residual materials) of the four (4) trenches excavated in the central ditch in order to determine the depth of residual materials by LVM at the location of well 12-PO6, had metal concentrations below the CCME Recommendations for Industrial site and B Criteria of the MDDELCC Policy, hence complying applicable regulation. One (1) of the three (3) composite surface samples collected around the pile located in the wooden area, west of the zone where the test was conducted, had lead and copper concentrations greater than the C Criteria or RESC Annex I value. The material (approximately 3 m<sup>3</sup>) was considered as hazardous material in the sense of the Hazardous Material Regulation.

During the preliminary test, a total of 2,497.42 metric tonnes of metal-impacted soil and hazardous materials were disposed offsite at sites authorized by the MDDELCC.

The water sampled in the excavation showed concentrations for metals, ammoniacal nitrogen, fluorides, nitrites, total PCBs and dioxins and furans above the Federal Interim Groundwater Quality Guidelines (industrial/commercial sites) or the Quebec Policy groundwater criteria (resurgence in surface water or infiltration in sewer).

**Technorem, May 2016b (Ref.: PR15-63)**



## EXECUTIVE SUMMARY

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The site of the former Saint-Germain foundry, located at 1348, 10<sup>e</sup> Rang in Saint-Edmond-de-Grantham (Quebec), was used for metal recycling between 1977 and 2004. Scrap metal was stored directly on the ground before being molten. Site management was under PWGSC responsibility since 2010. Previous environmental studies conducted at the site between 2010 and 2015 revealed the presence of soil with metal concentrations exceeding applicable criteria, and groundwater impacted by metals, ammoniacal nitrogen, fluorides, nitrites and nitrates, and pH.

This report presents the potential methods for the valorization of hazardous materials in order to identify the options applicable for site-scale rehabilitation and to conduct a preliminary test with the retained option.

The rehabilitation objectives set by PWGSC are the CCME Soil Quality Guidelines for industrial sites. Available or emerging technologies were investigated to find management options supplementary to those already presented by LVM in 2013 and 2015.

For hazardous materials, the companies or organizations contacted were: CRIQ, Glencore, ALS Global, UQAM Department of Earth Sciences, SGS Canada, ArcelorMittal Montreal, Zinc Électrolytique Canada, American Iron and Metal, COREM, Clean Earth, Centre Technologique des Résidus Industriels, Terrapure Environnemental, Véolia, Stablex, U.S. Ecology (Detroit) and foundries.

For the management of the contamination soils, the following sites were contacted: Stablex, Enfoui-Bec Inc., Waste Management and Horizon Environnement.

Following a thorough analysis of applicable commercial technologies and market interest, there are few treatment/valorization alternatives enabling the rehabilitation of metal contaminated soil and hazardous materials within the prescribed delay. According to PSGSC criteria which include considering only commercialized technologies and to dispose offsite hazardous materials and contaminated soils, the investigation primarily focused on the excavation and offsite disposal/valorization approach. The only rehabilitation scenario for initiating a preliminary test is as follows:

- Contaminated soil and hazardous material excavation and mineralogical sorting.
- Burying in commercial treatment sites or secure landfill.

Nevertheless, it is possible that some eliminated options for conducting the preliminary test may be adequate to achieve the objectives of the site-scale rehabilitation project.

**CNRC, May 2016 (Ref.: NRC-EME-55767)**



À partir des résultats obtenus, nous recommandons que :

- Pour obtenir une valeur plus juste des matériaux de remblai et des résidus de fonderie, il est recommandé d'évaluer le volume et les types de matériaux >31,5mm.
- Pour revaloriser le site, des travaux préparatoires sont recommandés, soit un nettoyage au «Peigne (de 100 à 200mm)» fixé sur une pelle excavatrice suivi d'un tamisage à 31,5mm par plage de contamination permettant de réduire les tonnages à gérer en matières résiduelles. Le matériel métallique >31,5mm récupéré lors du tamisage pourrait être recyclé vers des centres de recyclage et de récupération. Le matériel métallique <31,5mm pourrait être dirigé vers les consommateurs potentiels pour fin de revalorisation.

## EXECUTIVE SUMMARY

The present report of NRC shows the potential market for the revalorization of residual materials, particularly for eastern North America, and also provides an assessment of the value of residual materials in place at the former St-Germain foundry, located in Saint-Edmond-de-Grantham (Quebec). The main objective of this project is to identify of one or more solutions that would allow the SPAC to manage the nearly 20,271 m3 of residual materials present at this location. The residual materials found at this site are of two types: (1) a silty sand fill mixed, in variable proportion, with foundry residues (slag, ash, bottom ash), and other debris (scrap metal, brick, concrete, glass, ceramic, plastic and wood); and (2) a stockpile of pure foundry residues (slag, ash, bottom ash, various metallic debris). This project fits into a program of environmental management of SPAC to clean up and sell the property of the former St-Germain foundry.

Online materials and tools were used to assess the state of the market. This investigation has allowed us to identify seventy-one (71) companies that demonstrate a potential for the valorization of the smelters residues, in North America. Of these, sixty-five (65) are in Canada and six (6) in the United States. Canadian companies include twenty-one (21) manufacturers / equipment suppliers, twenty (20) brokers and twenty-four (24) potential consumers. For businesses located in Quebec, we count ten (10) potential consumers, nineteen (19) brokers and seventeen (17) manufacturers and equipment suppliers.

In Quebec, the potential consumers are composed of: five (5) smelters / refineries, including: CCR Refinery, CEZinc, General Smelter of Canada, Horne Smelter and Arcelor-Mittal, and five (5) companies of the cement industry: Graymont, Ciment Québec, Lafarge, Holcim, Colacem and CRH Group.

There are five (5) brokers in Quebec able to prepare the residues and / or deliver them to end consumers. These are: Opta Minerals Inc., Minerals Mart Inc., AIM Quebec, Solumet, Harsco Metals & Minerals. Metal recyclers with melting facilities were also identified and include: Rouville Station Inc., A. Bourque Steel & Metals Inc., etc.

The value of foundry residues, mixed and non-mixed with the fill material and other residual material, was evaluated from three (3) samples (POLY 1-1A, 4-1A and EMP-1). As a first step, the samples were tested for radioactivity and these results showed that the residual material is not radioactive. Characterization work was initiated using analytical methods applied in the mining industry including XRF analysis. Characterization analysis and tests were performed only on the size

fraction of <31.5mm. Analysis and testing was not performed on the fraction >31,5mm due to a lack of materials of this size range in the raw sample batches.

The results of ICP-OES / ICP-MS and XRF semi-quantitative analyses show that:

- Aluminium, with an average concentration of 30%, and iron, from 4.5 to 6.6%, are interesting for the cement industry.
- However, such concentrations of aluminum are harmful for some smelters and refineries.
- Copper has an average concentration of 3% with maximum concentrations of 40000 to 53000ppm (e.g. 4 to 5,3%) in fractions between 0,425mm and 20mm and up to 88900ppm (nugget effect) in the fraction >20mm.
- Zinc has a generally constant average concentration of 1.3% (between 1 and 3%).
- The average silver content is 33ppm, and appears constant in all size fractions analyzed except it is a little higher in the coarse fractions of EMP-1.
- Gold is at an average 0,9ppm content except for a single portion of the EMP-1 sample with a single value of 3.61 ppm (sample EMP1-AE-A4).
- Analysis by ICP-OES / ICP-MS do not exhibit high levels for platinum, palladium, rhodium. No concentration of rare earths is significant in all analyzed batches.
- The lead concentration averages 6000ppm in the 3 sample batches, varying from 161 to 24900ppm.
- Arsenic is 7 to 64ppm in EMP-1 and 5 to 25ppm in the backfill samples POLY and POLY 1-1A 4-1A. The antimony ranges from 12 to 1340ppm. Bismuth concentrations range from 0.5 to 23ppm. As, Sb and Bi are undesirable for metallurgical processes.
- Concentrations observed for beryllium are from 1.25 to 4,59ppm and below 0,6ppm for mercury. Fluorides ranged from <10 to 55ppm, except for a value of 512ppm measured in one of the granulometric fractions analyzed from one sample. Chlorides vary from 23 to 196ppm.
- The Sulfur contents are very low (0.5 to 3.1ppm), and do not contaminate the soil, the metals being present as oxides and not as sulfides.

Also, the analytical results show that:

- There is a contamination with dioxins and furans of the fill material samples (Poly 1-1A and POLY 4-1A) beyond the RESC whereas EMP-1 (foundry residues) is rated B-C.
- From an environmental point of view, the residual waste is classified as hazardous material because of lead values beyond the criteria of 5 mg / L. The value sample lead leachate is 7,49 mg /L for EMP-1; 38,5mg/L for POLY 4-1A and 76.9 mg / L for POLY 1-1A.

From the analysis of thin sections, Cu is present in metallic or oxide form. Cu and Zn, very finely grained, are present either as single metal or alloy (especially Cu). This type of occurrence is amenable to extractive metallurgy with inexpensive and non-aggressive physical methods: e.g. gravity methods, magnetic methods, etc.; coupled with a sieving method because the phases of interest are very fine-grained. If more aggressive methods were to be used, a leaching technique would be appropriate because it could extract very fine metals.

The maximum potential value of the fill material and the stack of foundry residues, calculated on the basis of an average copper concentration of 3%, is \$ 6,637,864. With recovery of Pb, Zn, Ag and Au in addition to Cu, the estimated maximum potential value is \$ 10,459,039 (excluding soil classified A-B).

The cost of environmental management (excavation, transport and disposal off-site of the soil and non-hazardous and hazardous waste) is estimated by SPAC at nearly \$ 10 million.

Based on the results, we recommend that:

- For a complete evaluation of the value of the fill materials and the foundry residues, it is recommended to evaluate the volume and types of materials bigger than 31,5mm diameter.
- To initiate the revalorization of the site, preparatory work is recommended, such as raking with a "Comb (from 100 and 200mm)" fixed to an excavator followed by sieving at 31,5mm in order to reduce tonnages of residual materials. The metallic debris >31,5mm recovered during the sifting could be recycled to the centers for recycling and recovery. The metallic residues and debris smaller than 31,5mm could be directed to the potential consumers for valorization.

