REGIONAL DISTRICT
of Fraser-Fort George

INVITATION TO TENDER
ES-24-11

Compaction and Cover Services
Foothills Boulevard Regional Landfill

Date Issued:	August 1, 2024
Closing Location:	Regional District Office 3rd Floor, 155 George Street, Prince George, BC V2L 1P8
Mandatory Site Meeting:	August 9 at 9:00 am Foothills Blvd Regional Landfill
Closing Time:	August 29, 2024 2:00 pm (Pacific Standard Time) No Public Opening
Inquiries:	Email Contract Manager- Laura Zapotichny at lzapotichny@rdffg.bc.ca
Note:	Late submissions will not be considered.

Regional District of Fraser-Fort George
155 George Street, Prince George BC V2L 1P8
Telephone 250-960-4400 / Toll Free 1-800-667-1959
www.rdffg.ca

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INVITATION TO TENDER

PART A – INTRODUCTION

The Regional District of Fraser-Fort George (Regional District) invites qualified Contractors to submit their Tender to provide compaction and cover services at the Foothills Boulevard Regional Landfill (FBRL). The Foothills Boulevard Regional Landfill is located at 6595 Foothills Boulevard within the City of Prince George.

The Foothills Boulevard Regional Landfill (Facility) includes a landfill (Landfill), composting area, public tipping / recycling area, and appurtenances. The location of these facilities is shown on the Site Plan included in Appendix D1. Site users access the Facility via the entrance and proceed to the weigh scale and scale house for weighing and/or directions for using the Facility. Regional District staff are located in the scale house. Commercial waste haulers are directed to the Active Area, while other site users are directed to other areas of the Facility as appropriate.

The Work to be performed under this Invitation to Tender (ITT) includes Compaction and Cover Services, Cover Extraction and Burrow Pit Operations and Ancillary Services as listed within this Invitation to Tender (ITT) at the Foothills Boulevard Regional Landfill.

The Contract term is **November 1, 2024 – October 31, 2029.**

TENDER DOCUMENTS

The Invitation to Tender (ITT) documents may be obtained on or after **August 1, 2024.**

(a) in a PDF (Public Document Format) file format from the Regional District's website at www.rdffg.ca

(b) on the BCBid® website at www.bcbid.gov.bc.ca.

All subsequent information regarding this ITT, including Addendum(s) and answers to questions will also be available as above.

It is the sole responsibility of the Tenderer to ascertain that they have received a full set of Tender Documents. Upon submission of their Tender, the Tenderer will be deemed as conclusively been in possession of a full set of Tender Documents.

All Tender Documents (including the Security) must be received by the Closing Time in order for the Tender to receive consideration.

Tenders not submitted in strict accordance with these instructions or not complying with the requirements in this ITT may be rejected.

To be considered, Tenders must be signed by an authorized signatory of the Tenderer. By signing the Tender, the Tenderer is bound to statements made in response to this ITT. Any Tender received by the Regional District that is unsigned will be rejected.

The lowest of any Tender will not necessarily be accepted. The Regional District of Fraser-Fort George reserves the right to accept or reject any or all Tenders.

TENDER SUBMISSION AND CLOSING LOCATION AND TIME:

The Regional District will accept Tenders submitted either by direct delivery (hand delivery, courier or by post/mail) or electronically to the Closing Location and Time as outlined below.

Tenders will be received by the General Manager of Financial Services at the Regional District of Fraser-Fort George, 3rd floor, 155 George Street, Prince George, BC (the "**Closing Location**") no later than 2:00 p.m. local time on **August 29, 2024** (the "**Closing Time**") or by email to purchasing@rdffg.bc.ca. There will not be a public opening for this Tender.

Tenders must be in English and must be submitted using the submission methods outlined below.

Closing Date for tenders is August 29, 2024 at 2:00 p.m. local Prince George time.

For Tenders being submitted by hard copy direct delivery:

Two complete copies of your Tender and bid must be submitted in a sealed envelope with the following information written on the outside of the envelope containing the Tender, as well as on the outside of the courier envelope/box (if sending by courier):

1. Attention: General Manager of Financial Services
   Regional District of Fraser-Fort George
   3rd Floor, 155 George Street
   Prince George, BC V2L 1P8

2. Invitation to Tender, ES-24-11
   Compaction and Cover Services – Foothills Boulevard Regional Landfill

3. Responding Tenderer's name and address

Facsimile Tenders will NOT be accepted.

For Tenders to be submitted electronically, with Security Deposit:

"Prince George Time" will be conclusively deemed to be the time indicated in the electronic timestamp the Tender receives upon delivery to the email address specified herein.

Other than the security deposit, Tenderer's must submit all portions of their Tender by email in accordance with the following:

Subject of the file to be: ES-24-11 Compaction and Cover Services – Foothills Boulevard Regional Landfill – (Insert Responding Tenderer's Name)

All emailed documents must be in PDF format and should be in one combined file. Tenderer's should ensure that the files do not collectively exceed 30MB. Zip the files to reduce the size if needed. **Submitting the files via Drop Box, FTP, or similar programs, is not acceptable.**

Tenders must be submitted to purchasing@rdffg.bc.ca. Other than the security deposit, do not deliver a physical copy of the Tender package to the Regional District of Fraser Fort George.

The Security Deposit must not be sent by email. The security deposit must be received by the General Manager of Financial Services, at the Regional District of Fraser-Fort George, 3rd Floor,

155 George Street, Prince George, BC on or before the Closing Time. The security deposit must be submitted in a sealed envelope with the following information written on the outside of the envelope containing the security deposit, as well as on the outside of the courier envelope if being sent by courier.

1. Attention: General Manager of Financial Services
   Regional District of Fraser-Fort George
   3rd Floor, 155 George Street
   Prince George, BC V2L 1P8

2. Invitation to Tender, ES-24-11
   Compaction and Cover Services – Foothills Boulevard Regional Landfill

3. Tenderer's name and address

The Regional District does not assume any risk or responsibility or liability, including in Contract or tort (including negligence), whatsoever to any Tenderer:

1. for ensuring that any electronic email system being operated by or for the Regional District is in good working order, able to receive transmissions, or not engaged in receiving other transmissions such that a Tenderer's electronic transmission, including the transmission of an electronic copy of its Tender, cannot be received;
2. for errors, problems, or technical difficulties with respect to a Tenderer's electronic transmission, including the transmission of an electronic copy of its Tender; and,
3. that a Tenderer's electronic transmission, including the transmission of an electronic copy of its Tender, is received by the Regional District of Fraser-Fort George in its entirety or within any time limit specified by this Tender.

PART B – INSTRUCTIONS TO TENDERER'S

The Regional District of Fraser-Fort George, invites Tenders for:

ES-24-11 Compaction and Cover Services – Foothills Boulevard Regional Landfill
November 1, 2024 – October 31, 2029

Instructions regarding obtaining the Tender Documents are contained in Part A: Introduction.

Questions relating to the Tender or project must be directed to the Contract Manager:

Laura Zapotichny, General Manager of Environmental Services
Regional District of Fraser-Fort George
Phone: 250-960-4400
Email: lzapotichny@rdffg.bc.ca

Deadline for question submissions is 5:00 p.m. (local time) August 16, 2024.

Those questions that are determined to be of a common interest to all potential Tenderer's will be summarized and posted as Addendum(s) on the Regional District's website as well as the BCBid® website.

ACKNOWLEDGEMENT LETTER

Upon receipt of this Invitation to Tender, a potential Tenderer should complete and sign the Acknowledgement Letter at Appendix A and email the signed Acknowledgement Letter to: Contract Manager, lzapotichny@rdffg.bc.ca. A Tenderer who signs and returns the Acknowledgement Letter is not obligated to submit a Tender.

Any prospective Tenderer who does not submit the Acknowledgement Letter will not be sent any Addendum(s), or answers to questions and may be disqualified.

SITE MEETING

All prospective Tenderer's must attend the site meeting. The Contract Manager will provide an overview of the Contract expectations and be available for questions pertaining to this ITT. The purpose of the site meeting is for Tenderer's to satisfy themselves as to the nature of the work in general, to clarify their understanding of the scope of work, to view the site, to determine specifications, and to have the opportunity to ask questions regarding the project and any other circumstances which may influence their Tender.

Oral questions will be allowed at the site meeting. However, questions of a complex nature, or questions where the Tenderer requires anonymity, should be forwarded in writing, prior to the meeting, to the Contract Manager.

The Regional District will not, under any circumstances, make accommodations for rescheduling, or holding any additional site meetings or providing individuals access to the sites. Failure to attend the site meeting will disqualify your submission.

The mandatory site visit will be held on August 9, 2024 at 9:00 am at the Foothills Boulevard Regional Landfill. Please check in at the scalehouse prior to 9:00 am.

TENDER PROCESS

1.0 Definitions

1.1 "ACCEPTABLE WASTE" means waste which includes but is not necessarily limited to unmarketable food waste, market waste, combustibles such as paper, wood and leather, non-combustibles such as crockery, glass, dirt, ashes from fire places, street sweepings, bulky materials such as furniture and appliances, construction, demolition and land clearing refuse such as stumps, pipe, concrete, lumber, plastic and wire all arising from domestic, commercial, institutional or municipal activities, and Controlled Waste.

1.2 "ACTIVE AREA" means the area of active landfilling which includes the Secondary Road, Pad and Working Face.

1.3 "ADDENDUM(S)" means all additional information regarding this ITT including amendments to the ITT.

1.4 "ALTERNATIVE DAILY COVER OR ADC" means cover material other than soil and may include tarps, spray foam, wood chips, grinders, and other materials.

1.5 "ASBESTOS" means a waste containing friable asbestos fibres or asbestos dust in concentration greater than 1% by weight either at the time of manufacture, or as determined using a method specified in Section 40 (1) of the Provincial Hazardous Waste Regulation No. 63/88:

a) “Asbestos Friable” means any material containing asbestos that when dry, can be easily crumbled or pulverized to powder by hand due to its nature is very difficult to handle and therefore requires pre-approval for disposal.

b) “Asbestos Non-Friable” means any material containing asbestos fibres that are bound or locked into the product matrix, so that the fibres are not readily released.

Special handling fees and requirements may apply as specified in Schedules “B” (fees) and “C” (requirements) as described in Bylaw No. 3166, 2020, Amended Bylaw No. 3330, 2023.

1.6 “BCBID” means the BC Bid website located at www.bcbid.ca.

1.7 “BOARD” means the Board of the Regional District, referred to in Bylaw No. 3166, 2020.

1.8 “BERMED AREA” will be constructed of compacted soil to create a containment area above the existing Landfill surface to accept Controlled Waste.

1.9 "BULKY WASTE" means manufactured items or materials with a volume greater than one and one half cubic meters and manufactured items or materials greater than two and one half meters in length;
Special handling fees and requirements may apply as specified in Schedules “B” (fees) and “C” (requirements) as referred to in Bylaw No. 3166, 2020, Amended Bylaw No. 3330, 2023.

1.10 “CLOSING LOCATION” means the location specified in Part A - Introduction.

1.11 “CLOSING TIME” means the closing time and date specified in Part A - Introduction.

1.12 "CONTRACT DOCUMENTS" or "CONTRACT" means and includes the complete and completed set of all documents, specifications, drawings and addenda incorporated therein, as listed in the Table of Contents.

1.13 "CONTRACT MANAGER" means the General Manager of Environmental Services or a Regional District of Fraser-Fort George’s authorized delegate.

1.14 "CONTRACTOR" means the successful Tenderer who enters into the Contract Agreement.

1.15 "CONTROLLED WASTE" means those waste materials that are listed in Schedule “C” as referred to in Bylaw No. 3166, 2020. Special handling fees may apply as specified in Schedule “B” as referred to in Bylaw No. 3166, 2020, Amended Bylaw No. 3330, 2023.

1.16 "COVER" means soil, ADC, or other suitable material for covering solid waste and exhibiting characteristics that reduce odour, vectors, vermin, fire and litter, as referred to in Bylaw No. 3166, 2020.

1.17 "DAY’S WASTE" means the mass of Solid Waste handled by the Contractor in a working day, and the area of the working face completed in that day.

1.18 "EQUIPMENT" means anything and everything except persons used by the Contractor in performance of the work.

1.19 "FACILITY" means a Landfill, Transfer Station, or Recycling Facility designated by the Regional District of Fraser-Fort George that is used for receiving or processing municipal solid waste and/or recyclable materials as referred to in Bylaw No. 3166, 2020.

1.20 "FACILITY PROPERTY" means the property owned by the Regional District of Fraser-Fort George operating as the Foothills Boulevard Regional Landfill.

1.21 "HAZARDOUS WASTE" means any material defined as such in the Hazardous Waste Regulation, which includes, but is not limited to toxins, poisons, corrosives, irritants, strong sensitizers, flammables, and ignitables, as referred to in Bylaw No. 3166, 2020.

1.22 "HAZARDOUS WASTE REGULATION" means the Hazardous Waste Regulation No. 63/88 under the *Environmental Protection Act*.

1.23 “HEAVY EQUIPMENT" means heavy-duty mobile vehicles specially designed to execute construction tasks, most frequently involving earthwork operations or other large construction tasks.

1.24 "IGNITABLE" the same meaning as defined in Hazardous Waste Regulation No. 63/88.

1.25 “IRREVOCABLE COMMERCIAL LETTER OF CREDIT” means the irrevocable commercial letter of credit required by and in the form attached to this ITT.

1.26 “ITT” means Invitation to Tender, the solicitation described in this document, including any attached or referenced appendices, schedules or exhibits and as may be modified in writing from time to time by the Regional District by Addendum(s).

1.27 "LANDFILL" means the Foothills Boulevard Regional Landfill solid waste receiving facility at 6595 Foothills Boulevard which is used for the deposit of Refuse and additional waste and is used for the temporary storage of source separated residual material.

1.28 "LIFT” means the maximum horizontal height of landfilled waste completed in a given area at one time.

1.29 “MUST” means a requirement that must be met in order for a Tender to receive consideration.

1.30 "OWNER" means the Regional District of Fraser-Fort George.

1.31 "PAD" means an elevated area covered with road material which is used to turn vehicles, and from which to push Solid Waste into the Active Area.

1.32 “PRIMARY ROAD" means the designated areas within the Landfill with surfaces that have been prepared for vehicular traffic.

1.33 "PROHIBITED WASTE" means those waste materials that are listed in Schedule “D” referred to in Bylaw No. 3166, 2020.

1.34 "RADIOACTIVE WASTE" has the same meaning as defined in the Hazardous Waste Regulation No. 63/88.

1.35 "REACTIVE WASTE" as defined in the Hazardous Waste Regulation No. 63/88.

1.36 "REFUSE" means discarded or abandoned materials, substances or objects.

1.37 "REGIONAL DISTRICT" means the Regional District of Fraser-Fort George.

1.38 "SECONDARY ROAD" means any temporary access service road that may be found within the Landfill.

1.39 “SHOULD” or "MAY" means a requirement having a significant degree of importance to the objective of the ITT, but which the Regional District would strongly prefer to be fulfilled, and which the Regional District may in its sole discretion elect to treat the failure to fulfill as a grounds for rejection of a Tender.

1.40 "STARTER BERM" means a berm constructed of soil or waste on the outside edge of the Landfill slope to assist in commencing a new Lift of landfilling.

1.41 "SUBCONTRACTOR" means any person, firm or corporation approved by the Regional District having a contract for the execution or a part of parts of the Work included in this Contract and worked to a special design according to the drawings or specifications but does not include one who merely furnished material not so worked.

1.42 "SUPPLY" or "PROVIDE" means supply and pay for and provide and pay for.

1.43 “TENDER” means a submission in response to this ITT.

1.44 “TENDERER” means the person submitting a Tender.

1.45 "WORK" or "WORKS" means, unless the context otherwise requires, the whole of the Work and materials, labour matters and things required to be done, furnished and performed by the Contractor under this Contact.

1.46 "WORKING FACE" means the portion of the Active Area of the Landfill where waste is being placed and compacted.

2.0 Tender Documents

The Tender Documents are:

(a) Part A – Introduction;

(b) Part B – Instructions to Tenderer’s;

(c) Part C – Contract Details; and

(d) Appendices

3.0 Acceptance of Terms and Conditions

Submitting a Tender indicates acceptance of all the terms and conditions set out in the ITT, including those that follow and that are included in all appendices and any Addendum(s).

4.0 Submission Instructions

4.1 Tenderer's will complete and include all of the following forms in their Tender submission (hard copy or electronic format) provided in Appendix C.

a. Tenderer's Form (Appendix C1)
    i. Description of the Tenderer's organization including name of legal entity, address, telephone number and authorized representative.
b. Tenderer's Experience in Similar Work (Appendix C2)
    i. The Tenderer will be competent and capable of performing the Work. The Tenderer is required to provide evidence of previous landfill operation experience, a minimum of three references, and value of previous contracts.
c. List of Tenderer's Personnel (Appendix C3)
    i. List of personnel that will be dedicated to this Work and a description of the Tenderer's personnel's capabilities, experience, and training.
d. List of Subcontractors (Appendix C4)
    i. Description of the Tenderer's Subcontractors including contact information, project reference information and Work to be performed.
e. List of Equipment (Appendix C5) (Refer to Part C - Contract Details, Section 8)
    i. Description of each piece of heavy-duty Equipment for use and standby Equipment to be used in the event of breakdown.
f. Tender Form and Schedule of Prices – Tendered Price (Appendix C6) Statement of Tendered Price to provide the following:
    i. A. Compaction and Cover Services – per unit price.
    ii. B. Cover Extraction and Borrow Pit operations - price per cubic meter.
    iii. C.1 Ancillary Services - Snow Clearing - price per event (C1.1 to 1.3).
    iv. C.2 Ancillary Service – Road Maintenance – Ditch Maintenance – price per event. (C2.1 to 2.2).
g. Schedule of Prices - Force Account Work Rates (Appendix C7)
    i. The Contractor will provide a list and rates for on-site force account Work as needed. Actual hourly rates must be provided. References to other publications, documents or provincial rate sheets will not be accepted. Any references to other publications for rates of Equipment will be considered incomplete Tender documentation.
h. Conflict of Interest Disclosure Statement (Appendix C8)
i. Good & Services Tax Information (Appendix C9)

4.2 All prices and notations should be legibly written in a non-erasable medium pen. Erasures, interlineations, or other corrections should be initialed by an authorized signatory of the Tenderer.

4.3 Subject to any alternatives or options in respect of which the Regional District requests pricing or other information in an appendix to the ITT, Tenders are to be all inclusive and without qualification or condition.

4.4 The Regional District may, at any time and for any reason, extend the Closing Time by means of a written amendment published on the Regional District's website, at www.rdffg.ca and at www.bcbid.gov.bc.ca.

4.5 Each Tender must be signed by an authorized signatory or authorized signatories of the Tenderer, as is necessary for due execution on behalf of the Tenderer. Each Tender by a company or partnership must specify the full name of the legal entity submitting the Tender.

4.6 It is the sole responsibility of the Tenderer to ascertain that they have received a full set of the Tender documents. Upon submission of their Tender, the Tenderer will be deemed conclusively to have been in possession of a full set of the Tender documents.

4.7 If the Regional District, in the Regional District's sole discretion, determines that a clarification, addition, deletion, or revision of the ITT is required then the Regional District will issue an addendum and the addendum will be posted on the Regional District website and BC Bid.

4.8 It is the sole responsibility of the Tenderer to check for Addendum(s). Addendum(s) issued during the time of the tender process must be signed by the Tenderer and included with the Tender submission and they will become part of the Tender documents. Addendum(s) not signed and included with the Tender submission will be disqualified.

4.9 Submitting a Tender indicates acceptance of all the terms and conditions set out in the ITT, including those that follow and that are included in all appendices and any Addendum(s).

5.0 Discrepancies or Omissions

Tenderer's finding discrepancies or omissions in the specifications or other documents herein or having doubts on the meaning or intent of any part thereof, should immediately request in written form, by email, clarification from the Contract Manager. Upon receipt of the written request for clarification, the Contract Manager may, in the person's sole discretion, send by email written instructions or explanations to all parties registered as having returned the Acknowledgement Letter, and make amendments to this ITT. No responsibility will be accepted for oral instructions. Any requests must be received prior to 5:00 pm on August 16, 2024.

6.0 Late Submissions

Tenders and Security Deposits will be marked with their receipt time upon receipt. Only complete Tenders received before the Closing Time will be considered to have been received on time. Tenders received late will be marked late and will be rejected. In case of a dispute, the Tender receipt time as recorded by the Regional District will prevail whether accurate or not.

7.0 Changes to Tenders

A Tenderer that has already submitted a Tender may amend its Tender prior to the Closing Time:

(a) For changes to price only, by submitting an amendment via email or direct delivery at the address identified at the beginning of Part B of this Invitation to Tender, identifying a plus or minus variance to the Tenderer's Tender price; or

(b) In all cases, by delivering a completely new Tender in accordance with Part A to this Invitation to Tender, clearly indicating it replaces the previously submitted Tender.

Any such revision must clearly identify the ITT number and the Closing Time. A Tender revision submitted as aforesaid shall effectively amend the Tender and the Regional District shall only review and evaluate the Tender as amended.

8.0 Tender Prices

8.1 The Tenderer will be deemed to have satisfied themselves as to the sufficiency of the Tender for the Work and the price stated in the Schedule of Prices (Appendix C6). These prices will cover all their obligations under the Contract, and all matters necessary to the proper completion and maintenance of the work, and will include the supply of all labour, Equipment material, supervision, services, taxes and assessments, together with the Tenderer's overhead and profit, except where otherwise provided elsewhere in this ITT.

8.2 Tender prices must remain open for acceptance for a period of 90 days from the Closing Date unless otherwise stated by the Regional District.

9.0 Confidentiality

In accordance with the *Freedom of Information and Protection of Privacy Act*, Tenderer's will treat as confidential and will not, without prior written consent of the Regional District, publish, release, or disclose, or permit to be published, released, or disclosed, any information supplied to, obtained by, or which comes to the knowledge of a Tenderer as a result of this ITT except insofar as such publication, release or disclosure is required by the laws of British Columbia.

10.0 Rejection of a Tender

10.1 Tenders which contain qualifying conditions or otherwise fail to conform to the instructions contained in this ITT may be disqualified or rejected. The Regional District may, however, in its sole discretion, reject or retain for its consideration Tenders which are non-conforming because they do not contain the content or form required by the ITT, or for failure to comply with the process for submission set out in this ITT, whether or not such non-compliance is material.

10.2 The Regional District's intent is to enter into a Contract with the Tenderer who has submitted the offer that scores highest on the evaluation matrix. The Regional District reserves the right to accept any or none of the Tenders submitted and will evaluate Tenders based on the best value offered to the Regional District and not necessarily the lowest price. The Regional District reserves the right in its sole unrestricted discretion to:

(a) accept any Tender which the Regional District deems most valuable and advantageous to itself;

(b) reject any and/or all irregularities in a Tender submitted;

(c) waive any defect or deficiency in a Tender whether or not that defect or deficiency materially or substantially affects the Tender and accept that Tender;

(d) reject any and/or all Tender(s) for any reason, without discussion with the Tenderer(s);

(e) accept a Tender which is not the lowest Tender price; and

(f) cancel or reissue the Tender without any changes.

10.3 Without limiting any other provision of this Tender, the Regional District may, in its sole discretion, reject a Tender submitted by a Tenderer, if the Tenderer or any officer or director of a corporate Tenderer, is, or has been within a period of two years prior to the Closing Time, engaged either directly or indirectly through another corporation or legal entity in a legal proceeding initiated in any court against the Regional District in relation to any contract with, or works or services provided to the Regional District.

11.0 Conflict of Interest

11.1 When submitting a Tender, the authorized signatory must complete, sign and include with their Tender a conflict of interest disclosure statement (Appendix C8).

11.2 Without limiting any other provision of this ITT, the Regional District may reject a Tender based on an actual, potential or perceived conflict of interest.

The Regional District may reject any Tender where:

a. one or more of the directors, officers, principals, partners, senior management employees, shareholders or owners of the Tenderer, is an officer, employee or director of the Regional District or a consultant involved in the procurement process, or is a member of the immediate family of an officer, employee or director of the Regional District or a consultant involved in the procurement process; or

b. in the case of a Tender submitted by a Tenderer who is an individual person, where that individual is an officer, employee or director of the Regional District or a consultant involved in the procurement process or is a member of the immediate family of an officer, employee or director of the Regional District or a consultant involved in the procurement process.

A Tenderer who has any concerns regarding whether a current or prospective employee, advisor or member of that Tenderer is, or may be, a Restricted Party as defined above in 11.2 a and b, is encouraged to request an advance decision by submitting to the Contract Manager, not less than ten working days prior to the Closing Time, by email, the following information:

a. names and contact information of the Tenderer and the person for which the advance opinion is requested;
b. a description of the relationship that raises the possibility or perception of a conflict of interest or unfair advantage; and
c. copies of any relevant documentation.

The Regional District may make an advance decision regarding whether the person is a Restricted Party, and whether the Regional District will reject a Tender based on the information provided.

12.0 Tender Evaluation

12.1 The purpose of this ITT is to select a Tenderer with the capability and experience to efficiently and cost effectively complete the work described in this ITT.

12.2 The Regional District shall be the sole judge of a Tender and its decision shall be final. The Regional District staff shall use the following criteria to evaluate Tenders received:

Mandatory Requirements

The Tenderer's submission must meet the mandatory requirements in order to be evaluated. The mandatory requirements include:

a. Complete Tender submission including completed forms and all signed addendums.

b. Security Deposit.

c. Tenderer's Equipment requirements including hours, mass and horsepower and maintenance records (as applicable).

Evaluation Criteria

Tenders that meet the mandatory requirements will be evaluated based on the following, as evidenced by the information provided in the executed forms provided as part of the submission.

a. Tenderer's Qualifications, Experience, and References.

b. Past Work Experience with the Regional District.

c. Tender Price.

Preference will be given to the submissions where personnel meet the experience and training requirements.

12.3 The Tenderer acknowledges that the Regional District may rely upon criteria that the Regional District deems relevant even though such criteria may not have been disclosed to the Tenderer. By submitting a Tender, the Tenderer acknowledges the Regional District's right under this clause and absolutely waives any right of action against the Regional District for the Regional District's failure to accept their Tender, whether or not such right of action arises in contract, negligence, bad faith or any other cause of action.

12.4 Notwithstanding any other provision in this ITT, the award of a Contract by the Regional District may be subject to the availability of funding and the approval of the Board.

13.0 Proof of Ability

The Tenderer will be competent and capable of performing the Work. The Tenderer is required to provide evidence of previous experience and financial responsibility before the contract is awarded.

14.0 Equipment

A complete list of the Equipment, which the Tenderer will make available for the completion of the Contract, will be included with each Tender.

15.0 Security Deposit

A certified cheque, bank draft or money order in the amount of $15,000 must accompany the Tender. This security deposit will be returned to all unsuccessful bidders within 60 days of Tender opening and to the successful Tenderer when a contract has been executed. Failure of the successful Tenderer to execute the contract upon award by the Regional Board will result in forfeiture of the Security Deposit.

16.0 Irrevocable Commercial Letter of Credit

Upon written notice of award of Contract by the Regional District the successful bidder will provide an Irrevocable Commercial Letter of Credit. The Regional District will not execute a Contract until it is in possession of the required Irrevocable Letter of Credit. The Irrevocable Commercial Letter of Credit must be in the amount of $150,000 from a recognized Canadian Financial Institution. The Irrevocable Commercial Letter of Credit will be kept current for the life of the Contract plus 60 days as specified in the Contract Documents. Failure to provide the required Irrevocable Commercial Letter of Credit will result in forfeiture of the Security Deposit.

17.0 Examination of Contract Documents and Site

17.1 The Tenderer will satisfy themselves as to the practicality of executing the Work in accordance with the Contract, and they will be held to have satisfied themselves in every particular before making up their Tender by inquiry, measurement, calculation and inspection of the site.

17.2 The Tenderer will examine the site and its surroundings and, before submitting their Tender will satisfy themselves as to the nature of the site, the quantities and nature of the work and Equipment necessary for the completion of the work, and the means to access to the site, the accommodation they may require, and in general, will obtain all relevant information as to risks, contingencies and other circumstances which may influence their Tender.

18.0 Liability for Errors

18.1 The Regional District will not be responsible for any costs incurred by Tenderer as a result of the preparation or submission of a Tender pertaining to this ITT. The accuracy and completeness of the Tender is the Proponent's responsibility. If errors are discovered, they will be corrected by the Tenderer at their expense.

18.2 Tenderer’s acknowledge that the Regional District, in the preparation of the ITT, supply of oral or written information to Tenderer’s, review of Tenders or the carrying out the Regional District's responsibilities under this ITT, does not owe a duty of care to Tenderer’s.

19.0 Limitation of Liability

Except for claims for costs of preparation of its Tender, each Tenderer, by submitting a Tender, irrevocably waives any claim, action, or proceeding against the Regional District including without limitation any judicial review or injunction application or against any of the Regional District's employees, advisors or representatives for damages, expenses or costs including costs of Tender preparation, loss of profits, loss of opportunity or any consequential loss for any reason including: any actual or alleged unfairness on the part of the Regional District at any stage of the Tender process; if the Regional District does not award or execute a contract; or, if the Regional District is subsequently determined to have accepted a noncompliant Tender or otherwise breached or fundamentally breached the terms of this ITT.

20.0 Ownership of Tenders and Freedom of Information

20.1 Tenders will be received and held in confidence by the Regional District, subject to the provisions of the *Freedom of Information and Protection of Privacy Act* and this ITT. Each Tender should clearly identify any information that is considered to be confidential or proprietary information.

20.2 As an exception to Tenders being received and held in confidence, Tenderer's are advised and acknowledge that any contract entered into as a result of this Tender may be subject to Board approval, which may be discussed and voted on at a meeting of the Board that is open to the public. If Board approval is required, details of Tenders, including but not limited to proposed or negotiated fees, may be provided to the Board in a publicly available staff report, discussed at a Council meeting that is open to the public, and posted on a publicly available electronic agenda on the Regional District's website.

PART C – CONTRACT DETAILS

1. BACKGROUND

The Regional District has issued this Invitation to Tender as part of its mandate to operate the Foothills Boulevard Regional Landfill in a manner that protects the environment and is consistent with the conditions of Operational Certificate MR-01697 included in Appendix F. The conditions of Operational Certificate MR-01697 that are relevant to the Compaction and Cover Services at the Foothills Boulevard Regional Landfill are as follows:

4.2.3 The facilities must be developed and operated in accordance with the Design and Operation Plan.

5.1 At a minimum, the Regional District will ensure that operating personnel are trained to industry standards and at least one member of the on-site personnel are trained and current in a SWANA recognized landfill operator course, or equivalent.

6.1 Hazardous Waste
Hazardous Waste as defined by the Hazardous Waste Regulation pursuant to the Environmental Management Act are prohibited from disposal unless expressly authorized by the Hazardous Waste Regulation, approved by the Director or as specified in the Operational Certificate.

6.2 Waste Asbestos
Waste Asbestos is authorized for disposal subject to the compliance with the requirements of Section 40 of the Hazardous Waste Regulation and the following conditions:
6.2.1 The asbestos may not be mixed with any other hazardous waste.
6.2.2 The Regional District must approve the disposal before the disposal takes place.
6.2.3 All other applicable requirements of the Hazardous Waste Regulation, including but not limited to manifesting and waste record keeping, must also be complied with.

6.3 Handling of Impacted Soil
The Environmental Management Act, the Contaminated Sites Regulation and the Hazardous Waste Regulation are applicable for the disposal of impacted (contaminated) soil at the facility.

6.4 Hazardous Waste from Accidental Spills or Abandonment
Hazardous Waste resulting from accidental spills or abandonment of dangerous goods may be accepted at the facility only under the authority of Section 52(1) of the Hazardous Waste Regulation.

The “Design and Operation Plan” for the Foothills Boulevard Regional Landfill is represented by the following documents.

- The “Integrated Landfill Management Plan” prepared by XCG Consultants Ltd. (March 2010) included in Appendix G provides the general design, operation and maintenance information for the Facility. It is important to note that the Landfill

Development Stages A through D described in Section 5.0 of Appendix G and the Drawings for Cell 1 (existing limit of waste) have been superseded.

- The "Interim Fill Plan Update" prepared by Tetra Tech Canada Inc. Ltd. (September 15, 2023) provides Landfill development plans for current fill stages within Cell One and is included in Appendix H.

Landfilling for the Contract will commence in the Active Fill Area indicated within the interim fill plan and as directed by the Owner and as indicated in Appendix H.

Further it is noted that the current fill plan may be updated by the Regional District as required, and the Contractor will be required to make the necessary adjustments to accommodate these changes.

2. CONTRACT DURATION

The Contract will begin on November 1, 2024 at 12:01 a.m. and the Contract will stay in force until midnight October 31, 2029. The Contract duration will not exceed five years.

3. WORK

The Works will include the following three items as per the Schedule of Prices – Tendered Price.

a) Compaction and Cover Services; and
b) Cover Extraction and Borrow Pit Operations; and
c) Ancillary Services.

3.1 Compaction and Cover Services

As indicated in Appendix B2 – General Conditions, Section 18.1, the per tonne unit price for compaction and cover services will include all of the Work in this section.

The Contractor will not permit any waste to be removed from the Facility, unless otherwise directed by the Regional District.

3.1.1 Working Face Operation and Maintenance

The Contract Manager will provide direction to the Contractor as to the areas of the Landfill that will be used for disposal and determine the number and location of Working Faces and the types of Acceptable Waste to be compacted and covered at a Working Face. The Contract Manager will establish grades and elevations that the Contractor will achieve through compaction and cover. The Contractor will undertake the staging of landfilling as directed by the Owner.

The unloading of waste at the Landfill will be restricted to an area such that the waste can be incorporated into the Working Face with the provided Equipment. The Contractor will direct the unloading of the incoming waste at the edge of the Working Face and Pad.

The Contractor will maintain the Working Face and the Pad to a width between 25 metres and 30 metres unless otherwise directed by the Contract Manager.

When establishing a new Working Face the Contractor will excavate and stockpile existing Daily, Interim and/or Final Cover, and excavate and stockpile all soil from roads, berms and pads, for reuse.

The Contractor will keep the Pad clear of waste at all times.

The Contract Manager will establish the height of Lifts. The height of Lifts should typically not exceed five metres and typically not be less than three metres. Inclined slopes of the Working Face will typically be no steeper than 3:1 (horizontal:vertical). Horizontal surface grades will be maintained to manage surface run-off between 2% and 4% unless directed otherwise by the Contract Manager.

In certain instances, the Contract Manager may direct the Contractor to construct Starter Berms. The Contractor will shape, grade and compact all Starter Berms required on the outer edge of new Lifts. The Starter Berms will be constructed of waste and/or soil as directed by the Contract Manager. Starter Berms will be the same height as the Lift and will have an outside slope not greater than 3:1 (horizontal:vertical). The Contract Manager will direct where and how the Starter Berm will be developed.

3.1.2 Traffic Control

The potential for collision between heavy Equipment and other vehicles exists at the Facility. The Contractor will be responsible for ensuring collision avoidance. The Contractor will have only one company vehicle at the Active Face area at one time and safely parked away from any Equipment activity.

- The Contractor will ensure that heavy Equipment does not operate within 10 metres of vehicle(s) or person(s). If a vehicle enters the Working Face, the operator will move their machine at least 10 metres away from the vehicle and park until the area is clear.

- The Equipment operator must operate their machine in a manner that ensures they have a clear and unobstructed view. The Equipment operator will always have a clear and unobstructed view of the pad and active face.

If it is not possible for the Equipment operator to maintain a clear and unobstructed view then the Contractor, or at the direction of the Regional District, will provide a spotter to direct traffic. When a spotter is employed, the spotter will be responsible for directing vehicles to appropriate areas to avoid interference with the Contractor's Equipment and operations. The spotter must have verbal contact with the Equipment operators. The spotter must be trained in traffic control /avoidance roles and responsibilities must follow all WorkSafeBC requirements while engaged in spotting duties around mobile Equipment and or vehicle(s). Proof of training in traffic control must be provided by the Contractor.

The Contractor will be responsible for any damage caused by the Contractor to Facility survey reference points as set or established. These survey reference points will be repaired and/or replaced at the expense of the Contractor.

The Contractor will be responsible for any damage caused by the Contractor to Facility environmental monitoring wells, control points and landfill gas monitoring wells and

infrastructure, as set or established. These environmental monitoring stations will be repaired and/or replaced at the expense of the Contractor.

The Contractor will be responsible for ensuring that any water that comes in contact with the waste is routed into the waste. Stormwater control and drainage swales shall be maintained by the Contractor to prevent runoff of impacted surface water.

3.1.3 Traffic Control Devices

The Regional District will erect and maintain information signs at the entrance to the Facility. The Regional District will initially provide all signs, directional devices, barricades and fencing for directing traffic to the Working Face.

The Contractor will be responsible for the preservation of all signs, directional devices, barricades and fencing used at the Working Face to direct and control traffic. The Contractor will also move these signs, directional devices, barricades and fencing as required. Where the Contractor fails to preserve these traffic control devices, the Contractor will, at their expense, replace these with products of design and materials from a reputable company previously approved by the Contract Manager.

3.1.4 Controlled Waste

The Regional District will determine methods and areas of the Landfill for the disposal of Controlled Waste. The Contractor will be given at least 24 hours prior notice of the arrival of Controlled Waste requiring special handling including the description, type, and quantity of Controlled Waste. Controlled Waste will be disposed of in one of the following manners at the discretion of the Regional District:

- Landfilled in the active Working Face.
- Landfilled below the existing Landfill surface in an excavation. The Contractor will excavate a trench or pit within the existing landfill and in a location as directed by Contract Manager. The Contractor will place, grade and compact the Controlled Waste in the pit, place and compact the excavated waste over the top of the Controlled Waste, and place, grade and compact cover soil over the disturbed area. Excavation may be completed near the Working Face or at another location within the Landfill.
- Landfilled above the existing Landfill surface in a Bermed Area. The Contractor will place, grade and compact soil to construct a Bermed Area, as directed by the Regional District staff. The Owner will provide and stockpile soil for the construction of the Bermed Area near the area of construction. The Contract Manager will determine the location of the Bermed Area and the manner in which the Cell will be constructed. The Contractor will completely cover and compact the Controlled Waste as directed by the Contract Manager after the Controlled Waste has been deposited in the Bermed Area.

3.1.5 Windblown Litter

The Contractor will be responsible for all litter cleanup that results from the Works including litter due to insufficient compaction, insufficient cover, and non-maintained litter fencing. The

Regional District staff will be responsible for litter cleanup within 200 metres of the Transfer Station at the front entrance of the Facility. All other litter cleanup will be the responsibility of the Contractor.

The Contractor will supply, install, relocate and maintain a litter control device that is effective in minimizing windblown litter from the Working Face.

The Contractor will be responsible to complete an annual spring litter cleanup to Contract Manager's satisfaction. During the annual spring litter cleanup, the Contractor shall be responsible for all areas of the Facility except within 200 metres of the Transfer Station at the front of the Facility.

The Contractor will be required to keep records of staff hours spent on litter cleanup, and a yearly minimum of 1500 hours will be required. Copies of records may be requested by the Owner to verify yearly minimum hours.

3.1.6 Snow Clearing

The Contractor will keep all Secondary Roads, Pads, Borrow Areas and Stockpile Areas clear of snow as shown in Appendix D3. The Contractor will not allow snow to accumulate to depths of more than 10 centimetres on these roads and areas.

The Contractor will clear snow from the Working Face(s) prior to landfilling activities. The snow will be moved so as not to allow ponded water or interfere with on-site drainage courses such as swales, ditches and culverts.

Snow clearing operations for other areas of the Facility, which include the compost area, transfer station area, and primary roads are included in Ancillary Services.

3.1.7 Compaction

The Contractor will operate the Landfill Compactor whenever waste is being landfilled in a suitable manner to compact waste to an in-place density of at least seven hundred fifty kilograms per cubic metre (750 kg/m^3).

- The Contractor will spread the waste in layers on the Working Face not more than 60 centimetres thick.

- The Landfill Compactor will make a minimum of five passes over the entire area of the Working Face for each 60-centimetre spread layer of waste.

- On each pass, the compactor will drive beyond the spread layer of waste to ensure complete compaction of all waste within the layer. The Contractor will complete the minimum five passes with the Landfill Compactor prior to spreading subsequent layers of waste.

- At the end of each day, the Contractor will grade the surface of compacted waste, fill settled areas and trim any high spots to ensure a smooth grade approved by Regional District staff, and adjust if necessary, prior to placing Daily Cover.

- Slopes will not exceed a slope of 3:1 (horizontal:vertical) unless otherwise directed by the Contract Manager. The Contractor will grade and maintain the top of all Day's Waste and Lifts with a minimum two percent grade across the area, unless otherwise directed by the Contract Manager.

- When the Contract Manager establishes an additional Working Face, the Contractor may use the Bulldozer for compaction.

3.1.8 Compaction Testing

The Contractor will complete bi-annual (twice per year) topographical surveying of all active landfill areas worked in the previous six months and submit the results to the Regional District. The Regional District will use the topographical survey results to calculate compaction efficiency through airspace consumption.

All results coming out of the completed Topographical surveys will be submitted in a DWG format using AutoCAD 2018 or later.

Failure to achieve compaction density in Section 3.1.7 Compaction will result in a penalty found under Appendix B2 - General Conditions, Section 21 – PAYMENT WITHHELD OR DEDUCTED.

3.1.9 Daily Cover

The Contractor will be responsible for placement of Daily Cover at the end of each day of landfilling.

Daily Cover will be measured each day using Appendix E: Daily Cover Measurement Procedure.

The Contractor will be required to apply soil cover (either soil from clean fill stockpile area or borrow area) a minimum of once per week to the entire cell at the Active Face. This will be measured following Appendix E: Daily Cover Measurement Procedure.

The material to be used for Daily Cover will be prioritized as follows (high to low priority) unless otherwise directed by Regional District:

1. ADC Tarps;
2. Soil from the Clean Fill Stockpile Area;
3. Soil from the Borrow Area; and
4. ADC sawdust-soil mix to regulation standards.

The Contractor will supply, maintain, and use the ADC Tarps as directed by the Owner. The ADC Tarps include the use of reusable tarps or membranes and support structures and anchors equivalent to the existing system (or as approved by the Regional District) with a total coverage area of 600 square meters (20m x 30m).

The Contractor will use the ADC Tarps to the satisfaction of the Contract Manager.

The Contractor will ensure that their ADC Tarps are in good working order and will, at their expense, repair any damage, or replace, the ADC Tarps as required.

The Contractor will be responsible for preparing the sawdust-soil mix using sawdust provided by the Regional District in a stockpile located on the Landfill. The sawdust-soil mix will be composed of no more than 30 percent sawdust (by volume) mixed soil from either the Clean Fill Stockpile or the Borrow Area.

Failure to cover properly will be deemed to have occurred when waste is left exposed on the Active Face, including the failure to cover the waste sufficiently with the approved daily cover methods outlined in Section 3.1.9 Daily Cover. This will be a visual inspection done by the Regional District of Fraser Fort George.

Failure to achieve cover as outlined in Section 3.1.9 Daily Cover, will result in a financial penalty found under Appendix B2 - General Conditions, Section 21 – PAYMENT WITHHELD OR DEDUCTED.

3.1.10 Intermediate Cover

The Contractor will apply intermediate Cover Material to compacted and covered Solid Waste as directed by the Contract Manager. Typically, soil is used as an intermediate Cover Material.

Prior to applying intermediate Cover Material, any irregularities in the surface will be reworked by the Contractor so that a depression free surface with a suitable grade and elevation is created. The Contractor will apply intermediate Cover Material on top of compacted Solid Waste and/or existing Cover Material to achieve a combined compacted depth of 300mm of Cover Material.

Once spread, levelled and graded the Contractor will pack the Cover Material with the track-typed crawler tractor. The finished surface will be free of any depressions or other surface features that will trap or pool water or prevent the flow of water over the surface of the compacted Cover Material.

3.1.11 Final Cover

The Owner will be responsible for any final cover construction.

3.1.12 Secondary Road Maintenance

The Contractor will level, grade and maintain all Secondary Roads as shown in Primary and Secondary Road Map Appendix D4. Pads, turn-around areas or other vehicle access associated with the Working Face using the Bulldozer. Such Work will be conducted in a manner to prevent water ponding and promote surface water runoff in a direction suitable to the Contract Manager.

3.2 Cover Extraction and Borrow Pit Operation

3.2.1 Borrow Area Operation

The Contractor will provide and operate heavy Equipment to complete the excavation of materials (soil/gravel) from the Borrow Areas, as indicated on Figure 2 of Appendix D2, and stockpiling of the soil at the Landfill, as directed by the Regional District (for Forced Account Work).

The Regional District will advise the Contractor when soil is required, what amount is required and where it will be stockpiled.

The Contractor will be responsible for any grubbing required to access areas in the Borrow Area for excavation. The Contractor will haul and dispose of grubbed material at the Working Face. No separate payment will be made for grubbing.

The Contractor will maintain the Borrow Area as directed by the Owner and will comply with all legislation and regulations governing the operation of borrow area works as per the Ministry of Energy, Mines and Low Carbon Innovation.

The Contractor will ensure that their Work does not impede existing surface water drainage unless otherwise directed by the Contract Manager.

Work will be conducted during Landfill operating hours.

3.3 Ancillary Services

As indicated in Appendix B2 – General Conditions, Section 18 - PAYMENT, individual unit prices are to be provided for the following Ancillary Services associated with Force Account Work.

3.3.1 Snow Clearing

There are three separate areas requiring snow clearing at the Landfill facility. These areas are described as follows, and as shown on the Snow Clearing Map in Appendix D3:

a) The Transfer Station Area:

   The Transfer Station Area consists of all asphalt surfaces beginning at the entrance to Facility (from Foothills Boulevard). The Transfer Station Area also includes the by-pass road, the weigh scale approaches, all public use areas, the gravel pad that contains the fire hydrant and Regional District outbuildings, and the lower service road that accesses the roll-off bin loading area.

b) Blower Building Area:

   The Blower Building Area consists of the area enclosed by chain link fencing located west of the compost pad, lagoon/wetland complex, which contains the blower building and flare tower.

c) Primary Roads:

   All Primary Roads (see map Appendix D4) include all outer road surfaces or permanent road surfaces outside the Transfer Station Area used to access the

Landfill and marshalling areas within the Facility. This is the road used to access the Blower Building Area, access to certain areas on the asphalt compost pad as directed by Regional District staff, access to Controlled Waste disposal area, and the metal/fridge marshaling area.

At the request of Regional District staff, any one or combination of the three described areas may be cleared of snow.

Priority of snow clearing will be the Transfer Station Area, then the Primary Roads and then the Blower Building Area, unless otherwise directed by Regional District staff.

The Contractor will commence snow clearing activities under the following conditions:

a) During Landfill operating hours when snow accumulations are greater than 10 centimetres at the Facility; or when directed by Regional District staff.

b) Outside of Landfill operating hours the Contractor will be responsible for monitoring snowfall accumulations and coordinating the snow removal service response when accumulations at the Facility are:

- 10 cm or more by 5:00 a.m.; or
- 7.5 cm or more by 5:00 a.m. and it is still snowing.

The priority of the snow clearing activities is the Transfer Station, and this area must be cleared of snow by the following opening times:

- 7:00 a.m. Monday to Friday; and
- 9:00 a.m. Saturday and Sunday.

The Contractor will then clear the Primary Roads, unless otherwise directed by Regional District staff.

All cleared snow will be moved to snow storage areas. Snow storage areas will be identified at the mandatory site meeting. Snow placed in these storage areas will be pushed up by the Contractor to maximize snow storage capabilities and pushed back far enough to accommodate the closing of the snow gates at the Contractor's expense. The snow storage area is also used by Regional District staff from time to time. Minimum weekly push back in the snow dumps will be at the Contractor's expense.

The Contractor will ensure that all snow gates are and can be easily closed after each snow clearing event.

The Contractor will be responsible for removing excess snow from snow storage areas. This is required to be leveled and pushed back regularly at the Contractor's expense. Regional District staff use this area as well and will push back as capable with their machine, but the thorough cleaning will be the Contractor's responsibility.

Snow must not be cleared onto walkways, gardens, against buildings, Equipment, fences, gates, hydrants, monitoring wells or block access to these areas.

All gardens and culverts will be marked with re-bar and flagging tape. The culverts are to be kept clear from accumulated snow by the Contractor.

The Contractor is responsible for keeping the Primary Roads free of snow. If the roads get to the point where there is no room to push the snow off of the road, then the Contractor is responsible for removing the snow so that the roads can be plowed.

The Contractor is responsible for moving the directional sign and pylons at scale entrance and recycling area before and after plowing.

The Contractor will be issued a gate key to allow for after-hours access to the Landfill facility. The key will be used by the Contractor only for the purpose of providing snow clearing services.

The Contractor will ensure that the main gate remains closed and locked while providing snow clearing services during times outside the Landfill's regular operating hours.

The key will not be copied and will be returned to the Regional District at the completion of the Contract period or when requested to do so by the Regional District.

The Contractor will provide a phone number, which Regional District staff can contact or leave a message for request of snow clearing services during operating hours.

The Contractor will respond to Regional District snow removal request within two hours of call out.

If responding to a message left by Regional District staff, the Contractor will contact the Landfill to confirm receipt of the message and provide an estimated time of arrival at the Facility.

The ditches will have to be pushed back when heavy snow accumulation happens. Where it is not possible, the snow will have to be cleared out and hauled to onsite snow dump at the Contractor's expense.

From the edge of transfer station to the gravel pit gate there is nowhere to push snow into the ditches. The Contractor will be responsible for loading and trucking this snow to snow dump area #3 (see Snow Clearing Services Plan, Appendix D3). This snow dump area will require regular push back.

3.3.2 Road Maintenance: Grading and Ditching of Primary Roads

"Grading" of Primary Roads (see map Appendix D4) must be conducted at least three times per year. Time of service subject to road conditions and weather and will be requested by Regional District staff.

All grading services will be conducted during business hours, appropriate safety precautions will be adhered to at all times. Contractor to supply signage referring to work in progress.

"Ditching" along primary roads must be conducted as least three times per year and will be requested by the Contract Manager. (see map Appendix D1).

All ditching servicing will be conducted during business hours, appropriate safety precautions will be adhered to at all times. Contractor to supply signage referring to work in progress and traffic control personnel if required.

The Contractor is responsible for moving any and all directional sign or pylons that may impede either grading or ditching services.

4. SPECIFIC TERMS AND CONDITIONS

Contractor's shall recognize the following:

a) The Contractor is to provide Compaction and Cover Services at Foothills Boulevard Regional Landfill in a manner that protects the environment and is consistent with the conditions of the Operational Certificate for the Facility issued under the provisions of the Environmental Management Act (included in Appendix F), as well as all pertinent Federal, Provincial and local applicable acts, regulations, by-laws, guidelines and policies.

b) The Regional District owns and operates a leachate collection and control system at the Landfill. The Contractor shall ensure that access is maintained to the leachate collection system manholes, holding tanks and other access cleanouts at all times. The Contractor shall take all measures necessary to ensure that the leachate system is not damaged during the course of the Contractor's operations.

c) The Regional District owns and operates a landfill gas collection and control system at the Landfill. The Contractor shall ensure that access is maintained to the landfill gas collection and control system at all times and shall take the required protective measures for all of its own facilities and operating procedures. The Contractor shall take all measures necessary to ensure that the landfill gas collection and control system is not damaged during the course of the Contractor's operations.

d) The Regional District owns and operates a leachate collection system, and groundwater monitoring wells at the Landfill. The Contractor shall ensure that access is maintained to the monitoring wells at all times. The Contractor shall take all measures necessary to ensure that the monitoring wells are not damaged during the course of the Contractor's operations.

e) During the term of any Contract Agreement the Regional District shall retain title, as personal property, to all Equipment and or facilities at the located at the Facility at the commencement of the Contract Agreement.

f) During the term of Contract Agreement, the Contractor will retain title, as personal property, to all Equipment and or facilities provided by the Contractor. Upon termination of the Contract Agreement, all Equipment and or facilities that are the property of the Contractor shall be removed from the Facility.

g) A pre-contract site condition visual inspection will be completed jointly by the Contractor and the Regional District to establish the baseline conditions.

5. OPERATING HOURS

The Facility and the Landfill operates on the following operating hours:

Year Round

Monday to Friday	7 am – 5 pm
Saturday & Sunday	9 am – 5 pm
Holiday Operating Hours	9 am – 5 pm

The Facility is open from 9:00 am to 5:00 pm on the following holidays; Easter Monday, Victoria Day, Labour Day and Thanksgiving Day ONLY.

The Facility is closed on New Year's Day, Family Day, Good Friday, Easter Monday, Victoria Day, Canada Day, BC Day, Labour Day, National Day for Truth and Reconciliation, Thanksgiving Day, Remembrance Day, Christmas Day and Boxing Day.

The Regional District retains the right to adjust operating hours. The Regional District will provide two weeks advance written notice to the Contractor of any change in operating hours.

The Contractor will provide and maintain an emergency contact phone number for emergency call out by the Regional District outside of regular operating hours. The Contractor will provide this emergency contact number to the Regional District prior to commencement of the Contract Agreement.

6. MATERIALS NOT ACCEPTED

The Regional District will provide the Contractor with a list of Controlled Waste and Prohibited Waste materials, which may change from time to time. The Contractor will be responsible for visually inspecting all waste directed for landfilling for the presence of Controlled Waste or Prohibited Waste prior to landfilling. The Contractor will not knowingly landfill any Controlled Waste and Prohibited Waste unless directed to do so by the Contract Manager. When the Contractor identifies a Controlled Waste or Prohibited Waste co-mingled with other Acceptable Waste they will immediately notify Regional District staff at the Scale House.

The Contractor will notify the Regional District Landfill staff where the following is observed:

- waste that is a powder, sludge, gaseous or contaminated soil;
- waste that is in barrels, drums, small sealed containers, tanks or pressure vessels;
- waste that has a chemical or other unusual description;
- containers marked with warning labels;
- waste that has an unusual odour or appearance;
- waste that falls into one of the Hazardous Waste classifications; or
- waste that is not familiar to the Contractor’s personnel.

7. WASTE AND SOIL QUANTITY

The table below shows the mass of waste landfilled over the past four years. The Regional Solid Waste Management Plan completed in 2015. If provincial diversion programs are successful there is the potential for the waste quantity to reduce by up to 30 percent.

Over the past three years, on average, 33,077 cubic metres per year of soil has been excavated from the Facility borrow pit, stockpiled and used for daily cover, intermediate cover and construction of Secondary Roads, Pads and Berms.

This soil quantity demonstrates historical trends and does not constitute a warranty or guarantee by the Regional District as to actual quantity of soil that may be required during the duration of the Contract Agreement.

The Contractor should be aware that there may be considerable variation in the quantity of waste to be landfilled from month to month, season to season and year to year.

Year	*Waste Landfilled (tonnes)*	*Soil Used (cubic metres)*
2020	73,783	27,381
2021	79,139	36,093
2022	74,416	29,391
2023	72,661	39,443
Averages	**74,999**	**33,077**

8. CONTRACTOR'S EQUIPMENT

8.1 General

The Contractor will provide the following Equipment that will be at the Facility in working order at all times and available for work and equipped to complete the Work as required herein. All Equipment provided for the purpose of the Work will be as listed in the List of Equipment.

All mobile and Heavy Equipment employed on site (including pick up trucks) must meet or exceed WorkSafeBC standards for the job site.

8.1.1 Landfill Compactor

One four-wheeled steel-wheeled compactor originally designed and built especially for compaction of solid waste at landfills and not converted from some other use meeting the following specifications:

- No more than two years old and have no more than 2000 hours. Equipment with over 4000 hours requires certified maintenance records;
- A minimum manufacturer's specified operating mass of 25,000 kilograms;
- Ability to climb solid waste slopes of 3:1 (horizontal:vertical) (33 percent);
- An enclosed pressurized cab with working ventilation and all-season climate control systems;
- A design that allows the operator to have a clear and unobstructed view whenever operating the compactor in a forward or reverse direction; and
- A working two-way communication system.

The steel-wheeled compactor will operate continually at the Working Face throughout the day. Typical Work includes but is not limited to:

- Spreading, grading and compacting Acceptable Waste; and

- Spreading, grading and compacting daily cover soil.

8.1.2 Bulldozer

One track-type tractor bulldozer meeting the following specifications:

- Less than 2000 hours or newer;
- A minimum manufacturer's specified mass of 21,000 kg;
- A flywheel horsepower of 165 or greater;
- An enclosed pressurized cab with working ventilation and all season climate control systems;
- A design that allows the operator to have a clear and unobstructed view whenever operating the bulldozer in a forward or reverse direction; and
- A working two-way communication system.

Typical Work includes but is not limited to:

- Pushing, spreading, grading and compacting Acceptable Waste;
- Pushing, spreading, grading and compacting daily cover soil or ADC;
- Pushing, spreading, grading and compacting intermediate cover soil;
- Pushing, spreading, grading and compacting soil to construct and maintain Pads, berms and roads as directed by the Regional District;
- Pushing, spreading, grading and compacting soil or Acceptable Waste to construct Starter Berms; and
- Pushing and stockpiling snow for snow removal on Landfill roads, the borrow pit, and Pads, unless other Equipment is provided.