**Enviroservices, June 2016 (Ref.: 398-061)**



## EXECUTIVE SUMMARY

As part of its management of the Saint-Germain Foundry site which was transferred to Public Services and Procurement Canada (PSPC) in 2010, the site was considered as being contaminated and could thus potentially present health and safety concerns for the residents of the surrounding sector. Immediately upon transfer of the site to the PSPC, measures were implemented to assure the protection of both the public and the environment. Since 2010, Phase I, II and III Environmental Site Assessments (ESA) have been conducted on site, as well as surface and groundwater monitoring programs.

The site, located at 1348, 10<sup>e</sup> Rang in Saint-Edmond-de-Grantham, was occupied by a metal salvage industry between 1977 and 2004. Various metallic wastes, such as electrical wire, car parts, batteries and other components containing variable amounts of metal, were generally stored directly on the ground and then burned in an oven or in open air installations. Accelerants, such as used oil or tires were also used. Although the former structures have since been demolished, a tarp-covered stockpile of residues is still present on site.

With the environmental quality of the site as well as the contamination plume having been defined, procedures have been initiated towards undertaking the site remediation. Following the results of a remediation pilot study, a timeline for the remediation work has been established, culminating in 2018. The remediation objective within the identified contamination area and including the peripheral drainage ditch is the CCME's Recommendations for an industrial site use. The wooded area exhibiting airborne contamination is not included in the current mandate.

An ecological characterization study undertaken in parallel identified the drainage ditch on the periphery of the former industrial site as a fish habitat. The study, carried out in 2014 by Groupe Hémisphère, also identified eight (8) designated species, as defined by Appendix 1 of the Species at Risk Act, potentially present on the site.

Thus, according to the description of the recommended works as well as the human, biological and physical environment at the site, apprehended effects have been identified for the following components: noise and vibrations, air, soil and water quality, aquatic and terrestrial fauna and flora as well as aviary fauna, neighboring residents and transportation. No effect is apprehended to sediments quality since remediation work will be carried out to the ditch bed. Also, no designated flora specie is present on site and it is considered that fauna species will avoid the work area. No effect is thus apprehended. The site being a private property and not being part of an indigenous reserve, no effect is hence apprehended pertaining to recreational tourism or use of lands for traditional purposes by indigenous people. Mitigation measures have been elaborated for undertaking work in wet conditions if the drainage ditch is not dried. Also, recommendations for reconstruction of the ditch back to its original state have been transmitted to continue its use as a fish habitat following the completion of the works.

## **APPENDIX C**

### **BID FORM**

**BID FORM**

Date July 21, 2016  
 Client Public Services and Procurement Canada - Quebec Region  
 Project Environmental Remediation Work - Remediation of the St-Germain Foundry  
 Site Saint-Edmond-de-Grantham (Quebec)  
 Project R. 057850.101

1- Fixed Price		Global Lump Sum <sup>(2)</sup>
Section No.	Description	
11.2.1	Site organization and project monitoring	
11.2.2	Deforestation	
11.2.3	Deliverables	
11.2.4	Water management, treatment and disposal	
11.2.5	Fence removal	
11.2.6	Abandoned supply well dismantling and plugging	
11.2.7	Restoration and final clean-up of the site	
<b>Total (A) <sup>(1)</sup></b>		

2- Unit Price					
Section No.	Description	Unit	Estimated Quantity <sup>(3)</sup> and <sup>(4)</sup>	Unit Price <sup>(2)</sup>	Total Unit Cost <sup>(1)</sup>
11.3.1	Excavation, segregation, screening, transport and disposal/recovery of non-hazardous residual material (concrete slabs, foundations and others)	t	750	\$	\$
11.3.2	Excavation, segregation, screening, temporary storage, transport and disposal/recovery of hazardous residual material	t	21,000	\$	\$
11.3.3	Excavation, segregation, screening, temporary storage, transport and disposal/recovery of soil "A-B"	t	2,400	\$	\$
11.3.4	Excavation, segregation, screening, temporary storage, transport and disposal of soil "B-C"	t	8,000	\$	\$
11.3.5	Excavation, segregation, screening, temporary storage, transport and disposal of soil "C-RESC"	t	11,500	\$	\$
11.3.6	Excavation, segregation, screening, temporary storage, transport and disposal of soil "≥ RESC"	t	2,500	\$	\$
11.3.7	Excavation, segregation, screening, temporary storage, transport and disposal of soil "≥ RESC dioxins and furans"	t	2,800	\$	\$
11.3.8	Excavation, segregation, screening, temporary storage, transport and disposal of soil "≥ RESC mixt"	t	2,500	\$	\$
11.3.9	Excavation, temporary storage and filling with excavated material from the site	m <sup>3</sup>	800	\$	\$
11.3.10	Filling with clean borrowed material	t	17,700	\$	\$
<b>Total (B) <sup>(1)</sup></b>					
				<b>TOTAL A + B <sup>(1)</sup></b>	

**Notes:**

- <sup>(1)</sup> The sales taxes (GST and QST) are not included
- <sup>(2)</sup> Prices submitted by bidders are fixed for the entire length of the contract and include all the following elements : manpower, materials, installation of all that is required to carry out, build and carefully complete all the works according to state of the art practices, including all administration and general fees, profits, customs duty, permits, licenses, royalties and all other indirect or direct costs. All costs necessary to the mandate realisation which are not identified need to be included in the fixed price "Site organization and project monitoring". (Section 11.2.1).
- <sup>(3)</sup> The following density values were used for estimation of quantities expressed in metric tons:
  - Non-hazardous residual material: 2,400 kg/m<sup>3</sup>
  - Hazardous residual material: 1,730 kg/m<sup>3</sup>
  - *In situ* soils: 2,200 kg/m<sup>3</sup>
  - Borrowed material: 1,800 kg/m<sup>3</sup>
- <sup>(4)</sup> An increased charge of 10% is included in estimated quantities

Signature of the Contractor

Company

Date

## **APPENDIX D**

### **RECOMMENDATIONS FOR THE EXECUTION OF WORK IN A WATERLOGGED AND FOR EXCAVATION WATER PUMPING OR DITCH DRAINAGE**



# **RECOMMANDATIONS FOR THE EXECUTION OF WORK IN A WATERLOGGED DITCH AND FOR EXCAVATION WATER PUMPING OR DITCH DRAINAGE**

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## **1 GENERAL MEASURES**

- If work is carried out without the installation of a cofferdam, they must be carried out between September 1<sup>st</sup> and March 15<sup>th</sup> to avoid the fish spawning and reproduction period of the species present in the peripheral ditch.
- Install a cofferdam at the junction of the peripheral and dividing ditches between September 1<sup>st</sup> and the beginning of winter in order to avoid use of the peripheral ditch as a habitat by fish come spring.
- Restrict in time the duration of work and respect city standards as to working hours.
- Access the work zone by the access road leading from the 10e Rang. Work will be carried out from PSPC's property as much as possible.
- Restrict work to the work zone while reducing airborne contamination to a minimum.
- Carry out remediation work in the peripheral ditch while it is naturally dry or mechanically rendered dry.

## **2 SITE PREPARATION BEFORE EXCAVATION WORK**

### **2.1 DITCH ACCESS**

- Avoid machinery travail on the ditch bed or its immersion before the peripheral ditch's drainage.

### **2.2 WOOD CLEARING AND SOIL PREPARATION**

- Cut trees on the embankment top of the ditch of the excavation zone and dispose of the tree trunks, branches and stumps in an authorized site.
- Reprofile the ditch's embankment so as to avoid erosion.
- Do not carry out landscaping work close or in the ditch during floods or heavy rains.
- Do not throw debris in the ditch. All debris accidentally introduced in the ditch must be removed as soon as possible.

### **2.3 INSTALLATION OF A BARRIER AT THE PERIPHERAL AND DIVIDING DITCHES' JUNCTION TO ISOLATE THE SITE BEFORE WINTER**

Two (2) choices are available to the contractor:

- Installation of a cofferdam for the complete draining of the peripheral ditch to carry out the work.
- Installation of a 15 cm-high cofferdam from the dividing ditch's bed and a metallic mesh with a 0.5 cm maximum grid and 50 cm height above the cofferdam, which will allow water to drain from the peripheral ditch without allowing fish to go upstream.

In both cases, temporary structures must be conceived in a way as to limit sediment input risks, and thus, be resistant to flood.



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### 2.3.1 WATERTIGHT COFFERDAM

The installation of a lined cofferdam is necessary at the junction between the ditch that will be excavated and the dividing ditch that flows in the drainage ditch on 10e Rang in order to avoid upstream fish and waterflow during work. Four (4) types of cofferdams are available. For a description and installation method for each type of cofferdam, please refer to the *Guide d'aménagement des ponts et des ponceaux en milieu forestier* of the *Ministère de l'Énergie et des Ressources naturelles (MERN)*. Cofferdam types are the following:

- Rubber tubes;
- Rockfill;
- Sheetpiles;
- Concrete blocks.

### 2.3.2 15-CM COFFERDAM AND MESH

The installation of a 15 cm-high cofferdam from the dividing ditch's bed topped with a metallic mesh may also be done; refer to section 2.3.1 for types and installation methods. The metallic mesh of maximum grid 0.5 cm and minimum 50 cm height must be installed above the 15 cm cofferdam while making sure no space is between the two and no space is between the ditch's embankment and the mesh or cofferdam. The periodical inspection of the temporary structure is necessary to ensure the removal of all debris caught in the metallic mesh and to ensure its positioning in the ditch so there are no spaces for the fish to pass through to the peripheral ditch.

## 2.4 ELECTROFISHING

Following the installation of a barrier at the dividing and peripheral ditches' junction, the removal of all fish species present in the peripheral ditch must be carried out before the beginning of the remediation work. Electrofishing, done upstream to downstream, would ensure this step's success. To do so, a permit must be obtained from the *Ministère des Forêts, de la Faune et des Parcs (MFFP)* beforehand. The individuals thus caught will be released downstream from the cofferdam in open water. As possible, amphibian individuals must also be moved.

## 3 EXCAVATION WORK AND WATER MANAGEMENT DURING WORK

During excavation work in the work area and the peripheral ditch, all removed materials will be disposed in Ministry accredited disposition sites. If stockpiling the materials is necessary, it should be done outside the shoreline and banks, at 10 meters of all ditches to avoid contamination of underlying soils, and avoid stockpile exposure to rain and wind.

### 3.1 WEATHER FORECAST AND ENVIRONMENT

- Avoid periods of heavy rain and floods to carry out the work.
- Minimize duration of work in ditches and tasks in proximity to ditches.
- Dampen as needed the access road's surfaces to reduce dust emissions with a cistern.



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- An emergency petroleum product spill kit must be available at all times on the worksite. Soils contaminated by an accidental spill must be recovered as soon as possible and disposed in an authorized site.

### **3.2 MACHINERY PROCEDURES, MAINTENANCE AND STORAGE**

- Remove, as much as possible, according to the slope and the stability of the embankment, all machinery from the ditch to be excavated and the dividing ditch as soon as it is no longer used.
- Switch off the engine, while machinery is unused, to minimize exhaust gases and noise generated.
- The machinery must be verified and cleaned before use to avoid all contaminant leaks (oil, gas, grease). Maintenance and cleaning must be carried out at least 30 m from any ditch.
- Favor machinery and material storage in places already bare.

### **3.3 TOTAL OR PARTIAL DRAINAGE OF THE PERIPHERAL DITCH BY PUMPING**

If there is water present in the peripheral ditch before the beginning of the ditch's excavation work, its total or partial drainage will be necessary. There exists many techniques to dry a site, however, by pumping is the most appropriate for the current project.

Before the starting to pump, the water in the peripheral ditch must be sampled and analyzed in laboratory to determine management options. It is recommended to proceed with a comparison with surface water criteria « Aquatic life protection (acute effect) » (*Protection de la vie aquatique (effet aigu)*) of the MDDELCC and criteria « For consumption purposes » (*Aux fins de consommation*) of the MDDELCC's Politic.

Waters will have to satisfy the most restrictive of these references in order to be considered for discharge directly in the dividing or drainage ditch, in the exterior decantation basin or on the vegetation-covered soils, as described in the following sections, 3.3.1 to 3.3.3. If not, water will have to be treated before discharge, disposed in an authorized treatment center or discharged in the south peripheral ditch section fitted as a retention basin, as described in sections 3.4 and 3.4.1.

- If all discharge criteria are met, the pump must be installed upstream of the worksite in a natural depression, so as to reduce sediment suction.
- A mechanism must be installed to avoid live amphibian organism suction still in the peripheral ditch:
  - Submersible pump: fitted with a rock bed around it;
  - Non submersible pump: fitted with a sieve at the end of the pipe.
- Three (3) techniques are available for pumped water disposal, if it respects discharge criteria.

#### **3.3.1 DITCH DISCHARGE**

- At the pumped water's discharge point, a geotextile membrane must be deposited on the ditch's bed to prevent erosion of the bed and banks. The geotextile membrane must start at the discharge pipe's extremity and cover a distance of at



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least 5 meters on the ditch's bed. The water stream coming from the pipe must not erode the banks and bed or return to suspension sediments; the flow must then be adjusted consequently.

### **3.3.2 EXTERIOR DECANTATION BASIN**

- A shallow excavation, approximately 15 cm deep, must be dug in a place where soils are not contaminated and be in proximity of a ditch. Straw bales must be installed within the excavation's perimeter and a geotextile membrane placed at the bottom of the excavation and over the straw bales to create a basin. The pumped water discharge in this decantation basin will then percolate in the soil.
- The geotextile membrane must be inspected and replaced regularly. An important sediment quantity could clog the geotextile and prevent flow.
- Straw bales may also be placed inside the basin on top of the geotextile membrane. Straw bales allow a higher water flow than the membrane, but have a lower filtration efficiency. The positioning of straw bales inside the geotextile will allow for less frequent maintenance activities since the water will be prefiltered.

### **3.3.3 DISCHARGE ON VEGETATION COVERED SOIL**

- Pumped water must be discharged at least 20 meters away from all ditches in a place where soils are not contaminated and covered by vegetation to avoid sediment overload.

## **3.4 WATER INFILTRATION IN EXCAVATIONS OF THE WORKZONE**

Infiltration water can come from the water table or from the cofferdam. This water must be sampled and submitted to laboratory analyses in order to determine the management method. In the case of non compliance to discharge criteria, the water which could be sediment laden will either be:

- Treated to achieve compliance with discharge regulations to then be disposed according to one of the techniques described in sections 3.3.1 to 3.3.3;
- Stored and adequately disposed of; or
- Discharged in the south peripheral ditch if conditions stated in section 3.4.1 are met.

### **3.4.1 USE OF THE SOUTH PERIPHERAL DITCH AS INFILTRATION BASIN**

Waters that do not comply with discharge criteria could be pumped in the south part of the peripheral ditch, if and only if all the following conditions are met:

- The south part of the ditch has been isolated by two (2) cofferdams; four (4) types of cofferdams may be used as described in section 2.3.1;
- Electrofishing, as described in section 2.4, was carried out on the whole peripheral ditch, including the isolated part;
- The pumped water's suspended matter concentration does not exceed 25 mg/l;
- No water overflow is allowed;
- The temporary structures were designed to limit the risk of sediment input and thus, be resistant to floods.



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### **3.5 EROSION CONTROL**

The excavated ditch's embankment walls left bare must be protected against erosion, as the work progresses. The selected and installed structures to control erosion and turbidity must be efficient and removed last. Two (2) recognized techniques are available, the sediment barrier and straw bales. Any technique to control ditch walls erosion submitted by the contractor needs to be approved in advance.

#### **3.5.1 Sediment barrier**

- Dig a 15 cm x 15 cm trench along the site's lowest perimeter.
- Unroll the sediment barrier while installing stakes downstream.
- Drive in the stakes until the first staple is at 5 cm from the bottom of the trench.
- Spread the membrane on the bottom of the trench, backfill and compact.
- Anchoring may also be done by spreading the membrane directly on the soil without digging a trench, piling and compacting soil on top of the geotextile's flap.
- Rolls can be attached to each other by installing the first stake of the new roll inside the already installed barrier, next that one's last stake.

#### **3.5.2 Straw bales**

- Dig a 15-cm deep trench by the straw bale's width along the site's lowest perimeter.
- Install straw bales inside the trench.
- Backfill and compact soil upstream of the straw bales.
- Place stakes in the straw bales' center at 1.5 m intervals.
- If necessary, add a geotextile membrane upstream from the straw bales while making sure to bury the bottom in compacted soil.

## **4 RETURN TO ORIGINAL STATE OF PREMISES**

- The level and width of the ditch's bed must be returned to the original ones by backfilling with soils of same type and grain size. A gentle slope toward the dividing ditch must be present to ensure water flow to the drainage ditch. The peripheral ditch's embankments that will have undergone remediation work must be returned to gentle slopes.
- Banks must returned to original using stabilisation techniques using vegetation recognized for considering stability, erosion sensitivity, slope and embankment height. Revegalisation must be started as soon as possible after landscaping and earthworks have been completed and erosion control blankets must be installed to stabilise bare soils.
- A sheet of dead leaves must coat the ditch's bed.
- On the banks' top, indigenous trees, with the exception of ash, whose diameter is at least 5 cm at a height of 1.4 m from the soil, must be planted by 5 meter intervals with a support and rodent protection, to create areas of shade and an input of organic matter in the ditch.
- Finish stabilisation work before restoring normal water flow.

Based on final elevation of the site after remediation work, adjustments may be needed to these methods.

## **APPENDIX E**

### **MITIGATION MEASURES SUMMARY CHART**

MITIGATION MEASURES AND RESIDUAL EFFECTS			
ENVIRONMENTAL COMPONENTS AFFECTED BY THE PROJECT	DESCRIPTION OF THE COMPONENTS OR ACTIVITIES OF THE PROJECT	DESCRIPTION OF ENVIRONMENTAL EFFECTS	MITIGATION AND/OR COMPENSATION MEASURES
			DESCRIPTION AND SIGNIFICANCE OF RESIDUAL EFFECTS
<b>1 Noise and Vibration</b>			
Preparatory Activities	Mobilization and demobilization	Generation of noises and vibrations caused by heavy equipment	<ul style="list-style-type: none"> <li>Plan work during regular working hours in compliance with municipal requirements;</li> <li>Avoid engine idling as much as possible;</li> <li>Limit use of engine brake to a minimum during shipment of equipment and material.</li> </ul>
	Installation of an access road and a temporary weigh scale		
Remediation Work	Demolition of concrete slabs		
	Removal of trees on both sides of the peripheral ditch		
	Re-profiling of the inner slopes		
	Excavation and dewatering of contaminated sediments		
	Excavation, screening, and piling up of contaminated soil		
Restoration of the site			
Restoration of the ditch			
Management of the foundry residues, and contaminated soil and sediments			
<b>2 Quality of Air</b>			
Preparatory Activities	Mobilization and demobilization	Emission of atmospheric contaminants or particles in air	<ul style="list-style-type: none"> <li>Inspect equipment to verify proper operation and maintain it in compliance with the applicable recommendations;</li> <li>Shut equipment off if stationary or not used;</li> <li>Cover with a tarp all material stored on site, including dry material, demolition residues, excavated contaminated soil and sediments, and hazardous residual material;</li> <li>Cover excavated contaminated soil if they are stockpiled on site prior to their disposition;</li> <li>Avoid conducting excavation activities during high wind periods;</li> <li>Clean public ways regularly.</li> </ul>
	Installation of an access road and a temporary weigh scale		
Remediation Work	Demolition of concrete slabs		
	Excavation, screening, and piling up of contaminated soil		
	Restoration of the site		
Restoration of the ditch			
Management of the foundry residues, and contaminated soil and sediments			
Spills/leaks			