8.1.3 Excavator

Hydraulic excavator capable of excavating soil from the Borrow Area, soil from the Clean Fill Stockpile Area, and sawdust-soil mix from stockpiles and loading trucks, or snow removal, for use in the Works, at a rate that will allow uninterrupted performance of the Works. Excavator will be no more than five years old and have no more than 4000 hours. Equipment with over 4000 hours requires certified maintenance records.

Track mounted hydraulic excavator with approximately 180 horsepower, a maximum reach of approximately 10 metres, and a bucket capacity greater than 1.0 cubic metres.

8.1.4 Loader

Loader capable of excavating soil from the Borrow Area, soil from the Clean Fill Stockpile Area, and sawdust-soil mix from stockpiles and loading trucks, for use in the Works, at a rate that will allow uninterrupted performance of the Works. Loader will be no more than five years old and have no more than 4000 hours. Equipment with over 4000 hours requires certified maintenance records.

Rubber tired articulated loader with approximately 170 horsepower, a maximum lift height of approximately 3.5 metres and a bucket capacity of approximately three cubic metres and snow blade for snow removal.

8.1.5 Articulated Rock Truck

Tandem axle dump truck capable of hauling soil from the Borrow Area or Clean Fill Stockpile to the Landfill, and sawdust from stockpiles, over the Landfill roads, for use in the Works, at a rate that will allow uninterrupted performance of the Works. Box size must accommodate net load of 16 m^3 or 20 cubic yards. Articulated Rock Truck will be no more than five years old and have no more than 4000 hours. Equipment with over 4000 hours requires certified maintenance records.

8.1.6 Other Equipment

Any Equipment used by the Contractor for the extraction and stockpiling of soil, or any other Equipment used by the Contractor to complete the Work, will be of a design suitable for use in a landfill environment and in good working order. All Equipment will have:

- An enclosed pressurized cab with working ventilation and all-season climate control systems;
- A design that allows the operator to have a clear and unobstructed view whenever operating the Equipment in a forward or reverse direction; and
- A working two-way communication system.

Where the Contract Manager is not satisfied with the condition or suitability of the Equipment provided, the Contractor will follow all orders given by the Contract Manager to the Contractor to repair or replace the Equipment.

8.1.7 Water Tanker

One Water Tank, tandem axle carrier with rubber tire - axle configuration. Tank must hold a minimum of 10,000 litre capacity, have a minimum of 200 feet of 1.5-inch diameter fire hose and a water pump capable of 300 GPM (gallons per minute) at 100 PSI (pounds per square inch) on board unit.

The water tank and all required firefighting Equipment will be in good working order and be able to discharge water for the purpose of firefighting.

During the period of April 1 to October 31 the contractor will test monthly the pump, hoses and systems ability to pump water and demonstrate it suitability to fight fires to the satisfaction of the Contract Manager. The Contractor will, at their own expense, and in the presence of Regional District staff, test the water tank and Equipment to demonstrate its suitability to fight fires to the satisfaction of the Contract Manager at least on two separate occasions between Nov 1 and March 31 of the following year.

The Contractor must be able to tow the water tank with their on-site Equipment. The water tank will remain full year-round and at all times.

8.2 Maintenance and Repair of Contractor's Equipment

The Contractor will maintain and repair their Equipment to the manufacturer's original recommended specifications. Any modifications made to Equipment that do not meet the manufacturer's original recommended specifications require written approval by the Contract

Manager. The Contractor will keep, maintain and operate their Equipment in a condition in accordance with the Workers' Compensation Act.

8.3 Communication Equipment

The Contractor's Equipment will have working two-way communication systems. The two-way communication system will allow the Contractor's staff to communicate with the Regional District Landfill staff during Facility operating hours. The Contractor's two-way communication system must not interfere with the current Facility two-way radio system. The Contractor will supply the Regional District with any Equipment necessary to allow for two-way communication between the Contractor and the Regional District on-site staff.

8.4 Standby Equipment

The Contractor will provide, at their expense, stand-by Equipment so that, in case of break-down, the cover and compaction operations will not be interrupted. Whenever an Equipment breakdown occurs, the Contractor must immediately notify the Contract Manager in writing of the breakdown. The written notification will detail the nature of the breakdown, the repairs required, the estimated repair time required and the Contractor's action plan for providing replacement Equipment.

If the Contractor's Equipment is inoperable, the Contractor will provide replacement Equipment on the following basis:

- If the Landfill Compactor breaks down or is inoperable, and the Bulldozer is operating, the Contractor will provide a working replacement Landfill Compactor equivalent to or exceeding the specifications of the original Equipment, within 72 hours of the breakdown.

- If the Bulldozer breaks down or is inoperable, the Contractor will provide a working replacement Bulldozer equivalent to or exceeding the specifications of the original Equipment, within 24 hours of the breakdown.

- If the Excavator breaks down or is inoperable, the Contractor will provide a working replacement Excavator equivalent to or exceeding the specifications of the original, within 72 hours of the breakdown.

- If the Articulated Rock Truck breaks down or is inoperable, the Contractor will provide a working Articulated Rock Truck equivalent to or exceeding the specifications of the original, within 72 hours of the breakdown.

In the event that both the Landfill Compactor and Bulldozer are inoperable and the Contractor is not able to meet the Contract requirements herein, the Owner may choose to correct the deficiencies as detailed under Appendix B2 - General Conditions, Section 11 - OWNER'S RIGHT TO CORRECT DEFICIENCIES.

9. CONTRACTOR'S LANDFILL OPERATING PERSONNEL

The Contractor will provide the following personnel that will be at the Facility at all times and available for work and equipped to complete the Work as required herein.

9.1 Contractor's Supervisor

The Contractor will keep on the Site during working hours, a competent supervisor, (or designate). The supervisor (or designate) is to have at least five years industry experience and must have successfully completed the SWANA Manager of Landfill of Operations training course with certification in good standing as a Manager or Technical Associate within six months of the start of the Contract term.

The industry certified supervisor will be on site during the operating hours of the facility as per the schedule. The Contractor will identify the person who will act as the supervisor, in writing, to the Regional District.

The supervisor will represent the Contractor in their absence and directions given to them will be considered to have been given to the Contractor. The supervisor will have the ability to report to the appointed Regional District representative and have the authority to act on contractual obligations without prejudice on behalf of the Contractor.

The supervisor will have a daily meeting with the designated Regional District employee at the beginning and end of the day.

9.2 Contractor's Onsite Personnel

The Contractor will keep on the Work at all times sufficient onsite personnel (minimum two persons including the supervisor) to carry out the Work required by the Contract.

The Contractor will ensure that all personnel are experienced and well-trained to the satisfaction of the Contract Manager.

All personnel must have at least three years' experience operating bulldozers, landfill compactors, earthwork in accordance with grades and elevations set by others, road construction and maintenance and snow removal.

At least one member of the on-site personnel (in addition to the supervisor):

- has, in the previous 24 months, successfully completed a SWANA recognized Training Sanitary Landfill Operators course or equivalent, and will continue attendance at such courses as required; or
- has successfully completed the SWANA Manager of Landfill of Operations training course with certification in good standing as a Manager or Technical Associate.
- is certified in the operation of borrow areas as required by Provincial legislation.

Training must include annual training in the use of fire extinguishers and portable fire suppression Equipment listed in Section 8.1.7 "Water Tanker".

10. GARAGE

The Regional District will not provide an on-site garage for the Contractor's use.

11. CONTRACTOR'S FACILITIES

All facilities, services and utilities to be constructed or temporarily placed at the Facility by the Contractor will be subject to prior approval of the Contract Manager. All requests for such facilities, services and utilities must be made in writing to the Contract Manager. Requests will require drawings and details including design and building materials. The Contractor will remove such facilities, services and utilities from the Facility following completion of the Contract at their own expense.

12. SECURITY

Access to the Landfill within the Facility is restricted. The Contractor's staff must sign in and out every time they arrive at or leave the Landfill at the scalehouse.

On-site buildings and Equipment stored at the Facility have been subject to acts of theft and vandalism in the past. The Contractor should take all necessary precautions to minimize their exposure to acts of theft and vandalism. The Regional District accepts no responsibility for damage, vandalism or theft to any of the Contractor's facilities and Equipment stored at the Facility.

13. EQUIPMENT REPAIR AND MAINTENANCE WORK

The Contractor will not store any fluids, lubricants, filtration devices, ozone depleting substances and any other materials at the Facility without the written approval of the Contract Manager.

- The Contractor will not complete any Equipment repair, maintenance, cleaning or washing at the Facility without the written approval of the Contract Manager. The written request to the Contract Manager must include a plan on how the Contractor will manage, store and dispose of fluids, lubricants, filtration devices, ozone depleting substances and anything else that may contaminate the ambient environment.

- The Contractor will handle and store all fluids, lubricants, filtration devices, ozone depleting substances and anything else that may contaminate the ambient environment in a manner that does not allow for these materials to be introduced into the ambient environment. The Contractor must store and dispose of these materials in accordance with local, provincial and federal criteria and regulations.

- Repair work will not interfere with the Work.

14. FIRE CONTROL

The Contractor will be responsible for any fires at the Landfill, or resulting from, the Work.

- Smoking is strictly prohibited anywhere within the Landfill perimeter or property.

- The Contractor will be responsible for the fire protection of the Work or as a result of performing the Work.

- No fires are permitted within the Facility without the written approval of the Contract Manager.

- The Contractor will take all necessary and proper steps to see that all waste disposed at the Working Face is treated in such a manner as to prevent fire.

- Any soil required to extinguish fires or to restore the surface of the Landfill due to fire will be placed and compacted by the Contractor. The Contractor will keep track of the cubic meters of soil used and will be paid for cover extraction and placement as per APPENDIX C6 – SCHEDULE OF PRICES – TENDERED PRICES.

- The Contractor will, in the event of fire within the Facility, operate their Equipment as directed by the Contract Manager or the responding fire personnel to control and extinguish the fire. In all cases where there is a fire within the Facility, the Contractor will make their Equipment available for firefighting purposes at the force account rates.

- The Contractor will immediately notify the Regional District on-site staff when they or their employees observe smoke or flame. A fire report is to be provided to the Contract Manager within 24 hours.

15. SITE CHARACTERIZATION

Work may involve contact with waste and associated contaminants including, but not limited to landfill gas and landfill leachate.

Landfill Gas

Landfill gas results from the decomposition of waste and is primarily composed of 40 to 65 percent methane, and 30 to 50 percent carbon dioxide, less than two percent nitrogen, less than one percent oxygen, and trace gases including mercaptans, hydrocarbons, solvents, water vapour, and hydrogen sulfide.

Methane is explosive in concentrations between five and 15 percent by volume in air. Methane, carbon dioxide, and nitrogen are simple asphyxiants.

Trace gases in landfill gas may be toxic and odorous. Odorous gases cause nausea in some persons. Toxic gases may also be present at concentrations above or below the levels deemed safe for human exposure; there is always a potential for levels to be sufficient to cause permanent and irreversible damage and even death.

Leachate

Leachate is wastewater containing organic and inorganic compounds that is produced when water and other liquids seep through the waste. Leachate may be present in all excavations within, and immediately adjacent to, the waste. General safety considerations used for handling non-hazardous wastes should be used where there is the potential to come into contact with leachate.

16. RECORD KEEPING

At a minimum the Contractor must prepare and maintain the following plans and records and make these plans and records available to the Project Contract Manager immediately upon request.

Health and Safety Plan

The Contractor must prepare a Health and Safety plan in accordance with the provincial Workers' Compensation Act. A copy will be submitted to the Regional District prior to commencing the Work. The Contractor's employees must acknowledge the plan by signing a form which is to be kept on file at the Contractor's facility/office. Training procedures and training records for each employee will be kept on file at the Contractor's facility/office.

Safety Meetings

The Contractor will prepare for, schedule, administer and record proceedings for monthly safety meetings with their employees working at the Foothills Boulevard Regional Landfill. The Contractor will forward a copy of the minutes of the monthly safety meetings to the Regional District with monthly invoices. Meeting minutes will be kept on file at the Contractor's facility/office.

Equipment Maintenance Logs

The Contractor will maintain Equipment maintenance records for each piece of Equipment operating at the Facility. The records will detail regular maintenance, repairs and inspections.

These logs will be kept on file at the Contractor's facility/office.

17. APPENDICES

Appendix A Acknowledgement Letter
Appendix B Information Documents
B1 - Sample Contract Agreement
B2 - General Conditions
B3 - Example Irrevocable Commercial Letter of Credit
B4 – Tenderer's Checklist
Appendix C Forms
C1 - Tenderer's Form
C2 - Tenderer's Experience in Similar Work Form
C3 - List of Contractor's Personnel Form
C4 - List of Subcontractors Form
C5 - List of Equipment Form
C6 - Schedule of Prices- Tendered Price
C7 - Schedule of Prices- Force Account Work Rates
C8 - Conflict of Interest Disclosure Statement
C9 – Goods & Services Tax Information
Appendix D Maps
D1 - Site Plan

	D2 - Borrow Areas
	D3 - Snow Clearing Services Plan
	D4 – Primary and Secondary Roads
Appendix E	Daily Cover Measurement Procedure
Appendix F	Operational Certificate MR-01697
Appendix G	Integrated Landfill Management Plan
Appendix H	Fill Plan Update
Appendix I	Entrance Relocation Conceptual Layout

APPENDIX A - ACKNOWLEDGEMENT LETTER

The undersigned has received the full set of Tender Documents.

_____	_____
Signature	Company
_____	_____
Name (please print)	Address
_____	_____
Title	City
_____	_____
Phone Number	Fax Number
_____	_____
Date	Email Address

We presently intend to _____ provide/_____ not provide a Tender as requested.

Please send any Amendments to this Invitation to Tender via: _____ email.

Return immediately to:

Laura Zapotichny, General Manager of Environmental Services
lzapotichny@rdffg.bc.ca

APPENDIX B1 - SAMPLE CONTRACT AGREEMENT

BETWEEN:

REGIONAL DISTRICT OF FRASER-FORT GEORGE, a local government incorporated pursuant to the *Local Government Act* and having its business office located at:
155 George Street
Prince George, BC V2L 1P8

(hereinafter called "the Regional District")

OF THE FIRST PART

AND:

CONTRACTOR
a company duly incorporated under the laws of British Columbia and having a place of business at:
address
address, pc

(hereinafter called the “Contractor”)

OF THE SECOND PART

WITNESSETH that the Contractor and the Regional District undertake and agree as follows:

1. The Contractor will:

   (a) Provide all necessary labour, Equipment, transportation, materials, supervision, and services to perform all of the work, and fulfill everything as set forth in, and in strict accordance with, the Contract documents for “Invitation to Tender ES-24-11 Compaction and Cover Servies – Foothills Boulevard Regional Landfill.

   (b) Commence to actively proceed with the work of the Contract November 1, 2024.

2. The Regional District will pay to the Contractor as full compensation for the performance and fulfilment of this Contract, the sum or sums of money specified herein in the manner and at the times specified in the Contract Documents.

3. The Invitation and Instructions to Tenderer’s, Tender form, List of Subcontractors, Tender’s experience in similar Work, Schedule of Prices, all appendices, amendments and Addendum(s), as well as the Tenderer’s submission, are incorporated herein, to the intent and purpose as though recited in full herein, and the whole will form the Contract and will endure to the benefit of, and be binding upon, the parties hereto and their successors, executors, administrators, and assigns.

4. No implied contract of any kind whatsoever, by or on behalf of the Regional District, will arise or be implied from anything contained in this Contract or from any position or situation of the parties at any time, it being understood and agreed that the express contracts, covenants and agreements made herein by the parties hereto are, and will be, the only contract, covenants and agreements on which any rights against the Regional District may be founded.

5. Subject to Clause 4, this Contract will supersede all communications, negotiations, and agreements, either written or verbal, made between the parties hereto in respect of matters pertaining to this Contract prior to the execution and delivery hereof.

6. All communications in writing between the parties will be deemed to have been received by the addressee if delivered to the individual, or to a member of a firm, or to the General Manager of Financial Services at the Regional District for whom they are intended, or if sent by hand delivery, mail or registered mail as follows:

The contractor at _____
address

The Regional District at 155 George Street, Prince George, BC V2L 1P8.

IN WITNESS WHEREOF the parties have duly executed this Contract.

SIGNED ON BEHALF OF THE)
REGIONAL DISTRICT OF FRASER-FORT GEORGE)
)

_____) _____
Chair) Date
)

_____) _____
GM of Legislative and Corporate Services) Date
)
)

SIGNED ON BEHALF OF)
CONTRACTOR)
)
)

_____) _____
Signature) Date
)
)

_____)
(Name and Title) (Please print)

APPENDIX B2 – GENERAL CONDITIONS

1. INTENT OF CONTRACT DOCUMENTS

This Contract is not an agreement of employment. The Contractor is an independent contractor, and nothing herein will be construed to create a partnership, joint venture, or agency and neither party will be responsible for the debts or obligations of the other.

2. LOCAL CONDITIONS

The Contractor will, by personal inspection, examination, calculations or tests, or by any other means, satisfy themselves with respect to the local conditions to be encountered and the quantities, quality and practicability of the Work and of their methods of procedure. No verbal agreements or conversations with any officer, agent or employee of the Regional District, either before or after the execution of the Contract, will affect or modify any of the terms or obligations herein contained.

3. MANAGER'S STATUS

The Contract Manager will be the Regional District's representative during the period of operation and will observe the Work in progress on behalf of the Regional District for the purpose of ensuring that the Work has been satisfactorily carried out. The Contract Manager will have the authority to stop the Work whenever such stoppage may be necessary, in their opinion, to ensure the proper execution of the Work in accordance with the provisions of the Contract.

If at any time the Contract Manager is of the opinion that there exists a danger to life or to property, they may order the Contractor to stop Work or to take such remedial measures as is considered necessary.

The Contractor will comply with such an order immediately. Neither the giving, nor the carrying out of such orders thereby, entitles the Contractor to any extra payment and the Regional District will not be held liable for any damages or any breach of laws, bylaws or regulations that may result.

4. SUPERVISOR AND LABOUR

The Contractor will comply with all federal and provincial legislation regarding wages and labour regulations including payment of any and all dues, levies, or charges made under or in relation to the Contract. The Contractor will make proof of payment available to the Contract Manager when requested.

5. CHARACTER OF WORKERS

All workers must have sufficient knowledge, skill and experience to perform properly the Work assigned to them and to be tactful and courteous in dealing with the public and the Owner's staff. Any supervisor, Equipment operator, or worker employed by the Contractor or Subcontractor who, in the opinion of the Contract Manager, does not perform their Work in a competent manner, appears to act in a disorderly or intemperate manner, is intoxicated or willfully negligent will at the written request of the Contract Manager, be removed from the site of the Work immediately and

will not be employed again in any portion of the Work without the approval of the Contract Manager.

6. ASSIGNMENT OF CONTRACT

The Contractor will not sublet, sell, transfer, assign, or otherwise dispose of the Contract or any portions thereof, or their right, title or interest therein, or their obligations thereunder without written consent of the Regional District, except for assignment to a bank of the payments to be received hereunder.

7. PROVISIONS FOR TERMINATION OF CONTRACT BY THE OWNER

In the event of the breach or non-performance by the Contractor of any of the covenants, conditions and agreements contained in the Contract to be performed or stoppage under Section 3 MANAGER'S STATUS, the Regional District reserves the right to take corrective actions. The Owner may also deduct from the payments due to the Contractor or deduct from the Irrevocable Commercial Letter of Credit any payments or expenditures it is required to make to remedy any such non-performance or breach hereof.

In the event that the Ministry of Environment and Climate Change Strategy, or any other authorized regulatory agency, cancels or suspends the Waste Discharge Permit, or future Operating Certificate, for the Foothills Boulevard Regional Landfill, the Owner retains the right to terminate this Contract without notice.

Any salvaging by the Contractor, their employees or Subcontractors will be considered a breach of Contract and result in termination of the Contract.

For unsatisfactorily performed Work, the Contractor will, with written notice, have 24 hours to correct Deficiencies. If not completed within 24 hours, under General Conditions, Section 11 OWNER'S RIGHT TO CORRECT DEFICIENCIES, the Regional District has the right to correct them at which time the Regional District has the right to withhold costs from payment to the Contractor or deduct from the irrevocable line of credit. After three such written notices, the Contract will be terminated.

The Owner will have the right to terminate the Contractor's rights to continue with the Work if the Contractor at any time becomes bankrupt, makes an assignment of their property for the benefit of creditors, or if a receiver or liquidator should be appointed, and that such termination shall be effective upon the Owner giving notice thereof.

8. CONTRACTOR'S TERMINATION OF CONTRACT

The Contractor will have the right to terminate the Contract for any of the following reasons:

a. In the event of an Order of any Court or other public authority, other than the Owner, causing the Work to be stopped or suspended, when the period of such stoppage or suspension exceeds 90 days, and when such stoppage or suspension occurs through no act or fault of the Contractor, their agents or servants, the Contractor will receive from the Owner payment for the Work completed. The Owner will not be liable for any loss of profits, damages, or expenses incurred by the Contractor as a result of such

stoppage or suspension. Such termination will be effective upon the Contractor giving notice thereof.

b. In the event the Owner fails to pay for the Work performed, except as provided in the Contract Documents, within 30 days from this specified date of payment and fails to remedy such default within 10 days of the Contractor's written notice to do so, the Contractor will receive from the Owner payment for the Work completed. Such termination will be effective, upon the Contractor giving notice thereof.

9. SUSPENSION OF WORK BY THE OWNER

The Owner may, at any time, suspend the Work, or any portion thereof, provided they give the Contractor two working days' written notice of suspension.

10. SUBCONTRACTORS

All subcontractors, including affiliates of the Tenderer, should be clearly identified in the Tender as per the form attached as Appendix C4.

A Tenderer may not subcontract to a firm or individual whose current or past corporate or other interests, may, in the Regional District's opinion, give rise to an actual, perceived or potential conflict of interest in connection with the services described in the Tender. This includes, but is not limited to, involvement by the firm or individual in the preparation of the Tender or a relationship with any employee, Contractor or representative of the Regional District involved in preparation of the Tender, participating in evaluation or in the administration of the Contract. If a Tenderer is in doubt as to whether a proposed Subcontractor might be in a conflict of interest, the Tenderer should consult with the Contract Manager prior to submitting a Tender. By submitting a Tender, the Tenderer represents that it is not aware of any circumstances that would give rise to a conflict of interest that is actual, perceived or potential, in respect of the Tender.

11. OWNER'S RIGHT TO CORRECT DEFICIENCIES

Upon failure of the Contractor to perform the Work in accordance with the Contract Documents, and after written notice to the Contractor, or without notice if any emergency or danger to the Work or public exists, or where the Owner may be found to be out of compliance of the Permit or Operating Certificate requirements, the Owner may, without prejudice to any other remedy they may have, correct such deficiencies. The cost of Work performed by the Owner in correcting deficiencies will be paid by the Contractor or may be deducted from monies payable to the Contractor.

12. INDEMNITY AND RELEASE BY CONTRACTOR

The Contractor will indemnify and save harmless the Regional District from and against all losses, claims, demands, payments, suits, actions, recoveries and judgements of any kind brought or recovered against either of them by reason of any act or omission of the Contractor, its Subcontractors, agents or employees arising out of the entering of the Contract or the carrying out of the Work, whether on lands owned by the Regional District and whether arising from statutory liability or not.

13. IRREVOCABLE COMMERCIAL LETTER OF CREDIT

The Irrevocable Commercial Letter of Credit must be in the amount of $150,000 from a recognized Canadian Financial Institution. The Irrevocable Commercial Letter of Credit will be kept current for the life of the Contract plus 60 days as specified in the Contract Documents.

14. PERMIT AND REGULATIONS

The Owner will acquire and retain landfill and composting site operating permits or operational certificates issued by the Ministry of Environment and Climate Change Strategy and will acquire relevant Open Burning authorization as required.

The Contractor will, at their own expense, procure all other permits, certificates and licences required by law for the execution of the Work and will comply with all federal, provincial and local laws and regulations affecting the execution of the Work, save in so far as the Contract Documents specifically provide otherwise.

15. INJURY OR DAMAGE TO PERSONS OR PROPERTY

The Contractor will use due care and take all necessary precautions to ensure the protection of persons and property on the site and will comply with the Workers' Compensation Act of the Province of British Columbia. The Contractor will be liable for any and all injury or damage which may occur to person or to property on the site due to any act, omission, neglect or default of the Contractor, or their employees, Subcontractors or agents and indemnify and save harmless the Regional District in this regard.

16. OCCUPATIONAL HEALTH AND SAFETY

The Foothills Boulevard Regional Landfill is a multi-employer work site as defined in the provincial *Workers' Compensation Act*. The Regional District of Fraser-Fort George is recognized as the prime Contractor and is responsible for coordinating the occupational health and safety programs of all employees working at the Facility. The Contractor will ensure that they follow all occupational health and safety policies and procedures established by the Regional District. Contractors, their employees or agents not complying with the Regional District's health and safety expectations will be required to stop Work and will not be allowed to resume Work until the safety requirements are met.

The Contractor will use due care and take all necessary precautions to assure the protection of persons and property at the Facility and will comply with the *Workers' Compensation Act* of the Province of British Columbia.

17. CHANGES IN THE WORK

The Owner, without invalidating the Contract, may make changes by altering, adding to, or deducting from the Work. The Contractor will proceed with the Work as changed and the Work will be executed under the provisions of the Contract. No changes will be undertaken by the Contractor without written order of the Regional District, except in an emergency endangering life or property, and no claims for additional compensation will be valid unless the change was so ordered. The Owner will entertain no payment for extra work or changes in any Contract unless a "Change Order" form is completed and signed by the Regional District and the Contractor.

If, in the opinion of the Regional District, such changes affect the Contract amount, these will be adjusted at the time of ordering the changes. The value of the addition or deduction from the Contract amount, and the method of determining such value, will be decided by the Regional District. The Regional District will use one or more of the following methods in deciding such value:

a. by lump sum submitted by the Contractor and accepted by the Owner;
b. on a force account basis as specified in these General Conditions.

18. PAYMENT

The Regional District will, by the thirtieth day of the month following that for which payment is required, on receipt of an invoice and on advice from the Contract Manager that the Work has been satisfactorily carried out, pay the Contractor for Work completed, in accordance with the Contract, in the previous month. All invoices must include a reference to Agreement ES-24-11. No payment will be made for materials supplied by the Owner.

Payment will be made in accordance with the unit prices in the Schedule of Prices for actual quantities of completed Work. Payment may have financial penalties withheld as outlined in Section 21 PAYMENT WITHHELD OR DEDUCTED.

The Tendered unit prices and Equipment rates will be increased annually by two percent on Tender rates and Equipment rates on the first day of November in each successive year in which the Contract is in force.

18.1 Cover and Compaction

The Tendered **Per Tonne Unit Price for Compaction and Cover Services** includes all of the following as detailed in Part C, Section 3.1. The tonnage will be measured by the Owner based on the Owner's weigh scale system at the Facility. The Contractor will only be paid for the tonnage of refuse compacted and covered at the Active Face. In the event that the weigh scale system is inoperable, the Owner will use a volume based calculation of the tonnage of refuse during the period that the weigh scale is inoperable. The Owner will supply the weigh scale records and estimates to the Contractor for the Work that has been completed.

18.2 Cover Extraction and Burrow Area Operation

The **Per Cubic Metre Unit Price for Borrow Area Operation** includes all of the following as detailed in Part C, Section 3.2. The Contractor will only be paid for the volume in cubic metres of soil excavated and put in place for daily or intermediate cover.

18.3 Ancillary Services

The Tendered **Unit Prices for Ancillary Services** are as described in Part C, Section 3.3. The Contractor will not be paid for any Solid Waste or other material that they do not compact and cover, and for soil that they do not excavate and stockpile.

19. GOODS AND SERVICES TAX (G.S.T.)

Federal law states that five percent tax be paid on all goods and services. If the Contractor does not qualify as a small supplier, then the Contractor is required to identify the tax (GST/PST, as applicable) on all invoices and the Regional District is liable to pay this amount to the Contractor.

20. REMOVAL OF LIENS

The Contractor will forthwith remove at their own expense, liens filed or registered against the Landfill Property, and the Contractor will indemnify and save harmless the Owner from liability arising out of any such claims of lien.

21. PAYMENT WITHHELD OR DEDUCTED

The Owner may withhold, suspend or deduct the whole or part of any payment to the Contractor to the extent necessary to protect itself from loss on account of one or more of the following:

a. Where the Contractor is not performing the Work satisfactorily in the opinion of the Contract Manager.

b. Where any defective or faulty Work has not been remedied at all or in a manner satisfactory to the Contract Manager.

c. Where there are affidavits of claim of lien, or liens filed against the site and premises of which the Work is done or is being done, or reasonable evidence of the probable filing of such affidavits of claim of lien or of filing or registration of liens.

d. Where there exists unsatisfied claims for damages caused by the Contractor to anyone employed on the site or retained in connection with the Work.

e. Where Equipment that is inoperable and where the Contractor fails to meet the Contract requirements for Supply of replacement Equipment, the Owner may deduct the equivalent amount to the Force Account rate on the Schedule of Prices on an hourly basis during each operating day that the Equipment is inoperable.

f. Where the insufficient compaction penalty has been incurred by the Contractor, the financial penalty for compaction failure will be the average monthly tonnage between survey intervals (six-month average) 20% of the tonnage rate as per the bid.
   - For example: If the average tonnage per month between survey intervals is 5,500 tonnes x bid price (5,500 tonnes x $10.00/tonne x 20% = $11,000) will be the penalty withheld from monthly payment.

g. Where the insufficient cover penalty has been incurred by the Contractor a financial penalty of a 20% tonnage rate charge from the day prior.
   - For example: If 200 tonnes of refuse comes in on Wednesday x bid price (200 tonnes x $10.00/tonne x 20% = $400) will be applied. Penalty to be withheld from monthly payment.

h. Where the Owner has corrected a deficiency under Section 11 OWNER'S RIGHT TO CORRECT DEFICIENCIES.

i. Where Subcontractors of suppliers of materials are not receiving prompt payment, the Owner may make payment to such Subcontractors or suppliers directly having

deducted those amounts from payments to be made that are otherwise due to the Contractor.

22. RELEASE OF IRREVOCABLE COMMERCIAL LETTER OF CREDIT

The Irrevocable Commercial Letter of Credit will be returned to the Contractor within 60 days following the termination of the Contract where:

a. no affidavits or claims of lien have been filed against the lands and premises on which the work was done, and

b. WorkSafeBC has, at the request of the Contractor, filed with the Regional District certification that all assessments payable by the Contractor during the Contract term have been paid, and

c. no actions, suits, claims for damages, charges under provincial or federal status have been initiated, and

d. the Contractor has submitted the Statutory Declaration.

23. FUEL SURCHARGE

A Fuel Surcharge Rate Adjustment Scale will be implemented. The following table demonstrates the applicable diesel fuel surcharge rate that can be applied to the Tendered unit price each month for all **equipment on site**. The reference index will be Natural Resources Canada's Petroleum Product Prices publication for diesel prices in Prince George which can be viewed at: http://www2.nrcan.gc.ca/eneene/sources/pripri/prices_bycity_e.cfm?productID=5&locationID=4&frequency=D&priceYear=2019&Redisplay=.

The applicable fuel surcharge will be determined monthly and the month's applicable fuel surcharge rate will be based on the fuel index price for the **first day of the month** for Prince George. **The price of $1.742 per litre for diesel (as of July 18, 2024) will be used as a starting point for Contract ES-24-11.**

Example on how to calculate; if the index reports a price of $1.575 on September 1, the fuel surcharge payable for the tendered unit price for the month of September will be decreased by 1.00%. Resulting in a rebate to the Owner, to be entered as a credit line item on the invoice. If on September 1, the price is reported at $2.025, then the Fuel Surcharge for the tendered unit price in September will be increased by 2.50% resulting in an additional charge by the contractor to the Owner.

Fuel Surcharge Rate Adjustment Scale Table

Fuel Price is at Least	But Less Than	Fuel Surcharge
$1.200	$1.250	-4.50%
$1.250	$1.300	-4.00%
$1.300	$1.350	-3.50%
$1.350	$1.400	-3.00%
$1.400	$1.450	-2.50%
$1.450	$1.500	-2.00%
$1.500	$1.550	-1.50%
$1.550	$1.600	-1.00%
$1.600	$1.650	-0.50%
$1.650	$1.700	0.00%
$1.700	**$1.750**	**0.00%**
$1.750	$1.800	0.00%
$1.800	$1.850	0.50%
$1.850	$1.900	1.00%
$1.900	$1.950	1.50%
$1.950	$2.000	2.00%
$2.000	$2.050	2.50%
$2.050	$2.100	3.00%
$2.100	$2.150	3.50%
$2.150	$2.200	4.00%
$2.200	$2.250	4.50%

24. INSURANCE

The Contractor shall, without limiting its obligations or liabilities, and at its own expense, provide and maintain throughout the Contract term, the following insurance with insurers licenced in the Province of British Columbia, in forms acceptable to the Regional District. All required insurance (except automobile insurance on vehicles owned by the Contractor) shall be endorsed to show the

Regional District as additional insured and to require that the Regional District be provided with 30 days' advance written notice of cancellation or material change. The Contractor will provide the Regional District with evidence of the required insurance, in a form acceptable to the Regional District, upon notification of award and prior to the execution and delivery of the Contract:

i. Commercial General Liability (CGL) in an amount not less than $5,000,000 inclusive per occurrence insuring against bodily injury and property damage and including liability assumed under the Contract. Such CGL coverage shall include the following liability extensions: Contingent Employers Liability, Broad Form Products & Completed Operations, Personal Injury, Blanket Contractual, and Cross Liability. The Regional District is to be added as an additional insured.

ii. Where the Contractor requires the use of Automobiles to undertake the work of the Contract, the Contractor will have the following:

   a. Automobile Liability on all vehicles owned, operated, or licenced in the name of the Contractor in an amount not less than $5,000,000 per occurrence.

b. Non-owned Automobile Liability insurance in an amount not less $5,000,000 per occurrence.

iii. Equipment insurance on all Equipment owned or rented by the Contractor to its full insurable value.

iv. The Contractor will buy and keep in force at their expense until completion of the Contract, firefighting expense insurance in the amount of $100,000. Such insurance is to include forestry firefighting expenses and will be in the name of the Contractor and the Regional District.

The Contractor shall ensure that all Subcontractors forming from this Contract meet the insurance requirements outlined above.

It is the sole responsibility of the Contractor to determine if additional limits of liability insurance coverage are required to protect them from risk.

25. DURATION OF CONTRACT

The duration of the Contract will be from 12:01 a.m., November 1, 2024 to midnight, October 31, 2029.

26. FORCE ACCOUNT WORK

The Owner at its sole discretion may hire the Contractor's Equipment for work to be undertaken in addition to that specified in this Contract. The Contractor will make their Equipment available to the Owner at the hourly rates listed in the Schedule of Prices – Force Account Work. Such work will not interfere with the Contractor's ability to complete the Work as required in the Contract.

The Owner reserves the right to do extra work itself or contract to others at its sole discretion.

27. WORKSAFEBC

The Contractor will use due care and take all necessary precautions to assure the protection of persons and property while undertaking the Work and will comply with the Workers Compensation Act of the Province of British Columbia.

Prior to undertaking any of the Work in this Service Agreement, the Contractor will provide the Regional District with a Clearance Letter confirming they are in good standing with WorkSafeBC and will pay and keep current all assessments required by WorkSafeBC in relation to the Service Agreement amount.

Out of Province Contractors will be compliant with WorkSafeBC's registration requirements pertaining to out of Province firms. Where WorkSafeBC registration requirements allow for a Contractor to be registered with another Province's Worker's Compensation Board, or like organization, the Contractor will provide the Regional District with their registration number and written documentation confirming that the Contractor is in good standing with the appropriate Worker's Compensation Board, or like organization. The Contractor will pay and keep current all assessments required to maintain good standing in relation to the Service Agreement amount.

The Contractor will maintain an Occupational Health and Safety Plan (OHSP) and ensure that their employees and Sub-Service Providers are well trained and aware of the OHSP.

28. DISPUTED WORK

If, in the opinion of the Contractor, they are being required to perform work beyond that which the Contract requires them to do, whether at the discretion of the Regional District or otherwise, they will, within five days, deliver to the Owner a written notice of protest in the form prescribed herein prior to proceeding with any of the disputed work. The five-day time period commences from the time of direction given by the Owner or the time at which the Contractor determines that they are required to perform such work, whichever occurs first.

The Contractor will keep accurate and detailed cost records that should indicate the cost of the work done under protest. The Contractor will not be entitled to payment if they fail to keep and produce such records.

29. RIGHTS OF WAIVER

A waiver of any breach of or provision of this Agreement will not constitute or operate as a waiver or any other breach of any other provisions, nor will any failure to enforce any provision herein operate as a waiver of such provisions or of any other provisions.

30. SEVERABILITY

All paragraphs of the Contract are severable one from the other. Should a court of competent jurisdiction find that any one or more paragraphs herein are void, the validity of the remaining paragraphs hereof will not be affected.

31. NOTICE OF PROTEST

TO: General Manager of Environmental Services
Regional District of Fraser-Fort George

FROM: (Contractor)

DATE:

SUBJECT: THE CONTRACT

Date of Direction:

You have required me to perform the following work that is beyond the scope of the Contract.
(Set out details of work).
(Include dates where applicable)

The additional costs and claim for this work is as follows:
(Set out details of cost)

All supporting documentation and invoices are attached.

I understand that I am required to keep accurate and detailed cost records which will indicate the cost of the work done under protest and failure to keep such records will be a bar to any recovery by me.

Signature of Contractor

APPENDIX B3 - IRREVOCABLE COMMERCIAL LETTER OF CREDIT

(to be on bank letterhead)

Letter of Credit No. _____ Amount $_____

Regional District of Fraser-Fort George
155 George Street
Prince George, BC V2L 1P8

Dear Sir:

Re: Irrevocable Letter of Credit No. _____

In accordance with the Contract to provide services at the Foothills Boulevard Regional Landfill, under Contract ES-24-11 Compaction and Cover Services – Foothills Boulevard Regional Landfill, we hereby authorize you to draw on _____(name and address of bank) Province of British Columbia, for account of _____(name of Tenderer) up to an aggregate amount of $150,000 available on demand for 100% value.

Pursuant to the request of our customer _____, we the _____ Bank hereby establish and give you an Irrevocable Letter of credit in your favour in the above amount which may be drawn on by you at any time and from time to time upon written demand for your payment made upon us by you, which demand we will honour without enquiring whether you have the right as between yourself and the said customer to make such demand and without recognizing any claim of our said customer, or objection by it to payment by us.

1. Draws are to be made in writing to _____ (name of bank).

2. Partial draws may be made.

3. The Bank will not inquire as to whether or not the Regional District of Fraser-Fort George has the right to make demand on this Letter of Credit.

4. This Letter of Credit is irrevocable up to 60 days after the termination of the contract.

Demands must be made not later than 60 days following the expiration of the contract.

The Demands made under this Credit are to be endorsed hereon and will state on their face that they are drawn under _____(name and address of bank), Letter of Credit No. _____.

Yours truly,

Manager,
(On behalf of Name of Bank)

APPENDIX B4 – TENDERER'S CHECKLIST

Before submitting your Tender bid, check the following points:

- ❑ Has the Tender Form been signed and witnessed? _____
- ❑ Has the Security Deposit requirement been met? _____
- ❑ Are the following pages included?
  - Schedule of Prices – Tendered Price _____
  - Schedule of Prices – Force Account Work _____
  - List of Contractor's Personnel _____
  - List of Subcontractors _____
  - List of Equipment _____
  - Tenderer's Experience in Similar Work _____
  - Goods and Services Tax Information
  - Conflict of Interest Disclosure Statement _____ __
  - Signed Addendum(s)
- ❑ Are the documents complete? _____
- ❑ Are the documents enclosed in a sealed envelope if sending by mail? _____

Note: Your Tender may be disqualified if ANY of the applicable foregoing points have not been complied with.

If submitting by hard copy:

Tenderer's should ensure that the Tender is returned in a sealed envelope clearly marked on the outside with:

- ❑ Attention: General Manager of Financial Services
  Regional District of Fraser-Fort George
  155 George Street
  Prince George, BC
  V2L 1P8

- ❑ Invitation To Tender ES-24-11
  Compaction and Cover Services – Foothills Boulevard Regional Landfill

- ❑ Responding Organization's name and address.

If submitting by email:

Tenderer's should ensure that the files should not collectively exceed 30MB. Tenders must be submitted to purchasing@rdffg.bc.ca. DO NOT deliver a physical copy of the tender package to the Regional District of Fraser Fort George.

Subject of the file to be:
ES-24-11 Compaction and Cover Services – Foothills Boulevard Regional Landfill – (Insert Responding Tenderer's Name).

APPENDIX C1 – TENDER FORM

Date: _____

Regional District of Fraser-Fort George
3rd Floor, 155 George Street
Prince George, BC V2L 1P8

ATTENTION: General Manager of Financial Services

Dear Sir/Madam:

Having carefully examined the Instructions to Tenderer's, form of Tender, Contract agreement, General Conditions of Contract and Operational Specifications and subsequent written Addendum(s) (if any), and having visited the site(s) for purposes of examining site conditions and having satisfied myself/ourselves as to the sufficiency of the ITT, the undersigned agrees to furnish all labour, transportation, Equipment, materials, supervision and services and to do all work necessary for and reasonably incidental, as specified in accordance with the ITT, to do the work.

I/We agree that in consideration of having my/our Tender submission considered for the Total Contract Price as shown on the Schedule of Prices, this price is open for acceptance for 60 days from the date of the Tender opening and will not be withdrawn during that period of time.

It is understood that payment will be made for the work on the basis of the awarded Contract only and that any approved extras or refunds will be made by mutual agreement between the Regional District and me/us.

I/We agree that the Subcontractor(s) employed will be as listed on the List of Subcontractors and further agree that no changes or additions will be made to the list without written approval of the Regional District.

If I am/we are notified in writing of the acceptance of our Tender, I/we agree that within 14 days of the date of the acceptance notice I/we will enter into a contract and execute an agreement for the stated sum in the form of the specimen submitted to guarantee completion of the contract in accordance with the Contract Documents and within the time stated in the Tender documents.

I/We agree that the Regional District reserves the right to waive informalities in Tenders, reject any or all Tenders, or accept the Tender deemed most favourable in the interests of the Regional District.

I/We agree that Tenders which contain qualifying conditions or otherwise fail to conform to the instructions contained in this ITT may be disqualified or rejected. I/We agree that the Regional District may, however, in its sole discretion, reject or retain for its consideration Tenders which are non-conforming because they do not contain the content or form required by the ITT, or for failure to comply with the process for submission set out in the ITT, whether or not such non-compliance is material.

Accompanying this Tender please find our certified cheque, bank draft or money order as the security deposit in the amount of $15,000.

I/We agree that except for a claim for the reasonable cost of preparation of this Tender, by submitting a Tender, I/We irrevocably waive any claim, action, or proceeding against the Regional District including, without limitation, any judicial review or injunction application, and any claim against the Regional District and its elected officials, officers and employees for damages, expenses or costs, loss of profits, loss of

opportunity or any consequential loss for any reason, including any such claim, action or proceeding arising from:

1) any actual or alleged unfairness on the part of the Regional District at any stage of the Tender process, including without limitation any alleged unfairness in the evaluation of a Tender or award of a contract;

2) a decision by the Regional District not to award a contract to that Tenderer; or

3) the Regional District's award of a contract to a Tenderer whose Tender does not conform to the requirements of this ITT.

I/We hereby acknowledge receipt and inclusion of the following Addendum(s) to the ITT Documents:

Addendum No. _____ dated: _____ Addendum No. _____ dated: _____

Addendum No. _____ dated: _____ Addendum No. _____ dated: _____

Addendum No._____ dated: _____ Addendum No. _____ dated: _____

Signed and Delivered by:

Signature of Authorized Signatory	Name of Tenderer
Name of Authorized Signatory (Please print)	Address
Title	City, Province, Postal Code

Signed in the presence of:

Signature	Address
Name of Witness (Please print)	City, Province, Postal Code

APPENDIX C2 - TENDERER'S EXPERIENCE IN SIMILAR WORK

The Contractor is to demonstrate that they have a minimum of five years of current customer service experience as well as staff supervision experience. List professional and recent experience.

Year	Work Performed	Reference Contact (name and phone number)	Value

APPENDIX C3 - LIST OF CONTRACTOR'S PERSONNEL

The Contractor agrees that the personnel employed by them will be as listed below and further agrees that any changes or additions made to this list will be made in writing to the Regional District. As the job is service oriented, the Regional District is looking for the Contractor's employees to have customer service experience.

Name of Employee	**Employee's Experience / Qualifications**
	Landfill Operation Experience (Specific Projects and Number of Years)
	Heavy Equipment Operation Experience (Number of Years)
	Landfill Operation Formal Training
	Heavy Equipment Formal Training

Name of Employee	**Employee's Experience / Qualifications**
	Landfill Operation Experience (Specific Projects and Number of Years)
	Heavy Equipment Operation Experience (Number of Years)
	Landfill Operation Formal Training
	Heavy Equipment Formal Training

Name of Employee	Employee's Experience / Qualifications
	Landfill Operation Experience (Specific Projects and Number of Years)
	Heavy Equipment Operation Experience (Number of Years)
	Landfill Operation Formal Training
	Heavy Equipment Formal Training

Name of Onsite Supervisor	Supervisor's Experience / Qualifications
	Landfill Operation Supervision Experience (Specific Projects and Number of Years)
	Landfill Operation Formal Training

Please attach a separate page for additional information if required.

APPENDIX C4 - LIST OF SUBCONTRACTORS

The Contractor agrees that the Subcontractors engaged by it will be as listed below and further agrees that any changes or additions made to this list will be made in writing to the Regional District.

Name of Subcontractor Address of Subcontractor	**Reference Project and Reference Contact Information for Work to be Performed by Subcontractor**	**Work to Be Performed by Subcontractor**

APPENDIX C5 - LIST OF EQUIPMENT

The Tenderer will provide a description of each piece of heavy-duty Equipment to be used for Compaction and Cover Services at the Foothills Boulevard Regional Landfill. The age and condition of the Equipment will be a significant consideration in the quotation evaluation process. No changes to the Equipment used at the Facility will be allowed without the written consent of the Regional District.

State standby Equipment to be used in the event of breakdown of above, and where it will be drawn from.

Landfill Compactor

Make:_____ Model:_____

Year: _____ Weight:_____

Horsepower:_____ Start Up Operating Hours:_____

Owned or Leased:_____

Anticipated Hours of Operation per Year:_____

Accessories or Attachments to be Provided:_____

Maintenance Performed to Date (attach records/logs as required):_____

_____

_____

_____

Proposed Maintenance Program (attach separate sheets as required):_____

_____

_____

_____

Equipment Maintenance / Replacement Guarantees:_____

_____

_____

_____

Bulldozer

Make:_____ Model:_____

Year:_____ Weight:_____

Horsepower:_____ Start Up Operating Hours:_____

Owned or Leased:_____

Anticipated Hours of Operation per Year:_____

Accessories or Attachments to be Provided:_____

Maintenance Performed to Date (attach records/logs as required):_____

_____

_____

_____

Proposed Maintenance Program (attach separate sheets as required):_____

_____

_____

_____

Equipment Maintenance / Replacement Guarantees:_____

_____

_____

_____

Excavator

Make:_____ Model:_____

Year:_____ Weight:_____

Horsepower:_____ Start Up Operating Hours:_____

Owned or Leased:_____

Anticipated Hours of Operation per Year:_____

Accessories or Attachments to be Provided:_____

Maintenance Performed to Date (attach records/logs as required):_____

_____

_____

_____

Proposed Maintenance Program (attach separate sheets as required):_____

_____

_____

_____

_____

Equipment Maintenance / Replacement Guarantees:_____

_____

_____

_____

Loader

Make:_____ Model:_____

Year:_____ Weight:_____

Horsepower:_____ Start Up Operating Hours:_____

Owned or Leased:_____

Anticipated Hours of Operation per Year:_____

Accessories or Attachments to be Provided:_____

Maintenance Performed to Date (attach records/logs as required):_____

_____

_____

_____

Proposed Maintenance Program (attach separate sheets as required):_____

_____

_____

_____

Equipment Maintenance / Replacement Guarantees:_____

_____

_____

_____

Articulated Rock Truck

Make:_____ Model:_____

Year:_____ Weight:_____

Horsepower:_____ Start Up Operating Hours:_____

Owned or Leased:_____

Anticipated Hours of Operation per Year:_____

Accessories or Attachments to be Provided:_____

Maintenance Performed to Date (attach records/logs as required):_____

_____

_____

_____

Proposed Maintenance Program (attach separate sheets as required):_____

_____

_____

_____

Equipment Maintenance / Replacement Guarantees:_____

_____

_____

_____

Additional Equipment to be used

Make:_____ Model:_____

Year:_____ Weight:_____

Horsepower:_____ Start Up Operating Hours:_____

Owned or Leased:_____

Anticipated Hours of Operation per Year:_____

Accessories or Attachments to be Provided:_____

Maintenance Performed to Date (attach records/logs as required):_____

_____

_____

_____

Proposed Maintenance Program (attach separate sheets as required):_____

_____

_____

_____

Equipment Maintenance / Replacement Guarantees:_____

_____

_____

_____

Water Tanker

Make:_____ Model:_____

Year:_____ Weight:_____

Horsepower:_____ Start Up Operating Hours:_____

Owned or Leased:_____

Anticipated Hours of Operation per Year:_____

Accessories or Attachments to be Provided:_____

Maintenance Performed to Date (attach records/logs as required):_____

_____

_____

_____

Proposed Maintenance Program (attach separate sheets as required):_____

_____

_____

_____

Equipment Maintenance / Replacement Guarantees:_____

_____

_____

_____

* Please attach a separate page for additional equipment if required.

APPENDIX C6 - SCHEDULE OF PRICES – TENDERED PRICE

To supply all the necessary Equipment, labour, materials, supervision and all things necessary to provide compaction and cover services at the Foothills Boulevard Regional Landfill in accordance with the attached Invitation to Tender, Forms, and General Conditions.

Tender Price

A. Compaction and Cover Services Unit Price
(see Part C, Section 3.1 for work included in this price)

Total Compaction & Cover Services Unit Price $_____/tonne (excluding GST)

B. Cover Extraction and Borrow Pit Operations
(see Part C, Section 3.2 for work included in this price)

Total Cover Extraction $_____ /$m^3$ (excluding GST)

C. Ancillary Services
(see Part C, Section 3.3 for work included in this price)

C.1 Snow Clearing

C.1.1 Transfer Station Area $ _____/event (excluding GST)

C.1.2 Blower Building Area $ _____/event (excluding GST)

C.1.3 Primary Roads $ _____/event (excluding GST)

Total Snow Clearing (C.1) $ _____/event (excluding GST)

C.2 Road Maintenance – Ditch Maintenance

C. 2.1 Grading Primary Roads $ _____/event (excluding GST)

C. 2.2 Ditching Primary Roads $ _____/event (excluding GST)

Total Road Maintenance (C.2) $_____/event (excluding GST)

Tendered Sum

The quantities listed under Tender Sum are estimates only and are in no way guaranteed quantities. The purpose of these quantities is only for comparison of Tender submissions.

D. Estimated Total Annual cost of Compaction and Cover Services

Compaction and Cover Services Unit Price A x 75,000 tonnes: $ _____

E. Estimated Total Annual cost of Cover Extraction and Borrow Pit Operations

Borrow Pit Cover Extraction Unit Price B x 33,000 cubic metres: $ _____

F. Estimated Total Annual cost of Ancillary Services:

F1 Total Snow Clearing Unit Price C.1 x 20 events: $ _____

F2 Total Road Maintenance Unit Price C.2 x 3 events: $ _____

G. TOTAL TENDERED SUM (Sum D + E + F1 + F2) Excluding GST $ _____

H. GST on TOTAL TENDERED SUM $ _____

I. TOTAL TENDERED SUM (GST Included) $ _____

[Section 18 of the General Conditions provides that the Unit Prices will be increased by two percent (2%) on the 1st day of November in each successive year that the contract is in force.]

APPENDIX C7 - SCHEDULE OF PRICES – FORCE ACCOUNT WORK

Force Account hourly rates will be supplied for work that maybe required in addition to the Work specified herein.

The Contractor must supply Force Account hourly rates for Equipment that the Contractor may make available for additional work required at the Facility. List type, make, model, year and serial number and hourly rate of Equipment to be utilized. Provide actual hourly rates. Reference to other rates sheet or documents will be considered non-compliant and incomplete.

***Type, make, model, year and serial number of Equipment**	**Rate Per Hour (Excluding GST)**
LANDFILL COMPACTOR	
BULLDOZER	
EXCAVATOR	
ARTICULATED ROCK TRUCK	
SOIL COMPACTOR	
MOTOR GRADER	
MOTOR GRADER WITH WING (SNOW REMOVAL)	
LOADER	
LOADER WITH SNOW BLADE	
WATER TANKER	
PROVIDE ADDITIONAL EQUIPMENT AS AVAILABLE	

[Section 18 of the General Conditions provides that the Tendered Price on Equipment rates will be increased by two percent on the 1st day of November in each successive year that the contract is in force.]

*If additional space is needed, please attached additional sheet

APPENDIX C8 - CONFLICT OF INTEREST STATEMENT

ES-24-11
Compaction and Cover Services
Foothills Boulevard Regional Landfill

Tenderer Name:_____

The Tenderer, including its officers, employees, and any person or other entity working on behalf of or in conjunction with, the Tenderer on this Procurement Process:

- ☐ is free of any conflict of interest that could be perceived to improperly influence the outcome of this procurement process.
- ☐ has not, and will not, participate in any improper procurement practices that can provide the Tenderer with an unfair competitive advantage including obtaining and using insider type information to prepare a solicitation offer or participating in bid rigging.
- ☐ has an actual, perceived or potential conflict of interest regarding this procurement process as a result of:

State reason(s) for conflict of interest:

_____

_____

_____

_____

By signing below I certify that all statements made on this form are true and correct to the best of my knowledge.