MITIGATION MEASURES AND RESIDUAL EFFECTS			
ENVIRONMENTAL COMPONENT AFFECTED BY THE PROJECT	DESCRIPTION OF THE COMPONENTS OR ACTIVITIES OF THE PROJECT	DESCRIPTION OF ENVIRONMENTAL EFFECTS	MITIGATION AND/OR COMPENSATION MEASURES
<b>3 Quality of Sediments</b>			
		No effect anticipated due to the sediments remediation work	
<b>4 Quality of Soil</b>			
Preparatory Activities	Mobilization and demobilization		<ul style="list-style-type: none"> <li>Inspect equipment to verify proper operation and maintain it in compliance with the applicable recommendations;</li> <li>Limit movements of equipment outside the planned routes to avoid useless compaction of soil and spread of contamination;</li> <li>Clean wheels of trucks before getting them out of the working area, if needed, to avoid spreading contamination;</li> <li>Use clean material from known quarries and sand pits during filling and set up of the access road;</li> <li>Opt for sediments and foundry residues recovery;</li> <li>Do not stockpile contaminated sediments directly onto the ground, but rather into a sealed container allowing for water dripping and recovering;</li> <li>Excavate soil and hazardous residual material according to their modelled contamination level based on the results from the previous characterizations, and adapting to conditions met if different from the expected conditions;</li> <li>Place contaminated material and hazardous residual material on impermeable tarps and cover them with tarps if immediate disposition to an authorized disposal center is not possible;</li> <li>Recover dripping water avoiding infiltration in soil and assess environmental quality to select a management mode.</li> </ul>
	Installation of an access road and a temporary weigh scale		
Remediation Work	Removal of trees on both sides of the peripheral ditch	Compacting and stripping of the soil using heavy equipment	Negligible negative effects
	Re-profiling of the inner slopes	Contamination of soil with imported material	
	Excavation and dewatering of contaminated sediments	Contamination of soil due to a poor management of excavated material	
	Restoration of the site	Contamination with petroleum hydrocarbons	
	Management of the foundry residues, and contaminated soil and sediments		
Accidents	Spills/leaks		

MITIGATION MEASURES AND RESIDUAL EFFECTS			
ENVIRONMENTAL COMPONENT AFFECTED BY THE PROJECT	ENVIRONMENTAL COMPONENT AFFECTED BY THE PROJECT	ENVIRONMENTAL COMPONENT AFFECTED BY THE PROJECT	DESCRIPTION AND IMPORTANCE OF RESIDUAL EFFECTS
<b>5 Quality of Water</b>			
Preparatory Activities	Implementation of protective measures	Deposition of atmospheric contaminants Resuspension of sediments and particulates Contamination of water due to a poor management of residual material and excavated contaminated soil Contamination of water due to a poor management of infiltration water and rainwater Contamination with petroleum hydrocarbons	<ul style="list-style-type: none"> <li>▪ Use material that is clean upon arrival on site for filling activities;</li> <li>▪ Recover immediately any floating debris and retrieve from water;</li> <li>▪ Avoid storing any material near water to prevent leaching and so they are not carried by the wind</li> <li>▪ Avoid working during bad weather conditions to prevent dust dispersion;</li> <li>▪ Raise workers' awareness not to return unnecessarily to suspension the sediments of the hydrous environment bed during work;</li> <li>▪ Excavate soil according to their contamination level;</li> <li>▪ Place contaminated soil onto impermeable tarps and cover with tarps if immediate disposition is not possible;</li> <li>▪ Recover infiltration water and rainwater, and submit to analyses prior to discharging according to techniques described in sections 3.3.1 to 3.3.3 of Appendix 6. Parameters to be analysed are metals, ammonia nitrogen, fluorides, nitrites, pH, chlorides and nitrates-nitrites. If exceedances, refer to section 3.4 of Appendix 6;</li> <li>▪ Clean and maintain machinery at more than 30 m from the bank of ditches;</li> <li>▪ Do not store machinery at less than 30 m from the shore or a water stream nor circulate on hydrous environments beds;</li> <li>▪ Keep on monitoring groundwater after the end of remediation work.</li> </ul>
	Demolition of concrete slabs		
Remediation Work	Excavation and dewatering of contaminated sediments		
	Pumping and management of contaminated water		
Accidents	Spills/leaks		

MITIGATION MEASURES AND RESIDUAL EFFECTS			
ENVIRONMENTAL COMPONENT AFFECTED BY THE PROJECT	ENVIRONMENTAL COMPONENT AFFECTED BY THE PROJECT	ENVIRONMENTAL COMPONENT AFFECTED BY THE PROJECT	DESCRIPTION AND IMPORTANCE OF RESIDUAL EFFECTS
<b>6 Aquatic Fauna and Flora</b>			
Preparatory Activities	Implementation of protective measures		<p>Work when ditch is dry:</p> <ul style="list-style-type: none"> <li>Prior to the beginning of work and following the dewatering of the ditch, install a cofferdam into the common ditch to prevent the upstream migration of ichthyological species and inflow of water;</li> <li>Perform work outside the restriction periods required by DFO, when appropriate;</li> <li>Recover immediately any floating debris and retrieve from water;</li> <li>Avoid storing any material near water to prevent leaching and so they are not carried by the wind</li> <li>Avoid working during bad weather conditions;</li> <li>Raise workers' awareness not to return unnecessarily to suspension the sediments of the hydrous environment bed during work;</li> <li>Clean and maintain machinery at more than 30 m from the bank;</li> <li>Do not store machinery at less than 30 m from the shore or a water stream nor circulate on hydrous environments beds;</li> <li>Conduct monitoring program to ensure site naturalization.</li> </ul> <p>Work when ditch is wet, for which complete measures are attached to Appendix 6 of the environmental effects assessment:</p> <ul style="list-style-type: none"> <li>Perform work between September 1<sup>st</sup> and March 15<sup>th</sup> to avoid the spawning and reproduction season of fish species present into the ditch;</li> <li>Prevent machinery from circulating onto the bottom of the ditch or being immersed before ditch dewatering;</li> <li>Install cofferdams at strategic points to prevent inflow of water, and dewater bed by pumping toward downstream, ensuring sediments are retrieved using appropriate measures. Discharge water shall meet applicable criteria;</li> <li>Electro fish from upstream to downstream, and release individuals into the common ditch downstream from the cofferdams.</li> </ul>
Remediation Work	Pumping and management of contaminated water	Disturbance of individuals Modification of the habitat Contamination with petroleum hydrocarbons	Negligible negative effects
Accidents	Spills/leaks		



ENVIRONMENTAL COMPONENT AFFECTED BY THE PROJECT		DESCRIPTION OF THE COMPONENTS OR ACTIVITIES OF THE PROJECT	DESCRIPTION OF ENVIRONMENTAL EFFECTS	MITIGATION AND/OR COMPENSATION MEASURES	DESCRIPTION AND SIGNIFICANCE OF RESIDUAL EFFECTS
<b>7 Terrestrial Fauna and Flora</b>					
Preparatory Activities	Mobilization and demobilization	Installation of an access road and a temporary weigh scale	Generation of noises and vibrations caused by machinery Compacting and stripping of the soil using heavy equipment Contamination of soil during stockpiling and excavation of contaminated sediments and soil Contamination of soil with petroleum hydrocarbons	<ul style="list-style-type: none"> <li>Limit movements of equipment outside the planned routes to avoid useless compaction of soil and spread of contamination;</li> <li>Shut equipment off if stationary or not used;</li> <li>Do not stockpile contaminated sediments directly on the ground, but rather into a sealed container to enable water dripping and recovery;</li> <li>Place contaminated soil on impermeable tarps and cover them with tarps if immediate disposition to an authorized disposal center is not possible.</li> </ul>	Negligible negative effects
	Remediation Work	Demolition of concrete slabs Removal of trees on both sides of the peripheral ditch Re-profiling of the inner slopes Excavation and dewatering of contaminated sediments Pumping and management of contaminated water Excavation, screening, and piling up of contaminated soil Restoration of the site Restoration of the ditch Management of the foundry residues, and contaminated soil and sediments Spills/leaks			
<b>8 Avifauna</b>					
Preparatory Activities	Mobilization and demobilization	Installation of an access road and a temporary weigh scale	No effect is anticipated due to the presence of wooded lands close from the site.		
	Remediation Work	Demolition of concrete slabs Removal of trees on both sides of the peripheral ditch			



MITIGATION MEASURES AND RESIDUAL EFFECTS			
ENVIRONMENTAL COMPONENT AFFECTED BY THE PROJECT	DESCRIPTION OF THE COMPONENTS OR ACTIVITIES OF THE PROJECT	DESCRIPTION OF ENVIRONMENTAL EFFECTS	MITIGATION AND/OR COMPENSATION MEASURES
<b>9 Special Status Species</b>			
Preparatory Activities	Mobilization and demobilization	Perturbation resulting from noise and increased traffic	<ul style="list-style-type: none"> <li>Mitigation measures listed at the terrestrial species Section shall be implemented.</li> </ul>
	Installation of an access road and a temporary weigh scale		
	Demolition of concrete slabs		
	Removal of trees on both sides of the peripheral ditch		
	Re-profiling of the inner slopes		
	Excavation and dewatering of contaminated sediments		
	Pumping and management of contaminated water		
	Excavation, screening, and piling up of contaminated soil		
	Restoration of the site		
	Restoration of the ditch		
Remediation Work	Management of the foundry residues, and contaminated soil and sediments	Negligible negative effects	
	Spills/leaks		
<b>10 Residents of the sector</b>			
Preparatory Activities	Mobilization and demobilization	Increased noise and dust, and heavy equipment increased traffic	<ul style="list-style-type: none"> <li>Limit use of engine brake to a minimum during shipment of equipment and material.</li> <li>Shut equipment off if stationary or not used;</li> <li>Plan work during regular working hours in compliance with municipal requirements;</li> <li>Clean public ways regularly.</li> </ul>
	Installation of an access road and a temporary weigh scale		
Remediation Work	Demolition of concrete slabs	Negligible negative effects	
	Restoration of the site		
	Restoration of the ditch		
Management of the foundry residues, and contaminated soil and sediments			

MITIGATION MEASURES AND RESIDUAL EFFECTS			
ENVIRONMENTAL COMPONENT AFFECTED BY THE PROJECT	DESCRIPTION OF THE COMPONENTS OR ACTIVITIES OF THE PROJECT	DESCRIPTION OF ENVIRONMENTAL EFFECTS	MITIGATION AND/OR COMPENSATION MEASURES
11	Transportation		
Preparatory Activities	Mobilization and demobilization	Heavy equipment increased traffic	<ul style="list-style-type: none"> <li>Install proper road signs and markings on the route used by heavy trucks and machinery.</li> </ul>
	Installation of an access road and a temporary weigh scale		
	Demolition of concrete slabs		
	Restoration of the site		
	Restoration of the ditch		
Remediation Work	Management of the foundry residues, and contaminated soil and sediments		Negligible negative effects
12	Recreotourism	No recreotouristic activity carried out on site or in a 1-km radius of influence	
13	Lands Used by Natives for Traditional Purposes	No land with native usage is located close to the site.	



MITIGATION MEASURES AND RESIDUAL EFFECTS					
ENVIRONMENTAL COMPONENT AFFECTED BY THE PROJECT	DESCRIPTION OF THE COMPONENTS OR ACTIVITIES OF THE PROJECT	DESCRIPTION OF ENVIRONMENTAL EFFECTS	MITIGATION AND/OR COMPENSATION MEASURES		
			DESCRIPTION AND SIGNIFICANCE OF RESIDUAL EFFECTS		
1.4 Accidents and Failures	Preparatory Activities	Mobilization and demobilization	<ul style="list-style-type: none"> <li>▪ A response plan shall be planned prior to the beginning of work and communicated to and known by all participants;</li> <li>▪ Accidental spills shall be reported to the environmental emergency line of Environment and Climate Change Canada, 1-866-283-2333;</li> <li>▪ Vehicles maintenance, gas fueling, and fuel and other hazardous material storage shall be done, as much as possible, 30 meters for the drainage ditches. If the distance cannot be respected, containment precautions shall be applied. Moreover, emphasis should be placed on using equipment requiring a specifically designed biodegradable vegetable;</li> <li>▪ Waste oil and waste resulting from machinery use and maintenance are stored and disposed of in compliance with applicable provincial regulation;</li> <li>▪ Equipment used shall be clean, with no indication of hydrocarbons leak, and inspected regularly during work;</li> <li>▪ A response kit in case of accidental hydrocarbons spills shall be present on site;</li> <li>▪ Employees working on field shall have received the appropriate training in case of an environmental emergency. The person in charge of the field shall be immediately advised of the incident;</li> <li>▪ Soil, sediments or filling material, as the case may be, contaminated by an accidental spill shall be piled up onto impermeable tarps and covered with impermeable tarps, sampled according to the volume of soil concerned to cadences in compliance with the <i>Guide d'échantillonnage à des fins d'analyses environnementales, Cahier 5</i>, submitted to chemical analysis in laboratory: petroleum hydrocarbons C<sub>10</sub> to C<sub>30</sub>, polycyclic aromatic hydrocarbons (PAHs) and volatile organic compounds (VOCs), and managed in compliance with the guidelines of the MDDELCC's <i>Grille de gestion des sols contaminés excavés</i> or the applicable regulation, and transported to an authorized site;</li> <li>▪ Water contaminated by an accidental spill shall be confined to be characterized or directly taken over by a specialised company that will send it to a treatment center approved by the MDDELCC.</li> </ul>	Negligible negative effects	
		Installation of an access road and a temporary weigh scale			
		Implementation of protective measures			
		Demolition of concrete slabs			
		Removal of trees on both sides of the peripheral ditch			
		Re-profiling of the inner slopes			
		Excavation and dewatering of contaminated sediments			Soil, filling material and surface water can be locally contaminated by a petroleum products spill from the machinery used for work or material transportation.
		Pumping and management of contaminated water			
		Excavation, screening, and piling up of contaminated soil			
		Restoration of the site			
Restoration of the ditch					
Management of the foundry residues, and contaminated soil and sediments					
Spills/leaks					
Accidents					

## **APPENDIX F**

### **MONITORING FORM**

## MONITORING FORM

PROJECT IDENTIFICATION	
<b>Location:</b>	Foundry Saint-Germain
<b>Type of work:</b>	Contaminated Soil and Sediments Remediation
<b>Date of work:</b>	2016-2018
<b>Date of monitoring:</b>	
<b>Monitoring activity :</b>	Visit on field during work
	Other monitoring activity (specify):

MITIGATION MEASURES	TO PROVIDE		MEASURE CARRIED OUT	COMMENTS (If not carried out or N/A, explain)
	Photos	Document	Yes No N/A	
<b>Quality of air and noise</b>				
Plan work to carry out during regular working hours and in compliance with municipal requirement				
Avoid engine idling as much as possible				
Limit use of engine brake to a minimum during shipment of equipment and material				
Inspect equipment to verify proper operation and maintain it in compliance with the applicable recommendations				
Shut equipment off if stationary or not used				
Cover all material stored on site, including dry material, demolition residues, excavated soil and sediments, and hazardous residual material, with a tarp				
Cover excavated contaminated soil if they are stockpiled on site prior to their disposition				
Do not conduct excavation activities during high wind periods				
Clean public ways regularly				

MITIGATION MEASURES	TO PROVIDE		MEASURE CARRIED OUT	COMMENTS (If not carried out or N/A, explain)
	Photos	Document	Yes No N/A	
<b>Quality of sediments, soil and surface water</b>				
Inspect equipment to verify proper operation and maintain it in compliance with the applicable recommendations				
Limit movements of equipment outside the planned routes to avoid useless compaction of soil and spread of contamination				
Clean wheels of trucks before getting them out of the working area, if needed, to avoid spreading contamination				
Use clean material from known quarries and sand pits during filling and set up of the access road				
Opt for sediments and foundry residues recovery				
Do not stockpile contaminated sediments directly onto the ground, but rather into a sealed container allowing for water dripping and recovering				
Excavate soil and hazardous residual material according to their modelled contamination level based on the results from the previous characterizations, and adapting to conditions met if different from the expected conditions				
Place contaminated material and hazardous residual material onto impermeable tarps and cover them with tarps if immediate disposition to an authorized disposal center is not possible				
Recover dripping water avoiding infiltration in soil and assess environmental quality to select a management mode				
Use material that is clean upon arrival on site for filling activities				
Recover immediately any floating debris and retrieve from water				

MITIGATION MEASURES	TO PROVIDE		MEASURE CARRIED OUT	COMMENTS (If not carried out or N/A, explain)
	Photos	Document	Yes No N/A	
Avoid storing any material near water to prevent leaching and so they are not carried by the wind				
Avoid working during bad weather conditions to prevent dust dispersion				
Raise workers' awareness not to return unnecessarily to suspension the sediments of the hydrous environment bed during work				
Excavate soil according to their contamination level				
Place contaminated soil onto impermeable tarps and cover with tarps if immediate disposition is not possible				
Recover infiltration water and rainwater, and submit to analyses prior to discharging according to techniques described in sections 3.3.1 to 3.3.3 of Appendix 6. Parameters to be analysed are metals, ammonia nitrogen, fluorides, nitrites, pH, chlorides and nitrates-nitrites. If exceedances, refer to section 3.4 of Appendix 6				
Clean and maintain equipment at more than 30 m from the bank				
Do not store equipment at less than 30 m from the bank or a water stream nor circulate on hydrous environments beds				
Keep on monitoring groundwater after the end of remediation work				
<b>Aquatic fauna and flora</b>				
<b>Work when ditch is dry</b>				
Prior to the beginning of work and following the dewatering of the ditch, install a cofferdam into the common ditch to prevent the upstream migration of ichthyological species and inflow of water				
Perform work outside the restriction periods required by DFO, when appropriate				

MITIGATION MEASURES	TO PROVIDE		MEASURE CARRIED OUT	COMMENTS (If not carried out or N/A, explain)
	Photos	Document	Yes No N/A	
Recover immediately any floating debris and retrieve from water				
Avoid storing any material near water to prevent leaching and so they are not carried by the wind				
Avoid working during bad weather conditions				
Raise workers' awareness not to return unnecessarily to suspension the sediments of the hydrous environment bed during work				
Clean and maintain equipment at more than 30 m from the bank				
Avoid storing equipment at less than 30 m from the bank or a water stream or circulate on hydrous environments bed				
Conduct monitoring program to ensure site naturalization				
<b>Work when ditch is wet, for which complete measures are attached to Appendix 6 of the environmental effects assessment</b>				
Perform work between September 1 <sup>st</sup> and March 15 <sup>th</sup> to avoid the spawning and reproduction season of fish species present into the ditch				
Prevent equipment from circulating onto the bottom of the ditch or being immersed before ditch dewatering				
Install cofferdams at strategic points to prevent inflow of water, and dewater bed by pumping toward downstream, ensuring sediments are retrieved using appropriate measures. Discharge water shall meet applicable criteria				
Electro fish from upstream to downstream, and release individuals into the common ditch downstream from the cofferdams.				