_____ _____
Print Name of Person Signing Disclosure Authorized Representative of

_____ _____
Signature of Person Making Disclosure Date Signed

APPENDIX C9 - GOODS AND SERVICES TAX INFORMATION

Supplier: _____
Name

_____
Address

_____
City Province

_____
Postal Code Phone Number

Are you a GST Registrant? Yes_____ No_____

If YES, please indicate your registration number: _____

If NO, please fill in the following (check appropriate box):

- ❑ Supplier qualifies as a small supplier under s. 148 of the legislation
- ❑ Other: Specify _____

_____ _____
Signature of Authorized Person Print Name

_____ _____
Title Date

APPENDIX D1 – SITE PLAN

REGIONAL DISTRICT
of Fraser-Fort George

FOOTHILLS BOULEVARD REGIONAL LANDFILL
SITE TOPOGRAPHY

LEGEND

- PROPERTY BOUNDARY
- MW03-00 MONITORING WELL
- WASTE FILL AREA

SCALE 1:1,500 — 30 0 30 METRES

NOTE: EXISTING CONDITIONS AS OF MAY 2023

APPENDIX D2 – BORROW AREA

0 200 m

Scale: 1: 4 000

REGIONAL DISTRICT of Fraser-Fort George

TETRA TECH

COMPACTION AND COVER SERVICES
FOOTHILLS BOULEVARD REGIONAL LANDFILL

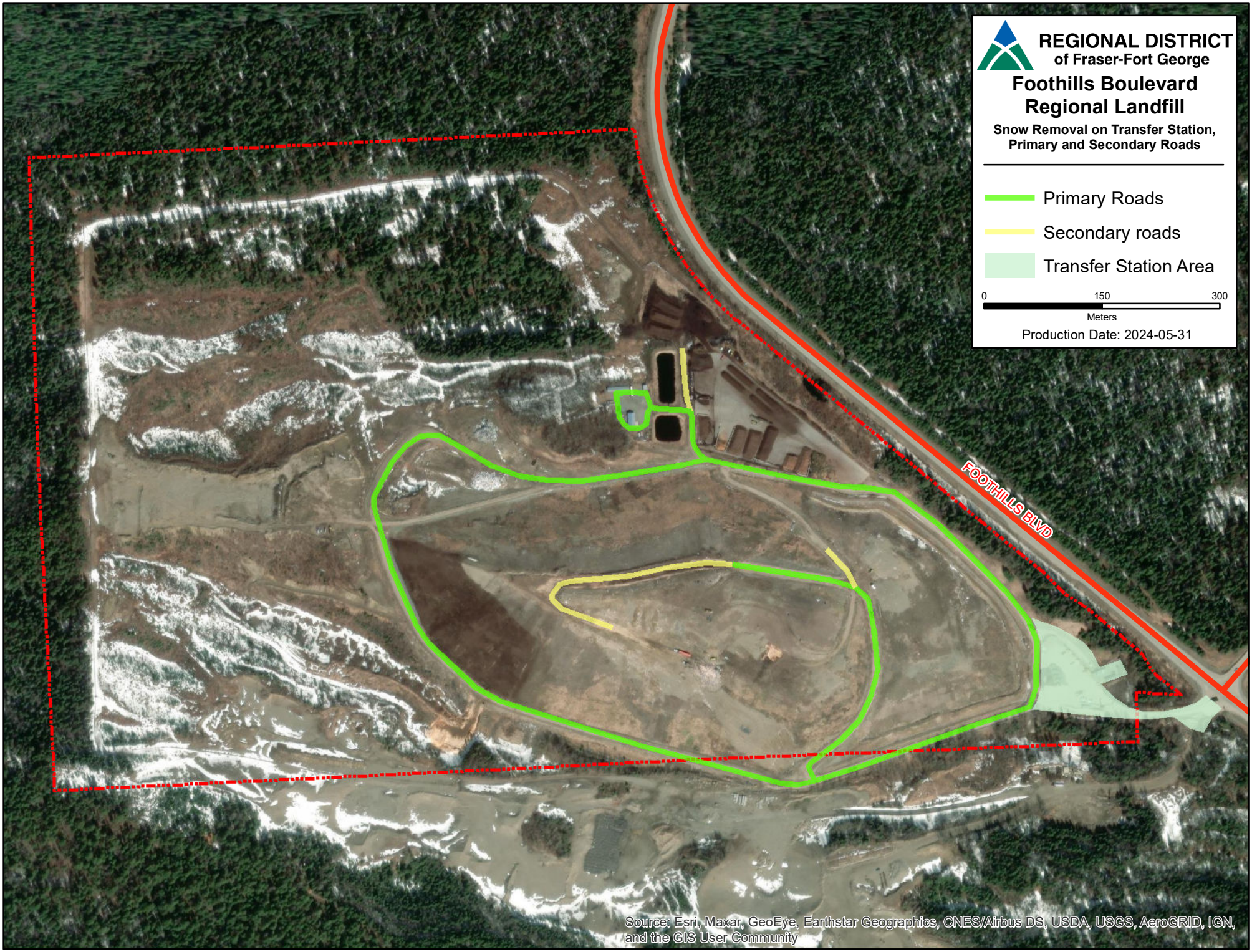
BORROW AREAS

PROJECT NO.	DWN	CKD	REV
SWM.SWOP03740-01	JL	ML	0

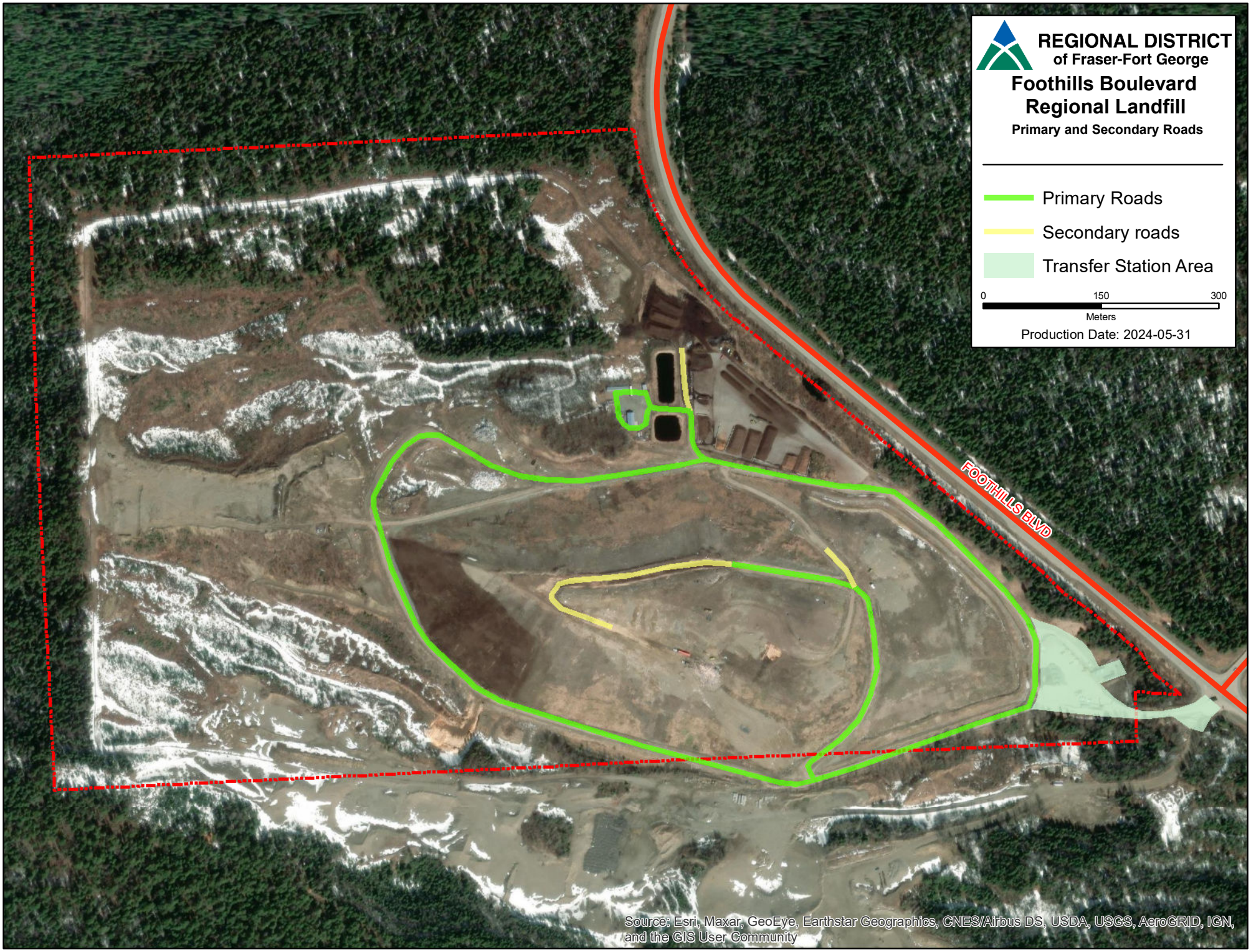
OFFICE	DATE
EDM	September, 2019

Figure 2

APPENDIX D3 – SNOW CLEARING SERVICES PLAN


REGIONAL DISTRICT
of Fraser-Fort George
Foothills Boulevard
Regional Landfill
Snow Removal on Transfer Station,
Primary and Secondary Roads
Primary Roads
Secondary roads
Transfer Station Area
0
150
300
Meters
Production Date: 2024-05-31
FOOTHILLS BLVD
Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

APPENDIX D4 – PRIMARY AND SECONDARY ROADS


REGIONAL DISTRICT
of Fraser-Fort George
Foothills Boulevard
Regional Landfill
Primary and Secondary Roads
Primary Roads
Secondary roads
Transfer Station Area
0
150
300
Meters
Production Date: 2024-05-31
FOOTHILLS BLVD
Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

APPENDIX E – DAILY COVER MEASUREMENT PROCEDURE

Telephone: 250-960-4400 | Fax: 250-562-8676 | http://www.rdffg.ca

FOOTHILLS BOULEVARD REGIONAL LANDFILL

Daily Cover Measurement of Active Face

Purpose

For the Regional District to have active control on the amount of cover material being excavated and used for daily cover. This is to monitor expenses and help with the extension of Landfill space and life of the burrow area.

No staff member will measure daily cover without being trained by a supervisor.

Background

To control the ratio of refuse to cover while at the same time preserving the landfill fill areas as well as burrow areas for as long as possible.

Hazards & Precautions

- Heavy equipment operating
- Unstable/uneven terrain
- Steep slopes
- Weather
- Walking on Active Face

Personal Protective Equipment (PPE) Required

- High Visibility Clothing (See Personal Protective Equipment Procedure)
- CSA Approved Steel-Toed Footwear
- Gloves
- Two-way Radio (See Two-Way Radio Protocol)
- Work Coveralls
- Bear Spray (seasonal)

Procedure

1) TOOLS REQUIRED

a) Measuring tape 50m
b) Calculator
c) Cover Measuring binder
d) Work Book
e) Pen

2) DAILY COVER

a) A RDFFG staff member will measure the Active Face daily to determine cover needed.
b) Measure with the Contractor working at the active face area.
   i) Measure the DLC Face as needed and/or once per week when in use.
c) Measure the Active Face area length x width in METERS
d) Write down total meters
e) Subtract number of daily tarps used
   i) 1 tarp = 100m2
   ii) Every Thursday is a complete cover where NO TARPS are required
f) Write down the difference
g) Multiple difference by 200 mm (0.2) for daily cover.
h) This number is the total CUBIC METERS required for cover that night
i) Divide total number of cubic meters by 20m3 (1 load of cover in the rock truck).
j) Indicate WHERE cover is coming from
   i) Soil from the Clean Fill Stockpile Area
   ii) Soil from the Borrow Area
k) Once you have the number of loads required, write all information down on work slip and give to the contractor.
l) Record if sawdust is being mixed with cover- not to exceed 30% mixture.
m) Staff will also record when they are giving cover for the deck, asbestos holes and/or test pits.

EXAMPLE: MEASURE ACTIVE FACE LENGTH by WIDTH= 20mx35m = 700 m2
SUBTRACT tarps = – 300m2
DIFFERENCE = 400m2
MULTIPLE by DAILY COVER REQUIRED (400 x0.2) = 80m3
DIVIDE by ROCK TRUCK LOADS, (20m3 per load) = 4 loads of cover required

20m x 35m = 700m2 – 300m2 = 400m2
400m2 x 0.2 = 80m3/20m3 = 4 loads of cover required

APPENDIX F – OPERATIONAL CERTIFICATE MR-01697

MINISTRY OF ENVIRONMENT

OPERATIONAL CERTIFICATE

MR-01697

Under the Provisions of the Environmental Management Act
and in accordance with the
Regional District of Fraser-Fort George
Solid Waste Management Plan

Regional District of Fraser-Fort George

155 George Street

Prince George, British Columbia

V2L 1P8

is authorised to manage recyclable material and municipal solid waste at a sanitary landfill located at **6595 Foothills Boulevard**, Prince George, British Columbia, subject to the conditions listed below. Contravention of any of these conditions is a violation of the *Environmental Management Act* and may result in prosecution.

1. LOCATION OF AUTHORISED FACILITY

The location of the facility for the management of recyclable material and municipal solid wastes to which this Operational Certificate is applicable is the Foothills Landfill, Block A of the Northeast ¼ of District Lot 4053 and Block A of the Northwest ¼ of District Lot 4048, Cariboo District as shown in the attached plan and containing 87 hectares more or less.

2. ENTRANCE FACILITIES

The authorised facility includes recyclable material and municipal solid waste drop-off facilities, weigh scales and related appurtenances approximately as shown on the attached Site Plan.

3. MANAGEMENT OF MUNICIPAL SOLID WASTE

3.1. Sanitary Landfill

3.1.1. The authorised facilities are a sanitary landfill area, composting area, landfill gas management, recyclable material storage areas and related appurtenances approximately as shown on the attached Site Plan. The site reference number for the discharge is E211018.

Date Issued: OCT 31 2005

Del Reinheimer, P.Eng.
for Director, Environmental Management Act

3.1.2. The characteristics of the discharge must be municipal solid waste as defined under the *Environmental Management Act* and other wastes as approved in writing by the Director.

3.1.3. Waste may be discharged to the areas specified in the Regional District's Design and Operation Plan, approximately located as shown on the attached Site Plan.

4. GENERAL REQUIREMENTS

4.1. Qualified Professionals

All facilities and information, including works, plans, assessments, investigations, surveys, programs and reports, must be certified by qualified professionals.

4.2. Plans

4.2.1. The Regional District shall prepare a Design and Operation Plan that will include considerations for site operation and development, leachate and landfill gas management, composting operations, monitoring programs and environmental impact mitigation management.

The Design and Operation Plan must be submitted to the Director by November 30, 2005.

4.2.2. The Design and Operation Plan must address, but not be limited to, each of the subsections in the *Landfill Criteria for Municipal Solid Waste* including performance, siting, design, operational and closure and post-closure criteria.

4.2.3. The facilities must be developed and operated in accordance with the Design and Operation Plan.

4.2.4. Any updates to the plan shall be immediately submitted to the Director.

4.3. Additional Facilities or Works

The Director may require investigations, surveys, and the construction of additional facilities or works. The Director may also amend information requirements of this Operational Certificate including plans, programs, assessments and reports.

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5. OPERATIONAL REQUIREMENTS

5.1. Operator Training and Development

At a minimum, the Regional District will ensure that operating personnel are trained to industry standards and at least one member of the on-site personnel are trained and current in a SWANA recognized landfill operator course or equivalent.

5.2. Wildlife Management and Control

At the time of issuance of this certificate the Regional District is not required to install electric fencing for the purpose of preventing access to the site by bears.

The Regional District is required to monitor wildlife (medium and large carnivores) activity at the facility and keep records of occurrences and observations of wildlife (medium and large carnivores).

The Director may request the Regional District to develop a Wildlife Management Plan that presents solutions for preventing wildlife access to the facility.

5.3. Compost

Composting facilities shall be operated and maintained in accordance with the *Organic Matter Recycling Regulation.*

5.3. Management of Landfill Gas

The management of landfill gas shall be managed in accordance with sections 4.2 and 6.4 of the *Landfill Criteria for Municipal Solid Waste.* In addition, the Regional District will have a qualified professional prepare an Operations and Maintenance Manual for the landfill gas management system.

6. HAZARDOUS WASTE MANAGEMENT

6.1. Hazardous Waste

"Hazardous Wastes" as defined by the *Hazardous Waste Regulation* pursuant to the *Environmental Management Act* are prohibited from disposal unless expressly authorised by the *Hazardous Waste Regulation*, approved by the Director or as specified in the Operational Certificate.

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for Director, Environmental Management Act

6.2. Waste Asbestos

Waste asbestos is authorized for disposal subject to compliance with the requirements of section 40 of the *Hazardous Waste Regulation* **and** the following conditions:

6.2.1. The asbestos waste may not be mixed with any other hazardous waste.

6.2.2. The Regional District must approve the disposal before disposal takes place.

6.2.3. All other applicable requirements of the *Hazardous Waste Regulation*, including but limited to manifesting and waste record keeping, must also be complied with.

6.3. Handling of Impacted Soil

The *Environmental Management Act*, the *Contaminated Sites Regulation* and the *Hazardous Waste Regulation* are applicable for the disposal of impacted (contaminated) soil at the facility.

6.4. Hazardous Wastes from Accidental Spills or Abandonment

Hazardous wastes resulting from accidental spills or abandonment of dangerous goods may be accepted at the facility only under the authority of Section 52(1) of the *Hazardous Waste Regulation*.

7. MONITORING

7.1. Monitoring Program

7.1.1. A monitoring program shall be developed by a qualified professional to identify potential impacts to the environment and public health from the facility.

7.1.2. The monitoring program shall be submitted as part of the Design and Operation Plan.

7.1.3. The monitoring program must address, but not be limited to, subsections 4.1, 4.2 and 7.15 of the *Landfill Criteria for Municipal Solid Waste* and the *Guidelines for Environmental Monitoring at Municipal Solid Waste Landfills.*

7.1.4. Monitoring must be conducted in accordance with the monitoring program.

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8. REPORTING

All reports and drawings shall be submitted in electronic format unless otherwise requested by the Director.

8.1. Drawings

All drawings shall be certified correct and sealed by a qualified professional. Drawings shall be submitted to the Director within 30 days of completion or as otherwise specified by the Director.

8.2. Annual Report

The Regional District shall submit an Annual Report to the Director on or before June 30 each year for the previous calendar year. The report shall contain, but not be limited to the following information:

i.) an executive summary;

ii.) the type and tonnage of waste received, recycled and landfilled for the year;

iii.) a current topographic map detailing airspace consumption, on-site borrow pit changes and future developments;

iv.) updated estimates for the remaining capacity, closure date for the current phase and closure date for the current landfill footprint;

v.) any new information or proposed changes relating to the facilities and Design and Operation Plan;

vi.) composting operation activity including amount of material received for composting, material composted, material sold and number of composting cycles;

vii.) occurrences or observations of wildlife (medium and large carnivores) at the facility;

viii.) a statement regarding the facility's progress in reducing the regional solid waste stream, in accordance with the hierarchy of reduce, reuse and recycle principles; and,

ix.) the results of all monitoring programs as specified in this Operational Certificate. Data interpretation and comparison to the performance criteria in the *Landfill Criteria for Municipal Solid Waste* and the *Guidelines for Environmental Monitoring and Municipal Solid Waste*

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for Director, Environmental Management Act

Landfills. Trend analysis, as well as an evaluation of the impacts of the discharges on the receiving environment in the previous year shall be carried out by a qualified professional.

9. CLOSURE PLAN

At least one year in advance of decommissioning the landfill, or as otherwise specified by the Director, a Closure Plan shall be submitted which includes at least the following information:

i) a topographic plan showing the final elevations contours of the landfill and surface water diversion and drainage controls;

ii) specifications for the final cap and proposed end use of the site; and,

iii) provisions for a minimum 25 year post-closure care period at the facility which, at a minimum, considers the following: groundwater monitoring, surface water monitoring, landfill gas management, erosion and settlement monitoring and management.

10. CLOSURE AND POST-CLOSURE FUND

The Regional District will conform to the Public Sector Accounting and Auditing Board's requirements (PS 3270) to recognize solid waste landfill closure and post-closure liability. The Regional District will develop a plan to ensure that sufficient funds are available for closure and post-closure care work.

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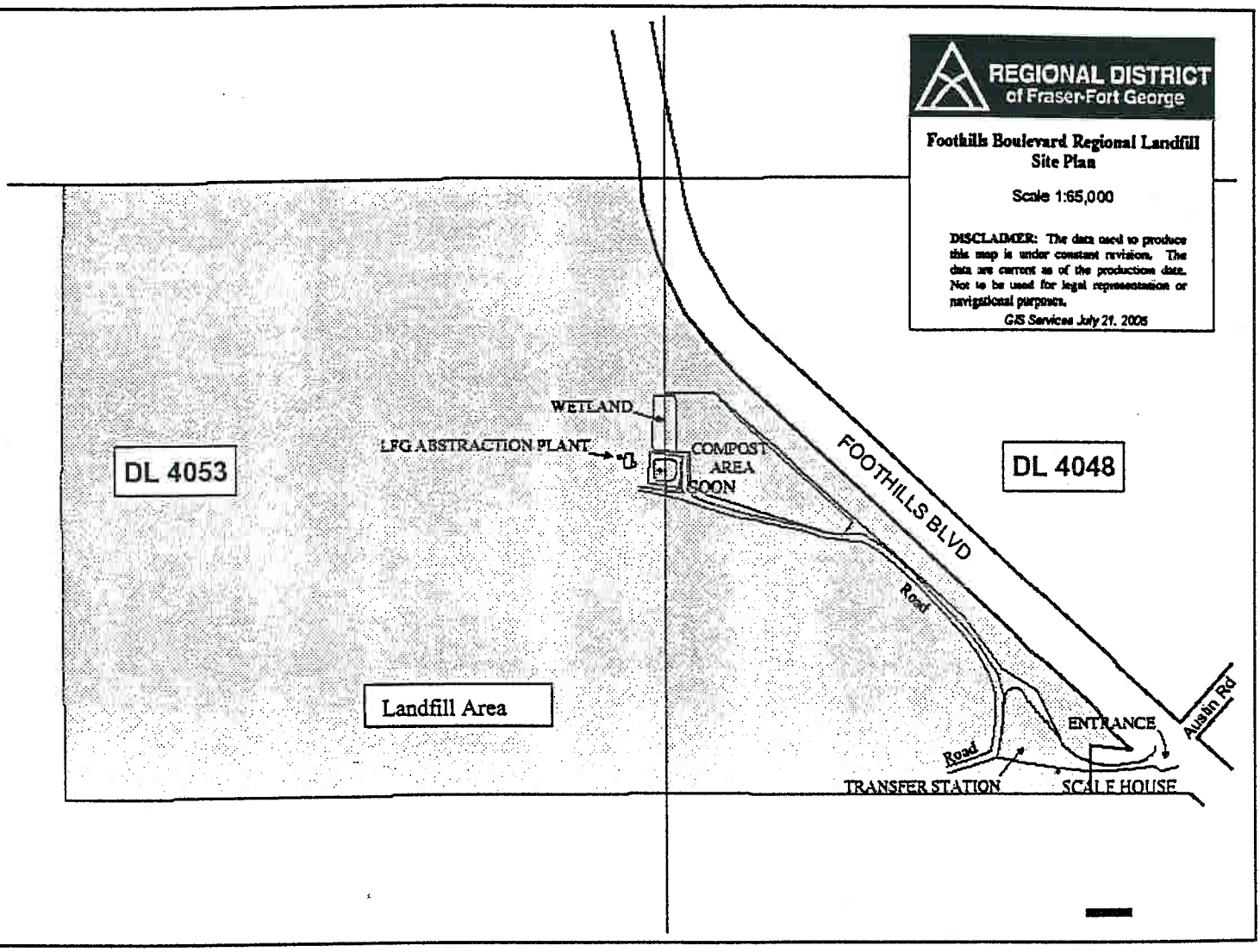
for Director, Environmental Management Act

PROVINCE OF
BRITISH COLUMBIA

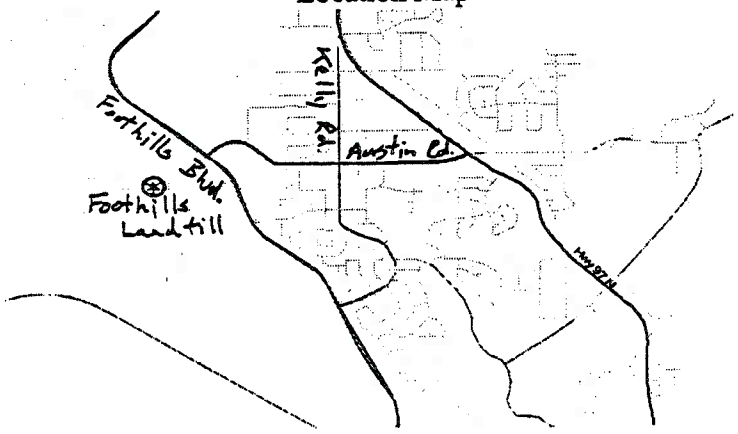
Environmental Protection

SITE PLAN

N



Location Map



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OCT 3 1 2005

Operational Certificate No. MR-01697

D. Reinheimer

Del Reinheimer, P.Eng.
for Director, Environmental Management Act
Omineca and Peace Regions

APPENDIX G – INTEGRATED LANDFILL MANAGEMENT PLAN

EXCELLENCE IN ENVIRONMENTAL CONSULTING SERVICES

XCG File No. 4-2428-01-07

March 25, 2010

INTEGRATED LANDFILL MANAGEMENT PLAN FOOTHILLS BOULEVARD REGIONAL LANDFILL PRINCE GEORGE, BRITISH COLUMBIA

Prepared for:

THE REGIONAL DISTRICT OF FRASER-FORT GEORGE
155 George Street
Prince George, British Columbia
V2L 1P8

Attention: Ms. Petra Wildauer
General Manager of Environmental Services

Michel Lefebvre, M.Sc., P.Eng.
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Scott Ferguson, C.E.T.
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E-mail:
edmonton@xcg.com

1.1 EXECUTIVE SUMMARY

This Integrated Landfill Management Plan (Plan) has been prepared in accordance with the design, performance, and operational requirements of the Operational Certificate for the Foothills Boulevard Regional Landfill (Site), and in general accordance with relevant British Columbia Ministry of the Environment (BC MOE) acts, regulations, and guidance documents. This document was developed based on an integrated development strategy which incorporates surface water, leachate, and landfill gas management controls into the landfill development plan to mitigate landfill derived impacts.

Key objectives incorporated into this document include the following:

- Updated fill plan which addresses the need to reduce leachate generation and optimize surface water controls;
- Updated final development contours which address potential future differential settlement of the landfill;
- Updated fill plan that optimizes landfill available airspace;
- Reduce long-term environmental impacts associated with the landfill area;
- Update and revise the environmental monitoring program; and
- Provide a conceptual design for the expansion of the landfill gas collection system to reduce greenhouse gas emissions and nuisance odours.

The resultant Plan is a comprehensive and integrated design document which addresses all of the aforementioned objectives. The Plan includes a detailed development strategy for the existing landfill area (Cell 1), which provides approximately 2 million cubic metres of airspace. The Plan also proposes a new landfill cell (Cell 2) located northwest of the existing landfill, which would provide an additional 4.5 million cubic metres of airspace. Based upon population growth projections and fill rate assumptions presented herein, it is estimated that the Site will reach design capacity for Cell 1 in 2025 and Cell 2 in 2042.

TABLE OF CONTENTS

TABLES (END OF TEXT)

FIGURES (END OF TEXT)

DRAWINGS (END OF TEXT)

APPENDICES

1. INTRODUCTION

XCG Consultants Ltd. (XCG) was retained by the Regional District of Fraser-Fort George (RDFFG) to prepare an Integrated Landfill Management Plan (Plan) for the Foothills Boulevard Regional Landfill (Site), as per XCG's proposal, entitled "Request for Proposals ES-09-08, Integrated Landfill Management Plan, Engineering Services," dated May 15, 2009.

This Plan has been prepared in accordance with the design, performance, and operational requirements of the Operational Certificate for the Site, and in general accordance with the following British Columbia Ministry of the Environment (BC MOE) acts, regulations, and guidance documents:

- Landfill Criteria for Municipal Solid Waste (June 1993);
- Guidelines for Environmental Monitoring at Municipal Solid Waste Landfills (January 1996);
- Environmental Management Act (July 2004); and
- Landfill Gas Management Regulation (December 2008).

The purpose of this document is to provide the RDFFG with a plan that meets the following objectives:

- Adopt the requirements of the Operational Certificate for the Site;
- Integrate the development plan (filling plan) with environmental controls [i.e., surface water, leachate, and landfill gas (LFG) management];
- Identify key infrastructure and environmental control elements and tie them in to the ongoing development and operation of the Site, expansion, and progressive closure;
- Provide a manual for the site operator;
- Summarize historic site operations which impact future development and connections for existing infrastructure (e.g., leachate pump station and surface water management systems); and
- Review and update the environmental monitoring program to further reduce potential liability associated with ongoing landfill operations.

In addition to the above-stated objectives, the following elements were also considered:

- Develop a surface water management strategy that can be practically implemented within the existing property boundary and ensure that clean water entering the Site is not impacted by landfill operations;
- Develop an optional LFG collection system to control greenhouse gas (GHG) emissions and odour from the landfill;

- Implement leachate management controls to reduce the impact of off-site leachate migration identified in recent monitoring reports; and
- Optimize available airspace to maximize site life.

1.1 Site Description

The Site is located in the northwest portion of the City of Prince George, British Columbia at 6595 Foothills Boulevard, northwest of the intersection with West Austin Road. The legal description of the Site is Block A of the northwest ¼ of District Lot 4053 and Block A of the northwest ¼ of District Lot 4048, Cariboo District. The location of the Site is shown on Figure 1.1.

The Site property (Figure 1.2) is bounded to the east by Foothills Boulevard and to the south by a gravel pit maintained and operated by the BC Ministry of Transportation. The Site is bounded to the north and west by naturalized northern coniferous forest. A residential area, referred to as the Hart Highlands area of Prince George, is located approximately 500 metres east of the Site, and a sport and recreation facility is located approximately 250 metres east of the Site entrance. The Site is located approximately 2.5 kilometres north of the Nechako River.

The Site serves a population of approximately 94,000 people, and receives approximately 96 percent of the regional solid waste stream (Gartner Lee Ltd., 2008). The Site accepts waste from the Prince George municipal and commercial collection services, the general public, local institutions, and businesses, and numerous regional transfer stations.

The property boundary for the Site encompasses an area of approximately 87.3 hectares. The landfill, composting, and recycling activities conducted at the Site encompass an area of approximately 25 hectares within the permitted landfill property.

Existing facilities located at the Site include the following (Figure 1.2):

- Scale house;
- Public tipping area;
- Swap Shed;
- Asphalt compost area; and
- Landfill gas utilization facility.

1.2 Background

The presence of the gravel pit located immediately south of the Site is believed to be evidence that the original use of the Site was for gravel extraction. A landfill operated by the City of Prince George commenced at the Site in 1976 and was operated until 1994, when the RDFFG took over management of the Site. Since that time, a number of changes have been made to the Site, including the following (AMEC, 2006):

- Installation or upgrade of site utilities including municipal water supply and a three-phase hydro service;
- Construction of a scale house/operating building and installation of two 80 tonne weigh scales commissioned in January 1995;
- Construction of an on-site transfer station and "Swap Shed" waste salvage building;
- Development of a composting site for green waste, wood waste, and animal bedding;
- Installation of groundwater monitoring wells and continuation of the Site monitoring program; and
- In 2002, final cover, landfill gas collection and flare infrastructure, and a condensate and leachate recirculation system were designed and constructed for the eastern portion of the landfill.

1.3 Existing Environmental Controls

1.3.1 Existing Surface Water Controls

The existing surface water management controls are presented in Drawing D-01, and include perimeter ditching and culverts. A detailed description of current surface water management controls are presented in Section 7.1.

1.3.2 Existing Leachate Controls

The existing leachate collection system is presented in Drawing D-02.

The landfill is a natural attenuation site, and as such was not designed with an engineered liner or leachate collection system. However, the final cover system used for the closure of a portion of Phase 1 incorporates a 300-millimetre leachate drainage layer. Leachate that moves through the drainage layer under the composite final cover, as well as condensate from the LFG collection header system is collected for recirculation into the landfill through four recirculation fields located in the final covered area of the landfill as shown on Drawing D-02. In 2007, approximately 1,600 cubic metres of leachate were collected and recirculated into the landfill (RDFFG, 2007).

1.3.3 Existing LFG Collection System

1.3.3.1 Well Field Overview

The current LFG well field is composed of 16 vertical collection wells, connected to a main header via five lateral lines. The vertical extraction wells were constructed using CES-Landtec Accu-Flo wellheads, non-telescoping perforated PVC well assemblies, 100-millimetre diameter high density polyethylene (HDPE) laterals, and a 200-millimetre diameter HDPE main header. The main header pipe conveys LFG to the Control Plant over a distance of approximately 926 metres. Condensate is

managed via two condensate knockouts located adjacent to the Control Plant (condensate knockout #2) and adjacent to the public transfer station area (condensate knockout #1). The knockouts include electrically operated pumps. Condensate is conveyed from the knockouts via a force main to the leachate recirculation sump, located adjacent to condensate knockout #1. The condensate force main is located in the main header trench, adjacent to the 200-millimetre header pipe.

1.3.3.2 Control Plant Overview

The LFG Control Plant is located at the northern extent of the landfill property. The LFG Control Plant is comprised of two primary components: abstraction building, and enclosed flare. The abstraction building includes three main areas: blower room, electrical room, and garage facility. The blower room includes two parallel Lamson multi-stage blowers, isolation valve, condensate knockout pot, LFG analyzer, and LFG flow meter. The electrical room houses the flare controls, programmable logic controller, blower variable frequency drive control, and datalogger.

The flaring mechanism is an enclosed flare unit with a reported thermal capacity of 25 million BTU per hour. Hence, at 50 percent methane (volumetric basis), the flare has a maximum flow capacity of approximately 1,360 cubic metres per hour (800 cfm).

1.3.3.3 Utilization Facility Interconnect

A stainless steel, 200-millimetre diameter, "T" connection was installed in the blower exhaust manifold, between the Control Plant building and enclosed flare, in the anticipation of future diversion of LFG for utilization.

1.4 Previous Studies

The following reports were reviewed in support of the preparation of this Plan:

- AGRA Earth & Environmental Ltd., June 1999. "Hydrogeological Review."
- AMEC Earth & Environmental Ltd., July 2009. "2008 Annual Groundwater Monitoring Report."
- AMEC Earth & Environmental Ltd., February 2001. "Re: Implications of Electromagnetic Survey – Foothills Landfill."
- AMEC Earth & Environmental Ltd., December 2006. "Design and Operations Plan."
- AMEC Earth & Environmental Ltd., February 2003. "Groundwater Evaluation – 2002."
- Associated Mining Consultants Ltd., December 2002. "Geophysical Surveys – Foothills Boulevard Landfill, Prince George, B.C."
- Associated Mining Consultants Ltd., November 2000. "Transient Electromagnetic Survey – Foothills Boulevard Landfill, Prince George, B.C."

- Conestoga-Rovers & Associates Ltd., July 2008. "Greenhouse Gas Offset Verification."
- Gartner Lee Ltd., September 2008. "2008 Regional Solid Waste Management Plan."
- Golder Associates Ltd., April 2008. "GHG Emission Reductions 2004 and 2005."
- Golder Associates Ltd., April 2008. "Documentation Protocol GHG Emission Reductions."
- Hardy BBT Ltd., April 1988. "Hydrogeological Investigation."
- Sperling Hansen Associates, July 2000. "Landfill Gas Management Project."
- Sperling Hansen Associates, January 2002. "Landfill Gas Utilization Study."
- Technology Resource Inc., April 2007. "Waste Characterization Study."
- Technology Resource Inc., April 2007. "Waste Characterization Study of the Residential Automated Collection System."
- XCG Consultants Ltd., November 2008. "Interim Phase 1 Landfill Gas Management Plan."
- XCG Consultants Ltd., November 2008. "Feasibility Study for Beneficial Use of Landfill Gas for Greenhouse Operations."

1.5 Report Organization

This document is organized into the following sections:

Section 1	Introduction
Section 2	Regulatory Environment
Section 3	Regional and Site Setting
Section 4	Design Criteria
Section 5	Site Development
Section 6	Volume and Site Life
Section 7	Surface Water Management
Section 8	Leachate Management
Section 9	Landfill Gas Management
Section 10	Site Facilities
Section 11	Site Operations
Section 12	Monitoring, Inspection, and Reporting
Section 13	Closure

2. REGULATORY ENVIRONMENT

The following section provides an overview of the regulatory environment which governs landfill design, operations, and closure of the Site.

2.1 Provincial Regulations

There are currently four documents published by the BC MOE, which regulate landfill design, operations, and monitoring:

- Landfill Criteria for Municipal Solid Waste (June 1993);
- Guidelines for Environmental Monitoring at Municipal Solid Waste Landfills (January 1996);
- Environmental Management Act (July 2004); and
- Landfill Gas Management Regulation (December 2008).

Key elements of these documents, addressed in the Plan, are as follows.

Landfill Criteria for Municipal Solid Waste

This document applies to all new landfills and both lateral and vertical expansions of existing landfills, designed and constructed for the disposal of MSW. Key elements of the criteria are as follows:

- Landfills must not be operated in a manner such that ground or surface water quality in existing or potential future water supply aquifers, or surface waters, decreases beyond that allowed by the Approved and Working Criteria for Water Quality at or beyond the landfill property boundary.
- For existing landfills, in the event that leachate discharge from the landfill results in excursions to the established criteria, the leachate shall be managed to control the impact.
- At no time shall combustible gas concentrations exceed the lower explosive limit (LEL) (5 percent methane, on a volumetric basis) in soils at the property boundary, or 25 percent of the LEL (1.25 percent methane, on a volumetric basis) in any on- site structure or facility.
- The buffer zone between the discharged MSW and the property boundary should be at least 50 metres, of which the 15 metres closest to the property boundary must be reserved for natural or landscaped screening (berms or vegetative screens). Depending on the adjacent land use and environmental factors, buffer zones of less than 50 metres but not less than 15 metres may be approved by the Manager.
- The distance between the discharged MSW and the nearest surface water body or watercourse is to be a minimum of 100 metres. Greater or lesser separation distances may be approved by the Manager where justified by hydrogeological investigations or by provision of surface water diversion works to reroute the watercourse of concern.

- The minimum liner specification for leachate containment systems is a 1-metre thick, compacted soil liner with a hydraulic conductivity of 1 x 10-7 cm/s or less.
- Minimum bottom slopes of the liner are to be 2 percent on controlling slopes and 0.5 percent on the remaining slopes.
- Minimum specifications for leachate collection systems are a 0.3-metre thick sand drainage layer having a hydraulic conductivity of 1 x 10-2 cm/s or greater. Synthetic drainage nets which provide an equivalent hydraulic conductivity are an acceptable alternative.
- The drainage layer is to be designed with appropriate grades and collection piping so that the leachate hydraulic head on the liner does not exceed 0.3 metres at any time.
- Final cover for landfill sites is to consist of a minimum of 1 metre of low permeability (less than 1 x 10^{-5} cm/s) compacted soil plus a minimum of 0.15 metre of topsoil with approved vegetation established. The depth of the topsoil layer should be related to the type of vegetation proposed to accommodate to necessary rooting depth. Soils of higher permeability may be approved based on leachate generation potential at the landfill site.
- Final cover is to be constructed with slopes between 4 percent and 33 percent with appropriate run-on/run-off drainage controls and erosion controls.
- For landfills exceeding 100,000 tonnes total capacity, an assessment of the potential emissions of non-methane organic compounds (NMOCs) shall be carried out. If the assessment indicates that the emission of NMOCs exceeds or is expected to exceed 150 tonnes/year, the installation and operation of landfill gas recovery and management systems are mandatory.
- Fencing is required around the perimeter of the landfill.

Guidelines for Environmental Monitoring at Municipal Solid Waste Landfills

These guidelines are intended to assist landfill owners and operators to design and implement an environmental monitoring program as required by the "Landfill Criteria for Municipal Solid Waste." Key elements of the guidelines are as follows:

Groundwater:

- The location and installation of monitoring wells should address both existing and anticipated site development, including any predicted changes in groundwater flow;
- Sampling frequency should be based on the rate of contaminant movement;
- The routine parameters monitored in groundwater include pH, redox potential (Eh), dissolved oxygen (DO), specific conductivity, metals, ammoniacal nitrogen, chloride, and chemical oxygen demand (COD); and
- For the monitoring of metals, the Environmental Protection Agency (EPA) recommends the following be monitored regularly; antimony, arsenic, barium,

beryllium, cadmium, chromium, cobalt, copper, lead, nickel, selenium, silver, thallium, vanadium, and zinc;

Surface water:

- Surface water monitoring locations should include the following locations:
  - Upstream to establish background water quality;
  - Immediately downstream to determine leachate impacts on water quality; and
  - Downstream to document the extent of the mixing zone and distance required for the surface water to assimilate leachate and for water quality to recover to background levels.
- Surface water should be monitored for pH, redox potential, specific conductance, temperature, and dissolved oxygen concentration.

Landfill Gas Management Regulation

The Landfill Gas Management Regulation applies to all regulated landfill sites that:

- Have 100,000 tonnes or more of municipal solid waste in place, or
- Receive 10,000 or more tonnes of municipal solid waste for disposal into the landfill site in any calendar year after 2008.

Key elements of the Regulation are as follows:

- An owner or operator of a regulated landfill site must ensure that a qualified professional conducts an initial LFG generation assessment of the landfill site.
- The owner or operator of a regulated landfill site that, as a result of an assessment conducted in accordance with this Regulation, is estimated to generate 1,000 tonnes or more of methane in the calendar year immediately preceding the calendar year of the assessment must ensure that a landfill gas management facilities design plan is prepared for the landfill site.
- The owner or operator of a landfill site for which there is an accepted design plan must:
  - Install landfill gas management facilities in accordance with the accepted design plan, no later than four years after the date the landfill gas management facilities design plan is submitted to the Director; and
  - Implement management practices, processes and methods for landfill gas management in accordance with any guidelines respecting:
    - Migration of LFG;
    - Use of landfill covers;
    - Operation of LFG management facilities;
    - LFG collection equipment;
    - LFG flaring equipment; and

- LFG management facilities maintenance, including the number of days annually that LFG management facilities may be shut down.

2.2 Landfill Operational Permit

The landfill is currently approved to operate under Operational Permit No. MR-01697 issued by the BC MOE on October 31, 2005. Key elements of this approval with respect to design, operation, and closure include the following:

- The Regional District is required to monitor wildlife (medium and large carnivores) activity at the facility and keep records of occurrences and observations of wildlife (medium and large carnivores);
- Composting facilities shall be operated and maintained in accordance with the *Organic Matter Recycling Regulation*;
- The management of landfill gas shall be managed in accordance with Sections 4.2 and 6.4 of the *Landfill Criteria for Municipal Solid Waste*;
- Waste asbestos is authorized for disposal subject to compliance with the requirements of section 40 of the *Hazardous Waste Regulation* and the following conditions:
  - The asbestos waste may not be mixed with any other hazardous waste.
  - The Regional District must approve the disposal before disposal takes place.
  - All other applicable requirements of the *Hazardous Waste Regulation*, including but not limited to manifesting and waste record keeping, must also be complied with.
- The *Environmental Management Act*, the *Contaminated Sites Regulation* and the *Hazardous Waste Regulation* are applicable for the disposal of impacted (contaminated) soil at the facility;
- Hazardous wastes resulting from accidental spills or abandonment of dangerous goods may be accepted at the facility only under the authority of Section 52(1) of the *Hazardous Waste Regulation*;
- A monitoring program shall be developed by a qualified professional to identify potential impacts to the environment and public health from the facility;
- The monitoring program must address, but not be limited to, subsections 4.1, 4.2 and 7.15 of the *Landfill Criteria for Municipal Solid Waste* and the *Guidelines for Environmental Monitoring at Municipal Solid Waste Landfills*.

A copy of the Operational Permit is included as Appendix A.

3. REGIONAL AND SITE SETTING

3.1 Topography

The Site occupies a series of depressions in a knob and kettle outwash plain area. Prior to the development of the landfill, surface elevations at the Site varied from approximately 735 to 790 metres above mean sea level. Depressions at the Site reached depths of up to 30 metres below the surrounding terrain. An east-west trending esker complex forms a highland area that separates the Site from an approximately 2 kilometre wide "lower" bench area closer to the Nechako River (AMEC, 2006).

3.2 Geology

Surficial deposits in the vicinity of the Site are comprised of lacustrine sand and silt with intermittent gravel content, underlain by clay till. It is believed that these Surficial soils are continuous throughout the area, with shallow soil at the Site having increasing silt content to the north and increasing coarse sand and gravel content to the south in the vicinity of the esker complex (AMEC, 2006).

The depth of bedrock at the Site is estimated to be approximately 50 metres below ground surface (bgs) (AMEC, 2006). Bedrock is expected to consist of tertiary volcanic rock (BC Ministry of Environment, Parks and Lands, 1996).

3.3 Hydrogeology

The horizontal direction of shallow groundwater movement at the Site is reported to be predominantly to the southwest towards the Nechako River (AMEC, 2006).

According to AMEC (2006), unsaturated sand at the Site extends to a depth ranging from approximately 55 to 83 metres bgs. The overburden sand constitutes an unconfined aquifer with a water table elevation recorded between 696 and 704 metres above mean sea level. The saturated sand is reported to range in thickness from 0 to approximately 5 metres. The hydraulic conductivity of the sand is reported to range from 1.2×10^{-4} to 6×10^{-5} metres per second.

3.4 Receptors

The primary environmental receptors include potential downstream uses of either surface water or groundwater, and the on-site buildings and adjacent property owners with respect to landfill gas.

The primary drainage feature in the greater Site vicinity is the Nechacko River, which flows east towards its confluence with the Fraser River. Intermittent drainage features are found to the southwest of the Site which flow towards the Nechako River; however, these features reportedly remain dry except at times of exceptional rainfall or snowmelt (Ecoplans Ltd., 2010).

Active production wells operated by the City of Prince George and commercial water users have been reported as being completed within the Nechako Aquifer

(Golder, 2002). The majority of these production wells are located along the south bank of the Nechako River, to the east of Foothills Boulevard.

3.5 Climate

The monthly mean temperature and monthly mean precipitation values for the Site are presented in Table 3.1. The monthly mean temperature data, compiled from Environment Canada Statistics at the Prince George A Weather Station, for the period between 1971 and 2000, indicate that the Site has a mean annual temperature of 4.0 °C.

The monthly mean precipitation values reported by Environment Canada at the Prince George A Weather Station indicate an average annual precipitation of approximately 600.8 millimetres (23.6 inches). As indicated in Table 3.1, approximately 380.8 millimetres (63 percent) of the annual precipitation at the Site occurs in the form of rainfall during the warmer months from April to October. According to the United States Environmental Protection Agency (1997), the Site would be classified as arid with precipitation less than 635 millimetres (25 inches) per year.

4. DESIGN CRITERIA

The following section presents an overview of the design criteria, summarized in Table 4.1, that were used to prepare this Plan.

4.1 Design Constraints

The following design constraints were taken into account to prepare this Plan:

- Maximum 3 horizontal to 1 vertical slope (33 percent);
- Minimum slope at final closure of 10 percent;
- Maximum access road grade of 8 percent;
- Minimize leachate generation; and
- Address surface water control to reduce run-on from upstream areas, improve landfill operations, reduce leachate generation potential, and reduce the amount of groundwater recharge in the vicinity of the Site.

4.2 Waste Characterization

4.2.1 Waste Quantification

Historic and estimated future tonnages of waste landfilled at the Site are provided in Table 4.2. Historic estimated annual tonnages were based on the Golder Associates Ltd. report entitled "Report on Documentation protocol GHG Emission Reductions," April 2008. Tonnages for 2006 to 2009 were provided by the RDFFG. Future annual tonnages were estimated based upon an annual growth rate of 1.1 percent as indicated by BC Statistics.

4.2.2 Waste Composition

A waste characterization study for the landfill was conducted by Technology Resource Inc. in February of 2007. The MSW composition results determined by the study are provided in Table 4.3. As indicated in Table 4.3, approximately 35.8 percent of the total waste landfilled at the Site is composed of decomposable waste, approximately 31.3 percent is composed of moderately decomposable waste, and approximately 32.8 percent of the waste is composed of relatively inert material.

4.2.3 Waste Density

The apparent waste density was used to estimate landfill airspace consumption. The apparent waste density is not a true density, but is a relationship that represents the mass of waste that can be disposed in each cubic metre of landfill air space. The apparent waste density is a more accurate measure of the efficiency of landfilling since soil (used for daily and interim cover) is excluded from the ratio. The apparent waste density is based on the comparison of the tonnage landfilled versus the air space consumed. Soil used as daily cover is excluded from consideration since an

increase in soil usage can increase the true density and provide a skewed representation of landfilling efficiency.

Efficient landfill compaction techniques employed at landfill sites utilizing waste compaction equipment typically attain an apparent waste density of 0.6 to 0.8 tonnes of waste per cubic metre of airspace consumed. Employing alternative daily cover and other efficiencies could increase the apparent density to as much as 1.0 tonne per cubic metre.

Based on a comparison of the 2007 and 2008 topographical contours, approximately 135,000 cubic metres of airspace was filled at the Site in 2007. Based upon the reported 91,840 tonnes of waste that was landfilled in 2007, the apparent density for the landfill was calculated to be approximately 0.68 tonnes per cubic metre.

4.2.4 Airspace Consumption

The basis for site life calculations presented herein is an annual air space consumption of approximately 135,000 cubic metres, which provides a monthly airspace consumption of approximately 11,250 cubic metres.

Active area dimensions of 20 metres in length by 30 metres in width were chosen for the development sequence. The rationale for selecting these dimensions is as follows:

- The width is based on allowing space for simultaneous unloading of three vehicles with adequate space between vehicles and access to the working face for the compactor or bulldozer;
- The length is kept to a minimum, but still provides adequate space to turn around the compactor without accessing inactive areas; and
- The lift height will be an average of 3 metres.

4.3 Landfill Limit

The approximate existing limit of waste (approved development area) is illustrated in Figure 1.2, and comprises an area of approximately 17.4 hectares. The existing conditions (2009) as illustrated on Figure 1.3, which form the basis for the Plan presented herein, was derived from the following:

- The existing landfill as well as the borrow pit area were derived from an aerial survey completed in 2009 by AeroGeoNautics Inc.; and
- The Site area surrounding the landfill was derived from an aerial survey completed on May 23, 2008 by Aero Geometrics Ltd. and from Natural Resources Canada topographical map 93 G/15 of Prince George.

4.4 Buffer Zones

The permitted landfill is shown on Figure 1.2, and encompasses an area of approximately 86.7 hectares.

The existing buffer zones (relative to the property boundary) for the landfill range from approximately 0 to 100 metres in the south, 575 metres in the west, 65 to 515 metres in the north, and 50 to 130 metres in the east.

The current buffer zones provide more than sufficient room for support facilities associated with site operations. These facilities include the following:

- Site entrance and access roads;
- Weigh scale;
- Storage building;
- Public tipping area;
- Equipment and haul roads;
- Surface water management controls;
- Leachate management controls; and
- Landfill gas management controls.

4.5 Existing Facilities

The existing facilities needed for the proper operation of the landfill are as follows:

- Weigh scale;
- Public tipping area;
- Swap shed;
- Asphalt compost area;
- LFG utilization facility; and
- Access roads.

These facilities are further discussed in Section 10.

4.6 Ingress/Egress

Access to the Site is provided from Foothills Boulevard through the main gate located in the southeast corner of the Site.

5. SITE DEVELOPMENT

The following section provides a summary of the development plan from existing conditions illustrated on Drawings D-01 and D-02 through to final contours for Cell 1 illustrated on Drawing D-18. Conceptual base contours and final contours for Cell 2 are illustrated on Drawings D-19 and D-20. Typical details for infrastructure and controls included in the development of the Site are presented on drawings D-21 and D-22.

5.1 Existing Conditions

Existing conditions presented on Drawings D-01 and D-02 illustrate the site conditions as of the 2009 survey date noted previously and were used as the basis for generating the drawings presented herein. Drawing D-01 illustrates the contours and surface water controls that form the basis of the Plan drawings. Drawing D-02 illustrates the existing leachate and landfill gas controls.

5.2 Key Development Considerations

Based on the design criteria presented in Section 4 and an assessment of the on-site infrastructure, the following key development issues were identified, which are addressed in the development sequence:

- Optimize available airspace;
- Minimize active area size and reduce infiltration by filling to final contours as soon as possible, and completing areas with interim or final cover as soon as possible;
- Construct surface watercourses early in the development to collect and direct stormwater run-off away from the landfill footprint;
- Reduce leachate generation;
- Implement an appropriate surface water management plan to improve surface water quality leaving the Site and reduce the potential for surface water run-on; and
- Expand the existing LFG collection system to reduce GHG emissions and support the future development of a LFG utilization project.

5.3 Footprint and Buffer Zones

The proposed final landfill footprint for Cell 1 (illustrated on Figure 5.1) will remain consistent with the current landfill footprint, with a total area of 20.8 hectares. Therefore, the proposed buffer zones will also remain unchanged. As per the recommendations outlined in the Draft Hydrogeological Data Gap Analysis for the Foothills Boulevard Regional Landfill (Ecoplans Ltd., 2010), the limit of waste will not be increased for the purpose of supporting the continued ongoing development of Cell 1 as a natural attenuation cell.

The proposed final landfill footprint for Cell 2 (illustrated on Figure 5.1) will occupy an area of approximately 18 hectares and will be developed as an engineered, composite lined cell. The proposed buffer zones for Cell 2 (relative to the property boundary) range from approximately 135 to 450 metres in the east, 335 to 400 metres in the south, 150 metres in the west, and 85 metres in the north.

5.4 Cell 1 Development Sequence

The following section provides a narrative description of the development sequence for Cell 1 illustrated in Drawings D-03 to D-18. The contours for each stage are representative of the landform at the end of that stage (i.e., Stage A shows the contours once landfilling in the south end of Cell 1 is complete).

It is important to note that the development sequence includes landfilling both below and above ground surface. Landfilling below ground surface will be completed using the trench method of landfilling. Landfilling above ground surface will be completed using the area method of landfilling.

5.4.1 Stage A

The proposed Stage A contours and works are presented on Drawing D-03. The objectives of this stage of the development sequence are as follows:

- Relocate the southern access road to permit landfilling up to the southern extent of the limit of waste;
- Divert as much surface water as possible away from the open cell during landfilling;
- Promote positive drainage off of the landfill;
- Establish surface water controls to convey surface water run-off away from the landfill footprint; and
- Optimize LFG collection.

These objectives will be achieved by implementing the following:

- Landfilling will take place in the southern portion of the landfill to bring this area up to existing landfill grades;
- Install interim cover on portions of the landfill;
- Install leachate interceptor to inhibit surface water/snow melt from infiltrating beneath existing final cover area;
- Construct temporary haul road to provide access to filling area;
- Construct a new section of gravel access road along the south perimeter of the landfill;
- Construct perimeter surface watercourse along the south perimeter of the landfill;
- Construct southwest surface water management pond;
- Extend LFG header along the south perimeter of the landfill;

- Install LFG condensate trap #3 and associated condensate force main; and
- Install temporary LFG vertical extraction wells and sub-headers for the collection of LFG from the central portion of the landfill.

In conclusion, this stage will:

- Provide 103,400 cubic metres of air space;
- Accept 70,300 tonnes of waste; and
- Require approximately 11,500 cubic metres of daily cover.

In addition, construction of Stage A will require the following:

- Construction of 460 linear metres of surface watercourse;
- Installation of a 10 linear metre culvert;
- Construction of southwest stormwater management pond;
- Installation of 370 linear metres of leachate interceptor;
- Construction of 30,000 cubic metres of interim cover;
- Construction of 525 linear metres of gravel access road;
- Construction of 125 linear metres of gravel haul road;
- Installation of 490 linear metres of LFG header;
- Installation of a LFG condensate trap;
- Installation of 840 linear metres of condensate trap force main;
- Installation of 590 linear metres of LFG laterals; and
- Installation of 9 LFG vertical extraction wells.

5.4.2 Stage B

The proposed Stage B contours and works are presented on Drawing D-04. The objectives of this stage of the development sequence are as follows:

- Continue filling the southern portion of the landfill;
- Promote positive drainage off the landfill;
- Establish surface water controls to convey surface water run-off away from the landfill footprint; and
- Optimize LFG collection.

These objectives will be achieved by implementing the following:

- Landfilling will take place in the southern portion of the landfill;
- Waste will be landfilled in order to construct a slope of approximately 2 percent to the south;
- Extend temporary haul road;

- Construct new sections of gravel access road along the western perimeter of the landfill;
- Construct perimeter surface watercourse along the western perimeter of the landfill;
- Extend LFG header along the western perimeter of the landfill; and
- Install LFG horizontal extraction trench.

In conclusion, this stage will:

- Provide 187,300 cubic metres of air space;
- Accept 127,360 tonnes of waste; and
- Require approximately 20,800 cubic metres of daily cover.

In addition, construction of Stage B will require the following:

- Construction of 275 linear metres of surface watercourse;
- Construction of 270 linear metres of gravel access road;
- Construction of 30 linear metres of gravel haul road;
- Installation of 280 linear metres of LFG header; and
- Installation of 145 linear metres of LFG horizontal extraction wells.

5.4.3 Stage C

The proposed Stage C contours and works are presented on Drawing D-05. The objectives of this stage of the development sequence are as follows:

- Continue filling the southern portion of the landfill;
- Promote positive drainage off the landfill;
- Relocate scale facilities and public tipping area to the north;
- Expand compost area; and
- Maximize LFG collection.

These objectives will be achieved by implementing the following:

- Landfilling will take place in the southern portion of the landfill;
- Waste will be landfilled in order to construct a slope of approximately 2 percent to the south;
- Scale facilities, public tipping area, and asphalt compost area will be relocated north of the existing landfill;
- Build berm and access road along the northern perimeter of the landfill;
- Construct perimeter surface watercourse along the northern perimeter of the landfill;
- Extend temporary haul road;

- Build haul road from landfill to new scale facility;
- Extend LFG header along the northern perimeter of the landfill; and
- Install LFG horizontal extraction trench.

In conclusion, this stage will:

- Provide 167,200 cubic metres of air space;
- Accept 113,700 tonnes of waste; and
- Require approximately 18,575 cubic metres of daily cover.

In addition, construction of Stage C will require the following:

- Construction of 60 linear metres of surface watercourse;
- Installation of a 10 linear metre culvert;
- Construction of 200 linear metres of asphalt road;
- Construction of 20,000 square metre asphalt compost area;
- Construction of 3,775-square metre asphalt public tipping area;
- Construction of 390 linear metres of gravel access road and berm;
- Construction of 380 linear metres of gravel haul road;
- Installation of 590 linear metres of LFG header; and
- Installation of 400 linear metres of LFG horizontal extraction wells.

5.4.4 Stage D

The proposed Stage D contours and works are presented on Drawing D-06. The objectives of this stage of the development sequence are as follows:

- Fill the northern portion of the landfill;
- Divert as much surface water as possible away from the open cell during landfilling;
- Promote positive drainage off the landfill;
- Establish surface water controls to convey surface water run-off away from the landfill footprint;
- Reduce leachate generation;
- Maximize LFG collection; and
- Stabilize north side slope of southeast stormwater management pond.

These objectives will be achieved by implementing the following:

- Landfilling will take place in the northern portion of the landfill;
- Waste will be landfilled in order to construct a slope of approximately 2 percent to the north;

- Construct perimeter surface watercourse along the western perimeter of the landfill;
- Installation of condensate forcemain and decommissioning of leachate recirculation galleries;
- Progressive closure;
- Installation of stormwater gravity main;
- Install LFG horizontal extraction trench.