MITIGATION MEASURES	TO PROVIDE		MEASURE CARRIED OUT	COMMENTS (If not carried out or N/A, explain)
	Photos	Document	Yes No N/A	
<b>Terrestrial fauna and flora</b>				
Limit movements of equipment outside the planned routes to avoid useless compaction of soil and spread of contamination				
Shut equipment off if stationary or not used				
Do not stockpile contaminated sediments directly on the ground, but rather into a sealed container to allow water dripping and recovery				
Place contaminated soil onto impermeable tarps and cover them with tarps if immediate disposition to an authorized disposal center is not possible.				
<b>Special status species</b>				
Mitigation measures listed at the terrestrial species Section shall be implemented.				
<b>Residents of the sector</b>				
Limit use of engine brake to a minimum during shipment of equipment and material				
Shut equipment off if stationary or not used				
Plan work during regular working hours in compliance with municipal requirements				
Clean public ways regularly				
<b>Transportation</b>				
Install proper road signs and markings on the route used by heavy trucks and equipment				
<b>Accidents and failures</b>				
A response plan shall be planned prior to the beginning of work and communicated to and known by all participants				
Accidental spills shall be reported to the environmental emergency line of Environment and Climate Change Canada, 1-866-283-2333				

MITIGATION MEASURES	TO PROVIDE		MEASURE CARRIED OUT	COMMENTS (If not carried out or N/A, explain)
	Photos	Document	Yes No N/A	
Vehicles maintenance, gas fueling, fuel and other hazardous material storage shall be done, as much as possible, 30 meters for the drainage ditches. If the distance cannot be respected, containment precautions shall be applied. Moreover, emphasis will be placed on using equipment requiring a specifically designed biodegradable vegetal oil				
Refueling activities shall be performed under constant supervision, on an impervious surface and at a single location				
Waste oil and waste resulting from equipment use and maintenance are stored and disposed of in compliance with applicable provincial regulation				
Equipment used shall be clean, with no indication of hydrocarbons leak, and inspected regularly during work				
A response kit in case of accidental hydrocarbons spills shall be present on site, nearby the refuelling zone				
Employees working on field shall have received the appropriate training in case of an environmental emergency. The person in charge of the field shall be immediately advised of the incident				

MITIGATION MEASURES	TO PROVIDE		MEASURE CARRIED OUT	COMMENTS (If not carried out or N/A, explain)
	Photos	Document	Yes No N/A	
Soil, sediments or filling material, as the case may be, contaminated by an accidental spill shall be piled up onto impermeable tarps and covered with impermeable tarps, sampled according to the volume of soil concerned to cadences in compliance with the <i>Guide d'échantillonnage à des fins d'analyses environnementales, Cahier 5</i> , submitted to chemical analysis in laboratory: petroleum hydrocarbons C <sub>10</sub> to C <sub>50</sub> , polycyclic aromatic hydrocarbons (PAHs) and volatile organic compounds (VOCs), and managed in compliance with the guidelines of the MDDELCC's <i>Grille de gestion des sols contaminés excavés</i> or the applicable regulation, and transported to an authorized site				
Water contaminated by an accidental spill shall be confined to be characterized or directly taken over by a specialised company that will send it to a treatment center approved by the MDDELCC				
<b>Comments: Observations on field, presence of fauna, waste poor management, presence of waste oil, spill on equipment, performed work not considered for the environmental assessment, any detail not mentioned in the mitigation measures, etc.</b>				

**MANAGEMENT (NUMBER AND DIGITAL ANNOTATION) OF PHOTOS**

01			
02			
03			
04			

**COMPLETION OF THE MONITORING**

Prepared by:	
Date:	
Organise:	
Phone number:	
Email:	

## **APPENDIX G**

### **TABLES**

Table 1: Groundwater gauging data from 2012 to 2016

Observation Well	Consultant and Date of Observation Well Installation	Monitoring Wells coordinates				Natural Ground Elevation	29/Nov/12			22/Apr/13			28/Aug/13			20/Nov/13			17/Sep/14			28/Nov/14			18/Nov/15			28/Apr/16		
		X	Y	Z	Ground Surface		Groundwater Elevation	Difference from		Groundwater Elevation	Difference from		Groundwater Elevation	Difference from		Groundwater Elevation	Difference from		Groundwater Elevation	Difference from		Groundwater Elevation	Difference from		Groundwater Elevation	Difference from		Groundwater Elevation	Difference from	
								Natural Ground	Surface																					
11-PO4	France Environment, 2011	386,998.84	5,080,119.02	69.09	70.01	67.87	66.96	-2.14	-0.92	68.13	-0.96	0.26	67.11	-1.98	-0.76	65.05	-1.04	0.19	65.82	-3.27	-2.05	67.70	-1.39	-0.17	66.16	-0.93	0.29	67.97	-1.18	0.04
11-PO5	France Environment, 2011	386,957.87	5,080,181.27	68.52	69.51	66.69	67.03	-1.49	0.34	68.01	-0.51	1.32	67.03	-1.49	0.34	67.88	-0.64	1.19	66.10	-2.42	-0.59	67.59	-0.93	0.90	67.95	-0.57	1.26	67.430	-1.09	0.74
12-PO2A	LVM, 2012	386,930.30	5,080,129.11	68.94	69.79	67.11	66.97	-1.97	-0.14	67.79	-1.15	0.88	66.83	-2.11	-0.28	67.52	-1.63	0.41	65.57	-3.37	-1.54	67.30	-1.65	0.19	67.70	-1.24	0.59	67.458	-1.48	0.35
12-PO2B	LVM, 2012	386,926.54	5,080,132.09	68.83	69.70	67.11	66.96	-2.16	-0.45	67.35	-1.49	0.23	66.95	-2.29	-0.56	67.21	-1.63	0.09	65.30	-3.53	-1.81	66.98	-1.85	-0.13	67.33	-1.50	0.22	67.100	-1.73	0.01
12-PO3A	LVM, 2012	389,019.18	5,080,147.42	69.38	70.29	68.16	67.59	-1.79	-0.57	68.58	-0.80	0.42	67.95	-1.83	-0.61	68.43	-0.95	0.27	66.84	-2.74	-1.52	68.01	-1.37	-0.15	68.54	-0.84	0.38	69.226	-1.15	0.07
12-PO3B	LVM, 2012	389,019.05	5,080,145.25	69.36	70.28	68.16	66.58	-2.78	-1.58	68.27	-1.09	0.11	67.21	-2.15	-0.95	68.15	-1.21	-0.01	66.07	-3.30	-2.10	67.65	-1.71	-0.51	68.15	-1.21	-0.01	67.922	-1.44	-0.24
12-PO4	LVM, 2012	386,998.37	5,080,194.95	69.31	70.22	68.70	67.54	-1.78	-1.17	68.59	-0.72	-0.11	67.39	-1.92	-1.31	68.26	-1.05	-0.44	66.71	-2.69	-1.99	67.58	-1.73	-1.12	68.50	-0.81	-0.20	67.945	-1.37	-0.76
12-PO5	LVM, 2012	389,030.71	5,080,189.10	69.50	70.42	68.89	67.93	-1.58	-0.97	69.01	-0.49	0.12	67.80	-1.70	-1.09	67.70	-1.80	-1.19	67.28	-2.22	-1.61	68.27	-1.24	-0.53	68.94	-0.96	0.05	69.505	-1.00	-0.39
16-PO6	LVM, 2012	389,021.98	5,080,226.12	69.33	70.29	67.35	67.23	-2.10	-0.12	68.84	-0.69	1.29	67.16	-2.18	-0.19	68.18	-1.15	0.83	66.20	-3.13	-1.15	67.02	-2.31	-0.88	68.45	-0.88	1.10	69.10	-1.23	-0.82
16-PO6	Englobe, 2016	389,065.84	5,080,275.89	70.33	71.19	69.72																								

**Table 2: Groundwater gauging data in the peripheral ditch**

Metal Rod installed in the Ditch	Consultant and Date of Installation	Elevation		17/Sep/14		26/Nov/14		18/Nov/15		26/Apr/16	
		Bottom of the Ditch	Top of the Rod	Water Level Elevation	Water Thickness						
TM-1	LVM, 2014	66.22	67.05	Dry	0.00	66.46	0.24	66.50	0.28	66.45	0.24
TM-2	LVM, 2014	67.15	67.94	Dry	0.00	Not Measured	-	Not Measured	-	67.32	0.18
TM-3	Englobe, 2015	67.75	68.72	Dry	0.00	The rod was removed		67.94	0.19	67.94	0.19
TM-4	LVM, 2014	67.37	68.24	Dry	0.00	Dry	0.00	Not Measured	-	67.39	0.02

**Table 3: Estimated volume of contaminated soil (sediments) in the peripheral ditch according to CCME's Guidelines**

Sounding (Sample)	Sample Interval (m)		Estimated Depth (m)		Estimated Thickness (m)	Sounding Area (m <sup>2</sup> )	Estimated Volume (m <sup>3</sup> )
	from	to	from	to			
12-SE-01	0.00	0.27	0.00	0.27	0.27	143.0	38.61
16-SE-01 CF-1B	0.05	0.64	0.27	0.64	0.37	143.0	0.00
12-SE-02A	0.00	0.17	0.00	0.17	0.17	116.0	19.72
12-SE-02B	0.17	0.30	0.17	0.30	0.13	116.0	0.00
12-SE-03	0.00	0.28	0.00	0.28	0.28	201.0	56.28
16-SE-03 CF-1B	0.22	0.74	0.28	1.00	0.72	201.0	144.72
12-SE-04A	0.00	0.12	0.00	0.12	0.12	162.0	19.44
12-SE-04B	0.12	0.30	0.12	0.30	0.18	162.0	0.00
12-SE-05A	0.00	0.15	0.00	0.15	0.15	322.0	48.30
12-SE-05B	0.15	0.30	0.15	0.40	0.25	322.0	80.50
12-SE-06	0.00	0.27	0.00	0.27	0.27	241.0	65.07
16-SE-06 CF-1B	0.32	0.75	0.27	1.00	0.73	241.0	175.93
12-SE-07	0.00	0.30	0.00	0.30	0.30	237.0	71.10
16-SE-07 CF-1B	0.10	0.70	0.30	1.00	0.70	237.0	165.90
12-SE-08	0.00	0.30	0.00	0.30	0.30	145.0	43.50
16-SE-08 CF-1B	0.30	0.70	0.30	1.00	0.70	145.0	101.50

Note: (1) : Refers to the Canadian Council of Ministers of the Environment - Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health

Table 4: Estimated Volume of Contaminated Soil or Residual Materials Present on the Site according to CCME's Guidelines