In conclusion, this stage will:

- Provide 127,000 cubic metres of air space;
- Accept 86,360 tonnes of waste; and
- Require approximately 14,100 cubic metres of daily cover.

In addition, construction of Stage D will require the following:

- Construction of 310 linear metres of surface watercourse;
- Installation of 850 linear metres of leachate force main;
- Installation of 135 linear metres of stormwater gravity main;
- Installation of 335 linear metres of LFG horizontal extraction wells; and
- Installation of 27,285 linear metres of final cover.

5.4.5 Stage E

The proposed Stage E contours and works are presented on Drawing D-07. The objectives of this stage of the development sequence are as follows:

- Fill the northern portion of the landfill;
- Promote positive drainage off the landfill; and
- Establish surface water controls to convey surface water run-off away from the landfill footprint.

These objectives will be achieved by implementing the following:

- Landfilling will take place in the northern portion of the landfill;
- Waste will be landfilled in order to construct a slope of approximately 2 percent to the north;
- Extend existing haul road; and
- Construct surface watercourse along the landfill haul road.

In conclusion, this stage will:

- Provide 160,100 cubic metres of air space;
- Accept 108,870 tonnes of waste; and
- Require approximately 17,790 cubic metres of daily cover.

In addition, construction of Stage E will require the following:

- Construction of 130 linear metres of surface watercourse; and
- Construction of 70 linear metres of gravel haul road.

5.4.6 Stage F

The proposed Stage F contours and works are presented on Drawing D-08. The objectives of this stage of the development sequence are as follows:

- Fill the southern portion of the landfill; and
- Promote positive drainage off the landfill.

These objectives will be achieved by implementing the following:

- Landfilling will take place in the southern portion of the landfill;
- Waste will be landfilled in order to construct a slope of approximately 2 percent to the south; and
- Build temporary haul road.

In conclusion, this stage will:

- Provide 250,500 cubic metres of air space;
- Accept 170,340 tonnes of waste; and
- Require approximately 27,830 cubic metres of daily cover.

In addition, construction of Stage F will require the construction of 160 linear metres of gravel haul road.

5.4.7 Stage G

The proposed Stage G contours and works are presented on Drawing D-9. The objectives of this stage of the development sequence are as follows:

- Fill the northern portion of the landfill;
- Promote positive drainage off the landfill; and
- Establish surface water controls to convey surface water run-off away from the landfill footprint.

These objectives will be achieved by implementing the following:

- Landfilling will take place in the northern portion of the landfill;
- Waste will be landfilled in order to construct a slope of approximately 2 percent to the north;
- Extend existing haul road; and
- Construct surface watercourse along the landfill haul road.

In conclusion, this stage will:

- Provide 103,900 cubic metres of air space;
- Accept 70,650 tonnes of waste; and
- Require approximately 11,540 cubic metres of daily cover.

In addition, construction of Stage G will require:

- Decommission 8 LFG vertical extraction wells;
- Decommission 555 linear metres of LFG lateral;
- Construction of 50 linear metres of surface watercourse; and
- Construction of 70 linear metres of gravel haul road.

5.4.8 Stage H

The proposed Stage H contours and works are presented on Drawing D-10. The objectives of this stage of the development sequence are as follows:

- Fill the southern portion of the landfill;
- Promote positive drainage off the landfill;
- Establish surface water controls to convey surface water run-off away from the landfill footprint;
- Reduce leachate generation via progressive closure; and
- Optimize LFG collection.

These objectives will be achieved by implementing the following:

- Landfilling will take place in the southern portion of the landfill;
- Waste will be landfilled in order to construct a slope of approximately 2 percent to the south;
- Extend existing haul road;
- Construct surface watercourse along the landfill haul road;
- Progressive closure; and
- Install LFG vertical extraction wells.

In conclusion, this stage will:

- Provide 234,600 cubic metres of air space;
- Accept 159,530 tonnes of waste; and
- Require approximately 26,070 cubic metres of daily cover.

In addition, construction of Stage H will require the following:

- Decommission one LFG vertical extraction well;
- Decommission 60 linear metres of LFG lateral;
- Construction of 80 linear metres of surface watercourse;

- Construction of 90 linear metres of gravel haul road;
- Installation of 185 linear metres of LFG lateral;
- Installation of 4 LFG vertical extraction wells; and
- Installation of 43,135 square metres of final cover.

5.4.9 Stage I

The proposed Stage I contours and works are presented on Drawing D-11. The objectives of this stage of the development sequence are as follows:

- Fill the northern portion of the landfill;
- Promote positive drainage off the landfill;
- Establish surface water controls to convey surface water run-off away from the landfill footprint; and
- Optimize LFG collection.

These objectives will be achieved by implementing the following:

- Landfilling will take place in the northern portion of the landfill;
- Waste will be landfilled in order to construct a slope of approximately 2 percent to the north; and
- Construct surface watercourse along the landfill haul road; and
- Install LFG horizontal extraction trenches.

In conclusion, this stage will:

- Provide 91,500 cubic metres of air space;
- Accept 62,220 tonnes of waste; and
- Require approximately 10,170 cubic metres of daily cover.

In addition, construction of Stage I will require

- Construction of 80 linear metres of surface watercourse;
- Installation of 365 linear metres of LFG sub-header; and
- Installation of 580 linear metres of LFG horizontal extraction trenches.

5.4.10 Stage J

The proposed Stage J contours and works are presented on Drawing D-12. The objectives of this stage of the development sequence are as follows:

- Fill the southern portion of the landfill;
- Promote positive drainage off the landfill; and
- Establish surface water controls to convey surface water run-off away from the landfill footprint.

These objectives will be achieved by implementing the following:

- Landfilling will take place in the southern portion of the landfill;
- Waste will be landfilled in order to construct a slope of approximately 2 percent to the south;
- Extend existing haul road; and
- Construct surface watercourse along the landfill haul road.

In conclusion, this stage will:

- Provide 160,300 cubic metres of air space;
- Accept 109,000 tonnes of waste;
- Require approximately 17,810 cubic metres of daily cover.

In addition, construction of Stage J will require the following:

- Construction of 65 linear metres of surface watercourse; and
- Construction of 75 linear metres of gravel haul road.

5.4.11 Stage K

The proposed Stage K contours and works are presented on Drawing D-13. The objectives of this stage of the development sequence are as follows:

- Fill the northern portion of the landfill; and
- Promote positive drainage off the landfill.

These objectives will be achieved by implementing the following:

- Landfilling will take place in the northern portion of the landfill; and
- Waste will be landfilled in order to construct a slope of approximately 2 percent to the north.

In conclusion, this stage will:

- Provide 153,200 cubic metres of air space;
- Accept 104,175 tonnes of waste; and
- Require approximately 17,020 cubic metres of daily cover.

5.4.12 Stage L

The proposed Stage L contours and works are presented on Drawing D-14. The objectives of this stage of the development sequence are as follows:

- Fill the central portion of the landfill;
- Promote positive drainage off the landfill; and
- Establish surface water controls to convey surface water run-off away from the landfill footprint.

These objectives will be achieved by implementing the following:

- Landfilling will take place in the central portion of the landfill;
- Waste will be landfilled in order to construct a slope of approximately 2 percent to the north and south;
- Extend existing haul road; and
- Construct surface watercourse along the landfill haul road.

In conclusion, this stage will:

- Provide 173,250 cubic metres of air space;
- Accept 117,810 tonnes of waste; and
- Require approximately 19,250 cubic metres of daily cover.

In addition, construction of Stage L will require:

- Construction of 85 linear metres of surface watercourse; and
- Construction of 85 linear metres of gravel haul road.

5.4.13 Stage M

The proposed Stage M contours and works are presented on Drawing D-15. The objectives of this stage of the development sequence are as follows:

- Fill the central portion of the landfill;
- Promote positive drainage off the landfill;
- Establish surface water controls to convey surface water run-off away from the landfill footprint;
- Reduce leachate infiltration via progressive closure; and
- Optimize LFG collection.

These objectives will be achieved by implementing the following:

- Landfilling will take place in the central portion of the landfill;
- Waste will be landfilled in order to construct a slope of approximately 2 percent to the north and south;
- Extend existing haul road;
- Construct surface watercourse along the landfill haul road;
- Progressive closure; and
- Install LFG vertical extraction wells.

In conclusion, this stage will:

- Provide 90,000 cubic metres of air space;
- Accept 61,200 tonnes of waste; and

- Require approximately 10,000 cubic metres of daily cover.

In addition, construction of Stage M will require:

- Construction of 85 linear metres of surface watercourse;
- Construction of 85 linear metres of gravel haul road;
- Installation of 460 linear metres of LFG sub-header;
- Installation of 700 linear metres of LFG lateral;
- Installation of 19 LFG vertical extraction wells; and
- Installation of 52,720 square metres of final cover.

5.4.14 Stage N

The proposed Stage N contours and works are presented on Drawing D-16. The objectives of this stage of the development sequence are as follows:

- Fill the central portion of the landfill;
- Promote positive drainage off the landfill; and
- Establish surface water controls to convey surface water run-off away from the landfill footprint.

These objectives will be achieved by implementing the following:

- Landfilling will take place in the central portion of the landfill;
- Waste will be landfilled in order to construct a slope of approximately 2 percent to the north and south;
- Extend existing haul road; and
- Construct surface watercourse along the landfill haul road.

In conclusion, this stage will:

- Provide 32,900 cubic metres of air space;
- Accept 22,370 tonnes of waste; and
- Require approximately 3,650 cubic metres of daily cover.

In addition, construction of Stage N will require:

- Construction of 35 linear metres of surface watercourse; and
- Construction of 35 linear metres of gravel haul road.

5.4.15 Cell 1 Final Contours

The proposed Final Contours and works are presented on Drawings D-17 and D-18. This final development stage will require:

- Installation of 205 linear metre surface water down chute;
- Installation of 725 linear metres of LFG lateral;

- Installation of 10 LFG vertical extraction wells; and
- Installation of the remaining 25,075 square metres of final cover.

5.5 Cover

The following section provides an overview of the final cover design and design philosophy. Final cover will be completed on a progressive basis to fulfil the following objectives:

- Mitigation of environmental risk (i.e., leachate generation and fugitive LFG emissions);
- Support post-closure land use; and
- Reduce long-term maintenance costs.

The final cover design is based on the following key criteria:

- Reduce leachate generation in the unlined area of the landfill to mitigate potential off-site impacts;
- Reduce leachate generation in the lined area of the landfill to improve the performance of the leachate collection system; and
- Support the post-closure concept, which includes a variety of vegetation.

5.5.1 Final Cover

The proposed final cover is a composite final cover (Drawing D-21) composed of the following elements:

- Mixed vegetation;
- 300 millimetres organic soil;
- Non-woven geotextile;
- 150 millimetres gravel drainage layer;
- 600 millimetre low permeability (less than 10^{-4} cm/sec) barrier soil;
- Non-woven geotextile;
- Geosynthetic Liner;
- Non-woven geotextile; and
- 300 millimetre sand foundation layer.

The final cover was designed to both reduce leachate generation in the landfill and to reduce the potential for off-site impacts.

5.5.2 Daily Cover

Alternative daily cover (i.e., tarps) will be used on a daily basis, weather permitting, with 0.15 metres of soil being used for daily cover once a week.

Soil for daily cover should be granular and free draining in order to ensure a hydraulic connection throughout the waste mass (on-site native soil is considered appropriate for use as daily cover). Daily cover soil may be mixed with wood chips at a ratio of 60 percent soil to 40 percent wood chips on a volumetric basis.

Alternatively, finer grained, non-cohesive material could be utilized for daily cover with the provision that it is removed or scarified prior to placement of additional lifts of waste.

The efficient use of daily cover can result in an optimal waste to daily cover soil ratio of eight to one volume based on the use of soil one day per week and an alternative cover for the remainder of the week.

5.5.3 Interim Cover

Interim cover is constructed by placing an additional 0.15 metres of soil on areas that have already received 0.15 metres of daily cover. This provides 0.30 metres of soil to constitute interim cover for areas of the landfill that will be inactive for extended periods of time. The efficient operation of the Site will include the recovery (excavation and reuse) of the top 0.15 metres of the interim cover soil. The recovered interim cover soil will be used for daily cover or future interim cover. Therefore, the interim cover soil volume does not constitute a demand in the soil balance calculations.

6. VOLUME AND SITE LIFE

6.1 Air Space

Based on the existing Site conditions presented on Figure 1.3 and the proposed final contours presented on Figure 5.1, the total remaining landfill capacity (airspace) is estimated to be 2 million cubic metres (excluding final cover) for Cell 1 as of August 2009, and 4.5 million cubic metres (excluding final cover) for Cell 2.

The Site life calculations presented herein are based on the following parameters:

- Apparent waste density of 0.68 tonnes of waste per cubic metre of airspace; and
- A waste to daily cover ratio of 8:1.

Based on the design concept, fill plan, and density parameters presented herein, a development summary for Cell 1 is presented in Table 6.1.

6.2 Soil Balance

A summary of the final cover soil requirements for Cell 1 or soil balance is provided in Table 6.2. The soil required includes daily, interim, and final cover.

6.3 Design Site Life

Future waste tonnages for the Site were estimated based upon the 2008 waste deposition rate of 88,368 tonnes, an apparent waste density of 0.68 tonnes per cubic metre, a 0.08 percent increase in waste generation per year, and a waste to daily cover ratio of 8:1. Based on these assumptions, Cell 1 is estimated to reach design capacity in 2025 and Cell 2 is estimated to reach design capacity in 2042. An airspace consumption summary and annual airspace consumption estimate for Cell 1 are presented in Tables 6.3 and 6.4, respectively.

The remaining capacity and estimated site life should be reviewed annually as part of the annual Operations and Monitoring Report described in Section 12.4.

7. SURFACE WATER MANAGEMENT

7.1 Objectives

The goal of surface water management is to minimize the impact of the landfill on the downstream environment, while preserving the hydrologic cycle. These complimentary objectives can be achieved by taking into account the following design considerations:

- Development of surface water management works to control both the quality and quantity of surface water run-off;
- Control surface water run-off to minimize flow into the active disposal area in order to minimize surface water contacting waste; and
- Minimize the potential for on-site erosion and sediment loading to the downstream receiving watercourses.

Primary objectives of the surface water management plan are as follows:

- Retain small rainfall events, which account for the majority of the total precipitation occurring at the Site;
- Detain intermediate precipitation events and release to watercourses at a controlled rate; and
- Convey extreme precipitation events safely downstream without damaging on-site infrastructure.

7.2 Hydrologic Model

The following section presents the results of the hydrologic modelling undertaken to prepare the Plan. The purpose of this modelling was to ensure the above stated objectives were met, and that the Site infrastructure is properly sized to mitigate potential environmental impacts resulting from severe storm events.

7.2.1 Climatic Data

The Environment Canada rainfall intensity-duration-frequency (IDF) data set (Prince George Airport, British Columbia), presented in Appendix C, was used as the basis for the hydrological analysis presented herein.

7.2.2 Model Results

An analysis of the existing and post development surface water run-off flow rates and total run-off volumes was undertaken utilizing the Hydraulic Engineering Centre – Hydraulic Modelling System (HEC-HMS). The sub-catchments for the existing and post-development site conditions are presented on Figures 7.1 and 7.2, respectively. The summary of the results of this analysis are presented in Table 7.1. The detailed analytical results are included in Appendix B.

7.3 Existing Drainage

Existing surface water drainage systems are based upon the following primary flow paths (Figure 1.3):

- Run-off from the eastern portion of the landfill flows to the east via a combination of on-site ditches and overland flow. The water is then conveyed to the south by a culvert to the low lying area located south of the weigh scales (southeast stormwater management pond);
- Run-off from the remaining portion of the landfill flows to the landfill limit of waste via a combination of on-site ditches, culverts, and overland flow. Water is conveyed to low lying areas located outside of the landfill limit waste by use of culverts;
- Run-off from the paved public tipping area is directed to a catch basin located northwest of the scale house. A stormwater pipe carries the run-off to the low lying area located north of the entrance to the Site (southeast run-off retention pond); and
- Run-off from the asphalt compost area is directed to a lagoon situated west of the landfill gas flare station. An overflow "wetland" area is located north of the lagoon.

7.4 Post-Development Drainage

Post development surface water management is based on the following primary flow paths:

- Run-off from the eastern portion of Cell 1 will be diverted toward the southeast run-off retention pond via a stormwater gravity main;
- Run-off from the western portion of Cell 1 is diverted to the southwest stormwater management pond situated at the southwest corner of the landfill;
- Run-off from asphalt pad located in the southeast corner of the site continues to be diverted to southeast run-off retention pond;
- Run-off from Cell 2 is diverted to a stormwater management pond situated west of Cell 2; and
- Run-off from the two asphalt compost areas is directed to the cell 2 leachate pump station, and is directed to the municipal sanitary system via a force main.

The proposed pond locations are shown on Figure 5.1. The ponds are designed to provide sufficient volume to retain the 1:25 year precipitation event and will include an emergency spillway for the 1:100 year storm event.

8. LEACHATE MANAGEMENT

8.1 Objectives

The objectives of leachate management are to minimize the impact of landfill operations on the environment (e.g., groundwater and surface water courses) and improve the performance of environmental controls. These objectives can be achieved by taking into account the following design considerations:

- Minimize off-site migration of leachate;
- Minimize the amount of water percolating/infiltrating into the waste mass; and
- Ensure that the leachate collection system provides an adequate barrier between the waste mass and surrounding environment.

8.2 Leachate Overview

Leachate is defined by the BC MOE as any liquid which has percolated through or drained from a municipal solid waste disposal facility (BC MOE, 1996). The generation of leachate is dependent on a number of factors including the amount of precipitation, the landfill area footprint, degree of saturation of the waste mass, and the various stages of landfill development (e.g., areas within the landfill footprint covered with daily cover, interim cover, and final cover and their respective grades).

In order to estimate the amount of annual precipitation at the Site, meteorological data for the region was obtained from Environment Canada. As indicated in Section 3.8 and Table 3.1, the total annual precipitation in the vicinity of the Site is approximately 600.8 millimetres.

It is generally assumed that all precipitation, which infiltrates through the landfill cover, will constitute leachate once the Site has reached field capacity. Municipal solid waste, when it arrives at the Site, generally contains 25 percent or greater moisture by weight. Consequently, landfilled waste can generally store additional moisture up to its field capacity, which is approximately 50 percent moisture by weight (McBean et al, 1995). The field capacity is the moisture content beyond which any increases in moisture content will result in leachate generation. As a result, newly landfilled waste provides a large potential storage volume, resulting in delayed leachate generation.

8.2.1 Leachate Quality

The mass of waste stored in a landfill represents a finite source of pollutants, with the mass of pollutants available for leaching being largely a function of the physio-chemical nature of the waste, the extent of waste stabilization, and the volume of infiltration into the landfill (Lu et al., 1984).

Factors affecting the composition of leachate include the following (McBean et al., 1995):

- Solid waste composition;

- Age of waste;
- Landfill operations;
- Climate and hydrogeological conditions; and
- Conditions within the waste mass (e.g., moisture content, temperature, and pH).

Due to the fact that these factors vary significantly from cell to cell in a landfill, leachate characteristics can vary significantly.

Landfill leachate is typically composed of a number of elements, which generally include the following constituent elements:

- Organics;
- Nitrogen;
- Chlorides;
- Phosphates;
- Metals (e.g., iron, sodium, potassium, calcium, manganese and zinc); and
- Dissolved solids.

8.2.2 Indicator Parameters

A number of leachate parameters can be used as indicators of leachate derived impacts associated with municipal landfills. Chemical constituents transported in landfill leachate are attenuated by numerous processes including dilution, dispersion, sorption, ion exchange, and biological degradation.

An indicator parameter of municipal waste derived impacts should ideally be a chemical which is subject to minimal affects attributed to attenuation so that it can signal the early migration of a leachate plume (i.e., a conservative chemical parameter). Chloride, an inorganic ion, is a preferred indicator parameter as it is typically present in landfill leachate at elevated concentrations and is attenuated only by dilution and dispersion.

8.3 Leachate Generation

Leachate generation is calculated using a water balance model which is a numerical modelling technique for estimating percolation through the cover system (e.g., daily, intermediate, and final cover systems). The water balance model tracks moisture inputs (i.e., precipitation), soil moisture storage, moisture outputs and landfill surface factors which influence leachate generation (i.e., percolation).

The leachate generation potential was calculated for the existing conditions and the final contours of the development plan using the Hydrological Evaluation of Landfill Performance (HELP) Model (USACE, 1997). The results of this analysis are summarized in Tables 8.1 and 8.2. Data output from the HELP model runs are included as Appendix C.

It should be noted that the estimates of infiltration generated by the HELP model are generally conservative, due to the fact that the model assumes that the site has reached field capacity and the full amount of infiltration through the cover will generate leachate. These conservative estimates are used to ensure that the design of engineered controls is completed using maximum anticipated leachate generation rates.

As indicated in Table 8.1, areas of the landfill which are completed with daily or interim cover are anticipated to generate an annual leachate volume of approximately 52 millimetres of infiltration.

Areas of the landfill completed with the existing and proposed final covers are anticipated to generate an annual leachate volume corresponding to between approximately 1 and 12 millimetres of infiltration over the area of final cover.

As shown in Table 8.2, the annual estimate volume of leachate generated under current conditions is approximately 10,400 cubic metres. This total will decrease to approximately 440 cubic metres per year upon closure of Cell 1, with 153 cubic metres conveyed to the environment and 286 cubic metres conveyed to the municipal sanitary sewer system.

8.4 Proposed Leachate Management Strategy

The proposed leachate management strategy involves the continued collection of leachate from the eastern portion of the landfill. In the short term, a leachate interceptor and ditching will be installed along the western extent of the existing final cover area (Drawing D-03) to prevent surface water run-off from infiltrating beneath the final cover system. This will reduce leachate generation and mounding within the eastern portion of the landfill.

As part of filling Stage D, the leachate recirculation system will be decommissioned, and a force main installed to convey leachate to the municipal sanitary system located in the Hart Highlands residential area (Drawing D-06).

As indicated above, the quantity of leachate generated from Cell 1 will decrease as the development sequence progresses, as a result of the progressive closure of the landfill.

The proposed leachate management strategy for Cell 2 includes six lined cells with interconnected sumps. Leachate from these sumps will drain to the east to the main sump which will include a leachate pumping station. Leachate will be pumped via a force main to the municipal sanitary system.

8.5 Leachate Seepage

In the event that seepage is identified, the site operations staff will immediately undertake remedial measures to contain the seepage, to prevent impacts to surface watercourses, and repair the cover (e.g., final, interim, or daily cover) in the area where seepage is observed.

In the event that leachate seepage has impacted surface watercourses, temporary controls, such as berming, should be implemented to prevent the migration of impacted surface water downstream. Where possible, the impacted surface water should be redirected into the active landfill area.

If the leachate seepage is deemed by operations staff to be substantial or chronic, prior to repairing the cover system, a vertical stone drain should be installed immediately up-gradient of the seep. This vertical stone drain is constructed by excavating through the uppermost lift of waste and the underlying soil (e.g., fire break or interim cover layer), to the underlying waste. This will provide a hydraulic connection to lower lifts of waste and allow the perched leachate to dissipate and prevent further seepage. The excavation is then backfilled with course stone to ensure the hydraulic connection to underlying waste is maintained upon completion of remediation measures. The cover is then restored with using un-impacted soil and regraded to pre-seepage contours. A detail for repair of leachate seeps is provided on Drawing D-23.

9. LANDFILL GAS MANAGEMENT

9.1 Objectives

The objectives of LFG management are to reduce fugitive emissions, control odour, mitigate potential subsurface lateral migration, and reduce GHG emissions to the atmosphere.

9.2 Overview

LFG is composed of approximately 50 percent methane and 50 percent carbon dioxide (volumetric basis) and is produced in the landfill environment as a result of the biological decomposition of organic waste material. In addition, LFG is composed of trace gases, which may include nitrogen, oxygen, hydrogen sulphide, disulphides, mercaptans, and various volatile organic compounds (VOCs).

Municipal solid waste is composed of both organic and inorganic matter. The organic component of municipal solid waste is reported to contain approximately 40 to 50 percent cellulose, 10 to 15 percent lignin, 12 percent hemicellulose, and 4 percent protein (Booker and Ham, 1982), with cellulose and hemicellulose being readily biodegradable.

LFG is produced by bacterial decomposition, which occurs when organic waste is broken down by bacteria naturally present in the waste and in the soil used as daily, interim, and final cover. Organic wastes include food, garden waste, street sweepings, textiles, and wood and paper products. Bacteria decompose organic waste in the following four stages, as illustrated in Figure 9.1 (US EPA, 1998):

1. Aerobic, Non-Methanogenic;
2. Anoxic, Non-Methanogenic;
3. Anaerobic, Methanogenic, Unsteady; and
4. Anaerobic, Methanogenic, Steady.

The aerobic, non-methanogenic stage occurs at the time of waste placement with air entrained in the void spaces. The duration of this phase is short due to the limited air supply. The anoxic non-methanogenic phase results in an increase in carbon dioxide generation due to acid fermentation with hydrogen gas also being generated; however, it is generally consumed during the methanogenic stage. The anaerobic unsteady methanogenic phase marks the commencement of methane production in the waste mass with declining carbon dioxide production. The anaerobic steady methanogenic stage represents steady state methane and carbon dioxide production. Subsequent to the anaerobic steady methanogenic stage, methane and carbon dioxide production declines as the supply of organics in the waste mass is depleted.

It is noted that nitrogen and hydrogen sulphide may also be produced during the anaerobic decomposition phase with nitrogen being generated from the microbial process of denitrification and hydrogen sulphide being produced by sulphate reducing micro-organisms.

9.2.1 Conditions Affecting Landfill Gas Generation

The rate of LFG generation is a function of several key physical and environmental factors which include the following:

- Waste composition;
- Age of waste;
- Moisture content;
- pH;
- Temperature; and
- Nutrients.

Waste Composition:

The quantity of LFG generated per tonne of waste is a function of the quantity and quality of organic matter present in a landfill.

Age of Waste:

Generally, more recently buried waste produces more LFG through bacterial decomposition than does older waste.

Moisture Content:

The presence of moisture in a landfill increases gas production by encouraging bacterial decomposition. Moisture provides the aqueous environment necessary for anaerobic LFG production, as well as serving as a medium for the transportation of nutrients and bacteria.

pH:

The optimal pH for methanogenic bacteria is in the range of 6.7 to 7.5.

Temperature:

The anaerobic decomposition process, which occurs in the waste mass, is an exothermic process resulting in the elevation of temperatures. As the landfill's temperature rises, bacterial activity increases, resulting in increased gas production. Increased temperature may also increase rates of volatilization and chemical reactions. LFG temperature typically ranges from 30°C to 60˚C.

Nutrients:

Bacteria in the waste mass require nutrients for development. The nutrients are primarily carbon, hydrogen, oxygen, nitrogen, and phosphorus. In general, the greater the quantity of nutrients, the greater the rate of gas generation.

9.2.2 Landfill Gas Characteristics

The following section provides an overview of the general characteristics of LFG as they pertain to the implementation of an LFG management and general health and safety issues. In general, these relevant characteristics are as follows (UK

Environment Agency, 2002): density, solubility, flammability, asphyxiation, toxicity, corrosion, odour, ecotoxicity, and greenhouse gas emissions.

Density

The density of landfill gas is highly variable as a function of composition. The two dominant constituent elements of LFG (methane and carbon dioxide) have specific densities of approximately 0.72 kg/m^3 and 1.98 kg/m^3, respectively. Hence, depending upon the gas composition, LFG can either be lighter or heavier than air. As a result, LFG can accumulate in either low lying regions (e.g., utility vault boxes) or high regions (e.g., building roof peaks and attics).

It is further noted that gas stratification can occur under stagnant conditions, such as that present in monitoring wells or soil gas probes. This propensity for gas stratification, with methane accumulating at the top of a sealed enclosure must be taken into account when developing LFG monitoring protocols.

Solubility

The constituent elements of LFG can dissolve in aqueous solutions to varying degrees. Methane is only slightly soluble in water while carbon dioxide is significantly more soluble. As a result, LFG lateral migration generally only occurs in the vadose, above the groundwater table, with groundwater acting as a relatively impermeable barrier to the migration of methane.

Flammability

A primary constituent of LFG is methane which is a highly flammable gas. Methane gas is explosive in air at concentrations ranging from 5 percent on a volumetric basis (lower explosive limit or LEL) and 15 percent on a volumetric basis (upper explosive limit or UEL). The minimum oxygen content that is required for methane ignition is approximately 14 percent on a volumetric basis.

Asphyxiation

The accumulation of LFG in enclosed, confined spaces, or low lying regions with poor circulation (i.e. excavation trenches) can pose a risk to human health and safety due to the potential for asphyxia. This condition can result from the displacement of oxygen by LFG when its composition results in a gas which is denser than air.

Toxicity

Some constituents of LFG (both major and trace elements) can result in acute toxicity if exposure occurs at adequately high concentrations. These constituents include, but are not necessarily limited to, carbon dioxide, hydrogen sulphide, and vinyl chloride. It is noted that the trace elements typically do not represent a health hazard when LFG is diluted in the atmosphere (UK Environment Agency, 2002). However, carbon dioxide can have adverse physiological effects in concentrations exceeding 2 percent.

Corrosion

Some elements of LFG have the potential to cause corrosion. This potential should be taken into account when designing and specifying equipment and infrastructure at

landfill sites. As indicated above, carbon dioxide is soluble in water and can form carbonic acid.

Odour

Trace elements present in LFG are responsible for some of the odours associated with landfill operations. LFG odours are primarily caused by hydrogen sulphide and mercaptan (thiol) compounds, which are present in trace quantities in LFG. These compounds may be detected by sense of smell at very low concentrations (0.005 and 0.001 parts per million, respectively).

Ecotoxicity

The lateral sub-surface migration of LFG can cause damage to vegetation and crop die-back (chlorosis) due to the displacement of oxygen in the soil and the resultant oxygen deprivation of the plant roots. Deterioration of vegetation on or near landfills may present both aesthetic and practical issues. In areas of the landfill cover system where vegetation is stressed or diminished, erosion may occur. This may result in a "cascade" effect, due to increased percolation through the cover system (resulting from decreased evapotranspiration), and increased moisture content in the waste mass, resulting in increased LFG emissions.

Greenhouse Gas Emissions

Carbon dioxide and methane have been identified as greenhouse gases which permit solar radiation to pass through the atmosphere while absorbing part of the infrared radiation that is reflected back from the Earth's surface. Methane is a potent GHG, which has 21 times the global warming potential of carbon dioxide. LFG represents more than 20 percent of Canada's anthropogenic methane production and is, therefore, a significant contributor to total GHG emissions.

9.2.3 Landfill Design Factors

Landfill design can have a significant affect with respect to the potential impacts of LFG generation within the waste mass. Key factors that affect the nature of LFG related impacts are as follows:

- Site configuration;
- Cover system; and
- Daily operations.

The spatial orientation/configuration of a landfill may be a significant factor associated with potential LFG impacts. Landfills developed above-ground may have increased potential for fugitive air emission impacts (i.e. odour), while sites located primarily below the ground surface may have a greater propensity for subsurface related impacts (i.e. lateral soil gas migration).

Landfill cover systems can also have a significant affect associated with LFG fugitive emission due primarily to the cover permeability, which impacts both the ability of moisture to percolate into the waste mass and for LFG to migrate to the atmosphere.

A relatively permeable cover system, composed of non-cohesive soil (i.e. sands and silty sands), promotes percolation of precipitation through the cover system and into the waste mass. This increased moisture content in the waste mass may result in increased LFG production rates, while reducing the overall duration of LFG generation. Permeable final cover systems also permit passive venting of LFG to the atmosphere which can result in lower gas pressures within the waste mass, thereby reducing the potential for lateral migration.

Relatively impermeable cover systems composed of cohesive soil (i.e. clay) or geosynthetic/geocomposite cover systems hinder the percolation of precipitation into the waste mass. The resultant decreased moisture content in the waste mass can result in lower LFG production rates while increasing the duration of LFG generation. Inversely to permeable cover systems, low permeability systems will typically reduce fugitive emissions to the atmosphere while increasing gas pressures within the waste mass. As a result, low permeability covers have a greater propensity for lateral migration.

9.2.4 Non-methane Organic Compounds

Non-methane organic compounds (NMOCs) are produced in the waste mass by volatilization or chemical processes and can include various organic hazardous air pollutants, greenhouse gases, and compounds associated with stratospheric ozone depletion. NMOCs can be created when certain wastes, particularly organic compounds, change from a liquid or a solid into a vapour (i.e. volatilization). In addition, NMOCs can be created by the reactions of certain chemicals present in waste.

VOCs are a form of NMOCs that include chemicals containing carbon and hydrogen atoms that can react to form other chemicals. VOCs are environmentally relevant due to their ability to react with nitrogen oxide in the presence of sunlight to form ozone.

NMOCs are relevant from a regulatory perspective as under the current British Columbia Landfill Criteria for Municipal Solid Waste (1993), NMOCs are utilized as a trigger mechanism to regulate LFG collection at MSW landfill sites. Those sites producing in excess of 150 tonnes per year of NMOCs are required to collect LFG.

9.3 LFG Production Assessment

The following section presents the site LFG production assessment based upon the development sequence outlined previously.

9.3.1 LFG Production Model

The LFG generation potential of the landfill was estimated using the LFG generation model prescribed in the landfill guidelines (BC MOE, 1996) and the Landfill Gas Generation Procedure Guidance Report (CRA, 2009). This model, commonly referred to as the Scholl Canyon model, is a first-order kinetic function which is the accepted industry standard model to evaluate LFG production and emission rates.

The Scholl Canyon model is used to estimate LFG production as a function of the following parameters:

- LFG generation constant (k);
- Methane generation potential (Lo); and
- Mass of waste (M).

Typical values of k range from 0.006 per year for dry sites to 0.1 per year for wet sites. Methane generation potential generally ranges from approximately 10 cubic metres to 350 cubic metres of methane per tonne of waste as a function of organic content.

The formula for the Scholl Canyon model can be expressed as follows:

$Q_T = \Sigma_{t=1,n} 2\ L_o\ k\ M_t\ e^{-kt}$

Where:

Q_T = total LFG emissions (50 percent CH_4 and 50 percent CO_2 by volume)

k = LFG generation constant ($year^{-1}$)

L_o = methane generation potential (m^3 CH_4 /tonne of waste)

M = mass of waste (tonnes) placed in year t

t = time in years

The NMOC generation rate is estimated utilizing the following formula:

$Q_{NMOC} = \Sigma_{t=1,n} 2\ L_o\ k\ M_t\ (e^{-kt})\ (C_{NMOC})\ (3.595*10^{-9})$

Where:

Q_{NMOC} = total emission rate of NMOCs (tonnes/year)

k = LFG generation constant ($year^{-1}$)

L_o = waste methane generation potential (m^3 CH_4 per tonne of waste)

M = mass of waste (tonnes)

t = time in years

C_{NMOC} = concentration of NMOCs reported as hexane (ppmv)

9.3.2 Model Input Parameters

The historic tonnages for waste landfilled at the Site were obtained from Golder Associates Ltd. (2008) report entitled "Report on Documentation Protocol GHG Emission Reductions." Future annual tonnages were estimated based upon an annual growth rate of 1.1 percent as per BC Stats.

For the purpose of meeting the requirements of the Landfill Gas Management Regulation (MOE, 2008), the LFG production assessment was undertaken in general accordance with the "Landfill Gas Generation Assessment Procedure Guidance Report" (CRA, 2009). As such, waste was divided into three categories (decomposable, relatively decomposable, and relatively inert materials) as per

Appendix A of the aforementioned guidance report. This waste composition breakdown, based upon the most recent waste characterization study (Technology Resources Inc., 2007) is summarized in Table 4.3. The methane generation potential (Lo) for each waste category is presented in Table 9.1. These values were selected in accordance with Section 5.2 of the published guidance document (CRA, 2009).

The landfill gas generation rate (k), for each waste category is presented in Table 9.1. These values, selected in accordance with Section 5.3 of the published guidance document (CRA, 2009), were selected based upon the following factors:

- Annual total precipitation of approximately 600 millimetres;
- Annual rainfall of approximately 419 millimetres;
- Historic reports of significant infiltration of snowpack into the waste mass;
- Significant depth of waste (greater than 20 metres in average); and
- Site predominantly covered with interim cover.

9.3.3 Results

The LFG production assessment presented herein is associated with the Cell 1 area only, based upon the following parameters:

- Waste tonnages summarized in Table 4.2;
- Consideration of only waste placed in the last 30 years as per the published guidelines (CRA, 2009);
- Model input parameters summarized in Table 9.1; and
- Cell One Closure in 2025.

The LFG generation model indicates that LFG is currently (2009) being produced in the range of approximately 1,431 cubic metres per hour. Peak LFG production is modelled to occur in 2026 (after final closure of the Site) with a peak generation rate of approximately 1,719 cubic metres per hour.

The peak NMOC emission rate was estimated to be less than 33 tonnes per year. This value is significantly lower than the 150 tonnes per year trigger value specified in the Landfill Criteria for Municipal Solid Waste (BC MOE, 1993) that would require the Site to incorporate a LFG collection system.

The peak methane emission rate was estimated to be approximately 4,941 tonnes per year. Current 2009 methane emissions are estimated to be approximately 4,111 tonnes per year. This value is above the 1,000 tonnes per year BC MOE Landfill Gas Regulation trigger value (BC MOE, 2008); however, the Site has incorporated a LFG collection system which will continue to expand with the growth of the landfill.

A summary of LFG production data is presented in Appendix D.

9.4 Landfill Gas Migration Assessment

9.4.1 Landfill Gas Migration Overview

As indicated above, LFG is composed primarily of carbon dioxide and methane. Although several properties of LFG can pose risk to human health and safety, the primary element of concern is methane, which is flammable in air from concentrations ranging from 5 percent (LEL) to 15 percent (UEL) on a volumetric basis.

LFG migration though soil voids and bedrock fractures is of potential concern when receptors are present (i.e. buildings, structures and utility corridors). Due to its relatively low solubility, groundwater acts as a barrier to LFG migration; as a result only unsaturated soil and bedrock are considered to be primary pathways for landfill gas migration. Consequently, a clear understanding of the geological and hydrogeological conditions present beneath and adjacent to the landfill is critical to evaluating LFG migration potential.

Three key factors which influence the migration of LFG away from the limits of waste are as follows:

- Advection;
- Diffusion; and
- Permeability.

LFG accumulates within the waste mass, resulting in a zone of high pressure (relative to atmospheric conditions). Differential pressure results in LFG migrating from areas of high pressure to areas of low pressure by means of convection. As pressure increases in the waste mass due to on-going LFG generation, gas tends to migrate up through the landfill cover, resulting in airborne fugitive emissions, and/or through the adjacent subsurface soil, resulting in lateral migration.

Diffusion is the process by which a gas attains chemical equilibrium by moving from areas of high concentration to areas of lower concentration. This process contributes to LFG migration due to differential chemical gradients in the waste mass relative to the surrounding soil.

Permeability has a significant impact on LFG migration due to a liquid or gases' propensity to move via the "path of least resistance." Waste, soil, and fractured bedrock all contain void spaces (i.e. porosity). These voids are generally interconnected; therefore, they provide a conduit for LFG to migrate.

Migration of LFG through soil poses two primary concerns that are related to the build-up of gases within or below structures near the landfill site; the accumulation of LFG in or around a subsurface structure may expose those required to enter the structure to an oxygen deficient environment, and the accumulation of LFG introduces the risk of an explosion if a source of ignition is present.

9.4.2 Factors Affecting Lateral Migration Potential

The ability of LFG to migrate laterally from the landfill limit of waste into the surrounding soil is dependent on the following primary factors:

- Leachate management systems;
- Landfill cover system;
- Geological conditions;
- Hydrogeological condition;
- Meteorological conditions; and
- Civil works.

Modern landfill design typically includes a liner system constructed of low permeability non-cohesive clay, geosynthetic materials (e.g. HDPE) or a composite system incorporating both materials. These liner systems present a barrier to LFG lateral migration to the surrounding environment unless tears in the liner system are present. Hence, the detection of LFG in the vadose zone immediately adjacent to the liner landfill cell is indicative of damage to the liner system.

The landfill cover system may have a significant impact on the potential for LFG migration. In landfills with a low permeable cover system, gases may exhibit greater propensity for lateral migration relative to a landfill cover with a more permeable material.

Soil stratigraphy beneath and in the immediate vicinity of the landfill can significantly impact LFG migration potential. Highly permeably, non-cohesive soil or fractured rock tend to act as preferential pathways for migration of LFG, while fine grained or cohesive soil tend to impede the movement of LFG. Non-cohesive, high permeability soil, bound between two lower permeability soil layers can also significantly impact LFG migration potential. This geologic condition can result in higher pressure gradients which increase the lateral migration potential.

Hydrogeological conditions also impact the migration potential of LFG. As discussed in Section 6.2, methane is only slightly soluble in water. As a result, methane migration (the constituent of primary concern) is precluded by saturated soil which acts as a barrier to gas migration.

Meteorological conditions may also affect LFG migration potential. Precipitation can saturate the soil cover, resulting in reduced LFG venting to the atmosphere; thus, resulting in increased surficial lateral pressure gradients. During the winter, frozen ground conditions may also impede LFG venting to the surface and also result in increased lateral pressure gradients.

Civil works adjacent to the landfill may also impact migration potential. Paved areas provide a barrier to venting; thus, increasing the potential for lateral migration of LFG. In addition, utility corridors, backfilled with non-cohesive and free draining bedding material, may provide a conduit for migration to adjacent civil works, buildings, or structures.

An additional consideration, when undertaking an assessment of potential LFG migration impacts, is the potential for methane oxidation in the shallow surficial soil. It is recognized that microbial oxidation of methane in aerobic soil can play a significant role in reducing the emission of methane to the atmosphere (Lelieveld et al., 1998). As a result of oxidation, the concentration of methane in the soil gas matrix is attenuated; thereby, reducing the risk of concentrations exceeding trigger levels.

The rate of oxidation in surficial soil is dependent upon both biochemical and physical processes (Hettiaratchi and Hansen, 1996). In an aerobic atmosphere, methane can be decomposed by methanotropic bacteria, which result in the generation of carbon dioxide and water as follows:

$$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$$

Hence, the oxidation of methane results in a decrease in the ratio of methane to carbon dioxide in the soil gas.

9.4.3 Soil Gas Triggers

LFG trigger concentrations are based upon the exceedance of combustible gas concentrations (i.e., methane) in the soil matrix voids. The BC MOE landfill criteria (1993) stipulate trigger concentrations for the following locations:

- Landfill property boundary;
- On-site building structures; and
- Off-site building structures.

Table 9.1 presents a summary of the trigger concentrations for the above-stated locations.

9.4.4 Migration Potential Assessment

Due to the fact that the landfill does not have a liner, the potential for LFG migration outside of the limit of waste is increased, especially if a hydraulic connection is established between the landfilled waste and the surrounding soil.

As discussed in Section 3, the surficial soil in the vicinity of the Site primarily consists of lacustrine sand and silt with intermittent gravel content. The surficial sand has a relatively high hydraulic conductivity of 6×10^{-5} to 1.2×10^{-4} metres per second. Due to the high permeability of the surficial soil, as well as a low groundwater table (approximately 55 to 83 metres bgs), the potential exists for LFG to migrate significant distances under ideal conditions. This assessment of the hydrogeological and geological conditions is consistent with the aforementioned soil gas monitoring results recorded in 1999-2000.

Additional LFG migration pathways, identified in the vicinity of the Site, are the utility corridors. Migration of LFG through the utility corridors is of concern as it would allow LFG to migrate to on-site buildings. Similarly, granular engineered fill

(i.e., road base or foundation base materials) which may have been used to construct the existing roads and Site facilities, could also be a potential migration pathway.

Based on the above stated assessment, the risk of lateral LFG migration originating from the Site is deemed to be relatively high. However, there are no off-site receptors in the immediate vicinity of the Site. Furthermore, active gas collection is taking place in the eastern portion of the Site, reducing the quantity of LFG available for migration.

9.5 Proposed LFG Collection System

The proposed post-development LFG well field (Drawing D-17) shall be composed of the following elements:

- HDPE header located along the inside shoulder of the perimeter road;
- Three condensate traps;
- Forty nine vertical extraction wells;
- Six LFG extraction trenches; and
- Lateral piping.

Staged progressive expansion of the LFG well field is illustrated on the development drawing set (Drawings D-03 through D-17).

10. SITE FACILITIES

10.1 Existing Infrastructure

The following section provides a description of the existing site facilities.

10.1.1 Fencing

Chain-link fencing exists along a large portion of the perimeter of the Site. Access to the Site is controlled by two gates; the main gate is located off of Foothills Boulevard, and a secondary access gate is located on the south side of the Site to give access to the existing gravel pit area. The main gate is locked outside of normal operating hours to prohibit vehicle entrance and uncontrolled disposal when the Site is closed. The secondary access gate is locked at all times.

10.1.2 Weigh Scale

A two-way truck weigh scale is located at the main site entrance. The two 80-tonne weigh scales are used to measure the weight of all waste haulage vehicles entering and leaving the Site.

10.1.3 Transfer Station

A well-signed transfer station, equipped with six roll off bin concrete retaining wall bays, is located north of the weigh scales. The roll-off bins are used for garbage collection, and recyclable materials.

Foothills Boulevard Regional Landfill provides recycling bins for corrugated cardboard and multi-material recycling. Multi-material recycling bins are divided into three categories:

- Newspaper;
- Metal food containers and plastic milk jugs; and
- Mixed paper.

10.1.4 Swap Shed

A Swap Shed is located on-site in the Transfer Station area, and is used to house re-usable items that the public drops off. These items can be dropped off or picked up free of charge. Accepted items include clothing, books, toys, sporting goods, and furniture.

10.1.5 Compost Facility

An asphalt compost area is located north of the landfill. Separated yard and garden waste can dropped off at the Site at no charge and is added to the centralized composting process. Finished compost is sold at the facility to residents of the RDFFG.

10.1.6 Landfill Gas Control Plant

A landfill gas control plant, comprised of blower system, gas analyzer, programmable logic controller, and flare is located in the north of the landfill.

10.1.7 Access Roads

Access roads include a paved road to the scale house and the transfer station area.

The Site has gravel access roads located:

- From the scale house to the landfill active area;
- From the public scale house around the perimeter of the existing limit of waste;
- From the scale house to the landfill gas utilization facility; and
- From the scale house to the asphalt compost area.

11. SITE OPERATIONS

The Foothills Boulevard Regional Landfill is currently operated under Operational Permit MR-01697 issued by the British Columbia Ministry of Environment, Lands and Parks, on October 31, 2005. The Site accepts municipal solid waste from the approved service area. In addition, the Site collects recyclable materials as part of the RDFFG's waste diversion initiative.

11.1 Site Access and Information

Access to the Site is provided via Foothills Boulevard, northwest of the intersection with West Austin Road. Access gates control entrance and/or exit from the Site at this location. The gate is locked outside of normal operating hours to prohibit vehicle entrance and uncontrolled disposal when the Site is closed.

Signage is provided at the site entrance and throughout the Site as follows:

- Site owner;
- Traffic control and directions;
- Hours of operation; and
- Tipping fees.

11.2 Hours of Operation

During the winter months (November 1 to March 31) the Site hours of operation are from 7:00 AM to 5:00 PM Monday to Friday, 7:00 AM to 4:00 PM on Saturday, and 10:00 AM to 4:00 PM on Sunday.

During the summer months (April 1 to October 31) the Site hours of operation are from 7:00 AM to 7:00 PM Monday to Saturday, and 10:00 AM to 7:00 PM on Sunday.

Holiday operating hours are from 9:00 AM to 5:00 PM. The facility is closed on Christmas Day and New Years Day.

11.3 Site Supervision

Regional District contractors operate the Foothills Boulevard Regional Landfill. As part of the operations, the contractor handles the following tasks:

- Place and compact the waste; and
- Apply daily or alternative daily cover.

The weigh scale operator, employed by the RDFFG, maintains a daily record of weighing operations. Tipping fees are charged for all waste entering the Site based on weight or number of units (e.g. fridges, tires, etc.).

11.4 Waste and Cover Soil Placement

Landfilling, as specified in the development sequence, will be completed using the area method of landfilling.

Waste hauling vehicles will unload at the working face and the landfill compactor will spread and compact the waste. The waste will be placed and compacted in layers of approximately 0.6 metres. The waste will receive a minimum of five passes with a landfill compactor in order to achieve maximum density. Completed stages will have a minimum lift height of 3 metres, with a minimum 2 percent grade. Daily cover consisting of tarps, native soil, suitable imported material, and/or woodchips blended with soil, will be placed at the end of each working day.

11.4.1 Daily Cover Soil

Daily cover helps to minimize litter migrating from active areas and will also help to control odours, vectors, and vermin. Typical daily cover is composed of 150 millimetres of permeable non-cohesive soil. Alternative cover systems, such as tarps, can be used on the working face six out of seven working days. On the seventh working day, cover soil is applied to the working face. Whenever possible, the daily cover should be removed and reused or scarified prior to placement of subsequent lifts of waste to promote a hydraulic connection to the underlying waste and to reduce the likelihood of lateral leachate breakouts.

11.4.2 Interim Cover

Certain areas of the landfill may be completed with interim cover to allow additional settlement and consolidation of the waste prior to final waste placement to final contours. Interim cover should be placed over areas that will remain inactive for an extended period of time. Interim cover should consist of a 0.3-metre layer of soil placed over the waste graded to promote surface water run-off.

Interim cover removal, prior to resumption of landfilling, should be performed to promote hydraulic connections between waste lifts.

11.4.3 Final Cover

Progressive final cover placement will be carried out in areas of the landfill that have reached final contours. The progressive placement of final cover will reduce leachate generation by promoting surface run-off thereby reducing infiltration into the landfill.

The final cover design for the landfill is presented in Section 5.5.1.

11.5 Surface Water Control

Surface water control will be conducted through the construction of temporary berms to control surface water run-off. Surface water run-off will be directed away from the active disposal areas in order to minimize the volume of surface water contacting waste, and the resulting leachate production.

11.6 Litter Control

Preventative litter control measures are steps taken to minimize the blowing of litter from the active area of a landfill. The following measures will be used at the site to control and minimize windblown litter:

- All vehicular traffic transporting waste to and around the site will be tarped to prevent litter from blowing out of the vehicle;
- Daily cover or tarps will be used to cover exposed waste and to confine light weight material;
- The working face location will be selected based on the direction and intensity of the wind to provide maximum shelter for the active area. The areal extent of the working face will be kept to a minimum on windy days;
- Temporary, moveable, litter control fencing will be utilized at the active face of the site, as required. Litter fences along the perimeter shall be a minimum of 2 metres high. Portable fencing at least 3 metres high will be placed on a daily basis in close proximity downwind of the working face; and
- The landfill operator is required to collect litter at the Site and up to 100 metres from the Site along public roads.

Practical steps will continue to be taken to prevent the escape of litter from the site.

11.7 Noise Control

Potential noise impacts from the site may result from the operation of the landfill equipment. The operation of this equipment will be conducted to ensure that noise emission standards are adhered to.

11.8 Odour Control

In general, landfills have the potential to emit two types of odours, waste odour and landfill gas odour. Waste odour is generated by recently disposed waste and is controllable by the application of daily cover. Landfill gas odour is generated during the anaerobic decomposition of organic waste material.

Should landfill gas odours become a problem at the Site, then an investigation into the issue is required and a solution implemented. The investigation will address such items as gas generation rates, the location of odour problems around the site, and potential methods to reduce odours.

11.9 Dust Control

Dust generation is common at most landfill sites due to the handling of soils, dry waste such as demolition waste, plaster and concrete, and the movement of vehicles along gravel and soil roads.

Dust mitigation measures will be employed on an as-needed basis and may include the following:

- Paved roads;

- Use of water to control dust;
- Seeding programs; and
- The proper placement of stockpiles to minimize dispersion.

Soil stockpiles that will not be used for more than one year will be seeded.

11.10 Vector and Vermin Control

The terms vector and vermin refer to objectionable insects, rodents, birds and bears that sometimes establish habitat at a landfill. Common landfill vectors and vermin are flies, rats, and gulls. The impact of these species is examined from a health perspective and from a social or psychological perspective.

Vectors and vermin are controlled by the application of cover material at a specified frequency and by the electric fence surrounding the property.

12. MONITORING, INSPECTION, AND REPORTING

12.1 Environmental Monitoring Program

The following section outlines the proposed site Environmental Monitoring Program (EMP). The requirements of the EMP are outlined in the following documentation issued by the BC MOE:

- Operational Permit MR-01697;
- Landfill Criteria for Municipal Solid Waste (1993); and
- Guidelines for Environmental Monitoring at Municipal Solid Waste Landfills (2006).

The following section presents the three major components of the proposed EMP: groundwater, leachate, and soil gas monitoring.

12.1.1 Groundwater Monitoring

The objective of the groundwater monitoring program is to detect the extent and magnitude of the migration of contaminants derived from landfill activities. The data compiled from the groundwater monitoring program is utilized to confirm that adequate attenuation of leachate-impacted groundwater is occurring prior to discharge from the landfill property.

Proposed Groundwater Monitoring Program

The current groundwater monitoring program includes the sampling of 17 monitoring wells (twice annually) for water levels and water quality. Water quality parameters monitored include field chemistry (pH, conductivity, and temperature), general chemistry, dissolved metals, and nutrient parameters (total ammonia, nitrate, nitrite, total phosphorous, orthophosphate, and total kjeldahl nitrogen). Wells have historically also been tested for volatile organic carbons and extractable petroleum hydrocarbon parameters.

Based on the recommendations presented in the Draft Hydrogeological Data Gap Analysis for the Foothills Boulevard Regional Landfill (Ecoplans Ltd., 2010), the following additional monitoring wells should be added to the groundwater monitoring program:

- A monitoring well(s) south-southwest of MW05-18 to determine the extent of leachate impacts to the south and southwest of the Site;
- A monitoring well 500 metres west of the landfill footprint to confirm groundwater flow directions and groundwater quality west of the landfill; and
- A monitoring well 500 metres east of the landfill footprint (along Austin Road) to confirm groundwater flow directions and groundwater quality east of the landfill.

The current and proposed groundwater monitoring locations for Cell 1 are illustrated on Figure 12.1.

12.1.2 Leachate Monitoring

The objective of the leachate monitoring program is to provide data with respect to leachate indicator parameters, which will enable the accurate assessment of the potential impacts derived from landfill related activities.

It is recommended that a leachate well be installed within the landfill in order to help characterize leachate quality at the Site and to aid in identifying leachate impacts (if any) down-gradient of the Site.

12.1.3 Soil Gas Monitoring

The objective of soil gas monitoring is to ensure the subsurface migration of LFG does not pose a risk the surrounding environment.

As discussed previously, the lateral migration of soil gas (i.e., LFG) poses three primary concerns associated with the accumulation of gases within the soil matrix or below building structures in close proximity to a landfill site:

- The accumulation of LFG in subsurface structures (e.g., manholes and vault boxes) which may create an oxygen deficient atmosphere:
- The accumulation of LFG as concentrations exceeding the LEL ,thereby posing a risk of explosion; and
- Vegetation stress effects due to displacement of oxygen in the root zone.

The soil gas monitoring program has been devised to monitor for the presence of lateral LFG migration through the subsurface along the property boundary and adjacent to identified potential receptors (i.e., on-site building structures and off-site residential dwellings).

As recommended in the Interim Phase 1 Landfill Gas Management Plan (XCG, 2008), the recommended probe locations are illustrated on Figure 12.2. These proposed probe locations include the following:

- One probe situated south of the LFG abstraction plant;
- One probe situated southwest of the Swap Shed; and
- One probe situated along the east edge of the asphalt paved area near the Site's entrance.

It is recommended that two additional gas probes be added to the soil gas monitoring program during the Stage C filling portion of the development plan, when the scale house and public tipping area are relocated to the north (Figure 12.3). At this time, it will also be necessary to replace existing soil gas probe EX-GP-99-5, which is currently located in the future proposed public tipping area.

Additional gas probes to the south and west are not deemed necessary at this time due to the lack of receptors in close proximity to these regions. In the event of development in these areas, the soil gas monitoring program should be re-evaluated and upgraded as necessary.

Each of the proposed gas monitoring locations will consist of a nest of multi-level probes. This will allow monitoring of LFG migration at multiple discrete depths from surface down to the seasonal low water table. The nested probes will be screened in areas of permeable strata. By locating the screened intervals within discrete permeable hydrogeologic units, it will be possible to better delineate subsurface gas migration point surfaces and determine risk to potential receptors.

Each probe will be constructed of 19-millimetre diameter, schedule 40, PVC pipe. The lengths of PVC pipe will be connected with threaded joints equipped with neoprene gaskets. The perforated pipe section will be backfilled with washed pea gravel and sealed with a concrete/bentonite seal at the ground surface. Each probe will be equipped with a slip cap cover (greased with non-petroleum based lubricant) and a 6 millimetre PVC labcock valve fitted with a 6 millimetre hose barb and PVC end-cap. A typical LFG probe detail is illustrated in Figure 12.3.