Sounding	Sample	Sample Interval (m)		Estimated Depth (m)		Estimated Thickness (m)	Sounding Area (m <sup>2</sup> )	Estimated Volume of Contaminated Soil (m <sup>3</sup> )		Estimated Volume of Residual Materials (m <sup>3</sup> )	Estimated Volume of Non Impacted Soil Located Above the Non-Compliant Material (m <sup>3</sup> )
		from	to	from	to			> INDUSTRIAL <sup>1</sup>	> PHC CWS Tier 1 /INDUSTRIAL <sup>2</sup>		
<b>Working Area of the Former Foundry</b>											
12-TR-10	MA-2	0.50	1.00	0.50	1.00	0.50	753.4	0.00	0.00	376.70	376.70
	MA-3	1.00	1.50	1.00	1.75	0.75	753.4	565.05	0.00	0.00	0.00
12-TR-12	MA-1	0.00	0.30	0.00	0.30	0.30	468.2	0.00	0.00	0.00	140.46
	MA-2	0.30	0.70	0.30	0.70	0.40	468.2	0.00	0.00	187.28	0.00
12-TR-13	MA-1	0.10	0.40	0.10	0.40	0.30	361.6	0.00	0.00	108.48	36.16
	MA-2	0.40	0.90	0.40	1.50	1.10	361.6	0.00	0.00	0.00	0.00
	MA-1	0.10	0.80	0.10	0.80	0.70	439.2	0.00	0.00	307.44	43.92
12-TR-14	MA-2	0.80	1.40	0.80	1.40	0.60	439.2	263.52	0.00	0.00	0.00
	MA-3	1.40	2.10	1.40	2.10	0.70	439.2	0.00	0.00	307.44	0.00
	MA-1	0.00	0.40	0.00	0.40	0.40	610.6	244.24	0.00	0.00	0.00
12-TR-15	MA-2	0.40	0.90	0.40	0.90	0.50	610.6	0.00	0.00	305.30	0.00
	MA-3	0.90	1.30	0.90	1.30	0.40	610.6	244.24	0.00	0.00	0.00
	MA-5	1.80	2.30	1.30	2.55	1.25	610.6	763.25	0.00	0.00	0.00
	MA-1 et MA-2	0.00	1.00	0.00	1.00	1.00	332.7	0.00	0.00	332.70	0.00
12-TR-16	MA-3	1.00	1.40	1.00	1.40	0.40	332.7	0.00	133.08	0.00	0.00
	MA-4	1.40	2.00	1.40	2.25	0.85	332.7	0.00	282.80	0.00	0.00
12-TR-17	MA-1	0.00	0.60	0.00	0.60	0.60	388.3	0.00	0.00	232.98	0.00
12-TR-18	MA-1	0.00	0.15	0.00	0.15	0.15	512.2	0.00	0.00	76.83	0.00
	MA-2	0.15	0.50	0.15	0.75	0.60	512.2	307.32	0.00	0.00	0.00
12-TR-19	MA-1	0.00	0.30	0.00	0.30	0.30	457.6	137.28	0.00	0.00	0.00
	MA-2	0.30	0.80	0.30	1.10	0.80	457.6	366.08	0.00	0.00	0.00
12-TR-20	MA-1	0.00	0.30	0.00	0.30	0.30	369.7	0.00	0.00	0.00	0.00
12-TR-21	MA-1	0.00	0.15	0.00	0.15	0.15	406.2	0.00	0.00	60.93	0.00
12-TR-22	MA-1 et MA-2	0.00	1.00	0.00	1.00	1.00	534.5	0.00	0.00	534.50	0.00
12-TR-23	MA-1	0.00	0.70	0.00	0.70	0.70	282.8	197.96	0.00	0.00	0.00
	MA-2 et MA-3	0.70	2.00	0.70	2.00	1.30	282.8	0.00	0.00	367.64	0.00
12-TR-24	MA-1	0.00	0.30	0.00	0.30	0.30	500.8	0.00	0.00	150.24	0.00
	MA-2	0.30	0.80	0.30	0.80	0.50	500.8	250.40	0.00	0.00	0.00
12-TR-25	MA-1	0.00	0.40	0.00	0.40	0.40	289.2	0.00	0.00	115.68	0.00
	MA-2	0.40	0.90	0.40	0.90	0.50	289.2	144.60	0.00	0.00	0.00
12-TR-27	MA-1 et MA-2	0.00	0.80	0.00	0.80	0.80	215.7	0.00	0.00	172.56	0.00
12-TR-28	MA-1	0.00	0.40	0.00	0.40	0.40	383.6	0.00	0.00	153.44	0.00
	MA-2	0.40	0.80	0.40	1.05	0.65	383.6	249.34	0.00	0.00	0.00
12-TR-29	MA-1	0.00	0.60	0.00	0.60	0.60	356.3	0.00	0.00	213.78	0.00
	MA-2	0.60	1.10	0.60	1.35	0.75	356.3	0.00	0.00	0.00	0.00
12-TR-30	MA-1	0.00	0.60	0.00	0.60	0.60	123.8	0.00	0.00	74.28	0.00
	MA-3	1.30	1.90	1.30	1.90	0.60	123.8	0.00	0.00	74.28	86.66
12-TR-31	MA-1	0.00	0.30	0.00	0.30	0.30	250.0	75.00	0.00	0.00	0.00
	MA-2	0.30	0.60	0.30	0.60	0.30	250.0	0.00	0.00	75.00	0.00
	MA-3	0.60	1.10	0.60	1.35	0.75	250.0	0.00	0.00	0.00	0.00
12-TR-32	MA-1	0.00	0.20	0.00	0.20	0.20	268.7	0.00	0.00	0.00	0.00
	MA-2 à MA-5	0.20	2.10	0.20	2.10	1.90	268.7	0.00	0.00	510.53	0.00
	MA-6	2.10	2.60	2.10	3.60	1.50	268.7	403.05	0.00	0.00	0.00
	MA-9	3.60	4.10	3.60	4.10	0.50	268.7	134.35	0.00	0.00	0.00
12-TR-33	MA-1	0.00	0.70	0.00	0.70	0.70	221.1	0.00	0.00	154.77	0.00
12-TR-34	MA-1	0.00	0.50	0.00	0.50	0.50	252.8	0.00	0.00	126.40	0.00
	MA-2	0.50	1.00	0.50	1.50	1.00	252.8	0.00	0.00	0.00	0.00
12-TR-35	MA-1	0.00	0.70	0.00	0.70	0.70	418.6	0.00	0.00	293.02	0.00
	MA-2	0.70	1.20	0.70	1.45	0.75	418.6	0.00	0.00	0.00	0.00
12-TR-36	MA-1	0.00	0.40	0.00	0.40	0.40	347.9	0.00	0.00	139.16	0.00
12-TR-37	MA-1	0.00	1.10	0.00	1.10	1.10	391.5	0.00	0.00	430.65	0.00
12-TR-38	MA-1	0.00	0.40	0.00	0.40	0.40	326.7	0.00	0.00	130.68	0.00
	MA-2	0.40	1.00	0.40	1.00	0.60	326.7	0.00	0.00	0.00	0.00
12-TR-39	MA-1	0.00	0.40	0.00	0.40	0.40	0.0	0.00	0.00	0.00	0.00
12-TR-40	MA-1	0.00	0.60	0.00	0.60	0.60	249.4	0.00	0.00	149.64	0.00
12-TR-41	MA-1 à MA-3	0.00	1.70	0.00	1.70	1.70	411.5	0.00	0.00	699.55	0.00
	MA-1 à MA-3	0.00	1.50	0.00	1.50	1.50	592.0	0.00	0.00	888.00	0.00
12-TR-42	MA-4	1.50	2.00	1.50	2.50	1.00	592.0	592.00	0.00	0.00	0.00
	MA-6	2.50	3.00	2.50	3.50	1.00	592.0	592.00	0.00	0.00	0.00
12-TR-43	MA-1	0.20	0.60	0.20	0.60	0.40	477.5	191.00	0.00	0.00	95.50
12-TR-44	MA-1	0.00	0.70	0.00	0.70	0.70	341.4	238.98	0.00	0.00	0.00
	MA-1	0.00	0.30	0.00	0.30	0.30	0.0	0.00	0.00	0.00	0.00
12-TR-45	MA-2	0.30	0.90	0.30	0.90	0.60	0.0	0.00	0.00	0.00	0.00
	MA-5	1.90	2.40	0.90	2.90	2.00	0.0	0.00	0.00	0.00	0.00
12-TR-46	MA-1	0.00	0.60	0.00	0.60	0.60	301.6	180.96	0.00	0.00	0.00
	MA-2	0.60	1.10	0.60	1.35	0.75	301.6	0.00	0.00	0.00	0.00
12-TR-47	MA-1	0.00	0.30	0.00	0.30	0.30	283.9	85.17	0.00	0.00	0.00
	MA-2	0.30	0.80	0.30	0.80	0.50	283.9	0.00	0.00	141.95	0.00
12-TR-48	MA-1	0.00	0.60	0.00	0.60	0.60	437.4	262.44	0.00	0.00	0.00
12-F1	CF-2	0.61	1.22	0.08	1.83	1.75	394.8	690.90	0.00	0.00	0.00
	CF-5	2.44	3.05	1.83	3.35	1.52	394.8	600.10	0.00	0.00	0.00
12-F2	CF-1	0.00	0.61	0.00	0.61	0.61	390.8	0.00	0.00	238.39	0.00
	CF-2	0.61	1.22	0.61	1.83	1.22	390.8	0.00	0.00	0.00	0.00
12-F3	CF-1	0.00	0.61	0.00	1.22	1.22	335.3	409.07	0.00	0.00	0.00
	CF-1	0.15	0.61	0.15	0.61	0.46	306.4	140.94	0.00	0.00	0.00
12-F4	CF-2	0.61	1.22	0.61	1.22	0.61	306.4	0.00	0.00	186.90	0.00
	CF-1	0.13	0.61	0.13	0.61	0.48	467.2	0.00	0.00	224.26	0.00
12-F5	CF-3	1.22	1.83	0.61	1.83	1.22	467.2	0.00	0.00	0.00	0.00
	CF-4	1.83	2.44	1.83	3.05	1.22	467.2	0.00	0.00	0.00	0.00
12-F6	CF-1	0.00	0.91	0.00	0.91	0.91	421.4	0.00	0.00	383.47	0.00
12-F7	CF-1	0.00	0.61	0.00	1.22	1.22	466.6	569.25	0.00	0.00	0.00
12-PO2A	CF-1 à CF-3	0.00	1.83	0.00	1.83	1.83	332.3	0.00	0.00	608.11	0.00
12-PO3A	CF-1	0.00	0.61	0.00	1.22	1.22	302.9	369.54	0.00	0.00	0.00
	CF-3	1.22	1.83	1.22	2.44	1.22	302.9	369.54	0.00	0.00	0.00
	CF-5	2.44	3.05	2.44	3.35	0.91	302.9	0.00	0.00	0.00	0.00
12-PO4	CF-1	0.00	0.61	0.00	0.61	0.61	157.9	0.00	0.00	96.32	0.00
	CF-2	0.61	1.22	0.61	1.83	1.22	157.9	192.84	0.00	0.00	0.00
12-PO5	CF-1	0.00	0.61	0.00	0.61	0.61	246.0	0.00	0.00	150.06	0.00
	CF-1 à CF-3	0.00	1.83	0.00	1.98	1.98	0.0	0.00	0.00	0.00	0.00
12-PO6	CF-5	2.44	3.05	2.44	3.05	0.61	0.0	0.00	0.00	0.00	0.00
	CF-7	3.66	4.27	3.66	4.27	0.61	0.0	0.00	0.00	0.00	0.00
Stockpiling <sup>(3)</sup>	-	-	-	-	-	-	-	0.00	0.00	1,775.00	0.00