As recommended in the Interim Phase 1 Landfill Gas Management Plan (XCG, 2008) soil gas monitoring shall be undertaken on a quarterly basis to monitor the following parameters:

- Soil gas pressure;
- Methane concentration;
- Oxygen concentration;
- Carbon dioxide concentration; and
- Groundwater level.

As recommended in the Interim Phase 1 Landfill Gas Management Plan (XCG, 2008), the following trigger levels will necessitate the implementation of contingency measures:

- 100 percent lower explosive limit (LEL) at monitoring locations EX-GP-99-1 to EX-GP-99-5; and
- 25 percent LEL at monitoring locations PR-GP-06 to PR-GP-08.
- Methane from LFG present in on-site enclosed structures;
- Methane from LFG present in off-site enclosed structures;
- Vegetative stress related to LFG impacts; and
- LFG emissions from the landfill resulting in odour issues and/or impacts to the air quality in the area.

12.2 Inspection and Record Keeping

Regular site inspections will be conducted to verify that nuisance issues associated with ongoing landfill operations (i.e., dust, litter, and odour) are adequately controlled, thereby preventing nuisances from developing into more serious environmental issues.

The inspections presented herein shall be undertaken by adequately trained landfill personnel on a weekly basis. Landfill personnel shall maintain records of the inspections and associated action items that require attention.

Weekly inspection records shall be filed on-site and archived for future reference in the event of an environmental release.

12.2.1 Surface Water Management Systems

Maintenance of the surface water management systems will include the maintenance of surface watercourses and ponds.

Grass lined surface watercourses shall be periodically inspected, while undertaking inspection of the cover system, for signs of deterioration and erosion. Maintenance will include periodic trimming of grass, repairs to side-walls, and dredging of sediment build-up.

The ponds will also require periodic inspection and maintenance. Inspections shall be undertaken for evidence of erosion and side-slope sloughing or tension cracks forming along the crest of the side-slope berms. Regular maintenance will include dredging of sediments to ensure the structure maintains the required capacity.

12.2.2 Leachate Management

The existing landfill is a natural attenuation site, and as such was not constructed with an engineered liner. Therefore, the primary task associated with leachate management is the regular inspection of the final cover for evidence of leachate surface seeps.

In the event that leachate seepage is identified, remedial measures will be immediately undertaken to contain the seepage in order to prevent impacts to surface watercourses, and affect repair to the final cover in the area where seepage is observed.

In the event that leachate seepage has impacted surface watercourses, temporary controls, such as berming, should be implemented to prevent the migration of impacted surface water downstream. Where possible, the impacted surface water should be redirected to the landfill by excavating a vertical channel into the waste mass and allowing the leachate to infiltrate into the waste.

12.2.3 Buffer Zones

Buffer zones should generally be vegetated with native species and should be self-supporting. As such, with the exception of potential remedial measures to address landfill derived impacts, maintenance should generally not be required. In the event of landfill derived impacts (i.e., vegetative stress associated with landfill gas, sediment accumulation or leachate seepage) an assessment of the cause of the impact shall be undertaken and appropriate measure put in place.

12.2.4 Fencing and Site Security

All fencing and gates should be maintained. If fencing/gates are found to be damaged or in disrepair, then the existing fence/gate should be repaired or replaced as needed to ensure the protection of the Site's environmental controls. The need for existing fencing and/or additional fencing should be reviewed on an annual basis.

12.2.5 Access Roads

Access roads shall be repaired should any erosion, rutting, or potholes occur. Snow clearing of the access road shall be performed on an as-required basis.

12.2.6 Environmental Monitoring Infrastructure

Existing groundwater and landfill gas monitoring wells should remain in place and operational throughout the post-closure care period of the landfill. Monitoring wells should be inspected at the time of monitoring for proper operation, and any broken valves or fittings should be replaced immediately. Should existing or any new monitoring wells be damaged beyond repair or abandoned, then they will be decommissioned as soon as reasonably possible.

In the event of ponding or surface water accumulation at the base of a monitoring well installation, remedial measures shall be undertaken to regrade the area and re-establish vegetative cover immediately. Alternatively, consideration can be given to decommissioning the monitoring well and installation a replacement in an adjacent location which will not be impacted by surface water.

12.3 Airspace Consumption

A survey of the active landfill area shall be conducted annually during operation of the site to determine annual airspace consumption. The annual volume of airspace consumed will be used to estimate the remaining site life. In addition, the volume calculation will be used in conjunction with the annual waste deposition rate to calculate the apparent waste density.

It is noted that the annual landfill survey should be undertaken at the same time each year to ensure that the annual airspace consumption calculation exercise is representative of actual conditions.

12.4 Annual Report

As stipulated in Section 8.2 of the landfill's Operational Permit, the RDFFG shall submit to the Director on or before June 30 each year for the previous calendar year.

Key elements of the Annual Report are as follows:

- An executive summary;
- The type and tonnage of waste received, recycled and landfilled for the year;
- A current topographic map detailing airspace consumption, on-site borrow pit changes and future developments;

- Updated estimates for the remaining capacity, closure date for the current phase and closure date for the current landfill footprint;
- Any new information or proposed changes relating to the facilities and Design and Operation Plan;
- Composting operation activity including amount of material received for composting, material composted, material sold and number of composted cycles;
- Occurrences or observations of wildlife at the facility;
- A statement regarding the facility's progress in reducing the regional solid waste stream; and
- The results of all monitoring programs as specified in the Operational Certificate. Data interpretation and trend analysis as an evaluation of the impacts of the discharges on the receiving environment in the previous year shall be carried out by a qualified professional.

13. CLOSURE AND POST-CLOSURE

The following section provides a general overview of closure and post-closure activities and requirements associated with closure of the Site. It is noted that detailed analysis of these elements will be undertaken upon detailed design of the proposed end-use concept and in the Landfill Closure Plan.

13.1 Design Criteria

Closure of the Site will be based on the final contours and design elevations presented in Table 4.1, and as illustrated in Figure 5.1.

13.2 End Use

The use of the Site will be restricted to an agricultural use such as grazing, or a passive use, such as wildlife habitat area, community trails, or green space.

13.3 Closure Schedule

The site life is governed by numerous factors which include the following:

- Available airspace;
- Annual waste tonnage landfilled;
- Compactive effort;
- Daily cover practices;
- Removal of interim cover prior to landfilling; and
- Settlement of the refuse mass prior to closure.

Based upon a current airspace availability for Cell 1 of approximately 2 million cubic metres and the assumptions presented in Section 6.3, the current estimated closure date for Cell 1 is 2025. The site life will be updated in the Annual Operations and Monitoring Report discusses in Section 12.4.

13.4 Site Rehabilitation

The following section provides an overview of landfill rehabilitation measures to be undertaken as part of the closure of the Site.

13.4.1 Final Cover System

The proposed final cover system is presented in Section 5.5.1. The proposed cover system has been developed to significantly reduce leachate generation for the purpose of mitigating potential environmental issues associated with post-closure public access to the Site.

13.4.2 Surface Water Management

During the placement of final cover, surface water run-off will be controlled to minimize sediment deposition in the surface watercourses and pond. Final cover construction will be during the summer months to provide adequate time for a vegetative cover to be established prior to the winter season. Closure contracts shall include provisions for irrigation and fertilization to promote root growth and reduce the potential for erosion.

13.5 Post-Closure Maintenance

The post-closure maintenance program for the Site will generally consist of the maintenance elements outlined in Section 12.2, as well as ongoing maintenance and inspection of the final cover. Immediately after construction the final cover will be inspected on a weekly basis until the vegetative growth is adequately established to limit the potential for erosion. Thereafter, semi-annual inspections will be completed to assess the integrity of the final cover.

Visual inspections will include the assessment of the integrity of the final cover with respect to the following:

- Inspection for erosion and waste exposure;
- Inspection for vegetative stress which may be indicative of the presence of LFG; and
- Inspection for leachate seeps.

13.6 Post-Closure Environmental Monitoring

The environmental monitoring program will continue at the site as indicated in Section 12.1 until groundwater, surface water and soil gas monitoring results indicate that the concentrations of contaminants of concern have sufficiently been reduced to either merit an amendment to the environmental monitoring program or to discontinue the program.

14. REFERENCES

1. AMEC Earth & Environmental Ltd., December 2006. "Design and Operations Plan."
2. British Columbia Ministry of Environment, 2006. "Guidelines for Environmental Monitoring at Municipal Solid Waste Landfills."
3. British Columbia Ministry of Environment, 1993. "Landfill Criteria for Municipal Solid Waste."
4. British Columbia Ministry of Environment, 2008. "Landfill Gas Management Regulation."
5. Conestoga-Rovers & Associates Ltd., March 2009. "Gas Generation Procedure Guidance Report."
6. Gartner Lee Ltd., September 2008. "2008 Regional Solid Waste Management Plan."
7. Ecoplans Ltd., February 2010. "Foothills Boulevard Regional Landfill Site Hydrogeological Data Gap Analysis."
8. United States Army Corp of Engineers, 2006. "Hydrologic Engineering Center - Hydrologic Modeling System (HEC-HMS) 3.1.0."
9. United States Army Corp of Engineers, 1997. "Hydrologic Evaluation of Landfill Performance (HELP), Version 3.07."
10. United States Environmental Protection Agency, 1997. "Emission Factor Documentation for AP-42, Section 2.4, Municipal Solid Waste Landfills."
11. XCG Consultants Ltd., November 2008. "Interim Phase 1 Landfill Gas Management Plan."

TABLES

Table 3.1 Climate Normals

Month	Daily Average Temperature (Celcius)	Average Total Rainfall (mm)	Average Total Snowfall (cm)	Average Total Precipitation (mm)
January	-9.6	6.2	55.8	52.4
February	-5.4	7.2	30.1	31.4
March	-0.3	13.1	22.9	32.7
April	5.2	25.9	6.3	32.2
May	9.9	49.5	1.4	50.9
June	13.3	72.7	0	72.7
July	15.5	63.5	0	63.5
August	14.8	51.1	0	51.1
September	10.1	51.9	0.6	52.5
October	4.6	50	8.4	57.9
November	-2.9	20.2	36.2	51.5
December	-7.8	7.5	54.4	52.0
Annual	4.0	418.9	216.1	600.8

Notes:
1. Source: Environment Canada, Climate ID 1096450 (1971-2000).

Table 4.1 Landfill Design Criteria Summary

Item	Criteria
Site Area	Permitted Area = 87.3 hectares
Waste Footprint Area	Existing area footprint = 20.8 hectares Proposed Cell 1 footprint = 20.8 hectares Proposed Cell 2 footprint = 18.0 hectares
Maximum Final Grade (horizontal:vertical)	Final contours 3H:1V
Minimum Final Grade	Final contours: 10 percent
Maximum Base Grade	5 percent
Minimum Base Grade	0.5 percent
Minimum Ditch Grade	0.5 percent
Final Cover	0.3 m vegetated organic soil Non-woven geotextile 0.15 m gravel 0.6 m low permeability soil Non-woven geotextile Geosynthetic Liner Non-woven geotextile 0.3 m sand 0.15 m existing cover
Maximum access road grade	8 percent

Table 4.2 Waste Generation

Year	Waste Landfilled (Tonnes)	Cumulative Waste Landfilled (Tonnes)
1976	65,377	65,377
1977	66,037	131,414
1978	66,704	198,118
1979	67,378	265,495
1980	68,058	333,554
1981	68,746	402,300
1982	69,440	471,740
1983	70,142	541,881
1984	70,850	612,732
1985	71,566	684,297
1986	72,289	756,586
1987	73,019	829,605
1988	73,756	903,361
1989	74,501	977,863
1990	75,254	1,053,117
1991	77,551	1,130,668
1992	79,848	1,210,516
1993	82,145	1,292,661
1994	84,442	1,377,103
1995	86,739	1,463,842
1996	89,035	1,552,877
1997	93,084	1,645,961
1998	75,808	1,721,769
1999	67,487	1,789,256
2000	68,760	1,858,016
2001	66,200	1,924,216
2002	68,381	1,992,597
2003	70,073	2,062,670
2004	80,478	2,143,148
2005	81,735	2,224,883
2006	86,072	2,310,955
2007	89,345	2,400,300
2008	88,368	2,488,668
2009	78,160	2,566,828
2010	79,020	2,645,848
2011	79,889	2,725,737
2012	80,768	2,806,504
2013	81,656	2,888,161
2014	82,554	2,970,715
2015	83,463	3,054,177
2016	84,381	3,138,558
2017	85,309	3,223,867
2018	86,247	3,310,114
2019	87,196	3,397,310
2020	88,155	3,485,465
2021	89,125	3,574,590
2022	90,105	3,664,695
2023	91,096	3,755,791
2024	92,098	3,847,890
2025	93,111	3,941,001
2026	94,136	4,035,137
2027	95,171	4,130,308
2028	96,218	4,226,526
2029	97,276	4,323,802
2030	98,346	4,422,149
2031	99,428	4,521,577
2032	100,522	4,622,099
2033	101,628	4,723,727
2034	102,746	4,826,473
2035	103,876	4,930,348
2036	105,018	5,035,367
2037	106,174	5,141,541
2038	107,342	5,248,882
2039	108,522	5,357,405
2040	109,716	5,467,121
2041	110,923	5,578,044
2042	112,143	5,690,187

Notes:

1. Waste tonnages for 1990 and 1996-2006 from Golder Associates Ltd. "Documentation Protocol GHG Emission Reductions," April 2008.
2. Waste tonnage for 2007 from RDFFG "Foothills Boulevard Regional Landfill Annual Report 2007 (Draft)," 2008.
3. Waste tonnage for 2009 provided by RDFFG.
4. Assume tonnage of 75,254 tonnes in 1990 decreases by 1 percent annually through to 1976.
5. Assume a disposal rate increase of 2,297 tonnes per year from 75,254 tonnes in 1990 to 89,035 tonnes in 1996.
6. Future annual tonnage data estimated using annual population growth rate of 1.1 percent (BC Statistics).

Table 4.3 Waste Composition

Waste Category [1]	Foothills Boulevard [2] (%)
Relatively Inert	
Glass	4.20
Ferrous Metals	3.28
Non-Ferrous Metals	1.06
Plastics	15.75
Rubber	0.20
Composite Products	7.74
Hazardous By-Products	0.58
Total	32.81
Moderately Decomposable	
Paper and Paperboard	29.99
Wood Products	0.75
Construction and Demolition Materials	0.54
Other	0.05
Total	31.33
Decomposable	
Organic Matter	30.07
Textiles	5.81
Total	35.88

Notes:

1. Conestoga-Rovers & Associates Limited "Landfill Gas Generation Assessment Procedure Guidance Report", March 2009.
2. Technology Resource Inc. "Waste Characterization Study - Foothills Boulevard Landfill," April 2007.

Table 6.1 Cell 1 Development Summary

Development Phase	Stage Air Space (m^3)	Estimated Stage Life (months)	Cumulative Air Space (m^3)	Cumulative Life (years)
Stage A	103,400	10	103,400	0.8
Stage B	187,300	19	290,700	2.4
Stage C	167,200	17	457,900	3.8
Stage D	127,000	13	584,900	4.9
Stage E	160,100	16	745,000	6.3
Stage F	250,500	25	995,500	8.3
Stage G	103,900	10	1,099,400	9.2
Stage H	234,600	24	1,334,000	11.2
Stage I	91,500	9	1,425,500	11.9
Stage J	160,300	16	1,585,800	13.3
Stage K	153,200	15	1,739,000	14.5
Stage L	173,250	17	1,912,250	15.9
Stage M	90,000	9	2,002,250	16.7
Stage N	32,900	3	2,035,150	16.9

Table 6.2 Final Cover Soil Requirements

Design Criteria			
Final Cover Organic Soil Thickness		0.3	m
Final Cover Gravel Thickness		0.15	m
Final Cover Low Permeability Soil Thickness		0.6	m
Final Cover Sand Thickness		0.3	m
	Total Final Cover Thickness	1.35	m
Soil Required [1]			
Daily Cover			
Volume of soil required for Cell 1		226,128	m^3
Final Cover			
Organic Soil required for Cell 1		46,682	m^3
Gravel required for Cell 1		23,341	m^3
Low Permeability Soil required for Cell 1		93,363	m^3
Sand required for Cell 1		46,682	m^3

Note:
1. All calculations are based on proposed final contours.
2. Assumes waste to cover ratio of 8:1.

Table 6.3 Projected Airspace Consumption by Stage

Stage	Waste Landfilled (tonnes)	Cumulative Waste Landfilled (tonnes)	Airspace Consumed (m^3)	Cumulative Airspace Consumed (m^3)	Volume of Daily Cover (m^3)
Stage A	70,312	70,312	103,400	103,400	11,489
Stage B	127,364	197,676	187,300	290,700	20,811
Stage C	113,696	311,372	167,200	457,900	18,578
Stage D	86,360	397,732	127,000	584,900	14,111
Stage E	108,868	506,600	160,100	745,000	17,789
Stage F	170,340	676,940	250,500	995,500	27,833
Stage G	70,652	747,592	103,900	1,099,400	11,544
Stage H	159,528	907,120	234,600	1,334,000	26,067
Stage I	62,220	969,340	91,500	1,425,500	10,167
Stage J	109,004	1,078,344	160,300	1,585,800	17,811
Stage K	104,176	1,182,520	153,200	1,739,000	17,022
Stage L	117,810	1,300,330	173,250	1,912,250	19,250
Stage M	61,200	1,361,530	90,000	2,002,250	10,000
Stage N	22,372	1,383,902	32,900	2,035,150	3,656

Notes:

1. Waste Landfilled based upon 0.8 percent annual population growth.
2. Airspace consumption based upon an apparent density of 0.68 tonnes per cubic metre (assuming use of alternative daily cover).
3. Daily cover consumption based upon a 8:1 waste to daily cover ratio (assuming use of alternative daily cover).

Table 6.4 Projected Airspace Consumption Summary

Year	Waste Landfilled (tonnes)	Cumulative Waste Landfilled (tonnes)	Airspace Consumed (m^3)	Maximum Volume of Daily Cover (m^3)	Total Maximum Volume of Daily Cover (m^3)
2010	79,020	79,020	116,206	12,912	12,912
2011	79,889	158,909	117,484	13,054	25,965
2012	80,768	239,676	118,776	13,197	39,163
2013	81,656	321,333	120,083	13,343	52,505
2014	82,554	403,887	121,404	13,489	65,995
2015	83,463	487,350	122,739	13,638	79,632
2016	84,381	571,730	124,089	13,788	93,420
2017	85,309	657,039	125,454	13,939	107,359
2018	86,247	743,286	126,834	14,093	121,452
2019	87,196	830,482	128,229	14,248	135,700
2020	88,155	918,637	129,640	14,404	150,104
2021	89,125	1,007,762	131,066	14,563	164,667
2022	90,105	1,097,867	132,508	14,723	179,390
2023	91,096	1,188,963	133,965	14,885	194,275
2024	92,098	1,281,062	135,439	15,049	209,324
2025	93,111	1,374,173	136,929	15,214	224,538

Notes:

1. Waste Landfilled based upon 0.8 percent annual population growth.
2. Airspace consumption based upon an apparent density of 0.68 tonnes per cubic metre (assuming use of alternative daily cover).
3. Daily cover consumption based upon a 8:1 waste to daily cover ratio (assuming use of alternative daily cover).

Table 7.1 Runoff Volume Summary

Development Stage	2-Year (m^3)	25-Year (m^3)	100-Year (m^3)
Existing Conditions (1)	1,925	4,220	5,484
Proposed Conditions (1)	2,065	5,626	7,800

Notes:
1. 24-hour storm duration.
2. Published intensity duration data from Environment Canada (1980 - 1997), City of Prince George.

Table 8.1 Infiltration Rate Summary

Cover Type	Model	Slope (%)	Infiltration Rate (mm/yr)
Existing Daily Cover	HELP	2%	52
Existing Intermediate Cover	HELP	2%	53
Existing Intermediate Cover	HELP	20%	53
Existing Final Cover	HELP	5%	12
Existing Final Cover	HELP	25%	4
Proposed Final Cover	HELP	10%	1
Proposed Final Cover	HELP	33%	1

Table 8.2 Cell 1 Leachate Generation Rate Summary

Development Stage	Total Leachate Generation Rate (m^3/yr)	Total Leachate to the Environment (m^3/yr)	Total Leachate to Sanitary System (m^3/yr)
Existing Conditions with Leachate Recirculation	10,400	10,400	0
Existing Conditions without Leachate Recirculation	9,568	9,300	286
Final Closure of Cell 1	440	153	286

Notes:
1. Total leachate recirculation volume includes leachate totals from existing final cover area.

Table 9.1 LFG Generation Constants

Mateial Type	K (yr^{-1})	Lo (m^3/tonne)
Inert	0.02	20
Moderately Decomposable	0.04	120
Decomposable	0.09	160

Notes:
1. Source: CRA (2009).

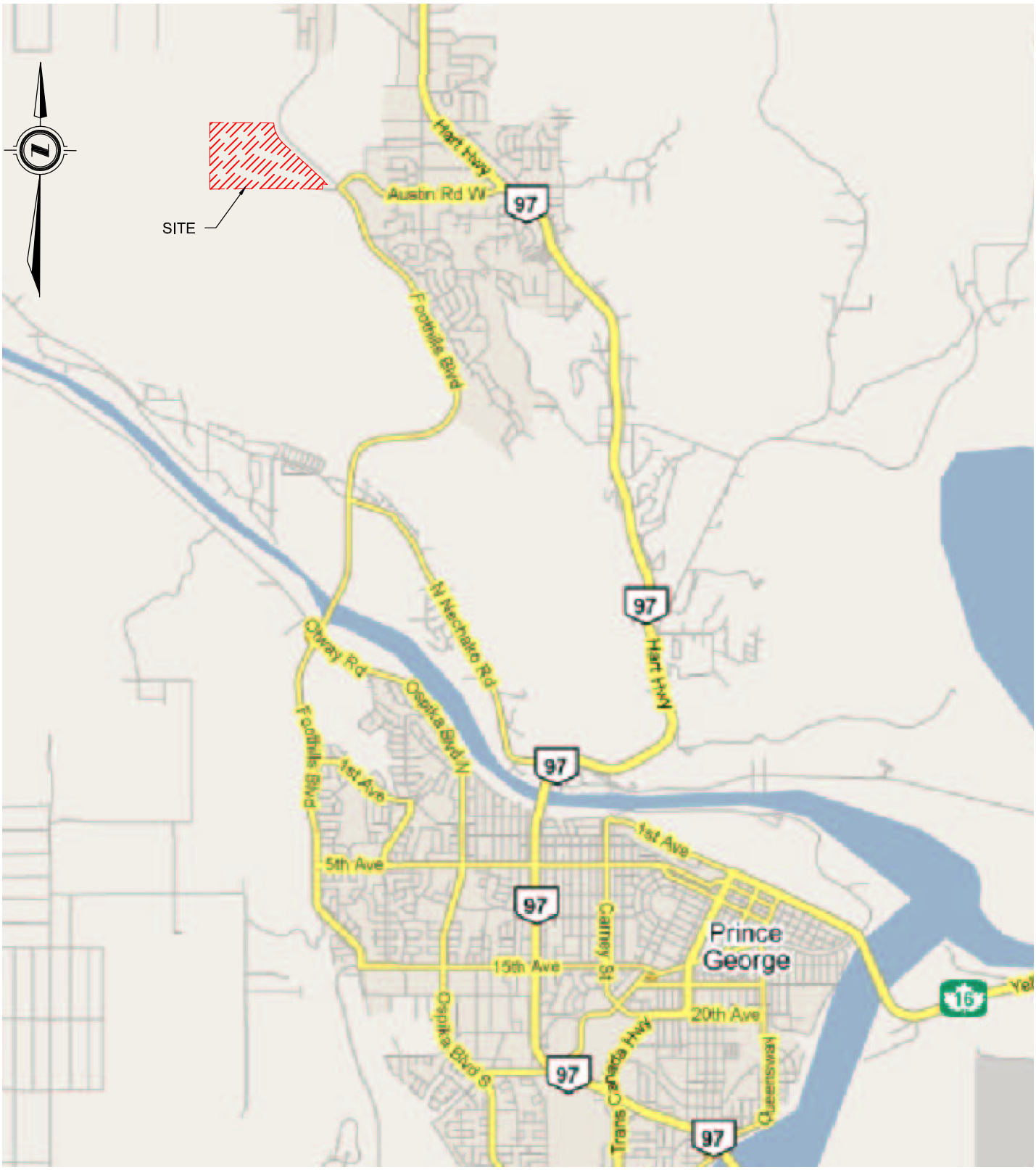
Table 9.2 Soil Gas Trigger Concentrations

Location	Trigger (% LEL)
On-site Structures	25
Off-site Structures	25
Property Boundary	100

Notes:

1. LEL - Lower Explosive Limit
2. Source: BC MOE, (1993). Landfill Criteria for Municipal Solid Waste.

FIGURES



SITE LOCATION MAP

INTEGRATED LANDFILL MANAGEMENT PLAN
FOOTHILLS BOULEVARD REGIONAL LANDFILL
REGIONAL DISTRICT OF FRASER-FORT GEORGE

XCG CONSULTANTS LTD.

DATE	JOB NO.	FIGURE NO.
FEB 2010	4-2428-01-07	1.1

(file: R424280107002FIG1-1.dwg)

0 150 300 m

1:7500

LEGEND

APPROXIMATE PROPERTY BOUNDARY

APPROVED DEVELOPMENT AREA

(file: R424280107002FIG1-2.dwg)

SITE PLAN

INTEGRATED LANDFILL MANAGEMENT PLAN
FOOTHILLS BOULEVARD REGIONAL LANDFILL
REGIONAL DISTRICT OF FRASER-FORT GEORGE

XCG CONSULTANTS LTD.

DATE	JOB NO.	FIGURE NO.
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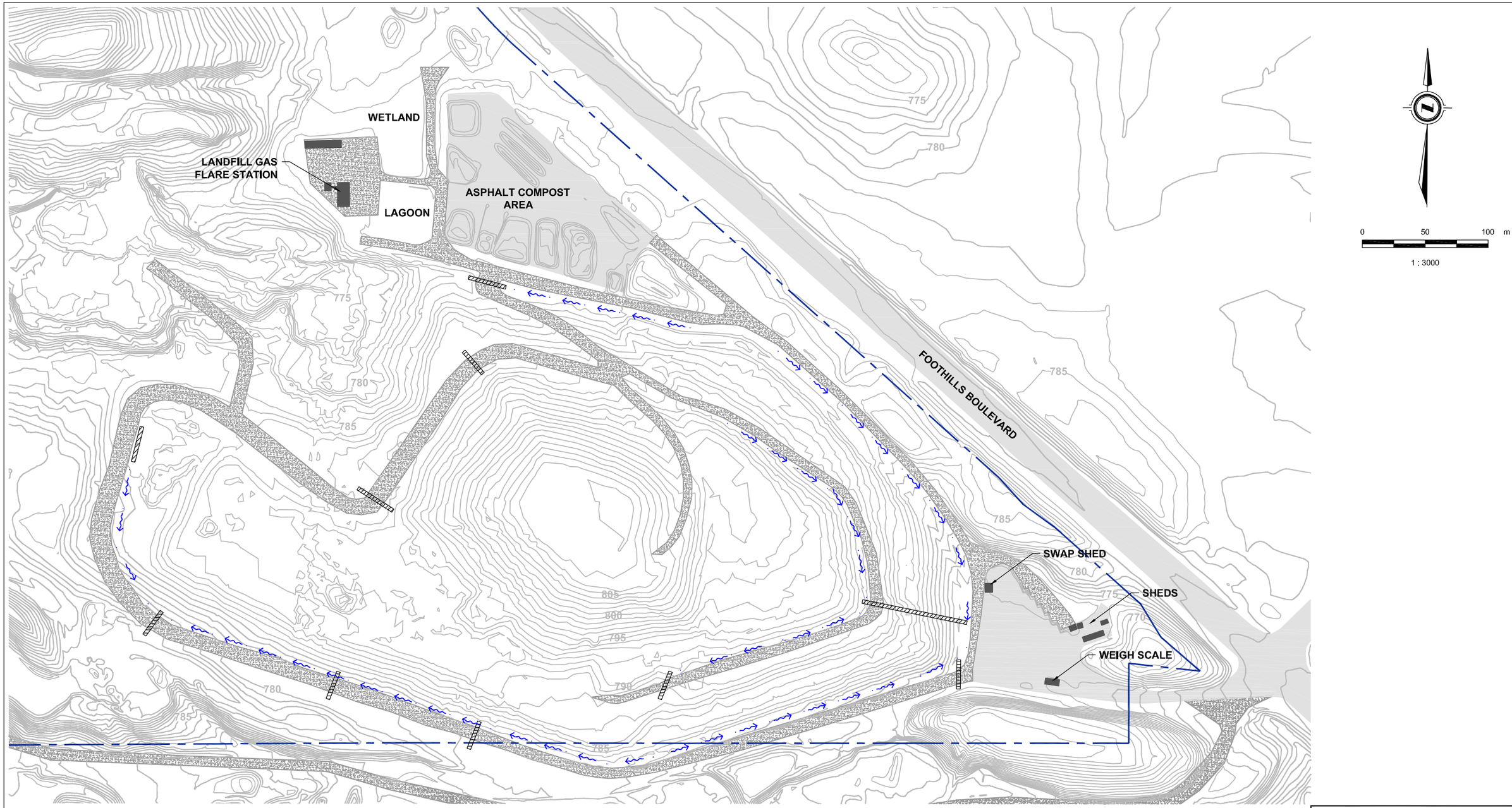

LEGEND

- PROPERTY BOUNDARY
- CONTOURS (770)
- ASPHALT ROAD
- GRAVEL ROAD
- BUILDING
- CULVERT
- SURFACE WATERCOURSE

(file: R424280107002FIG1-3.dwg)

EXISTING CONDITIONS

INTEGRATED LANDFILL MANAGEMENT PLAN
FOOTHILLS BOULEVARD REGIONAL LANDFILL
REGIONAL DISTRICT OF FRASER-FORT GEORGE

XCG CONSULTANTS LTD.

DATE	JOB NO.	FIGURE NO.
FEB 2010	4-2428-01-07	1.3

NORTH STORMWATER MANAGEMENT POND

CELL 2

ASPHALT COMPOST AREA

LANDFILL GAS FLARE STATION

ASPHALT COMPOST AREA

FOOTHILLS BOULEVARD

SURFACE WATER DOWN-CHUTE

CELL 1

SOUTHEAST RUNOFF DETENTION POND

SOUTHWEST STORMWATER MANAGEMENT POND

0 100 200 m

1 : 4000

LEGEND

- PROPERTY BOUNDARY
- CONTOURS (770)
- ASPHALT ROAD
- GRAVEL ROAD
- BUILDING
- CULVERT
- SURFACE WATERCOURSE
- GRAVITY MAIN (GM)
- CATCHBASIN

(file: R424280107002FIG5-1.dwg)

PROPOSED FINAL CONTOURS

INTEGRATED LANDFILL MANAGEMENT PLAN
FOOTHILLS BOULEVARD REGIONAL LANDFILL
REGIONAL DISTRICT OF FRASER-FORT GEORGE

XCG CONSULTANTS LTD.

DATE	JOB NO.	FIGURE NO.
FEB 2010	4-2428-01-07	5.1

WETLAND

LANDFILL GAS FLARE STATION

LAGOON

106
1.70 HA

ASPHALT COMPOST AREA

105
1.38 HA

103
2.52 HA

101
8.28 HA

102
5.51 HA

FOOTHILLS BOULEVARD

SWAP SHED

SHEDS

104
2.29 HA

WEIGH SCALE

775 780 785 790 795 800 805

0 50 100 m

1 : 3000

LEGEND

- PROPERTY BOUNDARY
- 770 EXISTING CONTOURS
- EXISTING ASPHALT ROAD
- EXISTING GRAVEL ROAD
- EXISTING BUILDING
- EXISTING CULVERT
- EXISTING SURFACE WATERCOURSE
- 101 8.28 HA SUBCATCHMENT

(file: R42428010700 2FIG7-1.dwg)

EXISTING SUBCATCHMENTS

INTEGRATED LANDFILL MANAGEMENT PLAN
FOOTHILLS BOULEVARD REGIONAL LANDFILL
REGIONAL DISTRICT OF FRASER-FORT GEORGE

XCG CONSULTANTS LTD.

DATE	JOB NO.	FIGURE NO.
FEB 2010	4-2428-01-07	7.1

205
18.72 HA

207
2.00 HA

ASPHALT COMPOST AREA

LANDFILL GAS FLARE STATION

ASPHALT COMPOST AREA

206
1.70 HA

FOOTHILLS BOULEVARD

203
2.04 HA

201
13.60 HA

202
6.81 HA

204
2.29 HA

SOUTHWEST STORMWATER MANAGEMENT POND

SOUTHEAST RUNOFF RETENTION POND

N

0 100 200 m

1 : 4000

LEGEND

- PROPERTY BOUNDARY
- EXISTING CONTOURS (770)
- EXISTING ASPHALT ROAD
- EXISTING GRAVEL ROAD
- EXISTING BUILDING
- EXISTING CULVERT
- EXISTING SURFACE WATERCOURSE
- SUBCATCHMENT (101 / 0.28 HA)
- EXISTING GRAVITY MAIN (GM)
- EXISTING CATCHBASIN

(file: R424280107002FIG7-2.dwg)

POST DEVELOPMENT SUBCATCHMENTS

INTEGRATED LANDFILL MANAGEMENT PLAN
FOOTHILLS BOULEVARD REGIONAL LANDFILL
REGIONAL DISTRICT OF FRASER-FORT GEORGE

XCG CONSULTANTS LTD.

DATE	JOB NO.	FIGURE NO.
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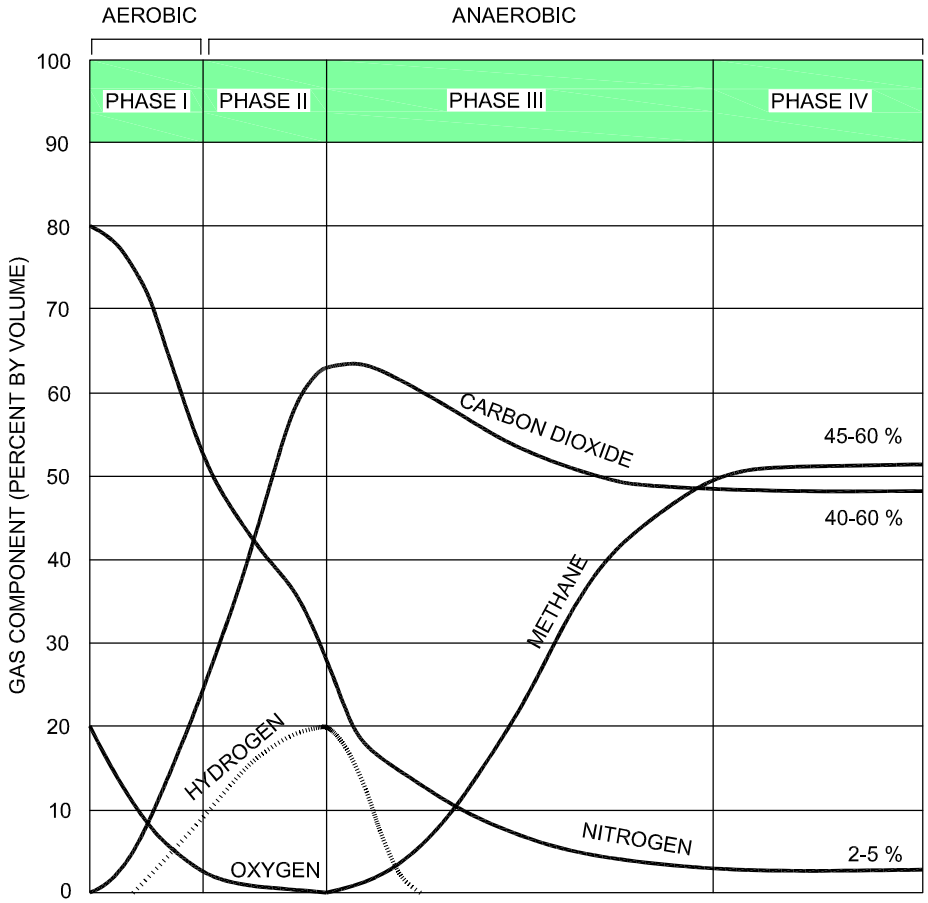


SOURCE: US EPA, 1997.

LFG PRODUCTION PHASES

INTEGRATED LANDFILL MANAGEMENT PLAN
FOOTHILLS BOULEVARD REGIONAL LANDFILL
REGIONAL DISTRICT OF FRASER-FORT GEORGE

XCG CONSULTANTS LTD.

DATE	JOB NO.	FIGURE NO.
FEB 2010	4-2428-01-07	9.1

(file: R424280107002FIG9-1.dwg)

0 500 1000 m

1 : 20000

LEGEND

APPROXIMATE PROPERTY BOUNDARY

MW94-6 APPROXIMATE GROUNDWATER MONITORING WELL LOCATION

PR-MW-01 PROPOSED GROUNDWATER MONITORING WELL LOCATION

(file: R424280107002FIG12-1.dwg)

GROUNDWATER MONITORING LOCATIONS

INTEGRATED LANDFILL MANAGEMENT PLAN
FOOTHILLS BOULEVARD REGIONAL LANDFILL
REGIONAL DISTRICT OF FRASER-FORT GEORGE

XCG CONSULTANTS LTD.

DATE	JOB NO.	FIGURE NO.
FEB 2010	4-2428-01-07	12.1

EX-GP-99-5

WETLAND

LANDFILL GAS FLARE STATION

PR-GP-06

LAGOON

ASPHALT COMPOST AREA

EX-GP-99-4

EX-GP-99-3

FOOTHILLS BOULEVARD

EX-GP-99-2

SWAP SHED

PR-GP-07

PR-GP-08

SHEDS

EX-GP-99-1

WEIGH SCALE

775 780 785 805 800 795 790 770

N

0 50 100 m

1 : 3000

LEGEND

- PROPERTY BOUNDARY
- 770 CONTOURS
- ASPHALT ROAD
- GRAVEL ROAD
- BUILDING
- ▲ EX-GP-99-1 EXISTING SOIL GAS PROBE
- ▲ PR-GP-06 PROPOSED SOIL GAS PROBE

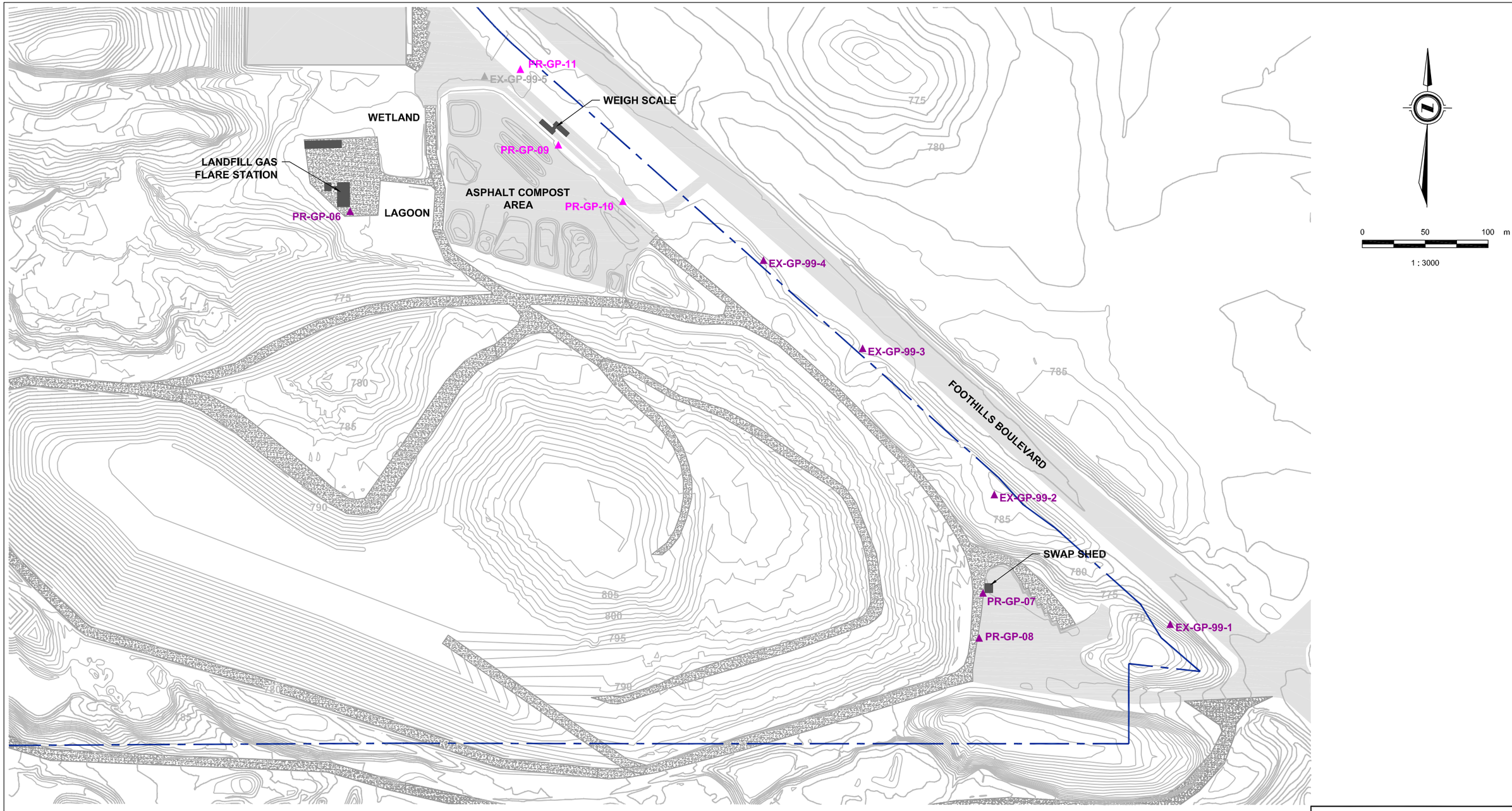
(file: R424280107002FIG12-2.dwg)

SOIL GAS MONITORING LOCATIONS

INTEGRATED LANDFILL MANAGEMENT PLAN
FOOTHILLS BOULEVARD REGIONAL LANDFILL
REGIONAL DISTRICT OF FRASER-FORT GEORGE

XCG CONSULTANTS LTD.

DATE	JOB NO.	FIGURE NO.
FEB 2010	4-2428-01-07	12.2



LEGEND

- PROPERTY BOUNDARY
- 770 CONTOURS
- ASPHALT ROAD
- GRAVEL ROAD
- BUILDING

- ▲ EX-GP-99-1 EXISTING SOIL GAS PROBE
- ▲ PR-GP-06 PROPOSED SOIL GAS PROBE
- ▲ PR-GP-99-5 DECOMMISSIONED SOIL GAS PROBE

(file: R424280107002FIG12-3.dwg)

STAGE C SOIL GAS MONITORING LOCATIONS

INTEGRATED LANDFILL MANAGEMENT PLAN
FOOTHILLS BOULEVARD REGIONAL LANDFILL
REGIONAL DISTRICT OF FRASER-FORT GEORGE

XCG CONSULTANTS LTD.

DATE	JOB NO.	FIGURE NO.
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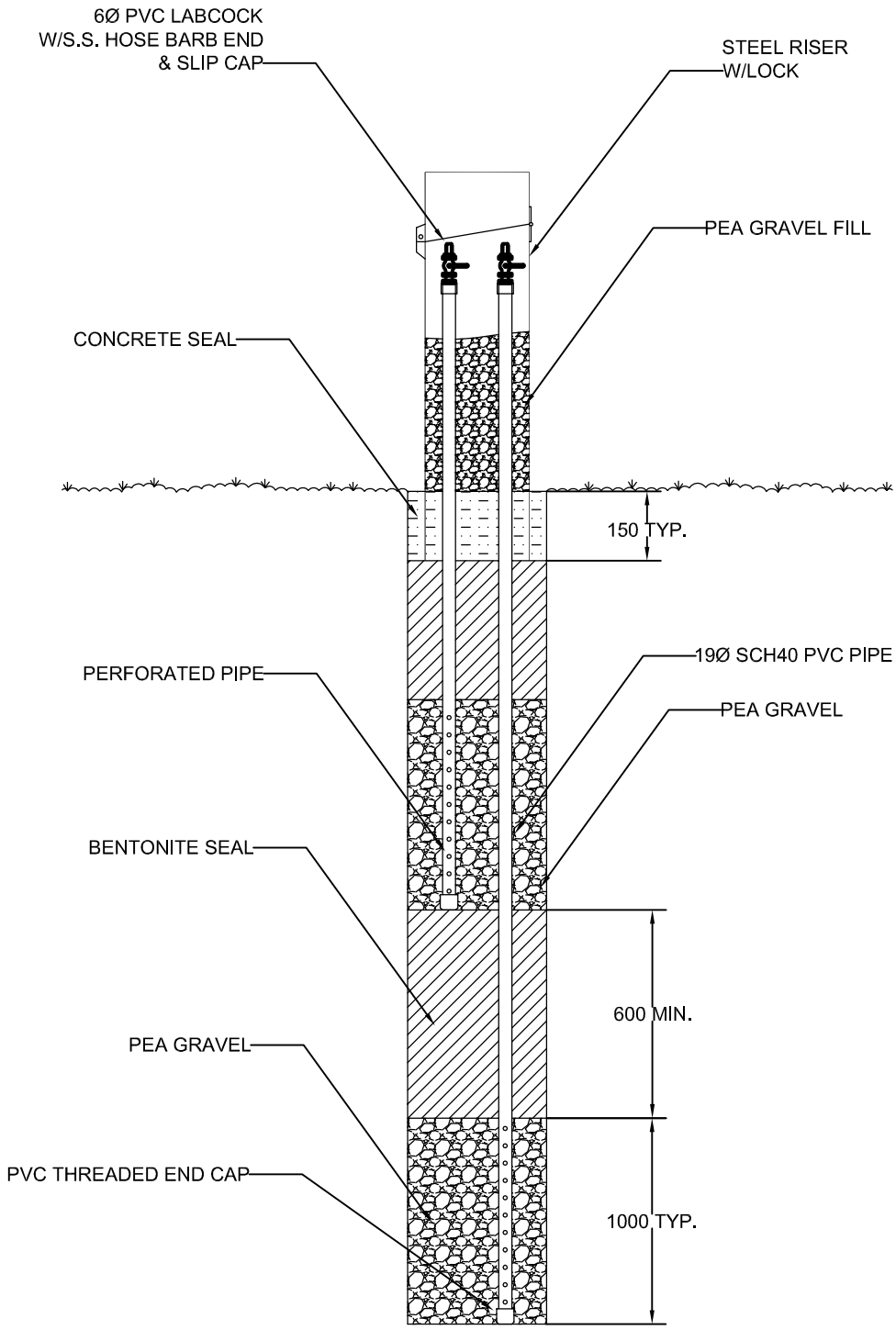


TYPICAL SOIL GAS PROBE DETAIL

INTEGRATED LANDFILL MANAGEMENT PLAN
FOOTHILLS BOULEVARD REGIONAL LANDFILL
REGIONAL DISTRICT OF FRASER-FORT GEORGE

XCG CONSULTANTS LTD.

DATE	JOB NO.	FIGURE NO.
FEB 2010	4-2428-01-07	12.4

(file: R424280107002FIG12-4.dwg)

DRAWINGS

KEY MAP

SCALE 1:10000

DRAWING INDEX

SHEET	REV. #	DATE	TITLE
D-1	0	FEB. 2010	EXISTING CONDITIONS
D-2	0	FEB. 2010	EXISTING CONDITIONS - UNDERGROUND PIPING
D-3	0	FEB. 2010	STAGE A FILLING
D-4	0	FEB. 2010	STAGE B FILLING
D-5	0	FEB. 2010	STAGE C FILLING
D-6	0	FEB. 2010	STAGE D FILLING
D-7	0	FEB. 2010	STAGE E FILLING
D-8	0	FEB. 2010	STAGE F FILLING
D-9	0	FEB. 2010	STAGE G FILLING
D-10	0	FEB. 2010	STAGE H FILLING
D-11	0	FEB. 2010	STAGE I FILLING
D-12	0	FEB. 2010	STAGE J FILLING
D-13	0	FEB. 2010	STAGE K FILLING
D-14	0	FEB. 2010	STAGE L FILLING
D-15	0	FEB. 2010	STAGE M FILLING
D-16	0	FEB. 2010	STAGE N FILLING
D-17	0	FEB. 2010	FINAL LANDFILL GAS SYSTEM
D-18	0	FEB. 2010	FINAL CONTOURS
D-19	0	FEB. 2010	CELL 2 - BASE CONTOURS
D-20	0	FEB. 2010	CELL 2 - FINAL CONTOURS
D-21	0	FEB. 2010	DETAILS I
D-22	0	FEB. 2010	DETAILS II
D-23	0	FEB. 2010	DETAILS III

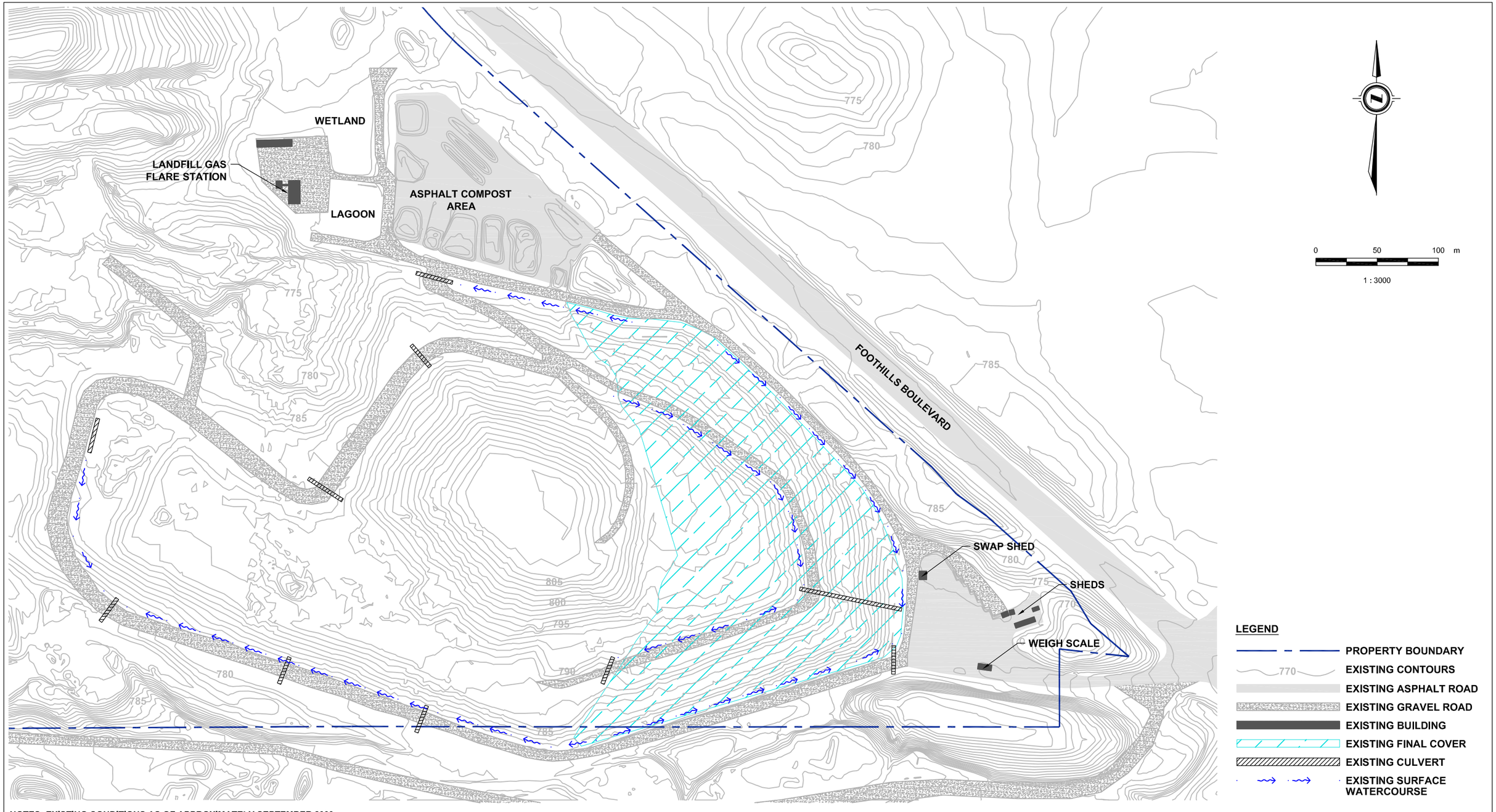
INTEGRATED LANDFILL MANAGEMENT PLAN FOOTHILLS BOULEVARD LANDFILL PRINCE-GEORGE, BRITISH COLUMBIA

REGIONAL DISTRICT OF FRASER-FORT GEORGE

XCG CONSULTANTS LTD.

REGIONAL DISTRICT of Fraser-Fort George

(file: R224280107002DWG00.dwg)



NOTES: EXISTING CONDITIONS AS OF APPROXIMATELY SEPTEMBER 2009.

(file: R42428107002DWG01.dwg)

REVISIONS

REV	DESCRIPTION	DATE	APPROVED
0	ISSUED FOR REVIEW	FEB. 2010	M. LEFEBVRE

INTEGRATED LANDFILL MANAGEMENT PLAN

FOOTHILLS BOULEVARD REGIONAL LANDFILL

REGIONAL DISTRICT OF FRASER-FORT GEORGE

VERIFY SCALE

BAR IS 10 mm ON ORIGINAL DRAWING.
0 ■ 10 mm
IF NOT 10 mm ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

EXISTING CONDITIONS

XCG CONSULTANTS LTD.

Date:	Location:	Rev.
FEBRUARY 2010	PRINCE-GEORGE, B.C.	0

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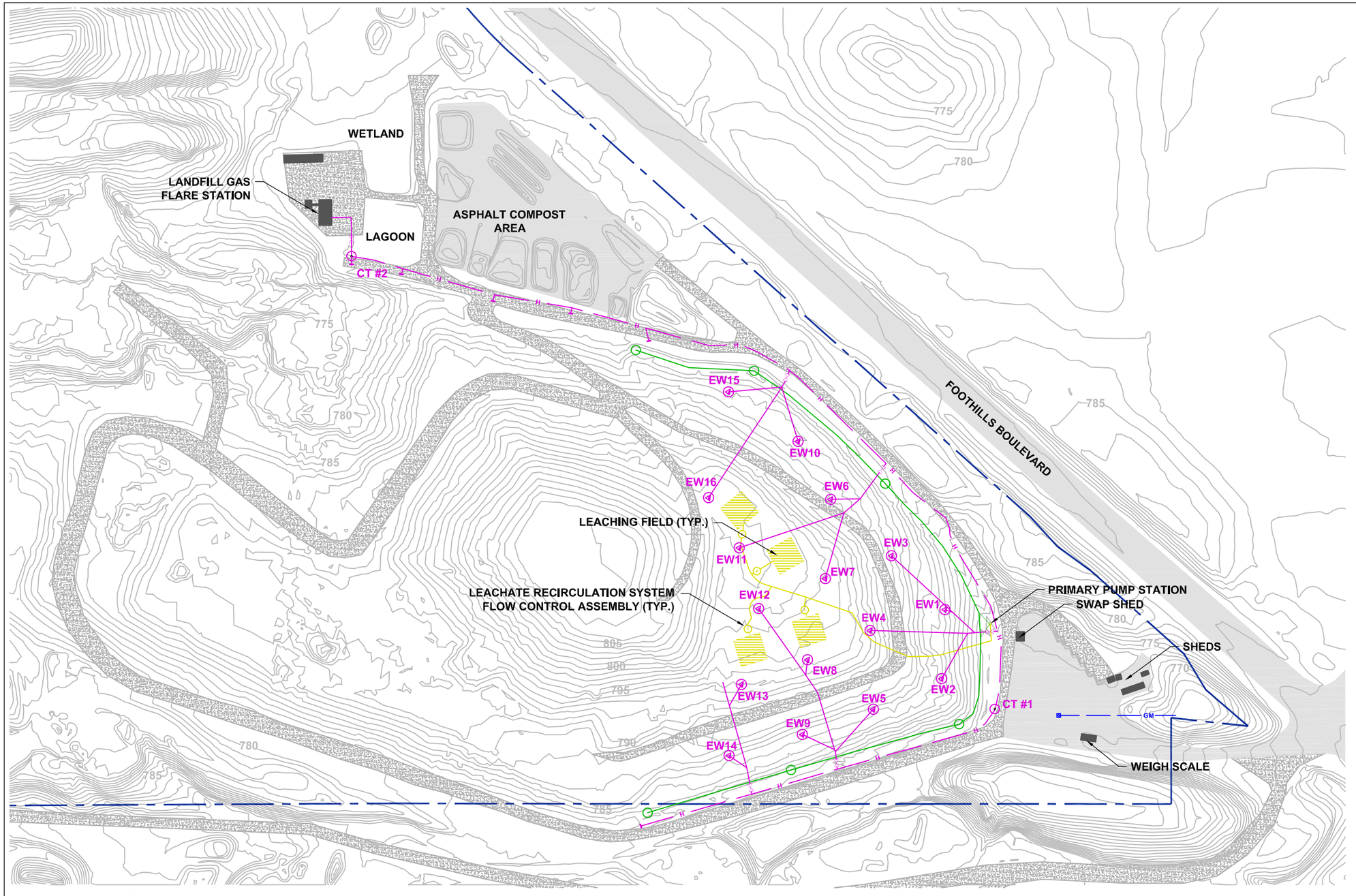

0 50 100 m

1 : 3000

LEGEND

- PROPERTY BOUNDARY
- EXISTING CONTOURS
- EXISTING ASPHALT ROAD
- EXISTING GRAVEL ROAD
- EXISTING BUILDING
- EXISTING GRAVITY MAIN
- EXISTING CATCHBASIN
- EXISTING LEACHATE COLLECTION
- EXISTING LEACHATE MANHOLE
- EXISTING LEACHATE RECIRCULATION
- EXISTING LFG HEADER
- EXISTING LFG LATERAL
- EXISTING LFG EXTRACTION WELL
- EXISTING LFG CONDENSATE TRAP

NOTES: EXISTING CONDITIONS AS OF APPROXIMATELY SEPTEMBER 2009.