Notes:

- <sup>(1)</sup> : Refers to the Canadian Council of Ministers of the Environment - Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health
- <sup>(2)</sup> : Refers to the Canada-Wide Standards for Petroleum Hydrocarbons (PHC) in Soil (2008), Coarse-grained soil (coarse-textured soil having a median grain size of >75 µm)
- <sup>(3)</sup> : Estimation from the SNC-Lavalin's Environmental Site Assessment - Phase I (February, 2012)

**Table 5: Water Discharge Criteria**

Parameters	Units	MDDELCC's Criteria <sup>(1)</sup>		Discharge Criteria
		Drinking Water	Seepage into Surface Water or Infiltration into Sewers	
Aluminum (Al)	ug/L	--	750	750
Antimony (Sb)	ug/L	6.0	--	6.0
Silver (Ag)	ug/L	100	7.9 <sup>(2)</sup>	7.9 <sup>(2)</sup>
Arsenic (As)	ug/L	25	340	25
Barium (Ba)	ug/L	1,000	2,888 <sup>(2)</sup>	1,000
Boron (B)	ug/L	--	--	5,000 <sup>(7)</sup>
Cadmium (Cd)	ug/L	5.0	4.75 <sup>(2)</sup>	4.75 <sup>(2)</sup>
Chromium (Cr)	ug/L	50	--	50
Cobalt (Co)	ug/L	--	500	500
Copper (Cu)	ug/L	1,000 <sup>(5)</sup>	29.4 <sup>(2)</sup>	29.4 <sup>(2)</sup>
Manganese (Mn)	ug/L	50 <sup>(5)</sup>	--	50 <sup>(5)</sup>
Mercury (Hg)	mg/L	0.001	0.00013	0.00013
Molybdenum (Mo)	ug/L	70	2,000	70
Nickel (Ni)	ug/L	20	914 <sup>(2)</sup>	20
Lead (Pb)	ug/L	10	223 <sup>(2)</sup>	10
Selenium (Se)	ug/L	10	20	10
Sodium (Na)	ug/L	200,000 <sup>(5)</sup>	--	200,000 <sup>(5)</sup>
Zinc (Zn)	ug/L	5,000 <sup>(5)</sup>	234 <sup>(2)</sup>	234 <sup>(2)</sup>
Ammonia Nitrogen (N-NH3)	mg/L	--	21 <sup>(3)</sup>	21 <sup>(3)</sup>
Total Fluorides (F)	mg/L	1.5	4.0	1.5
Nitrate(N) + Nitrite(N)	mg/L	10	--	10
Nitrite (N-NO2-)	mg/L	1.0	0.6 <sup>(4)</sup>	0.6 <sup>(4)</sup>
pH	pH	--	--	6.5-9.0 <sup>(6)</sup>
Sulfides (exprimés en S <sup>2-</sup> )	mg/L	0.05	0.2	0.05
Chlorides (Cl)	mg/L	250 <sup>(5)</sup>	860	250 <sup>(5)</sup>
Petroleum Hydrocarbons (C <sub>10</sub> -C <sub>50</sub> )	ug/L	--	3,500	3,500
Total BPC	ug/L	0.5	0.012	0.012
Dioxins & furans - Total Toxic Equivalency	pg/L	15	0.31	0.31 <sup>(9)</sup>
Suspended Matters	mg/L	--	-	25 <sup>(8)</sup>

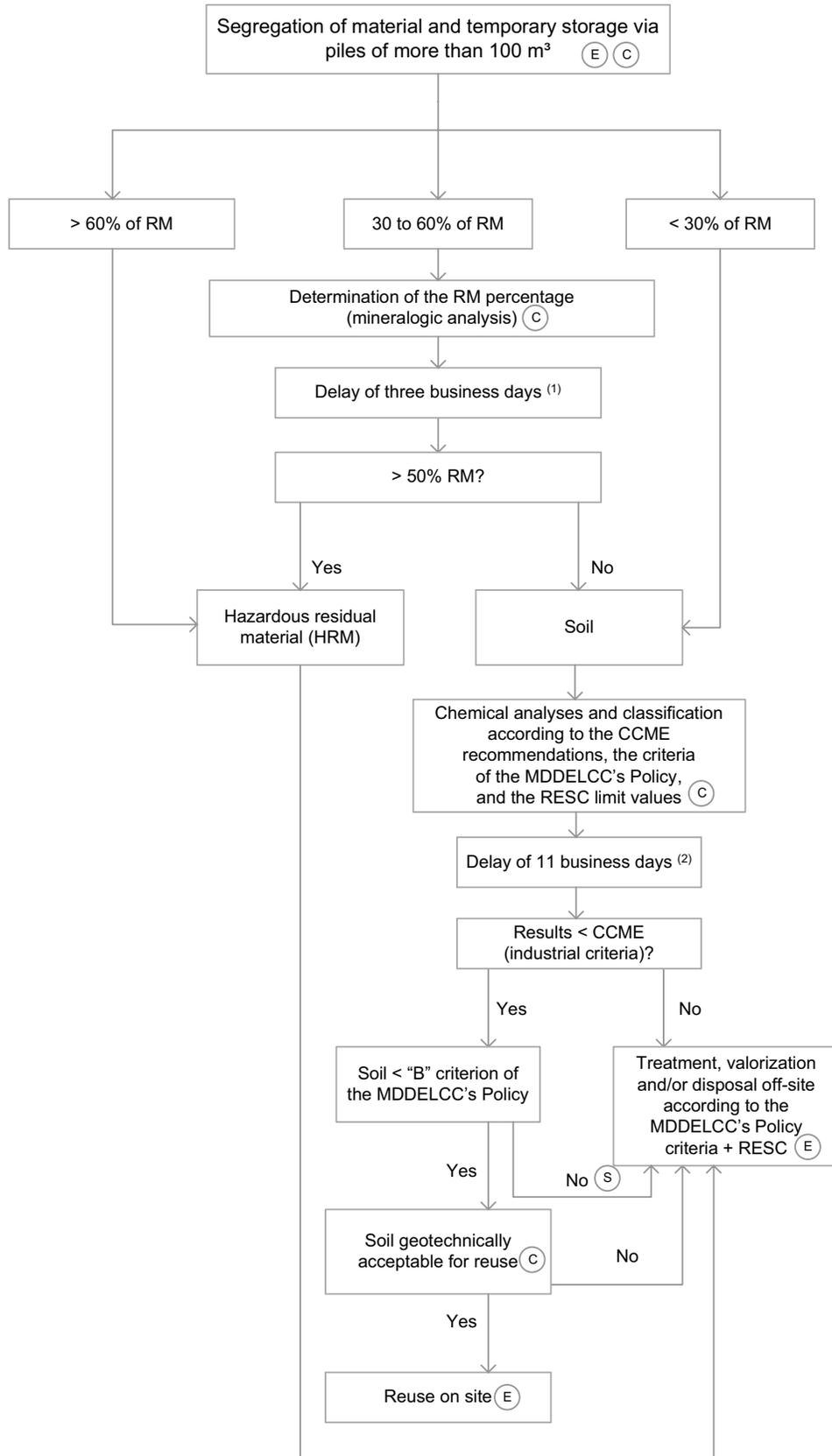
**Notes:**

- : No criteria or standard
- (1) : Soil Protection and Contaminated Sites Rehabilitation Policy, MDDELCC
- (2) : Criteria increase with hardness. See "Québec's Surface Water Quality Criteria" from MDDELCC. The value in the table corresponds to a hardness of 220 mg/L obtained in the David River.
- (3) : Criteria vary with temperature and pH. See "Québec's Surface Water Quality Criteria" from MDDELCC. The criteria corresponds to a pH of 7 and a temperature of 10°C.
- (4) : Criteria change with chloride contents. See "Québec's Surface Water Quality Criteria" from MDDELCC. The value mentioned in the table corresponds to a chloride concentration greater than 10 mg/L.
- (5) : Aesthetic Criteria
- (6) : Since there is no criteria in the Soil Protection and Contaminated Sites Rehabilitation Policy (MDDELCC), the value comes from "Québec's Surface Water Quality Criteria" from MDDELCC for aquatic life protection (acute effect).
- (7) : Since there is no criteria in the Soil Protection and Contaminated Sites Rehabilitation Policy (MDDELCC), the value is taken from Regulation Respecting the Quality of Drinking Water.
- (8) : Value proposed by Englobe Corp. and defined from the "Québec's Surface Water Quality Criteria" from MDDELCC.
- (9) : Discharge criteria to use is the higher value between 0.31 pg/L or field blank value.

## **APPENDIX H**

### **MANAGEMENT LOGICAL DIAGRAM OF EXCAVATED SOIL AND RESIDUAL MATERIAL**

# MANAGEMENT LOGICAL DIAGRAM OF EXCAVATED SOIL AND RESIDUAL MATERIAL



### Legend

- (C) Activity performed by the consultant
- (E) Activity performed by the contractor
- (S) Management mode established by SPAC

### Notes

(1) Following the reception of the samples at the laboratory

(2) Following the reception of the results of mineralogic analysis or following the reception of the samples at the laboratory (if < 30% of RM)