(file: R424280107002DWG02.dwg)

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
0	ISSUED FOR REVIEW	FEB. 2010	M. LEFEBVRE

INTEGRATED LANDFILL MANAGEMENT PLAN

FOOTHILLS BOULEVARD REGIONAL LANDFILL

REGIONAL DISTRICT OF FRASER-FORT GEORGE

VERIFY SCALE

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0 10 mm
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EXISTING CONDITIONS - UNDERGROUND PIPING

XCG CONSULTANTS LTD.

Date:	Location:	Rev.
FEBRUARY 2010	PRINCE-GEORGE, B.C.	0

Scale:		Sheet:
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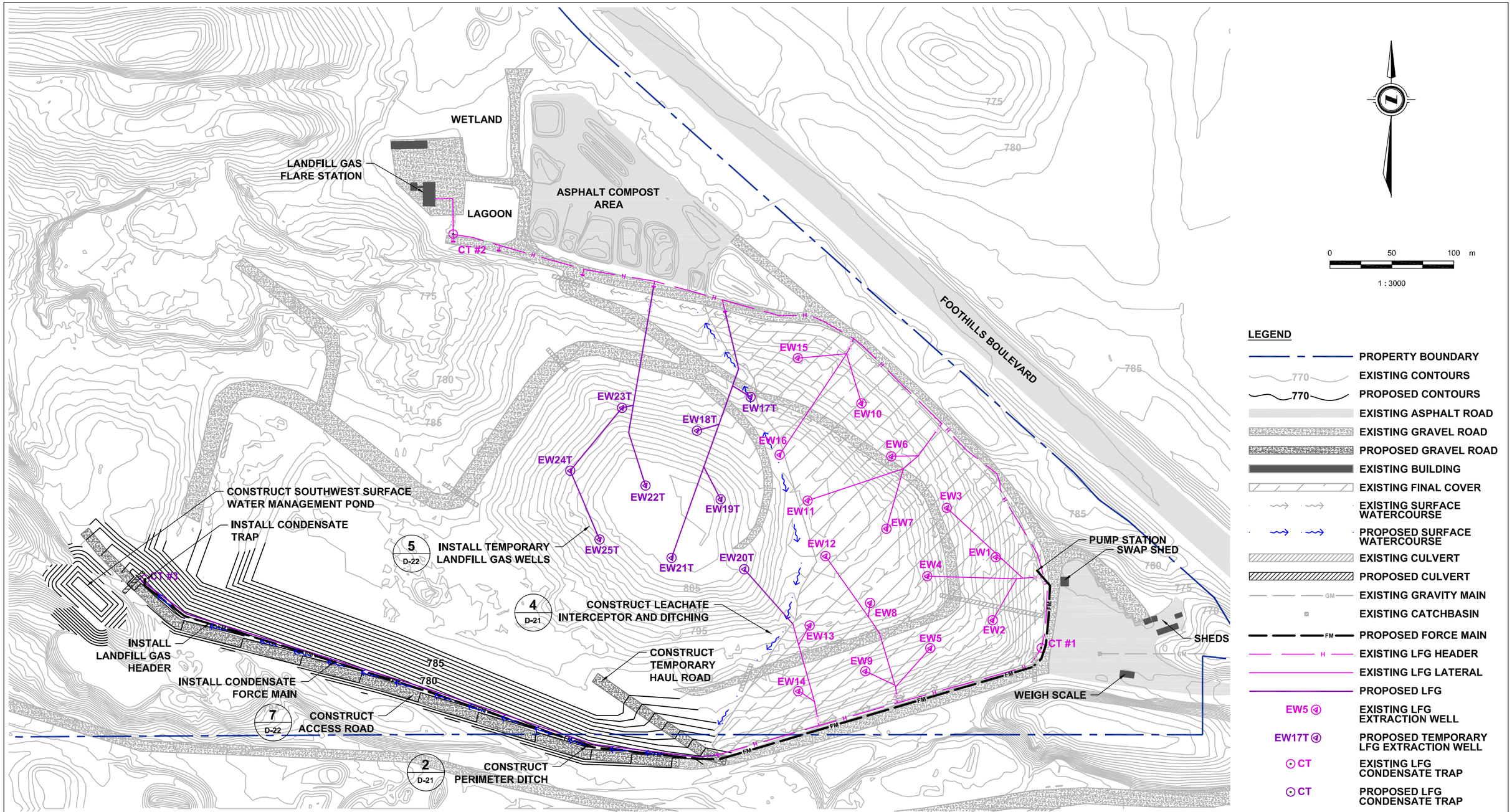

NOTES: EXISTING CONDITIONS AS OF APPROXIMATELY SEPTEMBER 2009.

(file: R42428010700 2DWG03.dwg)

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
0	ISSUED FOR REVIEW	FEB. 2010	M. LEFEBVRE

INTEGRATED LANDFILL MANAGEMENT PLAN

FOOTHILLS BOULEVARD REGIONAL LANDFILL

REGIONAL DISTRICT OF FRASER-FORT GEORGE

VERIFY SCALE

BAR IS 10 mm ON ORIGINAL DRAWING.
0 10 mm
IF NOT 10 mm ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

STAGE A FILLING

XCG CONSULTANTS LTD.

Date:	Location:	Rev.
FEBRUARY 2010	PRINCE-GEORGE, B.C.	0
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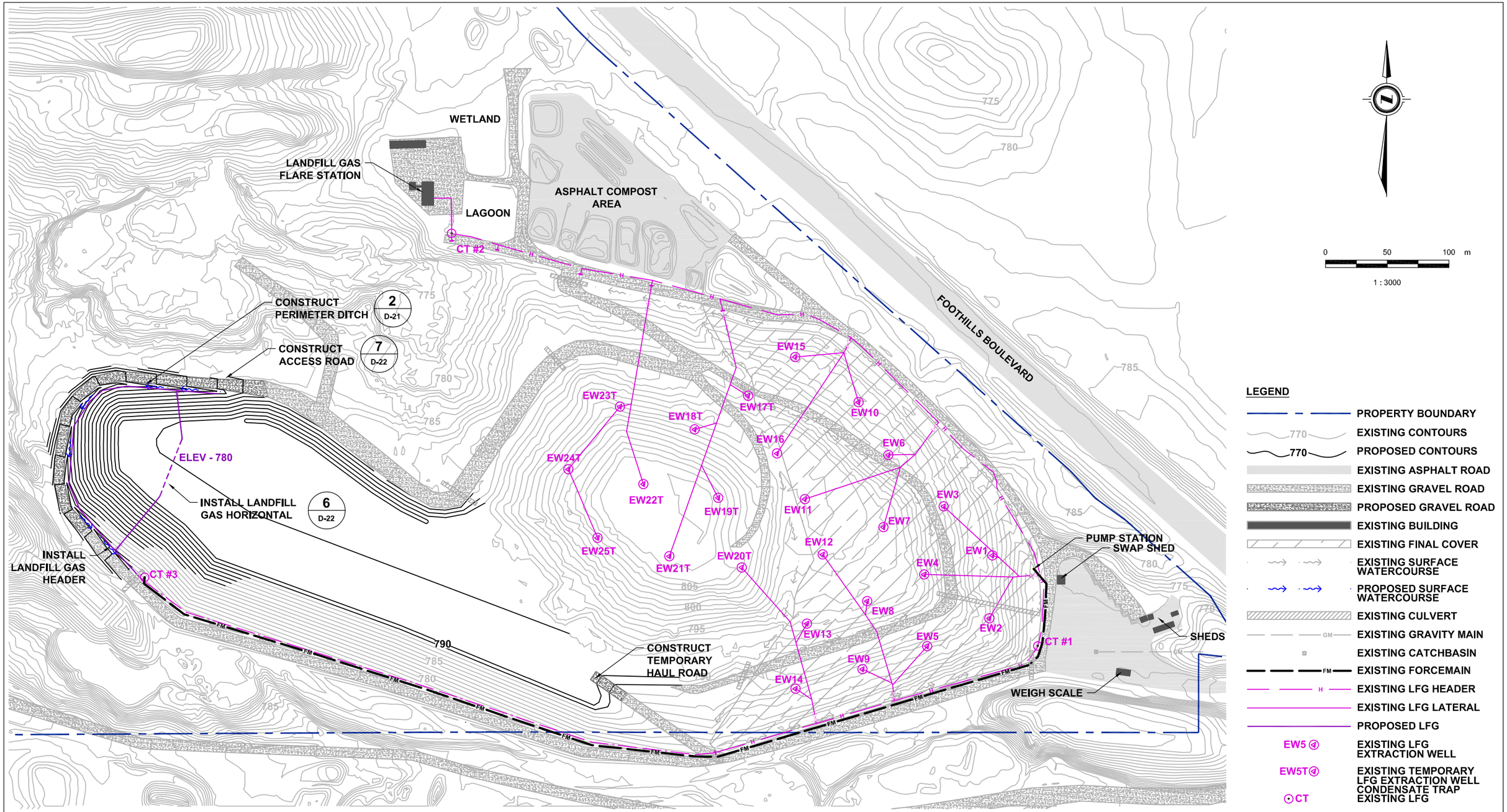

NOTES: EXISTING CONDITIONS AS OF APPROXIMATELY SEPTEMBER 2009.

(file: R424280107002DWG04.dwg)

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
0	ISSUED FOR REVIEW	FEB. 2010	M. LEFEBVRE

INTEGRATED LANDFILL MANAGEMENT PLAN

FOOTHILLS BOULEVARD REGIONAL LANDFILL

REGIONAL DISTRICT OF FRASER-FORT GEORGE

VERIFY SCALE

BAR IS 10 mm ON ORIGINAL DRAWING.
0 ▬ 10 mm
IF NOT 10 mm ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

STAGE B FILLING

XCG CONSULTANTS LTD.

Date:	Location:	Rev.
FEBRUARY 2010	PRINCE-GEORGE, B.C.	0

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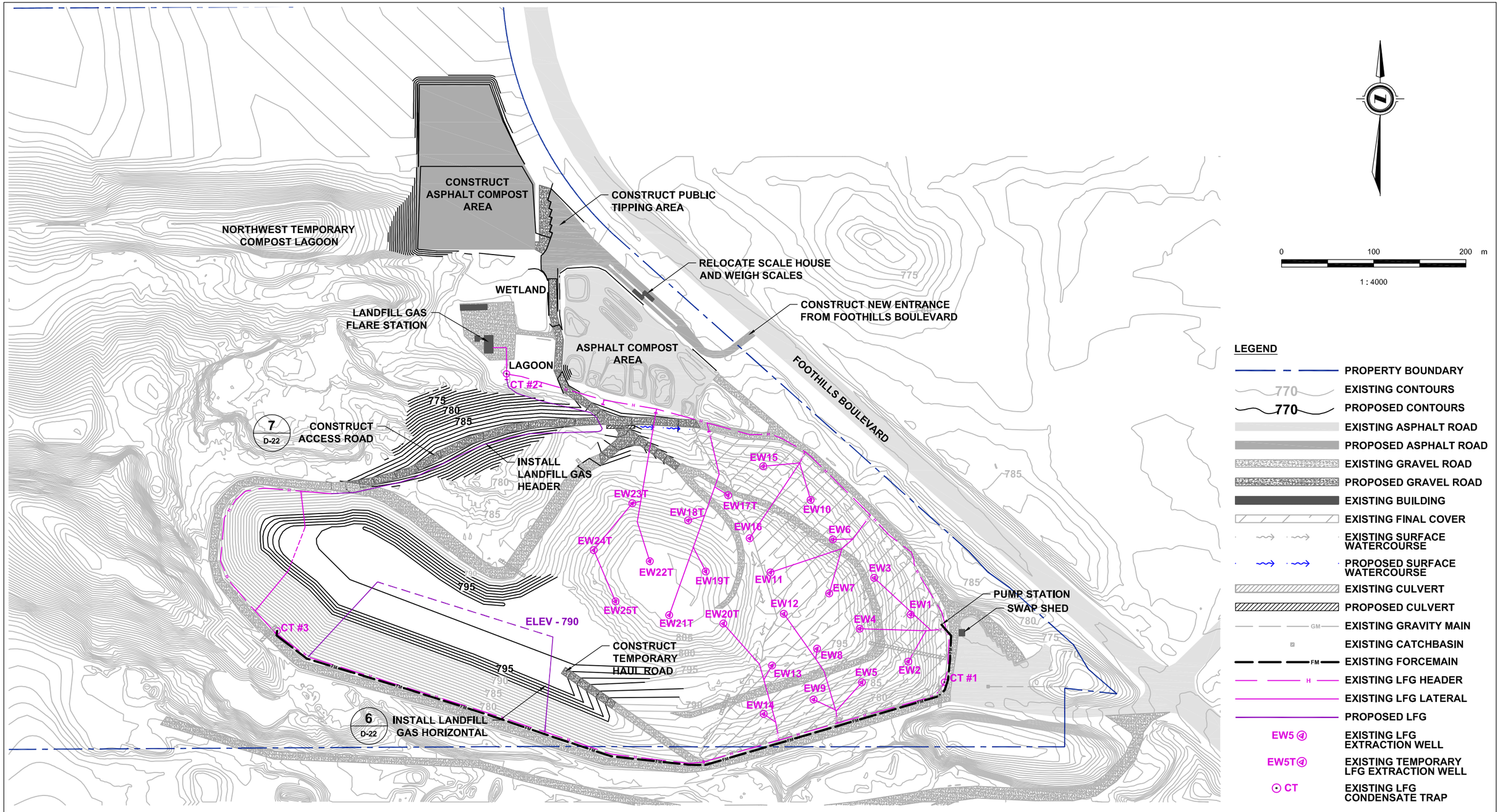

NOTES: EXISTING CONDITIONS AS OF APPROXIMATELY SEPTEMBER 2009.

(file: R42428010700 2DWG05.dwg)

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
0	ISSUED FOR REVIEW	FEB. 2010	M. LEFEBVRE

INTEGRATED LANDFILL MANAGEMENT PLAN

FOOTHILLS BOULEVARD REGIONAL LANDFILL

REGIONAL DISTRICT OF FRASER-FORT GEORGE

VERIFY SCALE

BAR IS 10 mm ON ORIGINAL DRAWING.
0 ■■■■■ 10 mm
IF NOT 10 mm ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

STAGE C FILLING

XCG CONSULTANTS LTD.

Date:	Location:	Rev.
FEBRUARY 2010	PRINCE-GEORGE, B.C.	0

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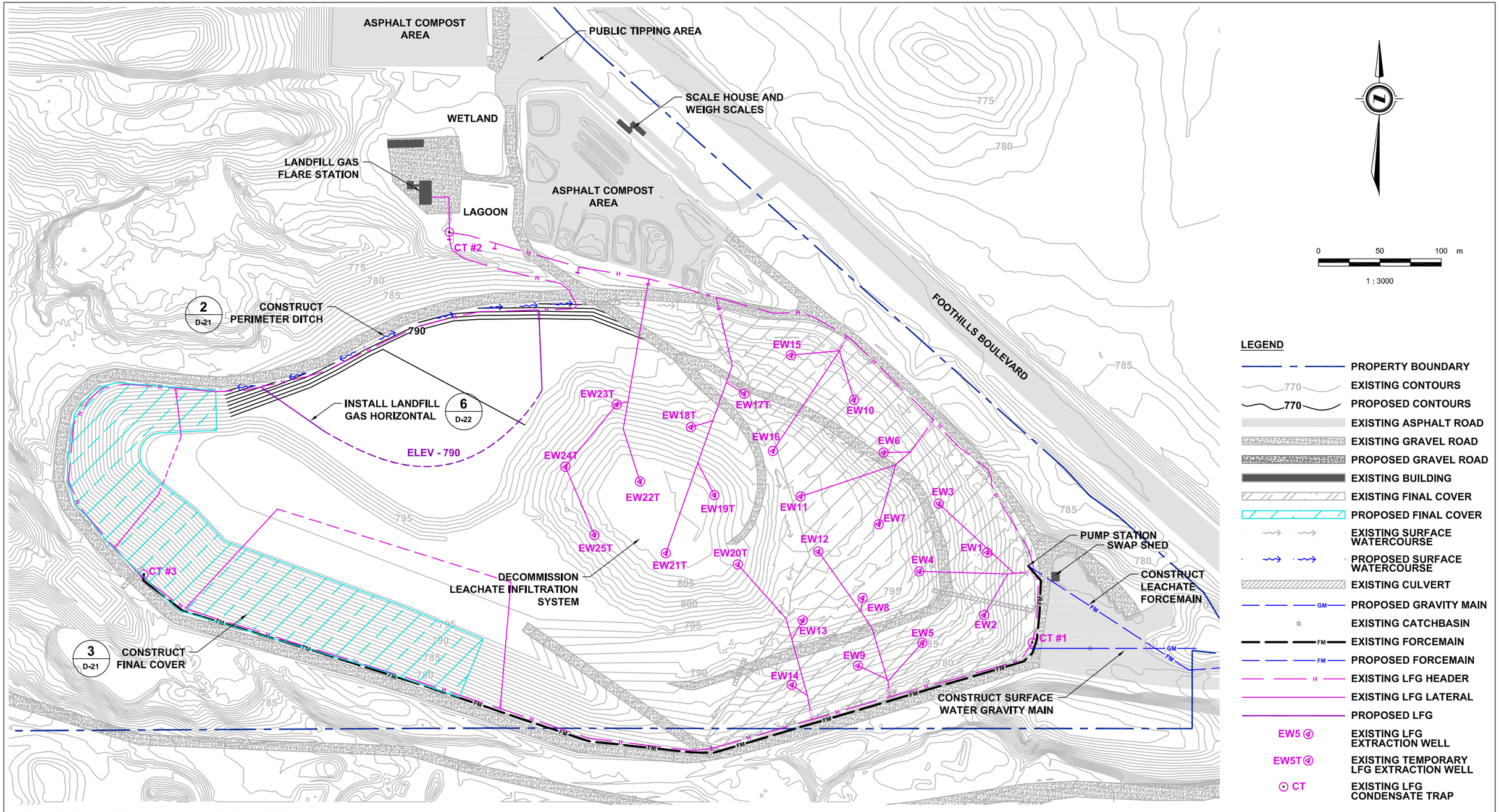

NOTES: EXISTING CONDITIONS AS OF APPROXIMATELY SEPTEMBER 2009.

(file: R42428107002DWG06.dwg)

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
0	ISSUED FOR REVIEW	FEB. 2010	M. LEFEBVRE

INTEGRATED LANDFILL MANAGEMENT PLAN

FOOTHILLS BOULEVARD REGIONAL LANDFILL

REGIONAL DISTRICT OF FRASER-FORT GEORGE

VERIFY SCALE

BAR IS 10 mm ON ORIGINAL DRAWING.
0 ▬ 10 mm
IF NOT 10 mm ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

STAGE D FILLING

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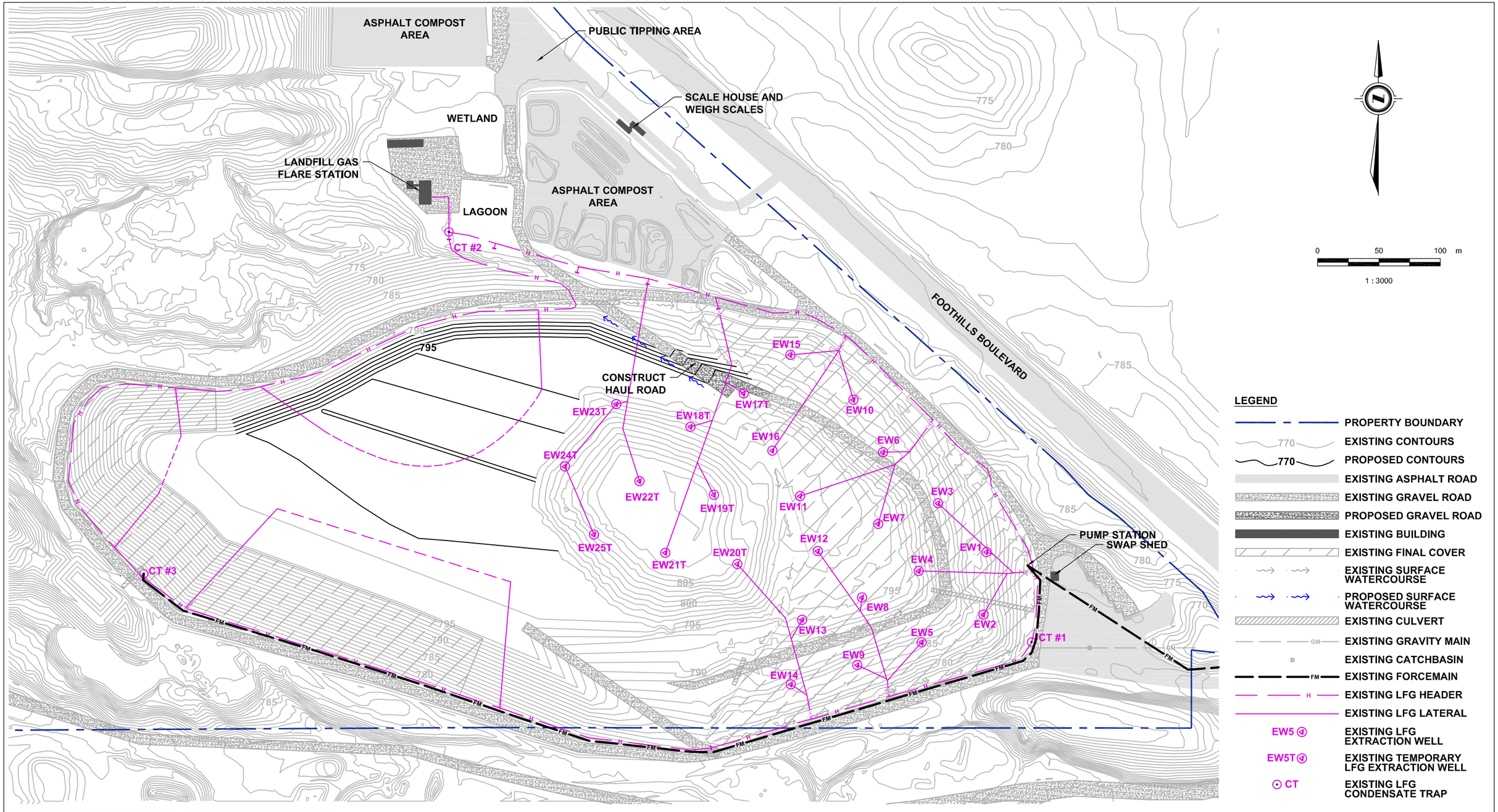
Scale: 1 : 3000 | 4-2428-01-07 | Sheet: D-6



NOTES: EXISTING CONDITIONS AS OF APPROXIMATELY SEPTEMBER 2009.

(file: R42428010700 2DWG07.dwg)

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
0	ISSUED FOR REVIEW	FEB. 2010	M. LEFEBVRE

INTEGRATED LANDFILL MANAGEMENT PLAN

FOOTHILLS BOULEVARD REGIONAL LANDFILL

REGIONAL DISTRICT OF FRASER-FORT GEORGE

VERIFY SCALE

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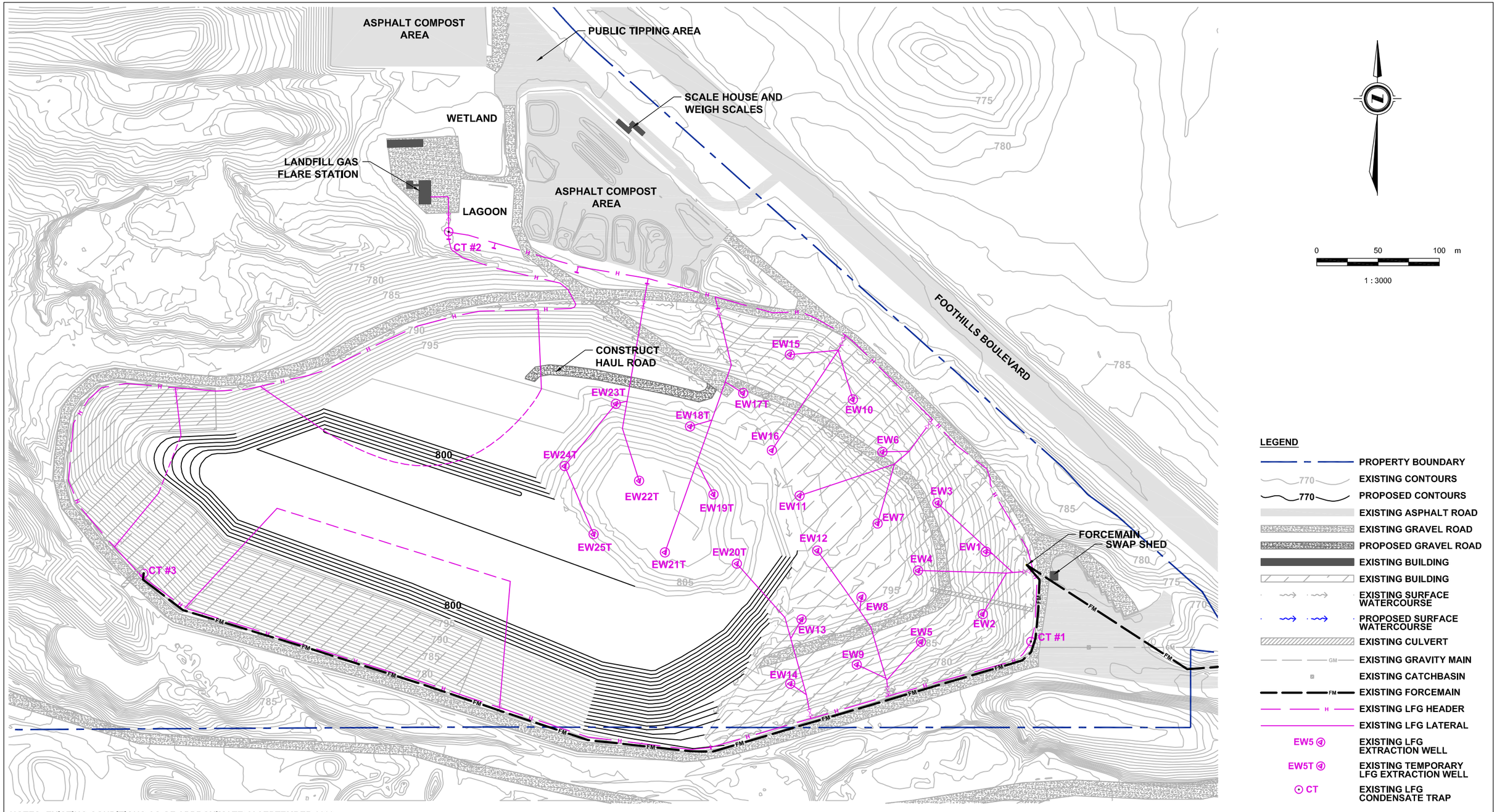
STAGE E FILLING

XCG CONSULTANTS LTD.

Date:	Location:	Rev.
FEBRUARY 2010	PRINCE-GEORGE, B.C.	0

Scale:		Sheet:
1 : 3000	4-2428-01-07	D-7



NOTES: EXISTING CONDITIONS AS OF APPROXIMATELY SEPTEMBER 2009.

(file: R42428010700 2DWG08.dwg)

REVISIONS

REV	DESCRIPTION	DATE	APPROVED
0	ISSUED FOR REVIEW	FEB. 2010	M. LEFEBVRE

INTEGRATED LANDFILL MANAGEMENT PLAN

FOOTHILLS BOULEVARD REGIONAL LANDFILL

REGIONAL DISTRICT OF FRASER-FORT GEORGE

VERIFY SCALE

BAR IS 10 mm ON ORIGINAL DRAWING.
0 ■■■■■ 10 mm
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STAGE F FILLING

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Date:	Location:	Rev.
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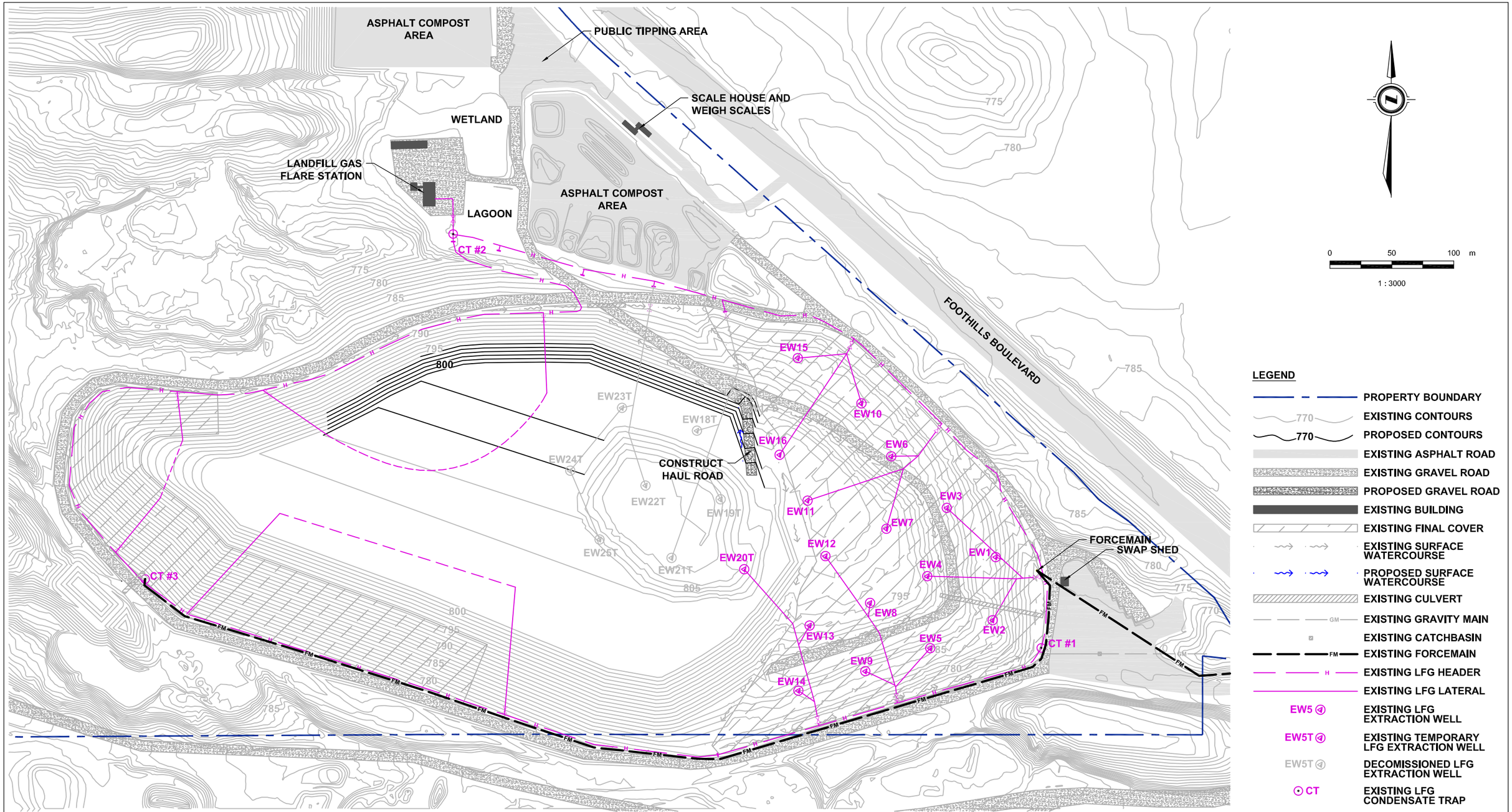
Scale: 1 : 3000 | 4-2428-01-07 | Sheet: D-8



NOTES: EXISTING CONDITIONS AS OF APPROXIMATELY SEPTEMBER 2009.

(file: R42428010700 2DWG09.dwg)

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
0	ISSUED FOR REVIEW	FEB. 2010	M. LEFEBVRE

INTEGRATED LANDFILL MANAGEMENT PLAN

FOOTHILLS BOULEVARD REGIONAL LANDFILL

REGIONAL DISTRICT OF FRASER-FORT GEORGE

VERIFY SCALE

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STAGE G FILLING

XCG CONSULTANTS LTD.

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Scale:		Sheet:
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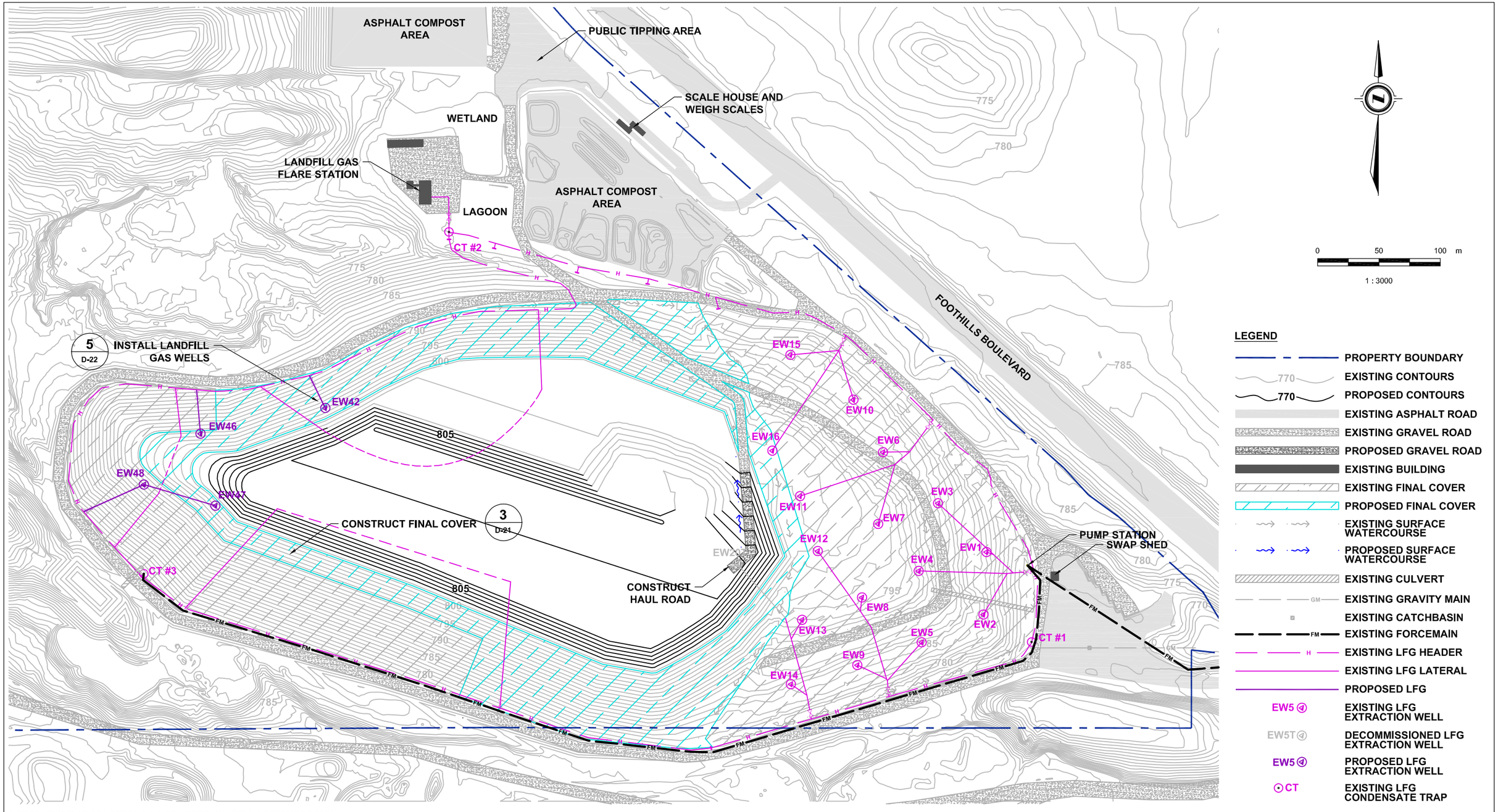

NOTES: EXISTING CONDITIONS AS OF APPROXIMATELY SEPTEMBER 2009.

(file: R424280107002DWG10.dwg)

REVISIONS

REV	DESCRIPTION	DATE	APPROVED
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INTEGRATED LANDFILL MANAGEMENT PLAN

FOOTHILLS BOULEVARD REGIONAL LANDFILL

REGIONAL DISTRICT OF FRASER-FORT GEORGE

VERIFY SCALE

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0 ▬ 10 mm
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STAGE H FILLING

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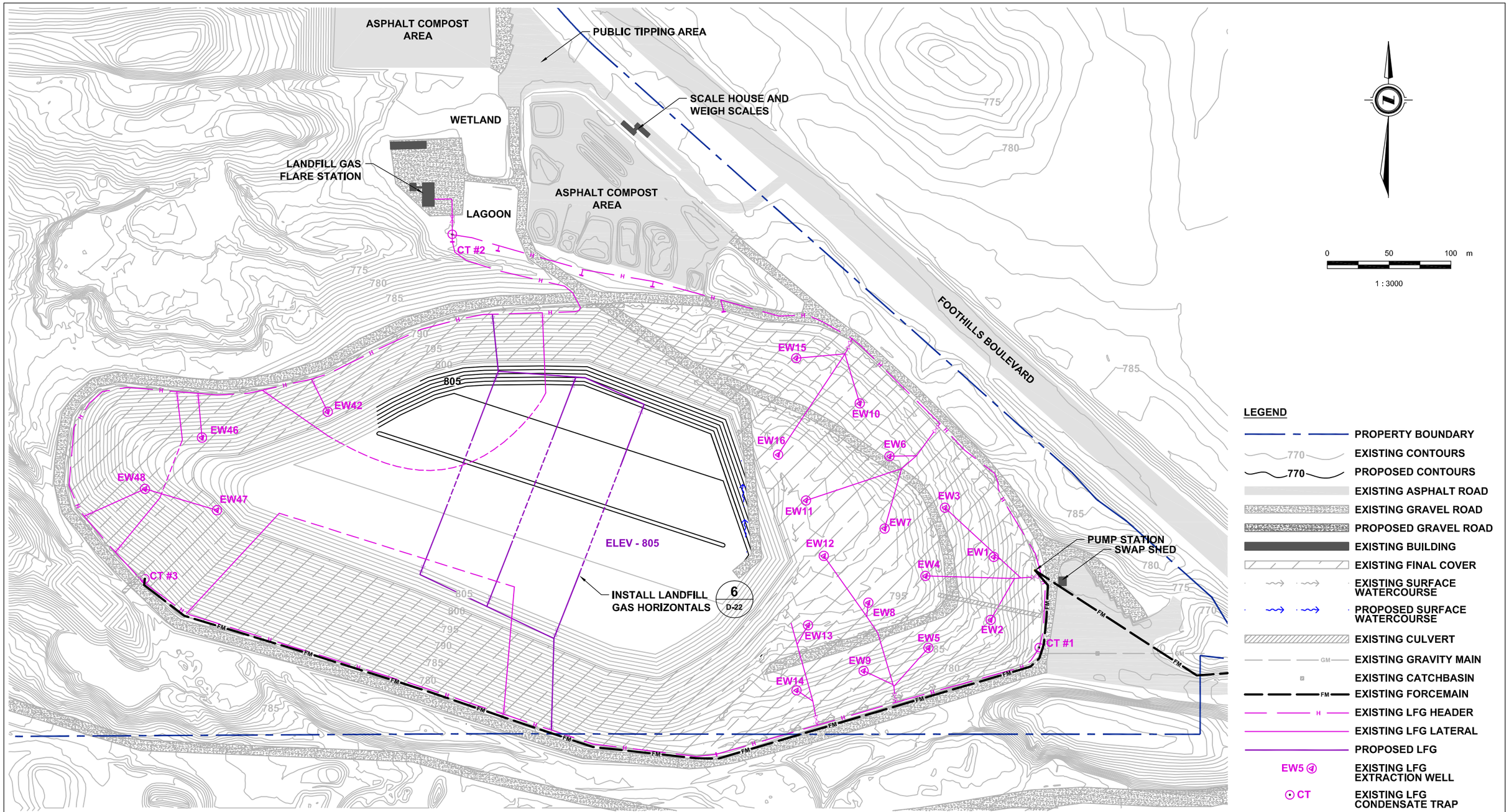
Scale: 1 : 3000 | 4-2428-01-07 | Sheet: D-10



NOTES: EXISTING CONDITIONS AS OF APPROXIMATELY SEPTEMBER 2009.

(file: R424280107002DWG11.dwg)

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
0	ISSUED FOR REVIEW	FEB. 2010	M. LEFEBVRE

INTEGRATED LANDFILL MANAGEMENT PLAN

FOOTHILLS BOULEVARD REGIONAL LANDFILL

REGIONAL DISTRICT OF FRASER-FORT GEORGE

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STAGE I FILLING

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FEBRUARY 2010	PRINCE-GEORGE, B.C.	0

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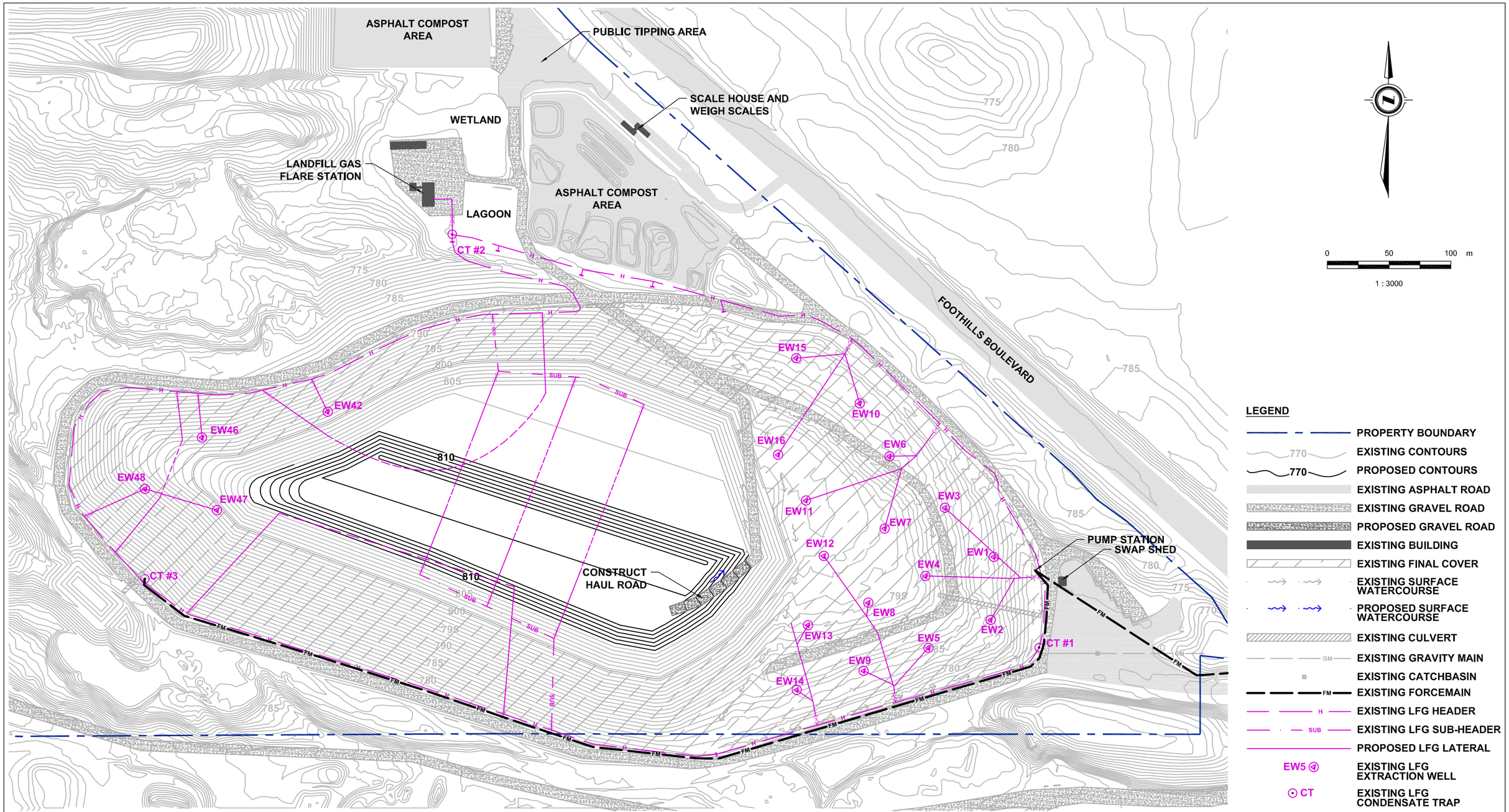

NOTES: EXISTING CONDITIONS AS OF APPROXIMATELY SEPTEMBER 2009.

(file: R424280107002DWG12.dwg)

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
0	ISSUED FOR REVIEW	FEB. 2010	M. LEFEBVRE

INTEGRATED LANDFILL MANAGEMENT PLAN

FOOTHILLS BOULEVARD REGIONAL LANDFILL

REGIONAL DISTRICT OF FRASER-FORT GEORGE

VERIFY SCALE

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STAGE J FILLING

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Date:	Location:	Rev.
FEBRUARY 2010	PRINCE-GEORGE, B.C.	0

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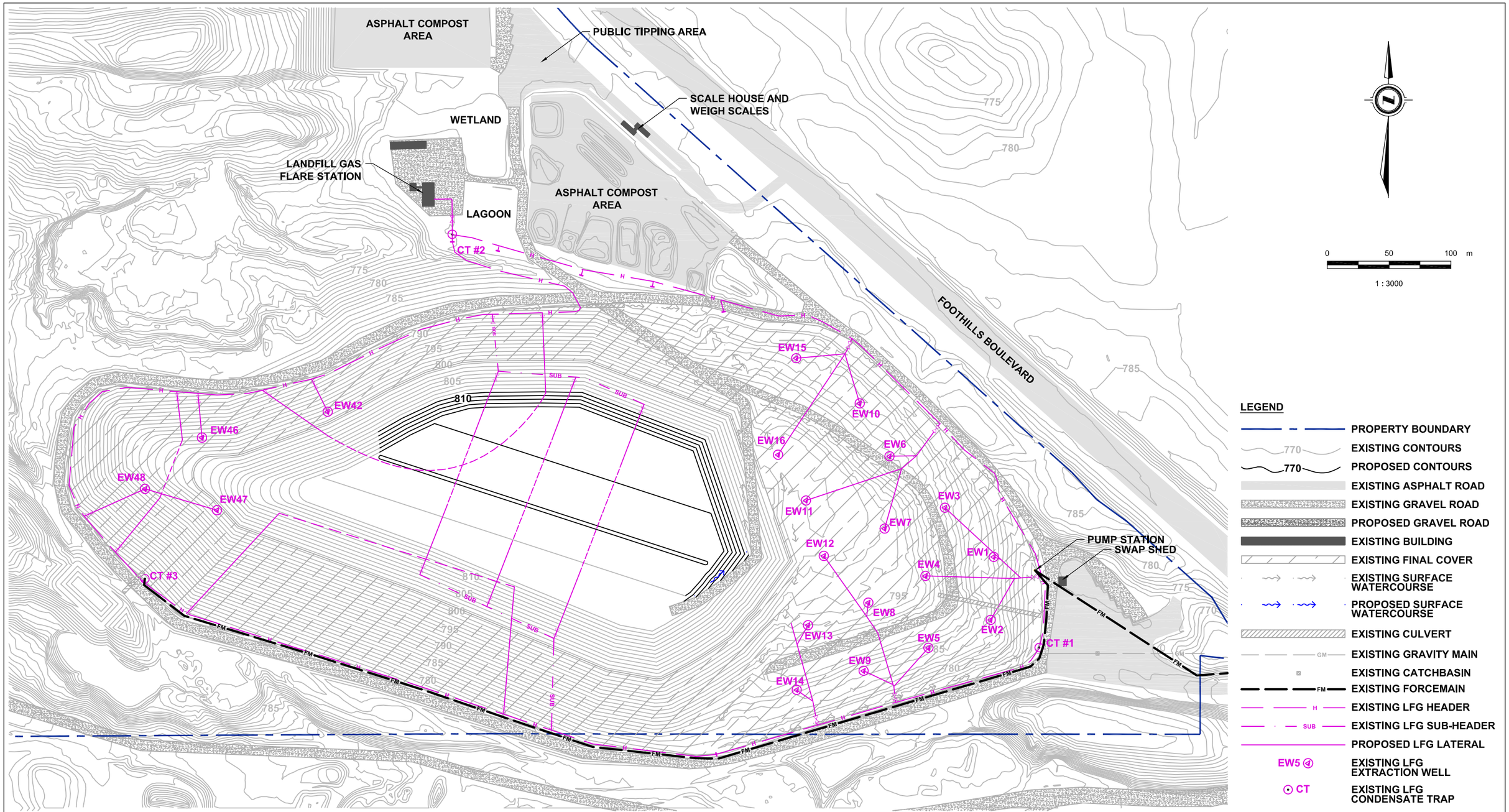
1 : 3000	4-2428-01-07	D-12



NOTES: EXISTING CONDITIONS AS OF APPROXIMATELY SEPTEMBER 2009.

(file: R424280107002DWG13.dwg)

REVISIONS			
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0	ISSUED FOR REVIEW	FEB. 2010	M. LEFEBVRE

INTEGRATED LANDFILL MANAGEMENT PLAN

FOOTHILLS BOULEVARD REGIONAL LANDFILL

REGIONAL DISTRICT OF FRASER-FORT GEORGE

VERIFY SCALE

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STAGE K FILLING

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Date:	Location:	Rev.
FEBRUARY 2010	PRINCE-GEORGE, B.C.	0

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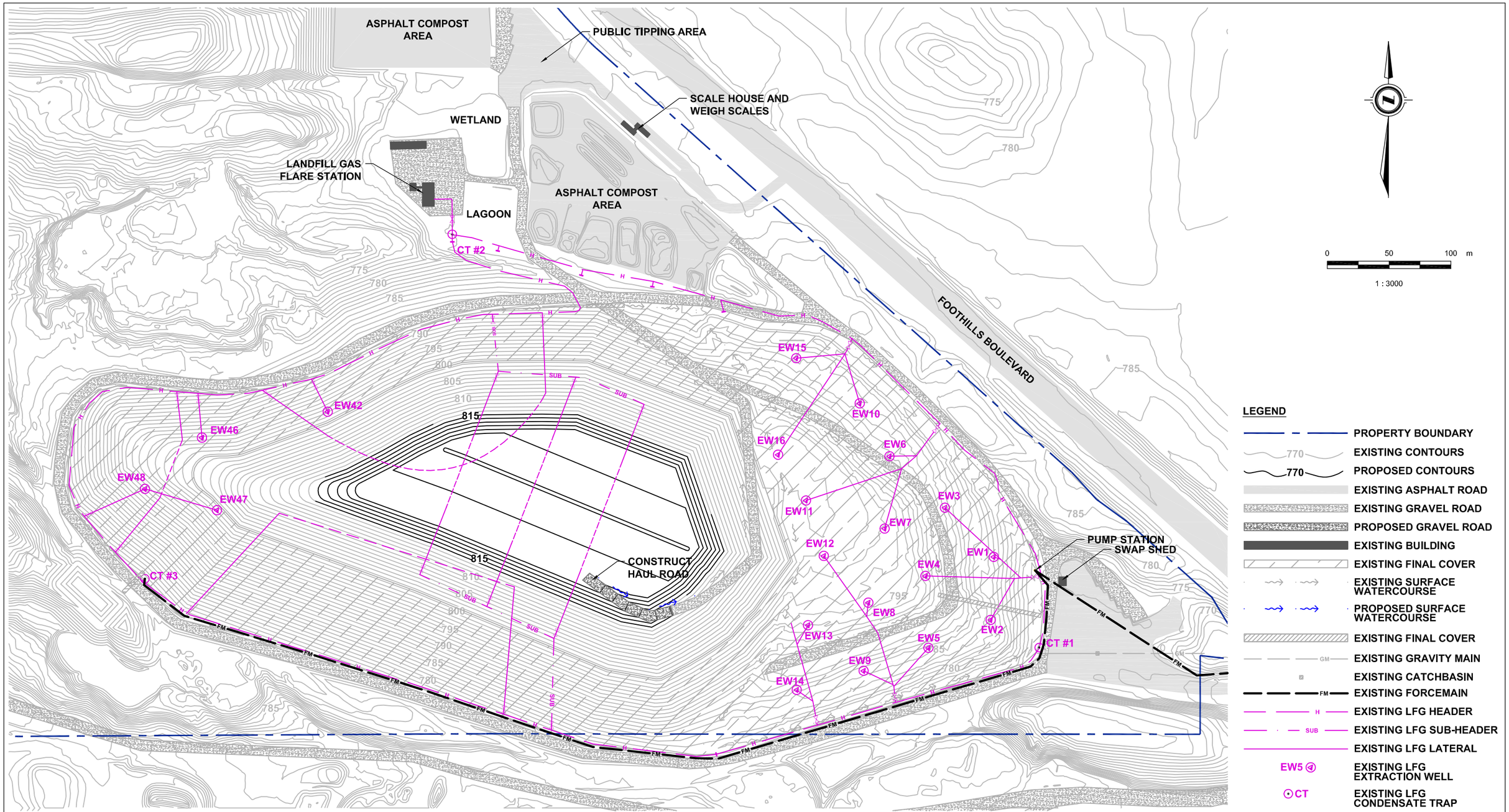
1 : 3000	4-2428-01-07	D-13



NOTES: EXISTING CONDITIONS AS OF APPROXIMATELY SEPTEMBER 2009.

(file: R424280107002DWG14.dwg)

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
0	ISSUED FOR REVIEW	FEB. 2010	M. LEFEBVRE

INTEGRATED LANDFILL MANAGEMENT PLAN

FOOTHILLS BOULEVARD REGIONAL LANDFILL

REGIONAL DISTRICT OF FRASER-FORT GEORGE

VERIFY SCALE

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STAGE L FILLING

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Date:	Location:	Rev.
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1 : 3000	4-2428-01-07	D-14

ASPHALT COMPOST AREA
PUBLIC TIPPING AREA
SCALE HOUSE AND WEIGH SCALES
WETLAND
LANDFILL GAS FLARE STATION
ASPHALT COMPOST AREA
LAGOON
CT #2
INSTALL LANDFILL GAS SUB-HEADER
FOOTHILLS BOULEVARD
EW15
EW26
EW25
EW35
EW42
EW17
EW10
EW46
EW41
EW24
EW16
EW6
EW45
EW18
EW48
EW43
EW11
EW3
EW7
3 D-21 CONSTRUCT FINAL COVER
EW47
825
CONSTRUCT HAUL ROAD
820
PUMP STATION SWAP SHED
EW12
EW1
EW44
EW39
EW19
EW4
CT #3
5 D-22 INSTALL LANDFILL GAS WELLS
EW38
EW8
EW31
EW20
EW22
EW2
EW13
EW30
EW5
CT #1
EW49
EW9
EW21
EW14
775
780
785
790
795
800
805
810
815
820
825

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LEGEND

- PROPERTY BOUNDARY
- EXISTING CONTOURS
- PROPOSED CONTOURS
- EXISTING ASPHALT ROAD
- EXISTING GRAVEL ROAD
- PROPOSED GRAVEL ROAD
- EXISTING BUILDING
- EXISTING FINAL COVER
- PROPOSED FINAL COVER
- EXISTING SURFACE WATERCOURSE
- PROPOSED SURFACE WATERCOURSE
- EXISTING CULVERT
- EXISTING GRAVITY MAIN
- EXISTING CATCHBASIN
- EXISTING FORCEMAIN
- EXISTING LFG HEADER
- EXISTING LFG SUB-HEADER
- EXISTING LFG LATERAL
- PROPOSED LFG
- EW5 EXISTING LFG EXTRACTION WELL
- EW5 PROPOSED LFG EXTRACTION WELL
- CT EXISTING LFG CONDENSATE TRAP

NOTES: EXISTING CONDITIONS AS OF APPROXIMATELY SEPTEMBER 2009.

(file: R424280107002DWG15.dwg)

REVISIONS

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INTEGRATED LANDFILL MANAGEMENT PLAN

FOOTHILLS BOULEVARD REGIONAL LANDFILL

REGIONAL DISTRICT OF FRASER-FORT GEORGE

VERIFY SCALE

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STAGE M FILLING

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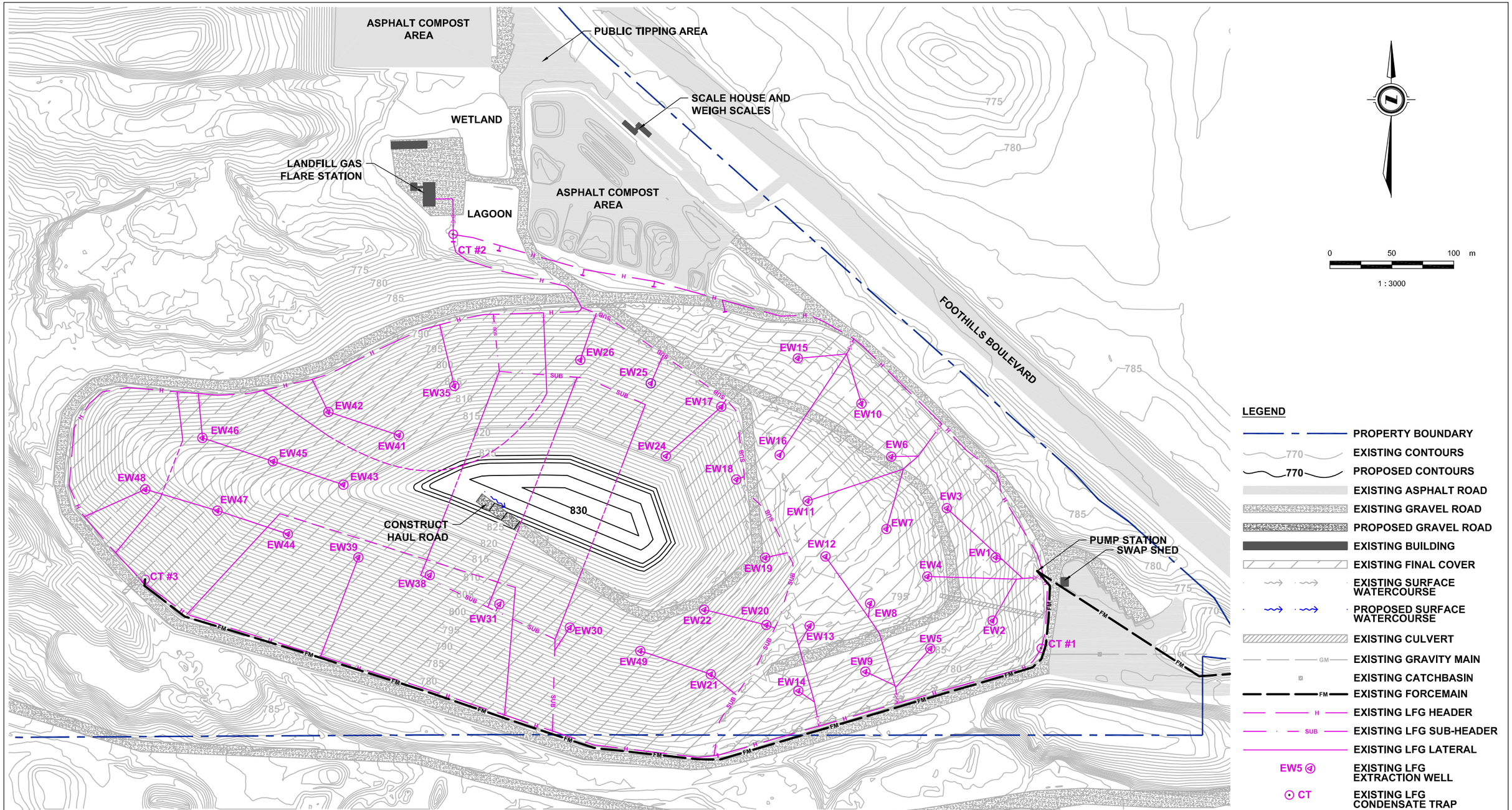
1 : 3000	4-2428-01-07	D-15



NOTES: EXISTING CONDITIONS AS OF APPROXIMATELY SEPTEMBER 2009.

(file: R4242801070O2DWG16.dwg)

REVISIONS			
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0	ISSUED FOR REVIEW	FEB. 2010	M. LEFEBVRE

INTEGRATED LANDFILL MANAGEMENT PLAN

FOOTHILLS BOULEVARD REGIONAL LANDFILL

REGIONAL DISTRICT OF FRASER-FORT GEORGE

VERIFY SCALE

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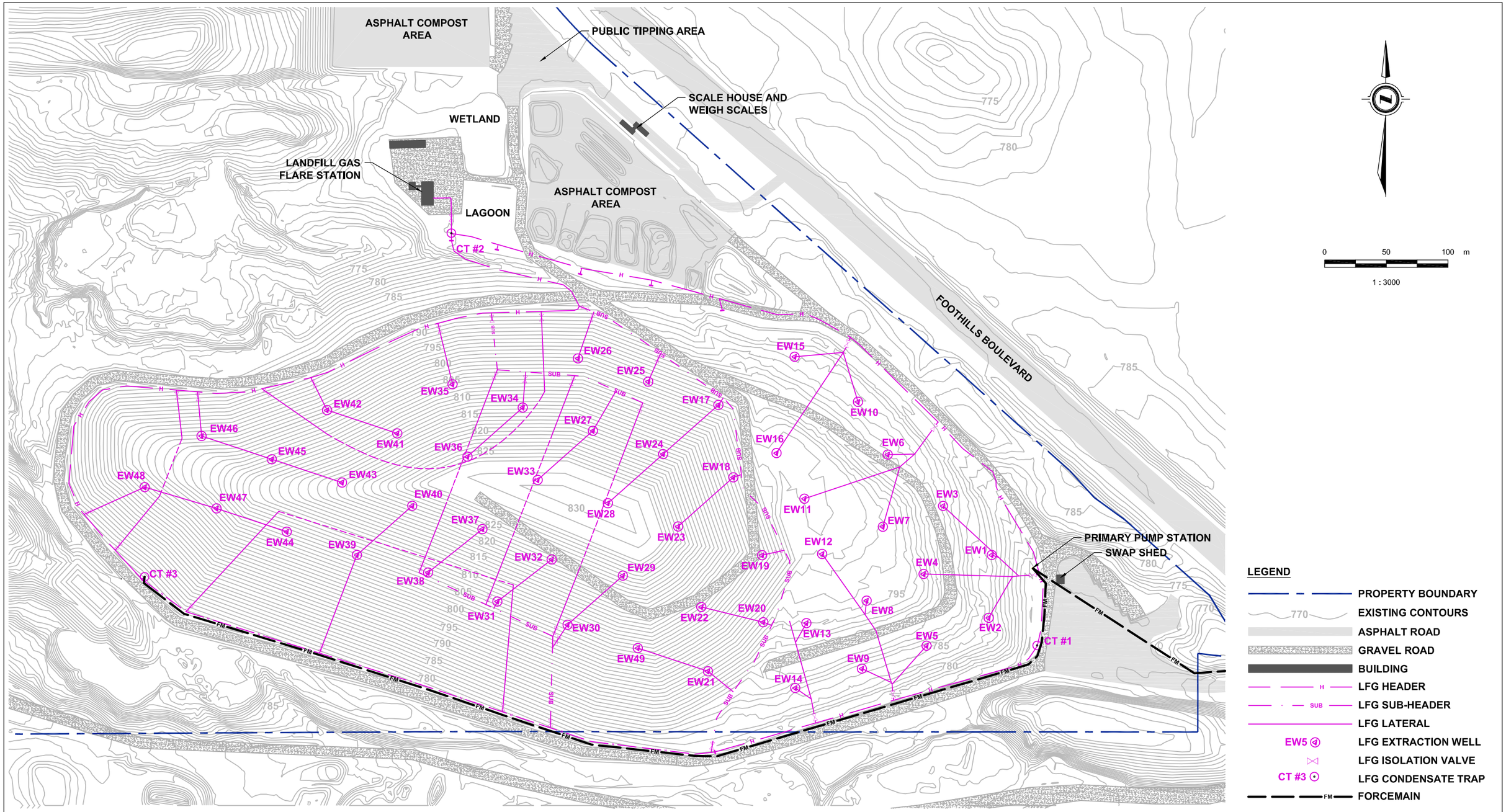
STAGE N FILLING

XCG CONSULTANTS LTD.

Date:	Location:	Rev.
FEBRUARY 2010	PRINCE-GEORGE, B.C.	0

Scale:		Sheet:
1 : 3000	4-2428-01-07	D-16



NOTES: EXISTING CONDITIONS AS OF APPROXIMATELY SEPTEMBER 2009.

(file: R42428010700 2DWG17.dwg)

REVISIONS

REV	DESCRIPTION	DATE	APPROVED
0	ISSUED FOR REVIEW	FEB. 2010	M. LEFEBVRE

INTEGRATED LANDFILL MANAGEMENT PLAN

FOOTHILLS BOULEVARD REGIONAL LANDFILL

REGIONAL DISTRICT OF FRASER-FORT GEORGE

VERIFY SCALE

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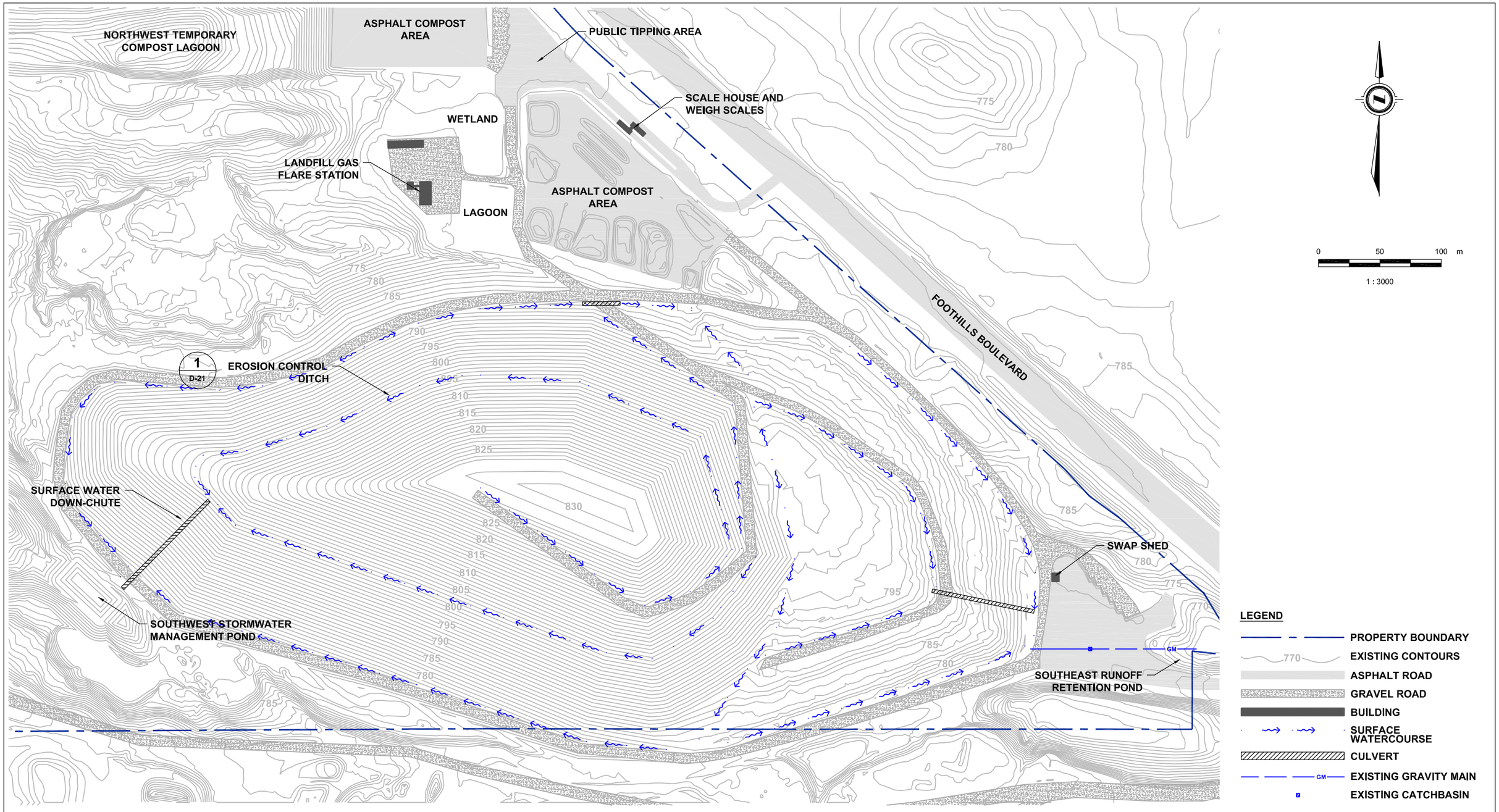
FINAL LANDFILL GAS SYSTEM

XCG CONSULTANTS LTD.

Date:	Location:	Rev.
FEBRUARY 2010	PRINCE-GEORGE, B.C.	0

Scale:		Sheet:
1 : 3000	4-2428-01-07	D-17



NOTES: EXISTING CONDITIONS AS OF APPROXIMATELY SEPTEMBER 2009.

(file: R424280107002DWG18.dwg)

REVISIONS

REV	DESCRIPTION	DATE	APPROVED
0	ISSUED FOR REVIEW	FEB. 2010	M. LEFEBVRE

INTEGRATED LANDFILL MANAGEMENT PLAN

FOOTHILLS BOULEVARD REGIONAL LANDFILL

REGIONAL DISTRICT OF FRASER-FORT GEORGE

VERIFY SCALE

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FINAL CONTOURS

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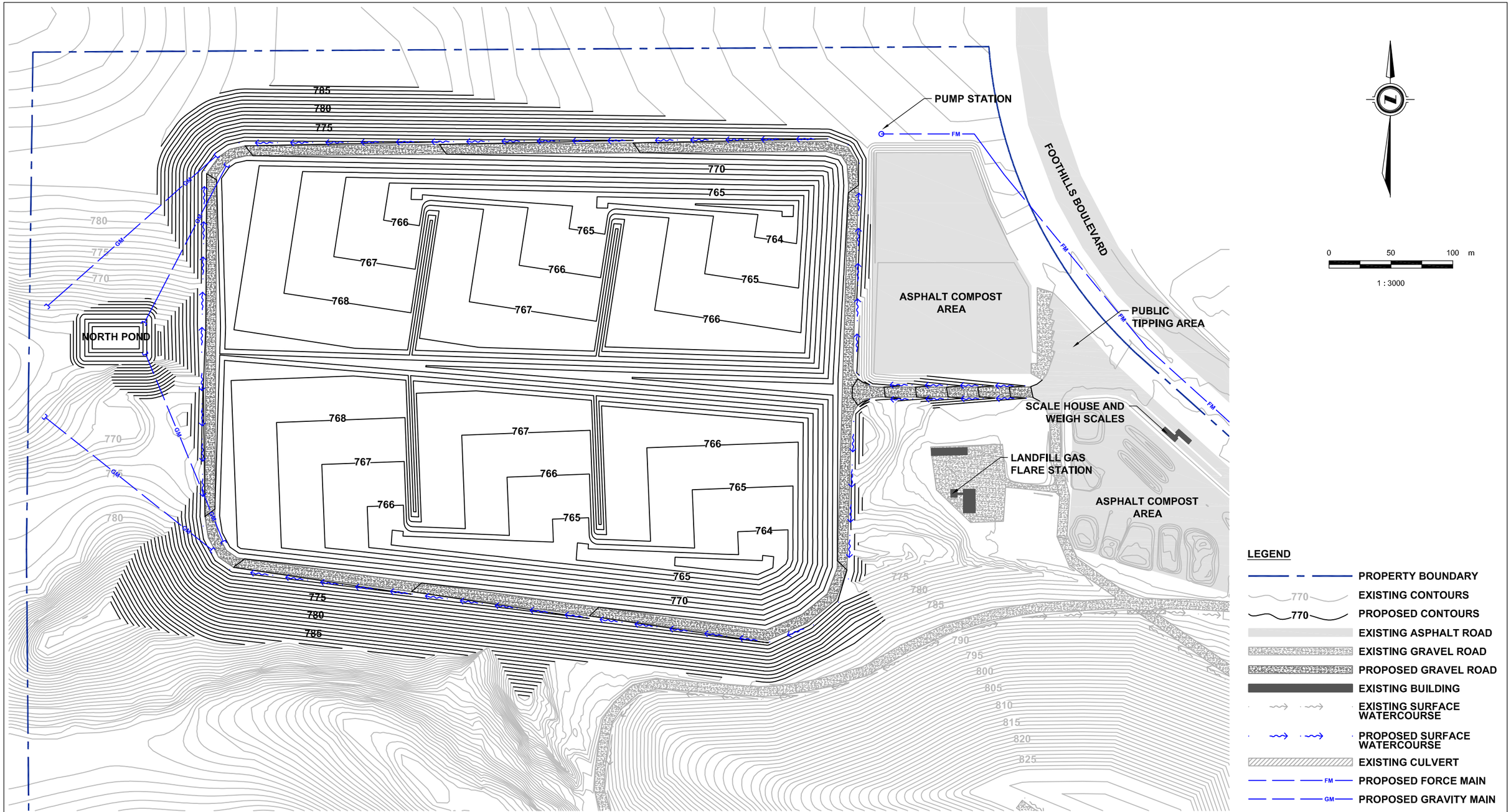
FEBRUARY 2010	PRINCE-GEORGE, B.C.	0

Scale:		Sheet:
1 : 3000	4-2428-01-07	D-18



NOTES: EXISTING CONDITIONS AS OF APPROXIMATELY SEPTEMBER 2009.

(file: R424280107002DWG19.dwg)

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
0	ISSUED FOR REVIEW	FEB. 2010	M. LEFEBVRE

INTEGRATED LANDFILL MANAGEMENT PLAN

FOOTHILLS BOULEVARD REGIONAL LANDFILL

REGIONAL DISTRICT OF FRASER-FORT GEORGE

VERIFY SCALE

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CELL 2 - BASE CONTOURS

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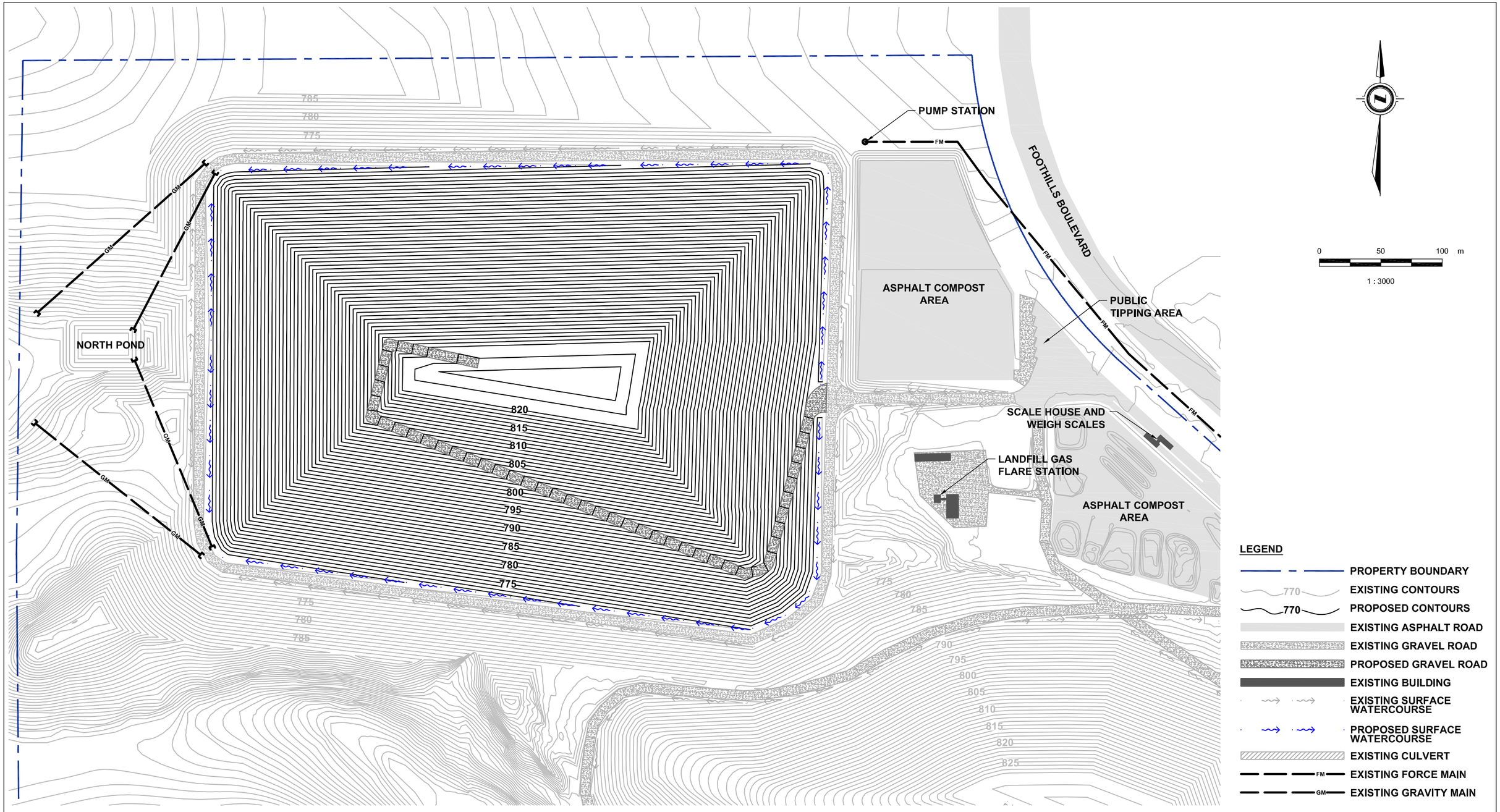
Date:	Location:	Rev.
FEBRUARY 2010	PRINCE-GEORGE, B.C.	0

Scale:		Sheet:
1 : 3000	4-2428-01-07	D-19



NOTES: EXISTING CONDITIONS AS OF APPROXIMATELY SEPTEMBER 2009.

(file: R42428010700 2DWG20.dwg)

REVISIONS

REV	DESCRIPTION	DATE	APPROVED
0	ISSUED FOR REVIEW	FEB. 2010	M. LEFEBVRE

INTEGRATED LANDFILL MANAGEMENT PLAN

FOOTHILLS BOULEVARD REGIONAL LANDFILL

REGIONAL DISTRICT OF FRASER-FORT GEORGE

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CELL 2 - FINAL CONTOURS

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Date:	Location:	Rev.
FEBRUARY 2010	PRINCE-GEORGE, B.C.	0

Scale:		Sheet:
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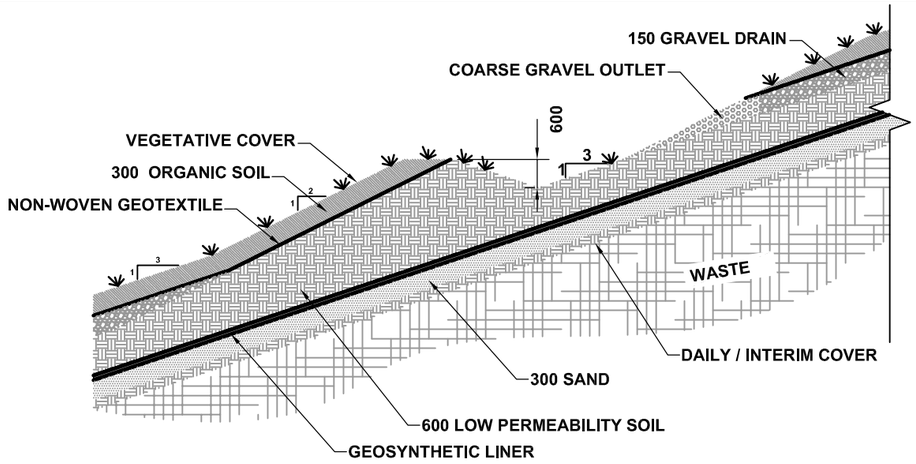
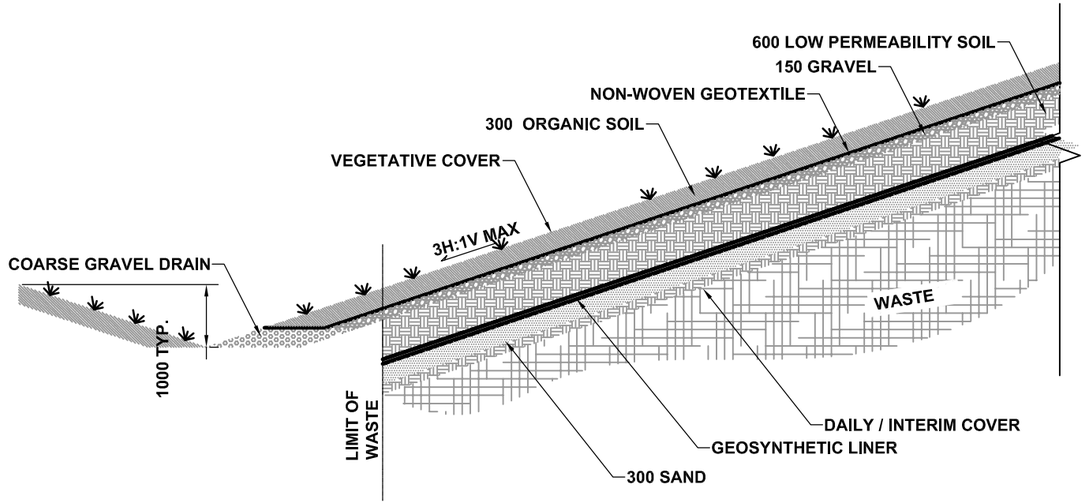
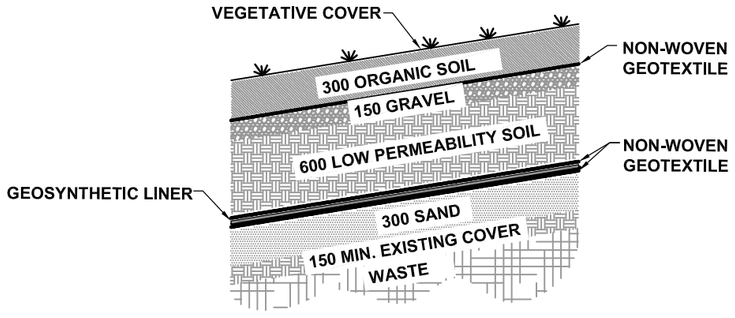


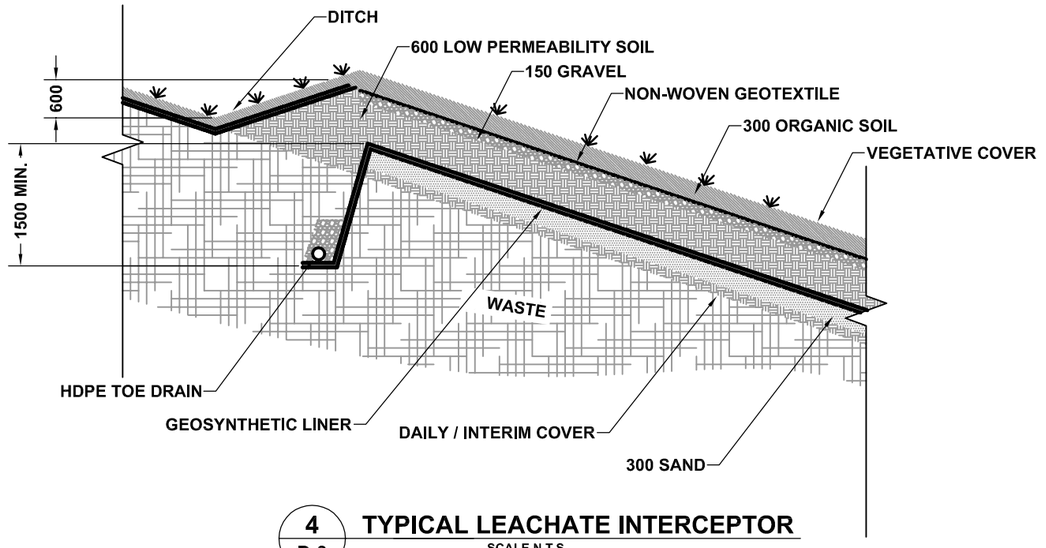
1 / D-18 TYPICAL EROSION CONTROL DITCH
SCALE: N.T.S.



2 / D-3 TYPICAL PERIMETER DITCH
SCALE: N.T.S.



3 / D-6 TYPICAL LANDFILL COVER DETAIL
SCALE N.T.S.



4 / D-3 TYPICAL LEACHATE INTERCEPTOR
SCALE N.T.S.

(file: R422000123002DWG18.dwg)

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INTEGRATED LANDFILL MANAGEMENT PLAN

FOOTHILLS BOULEVARD REGIONAL LANDFILL

REGIONAL DISTRICT OF FRASER-FORT GEORGE

VERIFY SCALE

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DETAILS I

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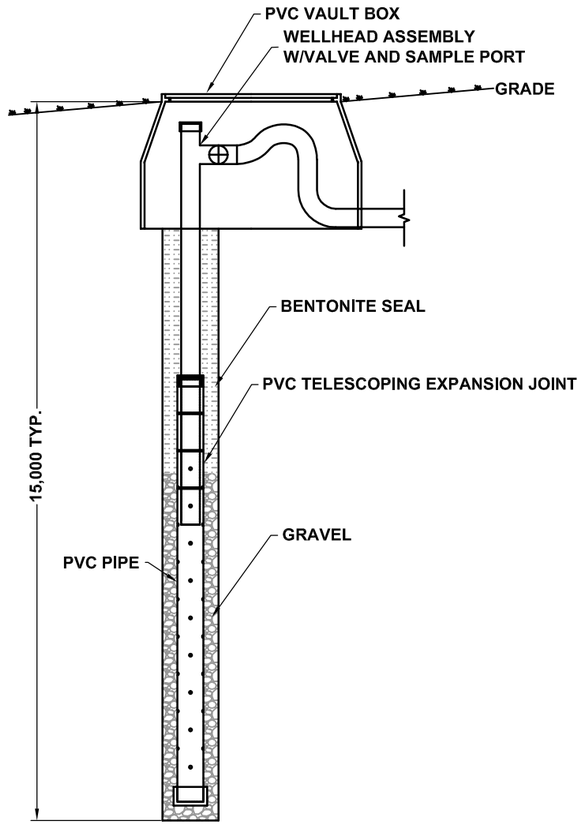
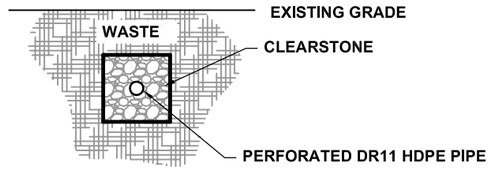
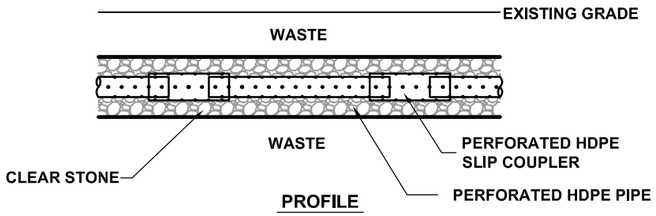
Date:	Location:	Rev.
FEBRUARY 2010	PRINCE-GEORGE, B.C.	0
Scale: AS SHOWN	4-2428-01-07	Sheet: D-21

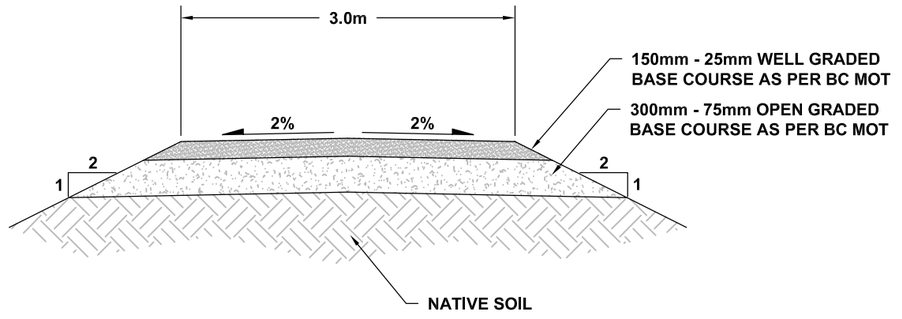


5 D-3 **TYPICAL LFG EXTRACTION WELL**
SCALE: N.T.S.





6 D-4 **TYPICAL LFG EXTRACTION TRENCH**
SCALE: N.T.S.



7 D-3 **GRAVEL ACCESS ROAD**
SCALE: N.T.S.

(file: R422000123002DWG22+.dwg)

REVISIONS			
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INTEGRATED LANDFILL MANAGEMENT PLAN

FOOTHILLS BOULEVARD REGIONAL LANDFILL

REGIONAL DISTRICT OF FRASER-FORT GEORGE

VERIFY SCALE

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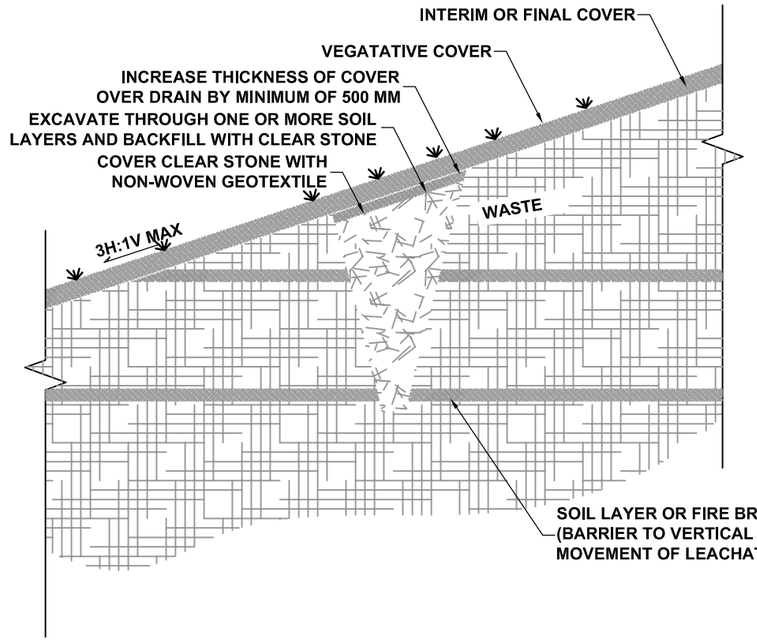
DETAILS II

XCG CONSULTANTS LTD.

Date:	Location:	Rev.
FEBRUARY 2010	PRINCE-GEORGE, B.C.	0
Scale: AS SHOWN	4-2428-01-07	Sheet: D-22



9 TYPICAL LEACHATE SEEP REPAIR

SCALE: N.T.S.

(file: R422000123002DWG22+.dwg)

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0	ISSUED FOR REVIEW	FEB. 2010	M. LEFEBVRE

INTEGRATED LANDFILL MANAGEMENT PLAN

FOOTHILLS BOULEVARD REGIONAL LANDFILL

REGIONAL DISTRICT OF FRASER-FORT GEORGE

VERIFY SCALE

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IF NOT 10 mm ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

DETAILS III

XCG CONSULTANTS LTD.

Date:	Location:	Rev.
FEBRUARY 2010	PRINCE-GEORGE, B.C.	0
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APPENDIX A
OPERATIONAL CERTIFICATE MR-01697

MINISTRY OF ENVIRONMENT

OPERATIONAL CERTIFICATE

MR-01697

Under the Provisions of the Environmental Management Act
and in accordance with the
Regional District of Fraser-Fort George
Solid Waste Management Plan

Regional District of Fraser-Fort George

155 George Street

Prince George, British Columbia

V2L 1P8

is authorised to manage recyclable material and municipal solid waste at a sanitary landfill located at **6595 Foothills Boulevard**, Prince George, British Columbia, subject to the conditions listed below. Contravention of any of these conditions is a violation of the *Environmental Management Act* and may result in prosecution.

1. LOCATION OF AUTHORISED FACILITY

The location of the facility for the management of recyclable material and municipal solid wastes to which this Operational Certificate is applicable is the Foothills Landfill, Block A of the Northeast ¼ of District Lot 4053 and Block A of the Northwest ¼ of District Lot 4048, Cariboo District as shown in the attached plan and containing 87 hectares more or less.

2. ENTRANCE FACILITIES

The authorised facility includes recyclable material and municipal solid waste drop-off facilities, weigh scales and related appurtenances approximately as shown on the attached Site Plan.

3. MANAGEMENT OF MUNICIPAL SOLID WASTE

3.1. Sanitary Landfill

3.1.1. The authorised facilities are a sanitary landfill area, composting area, landfill gas management, recyclable material storage areas and related appurtenances approximately as shown on the attached Site Plan. The site reference number for the discharge is E211018.

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for Director, Environmental Management Act

3.1.2. The characteristics of the discharge must be municipal solid waste as defined under the *Environmental Management Act* and other wastes as approved in writing by the Director.

3.1.3. Waste may be discharged to the areas specified in the Regional District's Design and Operation Plan, approximately located as shown on the attached Site Plan.

4. GENERAL REQUIREMENTS

4.1. Qualified Professionals

All facilities and information, including works, plans, assessments, investigations, surveys, programs and reports, must be certified by qualified professionals.

4.2. Plans

4.2.1. The Regional District shall prepare a Design and Operation Plan that will include considerations for site operation and development, leachate and landfill gas management, composting operations, monitoring programs and environmental impact mitigation management.

The Design and Operation Plan must be submitted to the Director by November 30, 2005.

4.2.2. The Design and Operation Plan must address, but not be limited to, each of the subsections in the *Landfill Criteria for Municipal Solid Waste* including performance, siting, design, operational and closure and post-closure criteria.

4.2.3. The facilities must be developed and operated in accordance with the Design and Operation Plan.

4.2.4. Any updates to the plan shall be immediately submitted to the Director.

4.3. Additional Facilities or Works

The Director may require investigations, surveys, and the construction of additional facilities or works. The Director may also amend information requirements of this Operational Certificate including plans, programs, assessments and reports.

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5. OPERATIONAL REQUIREMENTS

5.1. Operator Training and Development

At a minimum, the Regional District will ensure that operating personnel are trained to industry standards and at least one member of the on-site personnel are trained and current in a SWANA recognized landfill operator course or equivalent.

5.2. Wildlife Management and Control

At the time of issuance of this certificate the Regional District is not required to install electric fencing for the purpose of preventing access to the site by bears.

The Regional District is required to monitor wildlife (medium and large carnivores) activity at the facility and keep records of occurrences and observations of wildlife (medium and large carnivores).

The Director may request the Regional District to develop a Wildlife Management Plan that presents solutions for preventing wildlife access to the facility.

5.3. Compost

Composting facilities shall be operated and maintained in accordance with the *Organic Matter Recycling Regulation.*

5.3. Management of Landfill Gas

The management of landfill gas shall be managed in accordance with sections 4.2 and 6.4 of the *Landfill Criteria for Municipal Solid Waste.* In addition, the Regional District will have a qualified professional prepare an Operations and Maintenance Manual for the landfill gas management system.

6. HAZARDOUS WASTE MANAGEMENT

6.1. Hazardous Waste

"Hazardous Wastes" as defined by the *Hazardous Waste Regulation* pursuant to the *Environmental Management Act* are prohibited from disposal unless expressly authorised by the *Hazardous Waste Regulation*, approved by the Director or as specified in the Operational Certificate.

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6.2. Waste Asbestos

Waste asbestos is authorized for disposal subject to compliance with the requirements of section 40 of the *Hazardous Waste Regulation* **and** the following conditions:

6.2.1. The asbestos waste may not be mixed with any other hazardous waste.

6.2.2. The Regional District must approve the disposal before disposal takes place.

6.2.3. All other applicable requirements of the *Hazardous Waste Regulation*, including but limited to manifesting and waste record keeping, must also be complied with.

6.3. Handling of Impacted Soil

The *Environmental Management Act*, the *Contaminated Sites Regulation* and the *Hazardous Waste Regulation* are applicable for the disposal of impacted (contaminated) soil at the facility.

6.4. Hazardous Wastes from Accidental Spills or Abandonment

Hazardous wastes resulting from accidental spills or abandonment of dangerous goods may be accepted at the facility only under the authority of Section 52(1) of the *Hazardous Waste Regulation*.

7. MONITORING

7.1. Monitoring Program

7.1.1. A monitoring program shall be developed by a qualified professional to identify potential impacts to the environment and public health from the facility.

7.1.2. The monitoring program shall be submitted as part of the Design and Operation Plan.

7.1.3. The monitoring program must address, but not be limited to, subsections 4.1, 4.2 and 7.15 of the *Landfill Criteria for Municipal Solid Waste* and the *Guidelines for Environmental Monitoring at Municipal Solid Waste Landfills.*

7.1.4. Monitoring must be conducted in accordance with the monitoring program.

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8. REPORTING

All reports and drawings shall be submitted in electronic format unless otherwise requested by the Director.

8.1. Drawings

All drawings shall be certified correct and sealed by a qualified professional. Drawings shall be submitted to the Director within 30 days of completion or as otherwise specified by the Director.

8.2. Annual Report

The Regional District shall submit an Annual Report to the Director on or before June 30 each year for the previous calendar year. The report shall contain, but not be limited to the following information:

i.) an executive summary;

ii.) the type and tonnage of waste received, recycled and landfilled for the year;

iii.) a current topographic map detailing airspace consumption, on-site borrow pit changes and future developments;

iv.) updated estimates for the remaining capacity, closure date for the current phase and closure date for the current landfill footprint;

v.) any new information or proposed changes relating to the facilities and Design and Operation Plan;

vi.) composting operation activity including amount of material received for composting, material composted, material sold and number of composting cycles;

vii.) occurrences or observations of wildlife (medium and large carnivores) at the facility;

viii.) a statement regarding the facility's progress in reducing the regional solid waste stream, in accordance with the hierarchy of reduce, reuse and recycle principles; and,

ix.) the results of all monitoring programs as specified in this Operational Certificate. Data interpretation and comparison to the performance criteria in the *Landfill Criteria for Municipal Solid Waste* and the *Guidelines for Environmental Monitoring and Municipal Solid Waste*

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Landfills. Trend analysis, as well as an evaluation of the impacts of the discharges on the receiving environment in the previous year shall be carried out by a qualified professional.

9. CLOSURE PLAN

At least one year in advance of decommissioning the landfill, or as otherwise specified by the Director, a Closure Plan shall be submitted which includes at least the following information:

i) a topographic plan showing the final elevations contours of the landfill and surface water diversion and drainage controls;

ii) specifications for the final cap and proposed end use of the site; and,

iii) provisions for a minimum 25 year post-closure care period at the facility which, at a minimum, considers the following: groundwater monitoring, surface water monitoring, landfill gas management, erosion and settlement monitoring and management.

10. CLOSURE AND POST-CLOSURE FUND

The Regional District will conform to the Public Sector Accounting and Auditing Board's requirements (PS 3270) to recognize solid waste landfill closure and post-closure liability. The Regional District will develop a plan to ensure that sufficient funds are available for closure and post-closure care work.

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PROVINCE OF
BRITISH COLUMBIA

Environmental Protection

SITE PLAN

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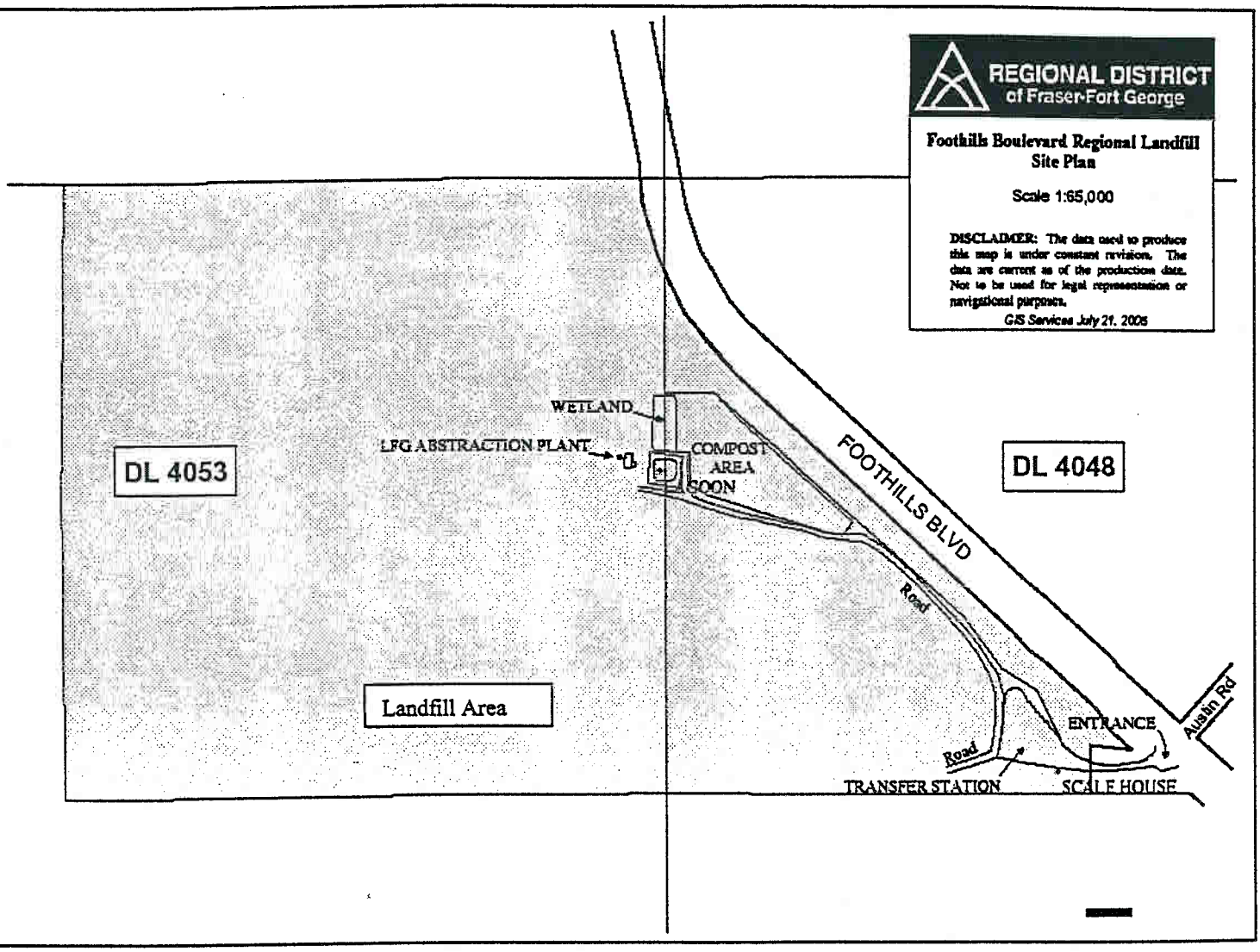
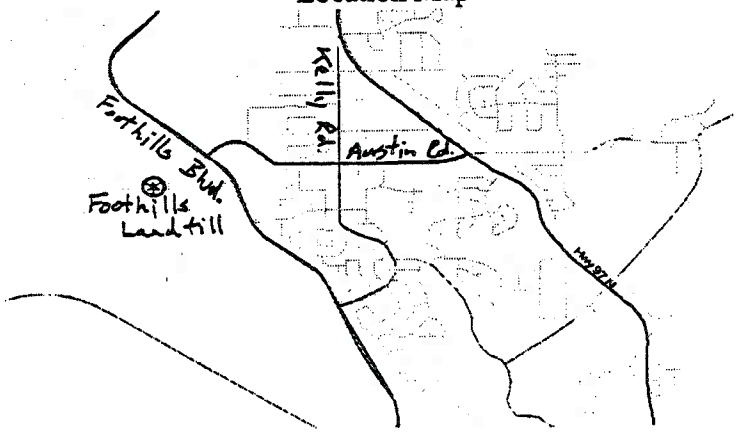


Location Map



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OCT 3 1 2005

Operational Certificate No. MR-01697

D. Reinheimer

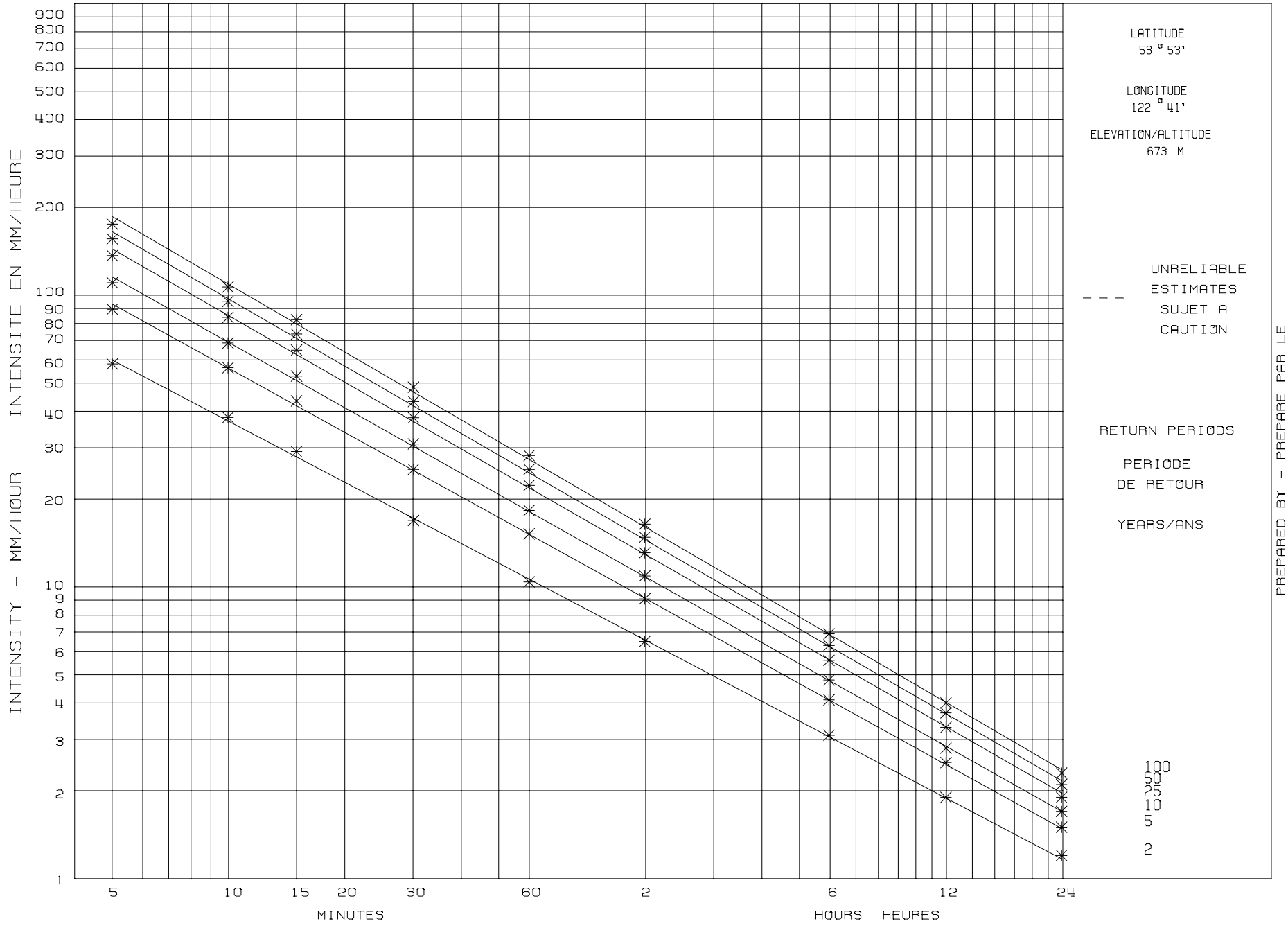
Del Reinheimer, P.Eng.
for Director, Environmental Management Act
Omineca and Peace Regions

APPENDIX B
HYDROLOGIC MODEL DATA

SHORT DURATION RAINFALL INTENSITY-DURATION FREQUENCY DATA FOR-
DONNEES SUR L'INTENSITE,LA DUREE ET LA FREQUENCE DES CHUTES DE PLUIE DE COURTE DUREE A PRINCE GEORGE AIRPORT BC

GUMBEL-METHOD OF MOMENTS
METHODE DES MOMENTS

BASED ON RECORDING RAIN GAUGE DATA FOR THE PERIOD-
BASEES SUR LES DONNEES DU PLUVIOGRAPHES POUR LA PERIOD 1960 - 1990 31 YEARS/AN



PREPARED BY - PREPARE PAR LE
ATMOSPHERIC ENVIRONMENT SERVICE - ENVIRONMENT CANADA
SERVICE DE L'ENVIRONNEMENT ATMOSPHERIQUE - ENVIRONNEMENT CANADA

Table B1 Subcatchment Parameters

Subcatchment	Area (ha)	Flow Length (metres)	Slope (m/m)	Impervious Area (%)
Existing Conditions				
101	8.28	191	0.08	0
102	5.51	93	0.15	0
103	2.52	80	0.12	0
104	2.29	64	0.12	39
105	1.38	70	0.12	0
106	1.70	70	0.01	100
Final Proposed Conditions				
201	13.60	166	0.33	0
202	6.81	98	0.15	0
203	2.04	79	0.33	0
204	2.29	64	0.12	39
205	18.72	88	0.33	0
206	1.70	70	0.01	100
207	2.00	88	0.01	100

Table B2 Soil Parameters

Subcatchment	Soil Group	Ground Cover	Hydrologic Condition	Roughness [1]	CN [2]
Existing Conditions					
101	C	Newly Graded Area		0.1	91
102	C	Grassland	Fair	0.4	79
103	C	Newly Graded Area		0.1	91
104	C	Woods	Good	0.6	55
105	C	Grassland	Fair	0.4	79
106	C	Newly Graded Area		0.1	91
Final Proposed Conditions					
201	C	Grassland	Fair	0.4	79
202	C	Grassland	Fair	0.4	79
203	C	Grassland	Fair	0.4	79
204	C	Woods	Good	0.6	55
205	C	Grassland	Fair	0.4	79
206	C	Newly Graded Area		0.1	91
207	C	Newly Graded Area		0.1	91

Notes:

1. Source: Chin, David A. 2000. Water-Resources Engineering. Prentice-Hall.
2. USDA Soil Conservation Service. 1986. "Urban Hydrology for Small Watersheds," Technical Release No.55 (TR-55).

Table B3 1:100 Year Storm Event - Runoff Volumes (m3)

Subcatchment	1:100 (1hr)	1:100 (2hr)	1:100 (6hr)	1:100 (12hr)	1:100 (24hr)
Existing Conditions					
101	880	1109	1700	2177	2478
102	127	214	420	605	733
103	276	355	522	663	766
104	250	277	359	418	455
105	31	53	104	151	183
106	456	534	677	792	869
Total	**2020**	**2542**	**3782**	**4806**	**5484**
Final Proposed Conditions					
201	319	521	1017	1492	1776
202	153	258	518	740	902
203	48	77	153	223	275
204	249	280	358	418	455
205	424	724	1402	2058	2505
206	456	534	677	792	869
207	556	645	802	938	1018
Total	**2205**	**3039**	**4927**	**6661**	**7800**

Table B4 1:100 Year Storm Event - Peak Discharge (m3/s)

Subcatchment	1:100 (1hr)	1:100 (2hr)	1:100 (6hr)	1:100 (12hr)	1:100 (24hr)
Existing Conditions					
101	0.310	0.242	0.206	0.182	0.139
102	0.023	0.044	0.029	0.023	0.020
103	0.114	0.087	0.073	0.076	0.051
104	0.072	0.060	0.040	0.030	0.021
105	0.007	0.011	0.007	0.006	0.005
106	0.214	0.165	0.097	0.077	0.053
Final Proposed Conditions					
201	0.048	0.097	0.071	0.055	0.047
202	0.027	0.053	0.036	0.028	0.024
203	0.014	0.017	0.011	0.009	0.008
204	0.072	0.060	0.04	0.030	0.021
205	0.110	0.158	0.098	0.084	0.073
206	0.214	0.165	0.097	0.077	0.053
207	0.234	0.181	0.107	0.083	0.059

Table B5 1:25 Year Storm Event - Runoff Volumes (m3)

Subcatchment	1:25 (1hr)	1:25 (2hr)	1:25 (6hr)	1:25 (12hr)	1:25 (24hr)
Existing Conditions					
101	545	744	1191	1582	1908
102	45	90	230	369	485
103	174	227	369	485	590
104	187	218	288	343	380
105	11	23	57	93	122
106	384	427	557	654	735
Total	**1346**	**1729**	**2692**	**3526**	**4220**
Final Proposed Conditions					
201	110	229	570	911	1189
202	56	115	287	461	599
203	17	36	84	138	184
204	186	218	288	343	379
205	163	310	776	1265	1682
206	384	427	557	654	735
207	425	512	648	766	858
Total	**1341**	**1847**	**3210**	**4538**	**5626**

Table B6 1:25 Year Storm Event - Peak Discharge (m3/s)

Subcatchment	1:25 (1hr)	1:25 (2hr)	1:25 (6hr)	1:25 (12hr)	1:25 (24hr)
Existing Conditions					
101	0.185	0.146	0.119	0.122	0.094
102	0.005	0.014	0.017	0.013	0.010
103	0.062	0.050	0.043	0.049	0.038
104	0.055	0.043	0.031	0.024	0.017
105	0.001	0.004	0.004	0.003	0.003
106	0.165	0.126	0.075	0.059	0.044
Final Proposed Conditions					
201	0.009	0.029	0.042	0.033	0.025
202	0.005	0.017	0.021	0.016	0.013
203	0.003	0.008	0.006	0.005	0.004
204	0.055	0.043	0.031	0.024	0.017
205	0.024	0.069	0.059	0.045	0.038
206	0.165	0.126	0.075	0.059	0.044
207	0.168	0.135	0.082	0.067	0.049

Table B7 1:2 Year Storm Event - Runoff Volumes (m3)

Subcatchment	1:2 (1hr)	1:2 (2hr)	1:2 (6hr)	1:2 (12hr)	1:2 (24hr)
Existing Conditions					
101	68	140	346	549	832
102	0	0	13	49	111
103	21	43	108	169	262
104	84	110	156	195	234
105	0	0	3	12	28
106	165	214	301	370	458
Total	**338**	**507**	**927**	**1344**	**1925**
Final Proposed Conditions					
201	0	0	30	119	266
202	0	0	15	60	136
203	0	0	5	18	43
204	84	110	156	195	234
205	0	0	44	168	395
206	165	214	301	370	458
207	197	244	355	435	533
Total	**446**	**568**	**906**	**1365**	**2065**

Table B8 1:2 Year Storm Event - Peak Discharge (m3/s)

Subcatchment	1:2 (1hr)	1:2 (2hr)	1:2 (6hr)	1:2 (12hr)	1:2 (24hr)
Existing Conditions					
101	0.009	0.026	0.024	0.025	0.032
102	0.000	0.000	0.001	0.003	0.003
103	0.008	0.009	0.008	0.010	0.013
104	0.019	0.018	0.015	0.012	0.010
105	0.000	0.000	0.000	0.001	0.001
106	0.053	0.052	0.037	0.031	0.025
Final Proposed Conditions					
201	0.000	0.000	0.001	0.007	0.007
202	0.000	0.000	0.001	0.003	0.004
203	0.000	0.000	0.000	0.001	0.001
204	0.019	0.018	0.015	0.012	0.010
205	0.000	0.000	0.003	0.010	0.010
206	0.053	0.052	0.037	0.031	0.025
207	0.060	0.053	0.043	0.035	0.028

APPENDIX C
HELP MODEL DATA

Table C1 Infiltration Rate Summary

Cover Type	Model	Slope (%)	Infiltration Rate (mm/yr)
Existing Daily Cover	HELP	2%	52
Existing Intermediate Cover	HELP	2%	53
Existing Intermediate Cover	HELP	20%	53
Existing Final Cover	HELP	5%	12
Existing Final Cover	HELP	25%	4
Proposed Final Cover	HELP	10%	1
Proposed Final Cover	HELP	33%	1

Table C2 Cell 1 Leachate Generation Rate Summary

Cover Type	Area (m^2)	Infiltration Rate (mm/yr)	Leachate Generation Rate (m^3/yr)	Total Leachate to the Environment (m^3/yr)	Total Leachate to Sanitary System (m^3/yr)
Existing Conditions with Leachate Recirculation					
Existing Daily Cover (2%)	1,200	52	62	62	0
Existing Intermediate Cover (2%)	109,294	53	5,793	5,793	0
Existing Intermediate Cover (20%)	65,000	53	3,445	3,445	0
Existing Final Cover (5%)	9,611	12	115	115	0
Existing Final Cover (25%)	42,784	4	171	171	0
Leachate Recirculation (1,100 m^3/yr)	-	-	1,100	1,100	-
			10,400	**10,400**	**0**
Existing Conditions without Leachate Recirculation					
Existing Daily Cover (2%)	1,200	52	62	62	0
Existing Intermediate Cover (2%)	109,294	53	5,793	5,793	0
Existing Intermediate Cover (20%)	65,000	53	3,445	3,445	0
Existing Final Cover (5%)	9,611	12	115	0	115
Existing Final Cover (25%)	42,784	4	171	0	171
			9,586	**9,300**	**286**
Final Closure of Cell 1					
Existing Final Cover (5%)	9,611	12	115	0	115
Existing Final Cover (25%)	42,784	4	171	0	171
Proposed Final Cover (10%)	12,000	1	12	12	0
Proposed Final Cover (33%)	141,460	1	141	141	0
			440	**153**	**286**

Notes:
1 - Total leachate recirculation volume includes leachate totals from existing final cover area.

APPENDIX D
LANDFILL GAS MODEL DATA

Table D1 LFG Assessment Summary

Year	LFG Emission Rate (m^3/hr)	Methane Emission Rate (tonne/yr)	CO_2e Emission Rate (tonne/yr)	NMOC Emission Rate (tonne/yr)
1979	0	0	0	0.0
1980	97	278	5,841	1.8
1981	187	539	11,309	3.5
1982	272	783	16,434	5.1
1983	352	1,012	21,246	6.6
1984	427	1,227	25,770	8.0
1985	498	1,430	30,029	9.3
1986	564	1,621	34,045	10.6
1987	627	1,802	37,839	11.8
1988	686	1,973	41,429	12.9
1989	743	2,135	44,832	13.9
1990	796	2,289	48,062	14.9
1991	847	2,435	51,134	15.9
1992	898	2,581	54,195	16.8
1993	949	2,726	57,246	17.8
1994	999	2,871	60,288	18.7
1995	1,049	3,015	63,322	19.7
1996	1,099	3,160	66,350	20.6
1997	1,149	3,303	69,371	21.6
1998	1,202	3,454	72,540	22.5
1999	1,226	3,524	73,997	23.0
2000	1,237	3,555	74,646	23.2
2001	1,249	3,589	75,376	23.4
2002	1,257	3,612	75,851	23.6
2003	1,268	3,643	76,498	23.8
2004	1,280	3,679	77,262	24.0
2005	1,307	3,757	78,890	24.5
2006	1,334	3,834	80,523	25.0
2007	1,366	3,925	82,418	25.6
2008	1,403	4,033	84,700	26.3
2009	1,436	4,127	86,663	26.9
2010	1,449	4,166	87,480	27.2
2011	1,464	4,206	88,328	27.4
2012	1,478	4,248	89,206	27.7
2013	1,493	4,291	90,111	28.0
2014	1,509	4,335	91,043	28.3
2015	1,524	4,381	91,999	28.6
2016	1,541	4,428	92,979	28.9
2017	1,557	4,475	93,981	29.2
2018	1,574	4,524	95,004	29.5
2019	1,591	4,574	96,047	29.8
2020	1,609	4,624	97,110	30.2
2021	1,627	4,676	98,192	30.5
2022	1,645	4,728	99,292	30.8
2023	1,664	4,781	100,409	31.2
2024	1,683	4,835	101,544	31.5
2025	1,702	4,890	102,694	31.9
2026	1,721	4,946	103,862	32.3
2027	1,605	4,614	96,884	30.1
2028	1,498	4,306	90,436	28.1
2029	1,400	4,023	84,474	26.2
2030	1,308	3,760	78,959	24.5
2031	1,224	3,517	73,856	22.9
2032	1,145	3,292	69,131	21.5
2033	1,073	3,083	64,753	20.1
2034	1,006	2,890	60,696	18.9
2035	943	2,711	56,934	17.7
2036	886	2,545	53,442	16.6
2037	832	2,391	50,201	15.6
2038	782	2,247	47,190	14.7
2039	736	2,114	44,392	13.8
2040	692	1,990	41,789	13.0
2041	652	1,875	39,367	12.2
2042	615	1,767	37,112	11.5
2043	580	1,667	35,011	10.9
2044	548	1,574	33,051	10.3
2045	517	1,487	31,224	9.7
2046	489	1,406	29,517	9.2
2047	463	1,330	27,923	8.7
2048	438	1,259	26,433	8.2
2049	415	1,192	25,039	7.8
2050	393	1,130	23,734	7.4

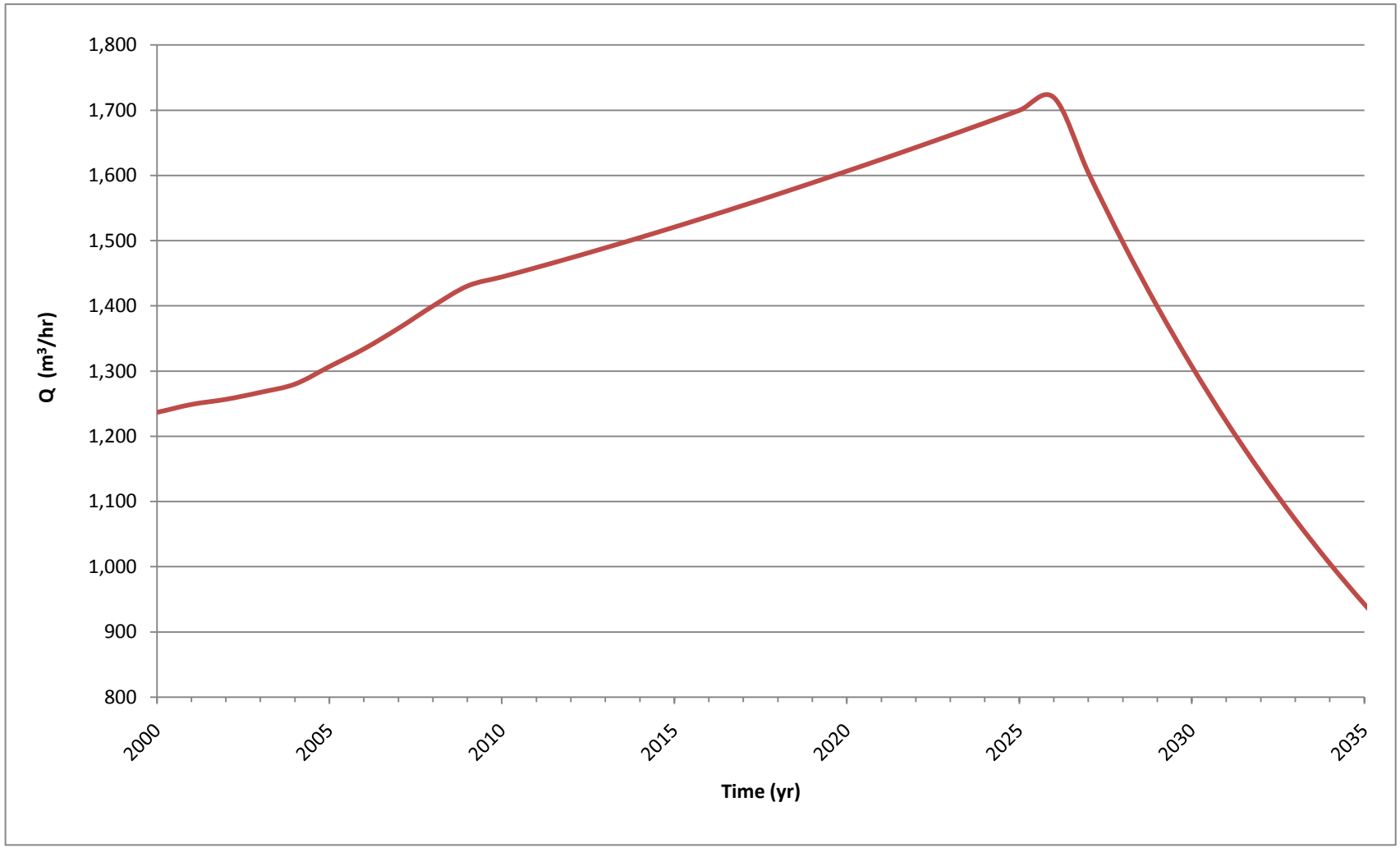


Figure D1
LFG PRODUCTION ESTIMATE
Foothills Boulevard Regional Landfill

Notes:
Relatively Inert: k = 0.02 yr^{-1}, Lo = 20 m^3/tonne
Moderately Decomposable: k = 0.04 yr^{-1}, Lo = 120 m^3/tonne
Decomposable: k = 0.09 yr^{-1}, Lo = 160 m^3/tonne

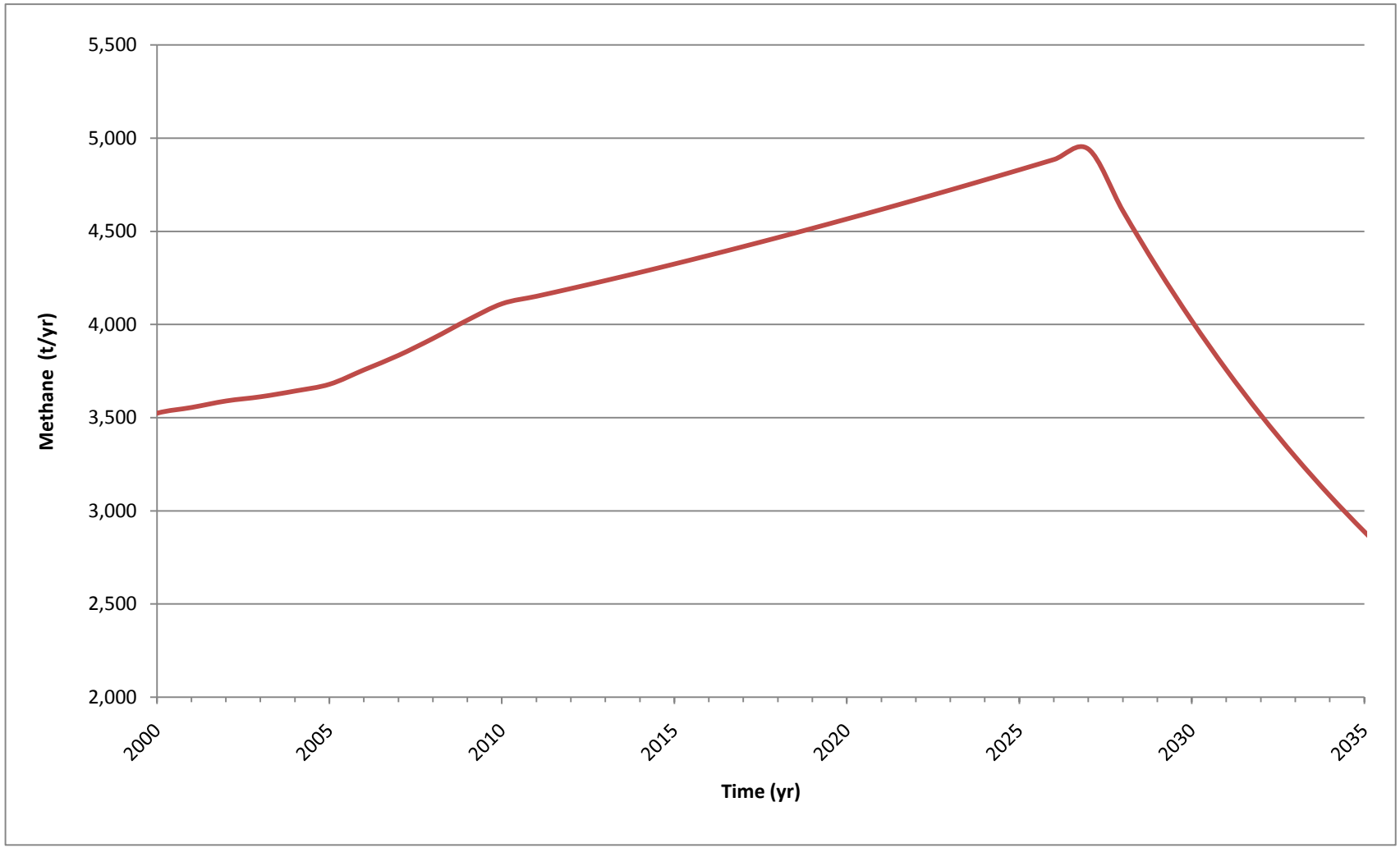


Figure D2
METHANE GAS EMISSION ESTIMATE
Foothills Boulevard Regional Landfill

Notes:
Relatively Inert: k = 0.02 yr^{-1}, Lo = 20 m^3/tonne
Moderately Decomposable: k = 0.04 yr^{-1}, Lo = 120 m^3/tonne
Decomposable: k = 0.09 yr^{-1}, Lo = 160 m^3/tonne

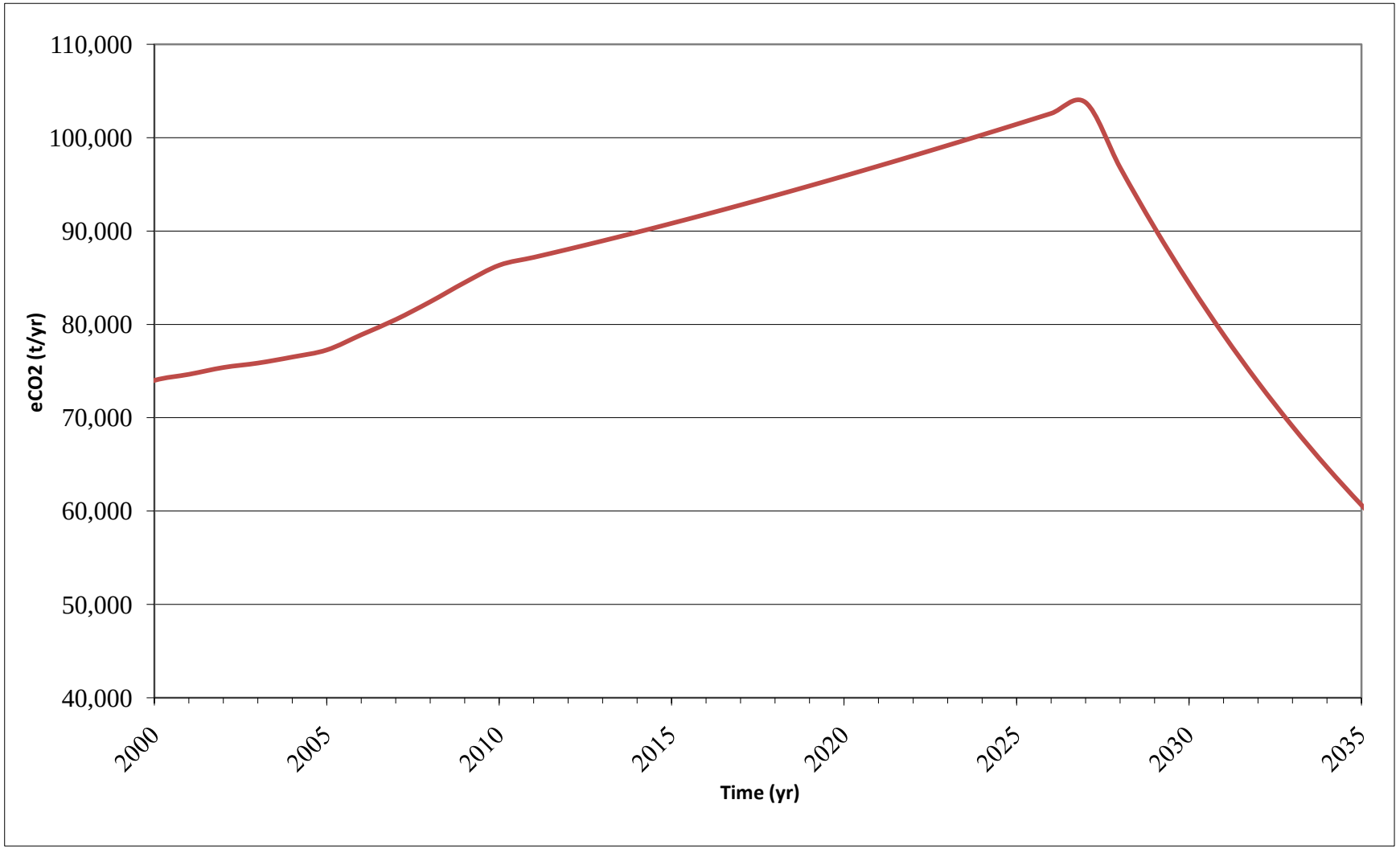


Figure D3
GREENHOUSE GAS EMISSION ESTIMATE
Foothills Boulevard Regional Landfill

Notes:
Relatively Inert: k = 0.02 yr^{-1}, Lo = 20 m^3/tonne
Moderately Decomposable: k = 0.04 yr^{-1}, Lo = 120 m^3/tonne
Decomposable: k = 0.09 yr^{-1}, Lo = 160 m^3/tonne

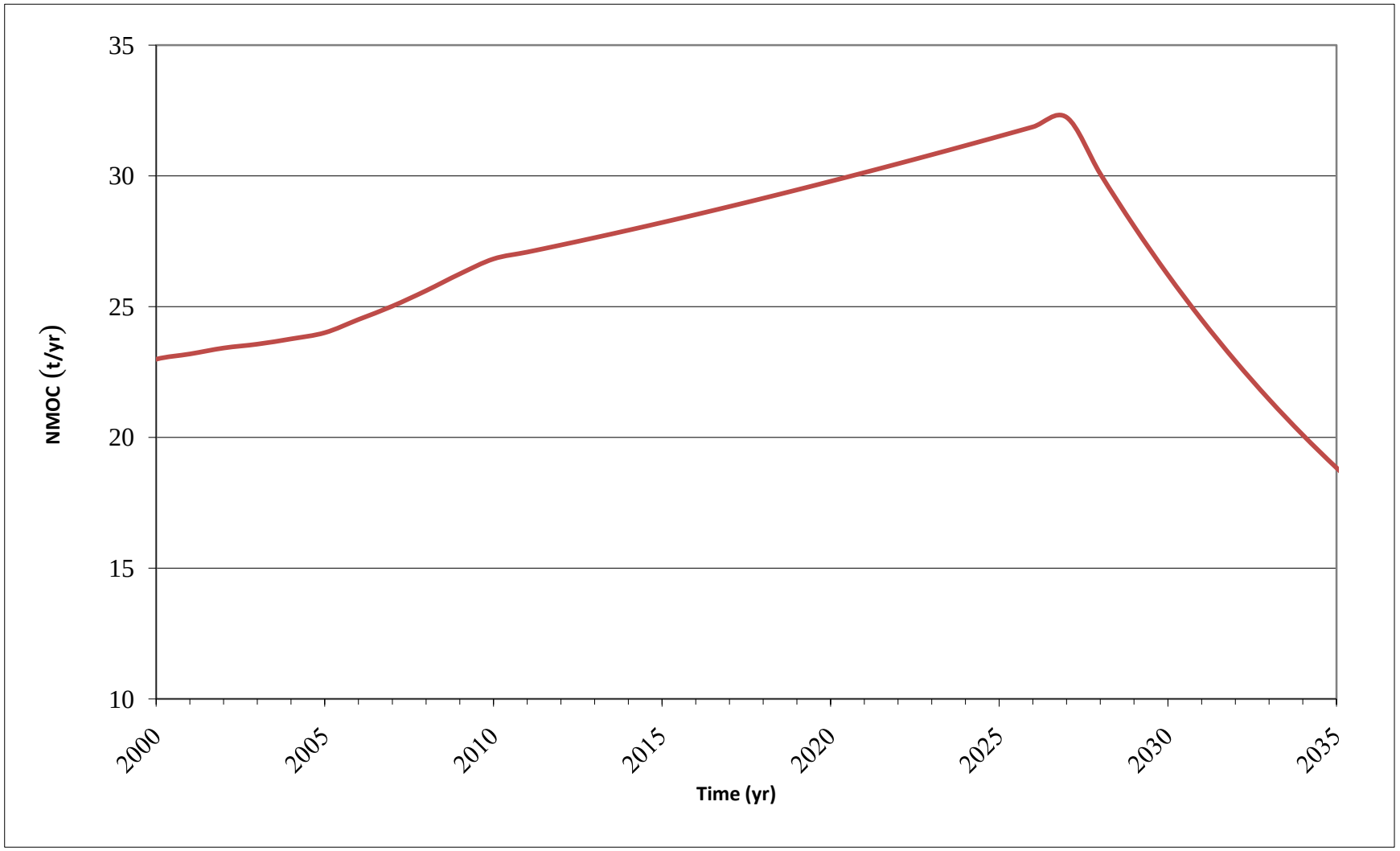
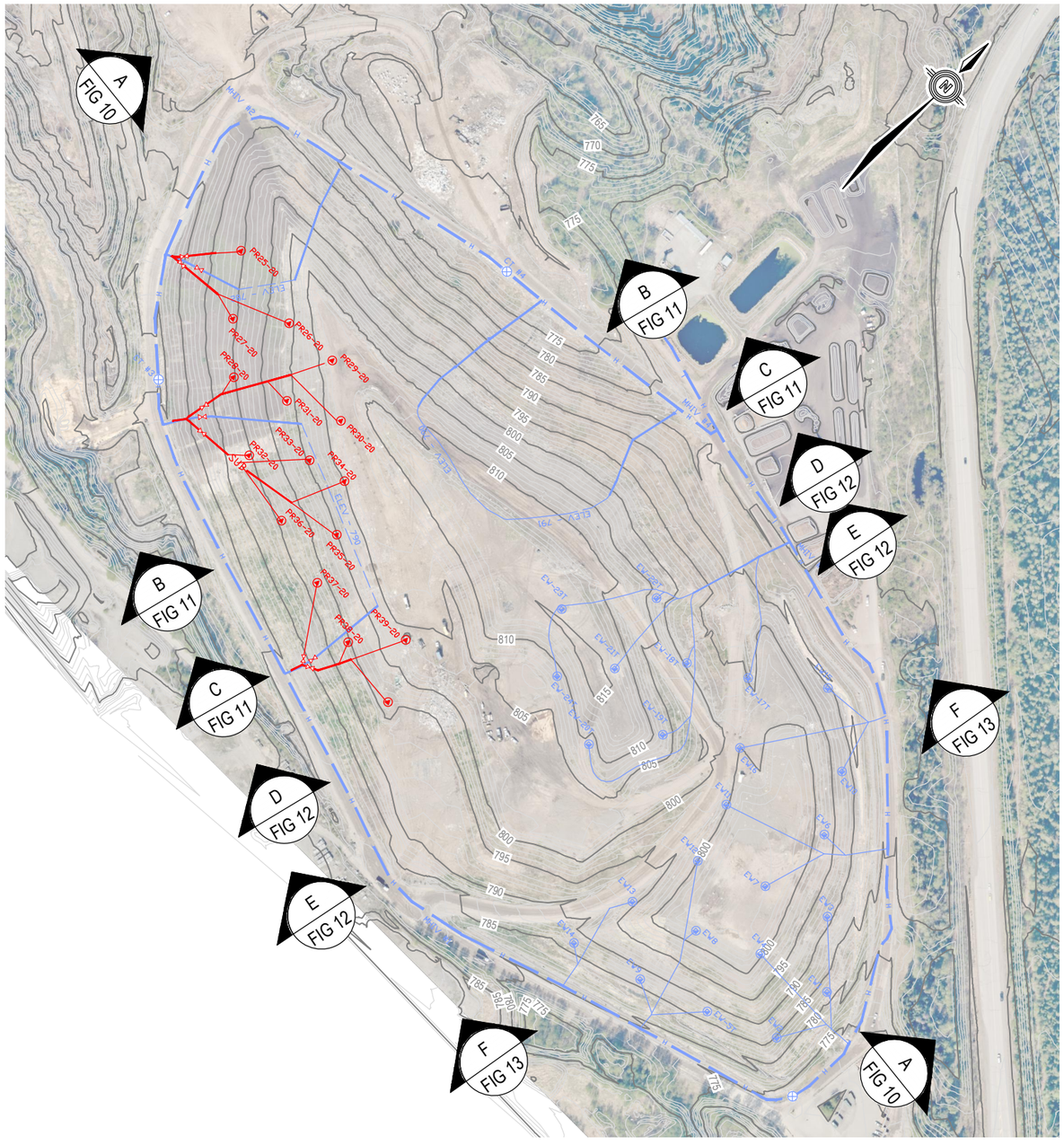


Figure D4
NMOC EMISSION RATE ESTIMATE
Foothills Boulevard Regional Landfill

Notes:
Relatively Inert: k = 0.02 yr^{-1}, Lo = 20 m^3/tonne
Moderately Decomposable: k = 0.04 yr^{-1}, Lo = 120 m^3/tonne
Decomposable: k = 0.09 yr^{-1}, Lo = 160 m^3/tonne

APPENDIX H – FILL PLAN UPDATE



Q:\Edmonton\Drafting\00_MASTER PROJECT BASE PLANS\Regional District of Fraser-Fort George\Production\SWM.SWOP04882-02-2023 Fill Plan Update\SWM.SWOP04882-02_FIG 1-7.dwg [FIGURE 1] September 19, 2023 - 4:16:37 pm (BY: GAMMIE, DON)

PLAN - EXISTING (May 11, 2023)

TOTAL AIRSPACE REMAINING: 749,686 m³

PLAN - FINAL TOP OF WASTE

0 200 m

Scale: 1: 4 000

NOTES

EXISTING GROUND CONTOURS AND AERIAL IMAGE BASED ON MAY 11, 2023 SURVEY BY AERO GEOMETRICS LTD.

PROJECTION: UTM ZONE 10 NAD 83

STATUS

ISSUED FOR REVIEW

CLIENT

REGIONAL DISTRICT
of Fraser-Fort George

TETRA TECH

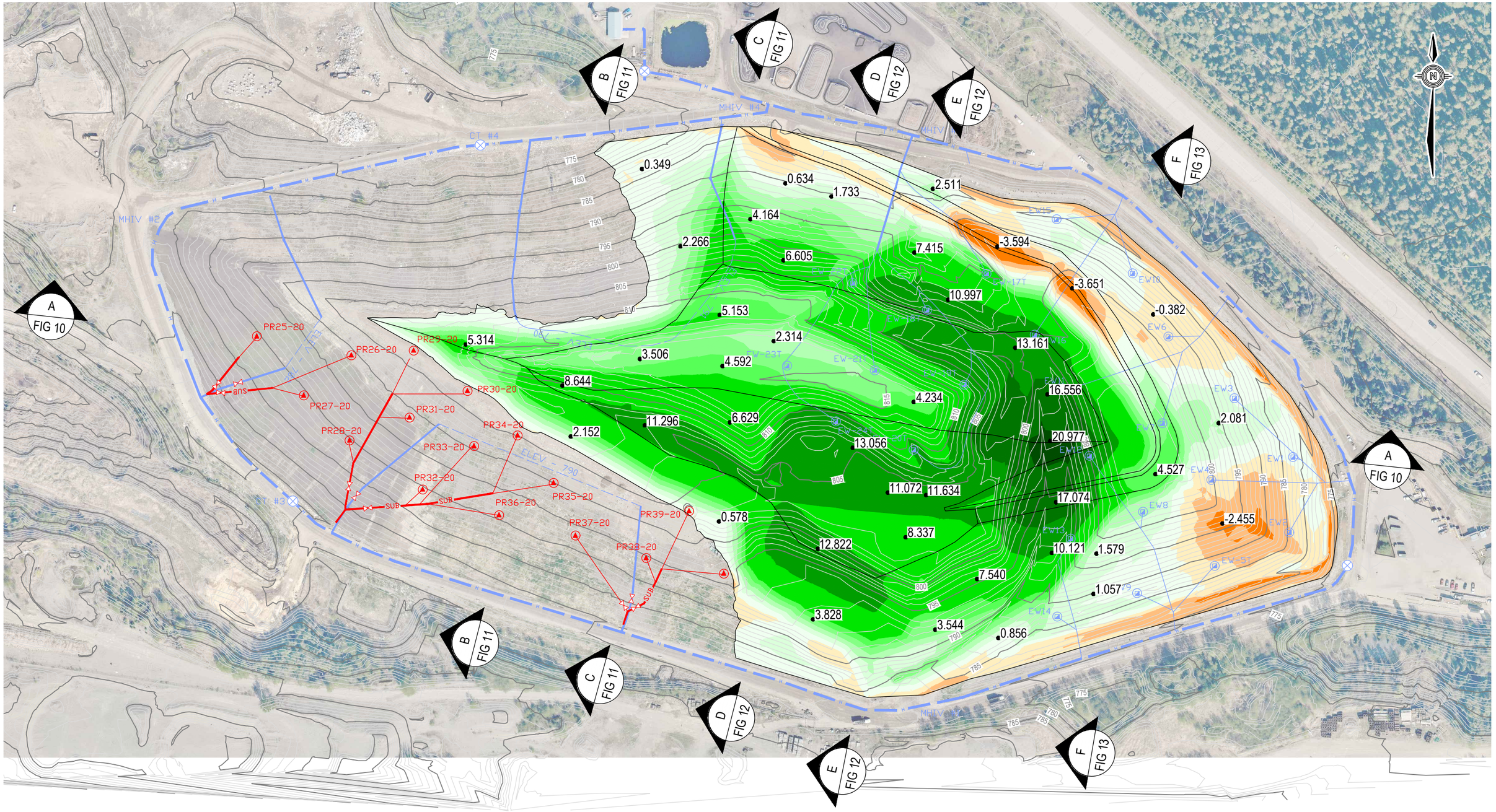
2023 LANDFILL FILL PLAN UPDATE
FOOTHILLS BOULEVARD REGIONAL LANDFILL

PLAN - EXISTING AND FINAL TOP OF WASTE

PROJECT NO.	DWN	CKD	REV
SWM.SWOP04882-02	DRG	ML	0

OFFICE	DATE
EDM	September 15, 2023

Figure 1



CUT	FILL THICKNESS REMAINING		
2.0m to 3.0m	>20.0m	5.0m to 10.0m	2.0m to 3.0m
1.0m to 2.0m	15.0m to 20.0m	4.0m to 5.0m	1.0m to 2.0m
0.0m to 1.0m	10.0m to 15.0m	3.0m to 4.0m	0.0m to 1.0m

NOTES
EXISTING GROUND CONTOURS AND AERIAL IMAGE BASED ON MAY 11, 2023 SURVEY BY AERO GEOMETRICS LTD.

PROJECTION: UTM ZONE 10 NAD 83

STATUS
ISSUED FOR REVIEW

0 100 m

Scale: 1: 2 500

CLIENT
REGIONAL DISTRICT of Fraser-Fort George

TETRA TECH

LANDFILL DEVELOPMENT SUPPORT
FOOTHILLS BOULEVARD REGIONAL LANDFILL

PLAN - CUT AND FILL HEAT MAP
EXISTING VS. FINAL DESIGN TOP OF WASTE

PROJECT NO.	DWN	CKD	REV
SWM.SWOP04882-02	DRG	ML	0
OFFICE: EDM	DATE: September 15, 2023		

Figure 2

Q:\Edmonton\Drafting\00_MASTER PROJECT BASE PLANS\Regional District of Fraser-Fort George\Production\SWM.SWOP04882-02-2023 Fill Plan Update\SWM.SWOP04882-02_FIG 1-7.dwg [FIGURE 2] September 19, 2023 - 4:05:13 pm (BY: GAMMIE, DON)

NORTH FILL AREA
FILL: 71,641 m³

EAST FILL AREA
FILL: 6,167 m³

TRAILER TIPPING AREA

COMMERCIAL/CURBSIDE TIPPING AREA

ASBESTOS AREA

ACCESS ROAD

3:1

812.099

807.344

MHIV #2

MHIV #4

CT #4

CT #3

ELEV - 790

PR25-20
PR26-20
PR27-20
PR28-20
PR29-20
PR30-20
PR31-20
PR32-20
PR33-20
PR34-20
PR35-20
PR36-20
PR37-20
PR38-20
PR39-20
SUB

EW-23T
EW-21T
EW-19T
EW-24T
EW-20T
EW13
EW14
EW9
EW-5T
EW8

A FIG 10
B FIG 11
C FIG 11
D FIG 12
E FIG 12
F FIG 13

TRAFFIC PATTERN:
- TRAILERS
- COMMERCIAL / CURBSIDE
- DITCH

NOTES
EXISTING GROUND CONTOURS AND AERIAL IMAGE BASED ON MAY 11, 2023 SURVEY BY AERO GEOMETRICS LTD.

PROJECTION: UTM ZONE 10 NAD 83

STATUS
ISSUED FOR REVIEW

0 100 m
Scale: 1: 2 500

CLIENT
REGIONAL DISTRICT of Fraser-Fort George

TETRA TECH

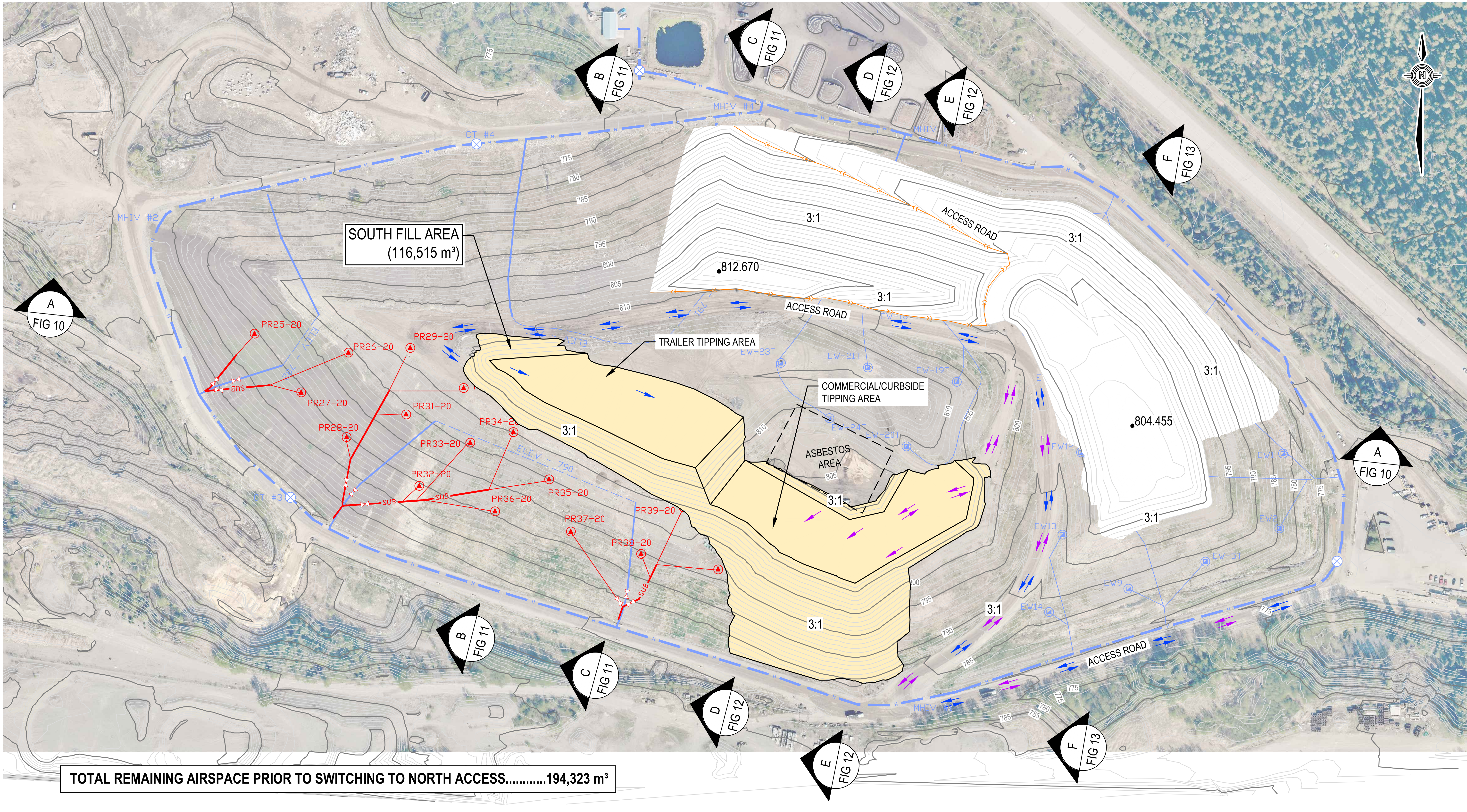
2023 LANDFILL FILL PLAN UPDATE
FOOTHILLS BOULEVARD REGIONAL LANDFILL

PLAN
AVAILABLE EAST AND NORTH FILL AREAS REMAINING

PROJECT NO.	DWN	CKD	REV
SWM.SWOP04882-02	DRG	ML	0
OFFICE: EDM	DATE: September 15, 2023		

Figure 3

Q:\Edmonton\Drafting\00_MASTER PROJECT BASE PLANS\Regional District of Fraser-Fort George\Production\SWM.SWOP04882-02-2023 Fill Plan Update\SWM.SWOP04882-02_FIG 1-7.dwg [FIGURE 3] September 19, 2023 - 4:05:48 pm (BY: GAMMIE, DON)


SOUTH FILL AREA
(116,515 m³)
TRAILER TIPPING AREA
COMMERCIAL/CURBSIDE
TIPPING AREA
ASBESTOS
AREA
ACCESS ROAD
ACCESS ROAD
ACCESS ROAD
812.670
804.455
3:1
A FIG 10
B FIG 11
C FIG 11
D FIG 12
E FIG 12
F FIG 13
PR25-20
PR26-20
PR27-20
PR28-20
PR29-20
PR31-20
PR32-20
PR33-20
PR35-20
PR36-20
PR37-20
PR38-20
PR39-20
ELEV. 790
MHIV #2
MHIV #4
CT #4
TOTAL REMAINING AIRSPACE PRIOR TO SWITCHING TO NORTH ACCESS............194,323 m³

TRAFFIC PATTERN:

- TRAILERS
- COMMERCIAL / CURBSIDE
- DITCH

NOTES

EXISTING GROUND CONTOURS AND AERIAL IMAGE BASED ON MAY 11, 2023 SURVEY BY AERO GEOMETRICS LTD.

PROJECTION: UTM ZONE 10 NAD 83

STATUS

ISSUED FOR REVIEW

0 — 100 m

Scale: 1: 2 500

CLIENT

REGIONAL DISTRICT of Fraser-Fort George

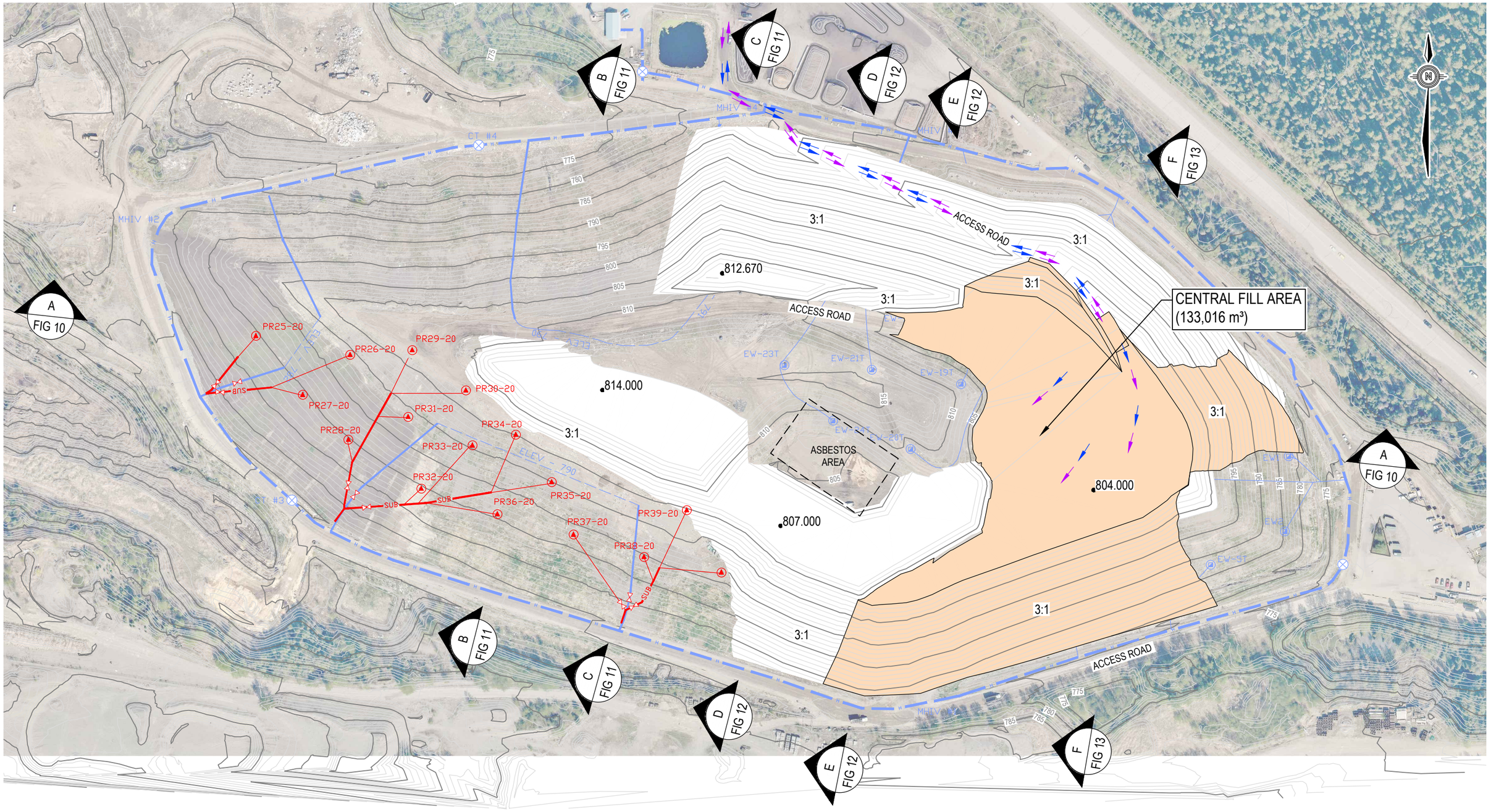
TETRA TECH

2023 LANDFILL FILL PLAN UPDATE
FOOTHILLS BOULEVARD REGIONAL LANDFILL

PLAN
AVAILABLE SOUTH FILL AREA REMAINING

PROJECT NO.	DWN	CKD	REV
SWM.SWOP04882-02	DRG	ML	0
OFFICE	DATE		
EDM	September 15, 2023		

Figure 4



TRAFFIC PATTERN:

- TRAILERS
- COMMERCIAL / CURBSIDE

NOTES

EXISTING GROUND CONTOURS AND AERIAL IMAGE BASED ON MAY 11, 2023 SURVEY BY AERO GEOMETRICS LTD.

PROJECTION: UTM ZONE 10 NAD 83

STATUS

ISSUED FOR REVIEW

0 100 m

Scale: 1: 2 500

CLIENT

REGIONAL DISTRICT of Fraser-Fort George

TETRA TECH

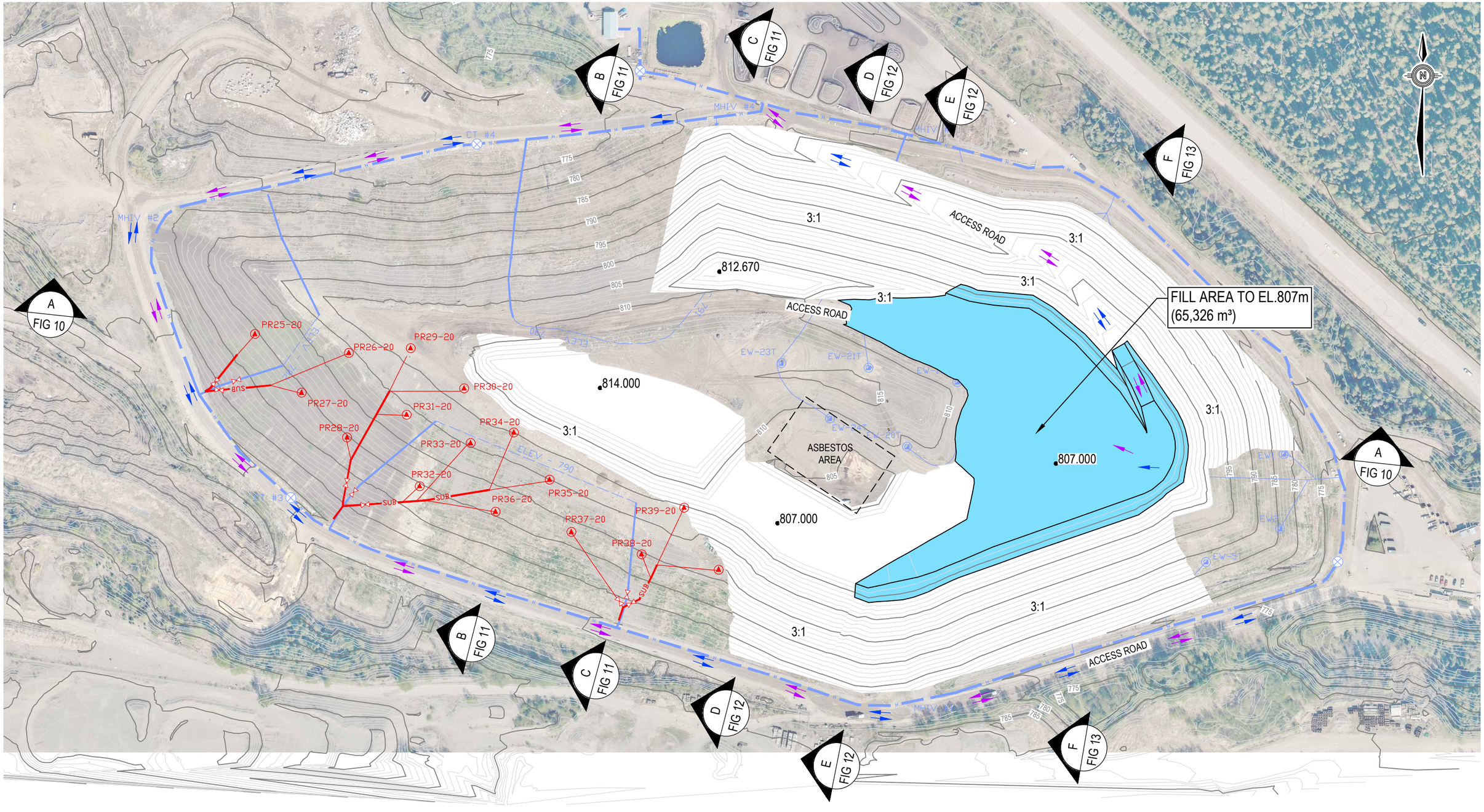
2023 LANDFILL FILL PLAN UPDATE FOOTHILLS BOULEVARD REGIONAL LANDFILL

PLAN CURRENT ACCESS ROAD FILL AREA TO ELEV. 804m

PROJECT NO.	DWN	CKD	REV
SWM.SWOP04882-02	DRG	ML	0
OFFICE: EDM	DATE: September 15, 2023		

Figure 5

Q:\Edmonton\Drafting\00_MASTER PROJECT BASE PLANS\Regional District of Fraser-Fort George\Production\SWM.SWOP04882-02-2023 Fill Plan Update\SWM.SWOP04882-02_FIG 1-7.dwg [FIGURE 5], September 19, 2023 - 4:06:49 pm (BY: GAMMIE, DON)



TRAFFIC PATTERN:

- TRAILERS
- COMMERCIAL / CURBSIDE

NOTES

EXISTING GROUND CONTOURS AND AERIAL IMAGE BASED ON MAY 11, 2023 SURVEY BY AERO GEOMETRICS LTD.

PROJECTION: UTM ZONE 10 NAD 83

STATUS

ISSUED FOR REVIEW

0 100 m

Scale: 1: 2 500

CLIENT

REGIONAL DISTRICT of Fraser-Fort George

TETRA TECH

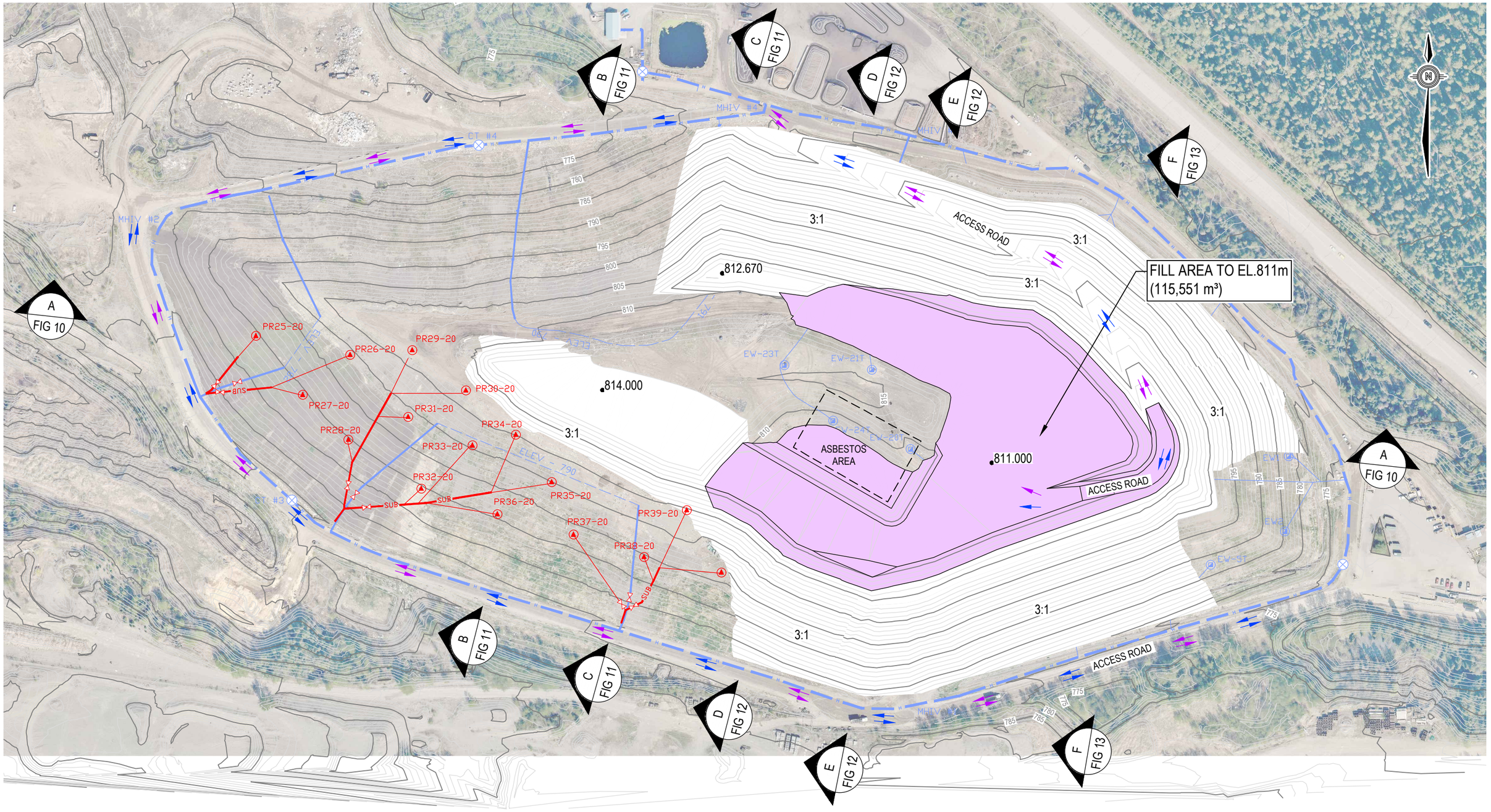
2023 LANDFILL FILL PLAN UPDATE
FOOTHILLS BOULEVARD REGIONAL LANDFILL

PLAN
FILL AREA TO ELEV. 807m

PROJECT NO.	DWN	CKD	REV
SWM.SWOP04882-02	DRG	ML	0
OFFICE: EDM	DATE: September 15, 2023		

Figure 6

Q:\Edmonton\Drafting\00_MASTER PROJECT BASE PLANS\Regional District of Fraser-Fort George\Production\SWM.SWOP04882-02-2023 Fill Plan Update\SWM.SWOP04882-02_FIG 1-7.dwg [FIGURE 6] September 19, 2023 - 4:07:25 pm (BY: GAMMIE, DON)



TRAFFIC PATTERN:

- TRAILERS
- COMMERCIAL / CURBSIDE

NOTES

EXISTING GROUND CONTOURS AND AERIAL IMAGE BASED ON MAY 11, 2023 SURVEY BY AERO GEOMETRICS LTD.

PROJECTION: UTM ZONE 10 NAD 83

STATUS

ISSUED FOR REVIEW

0 100 m

Scale: 1: 2 500

CLIENT

REGIONAL DISTRICT of Fraser-Fort George

TETRA TECH

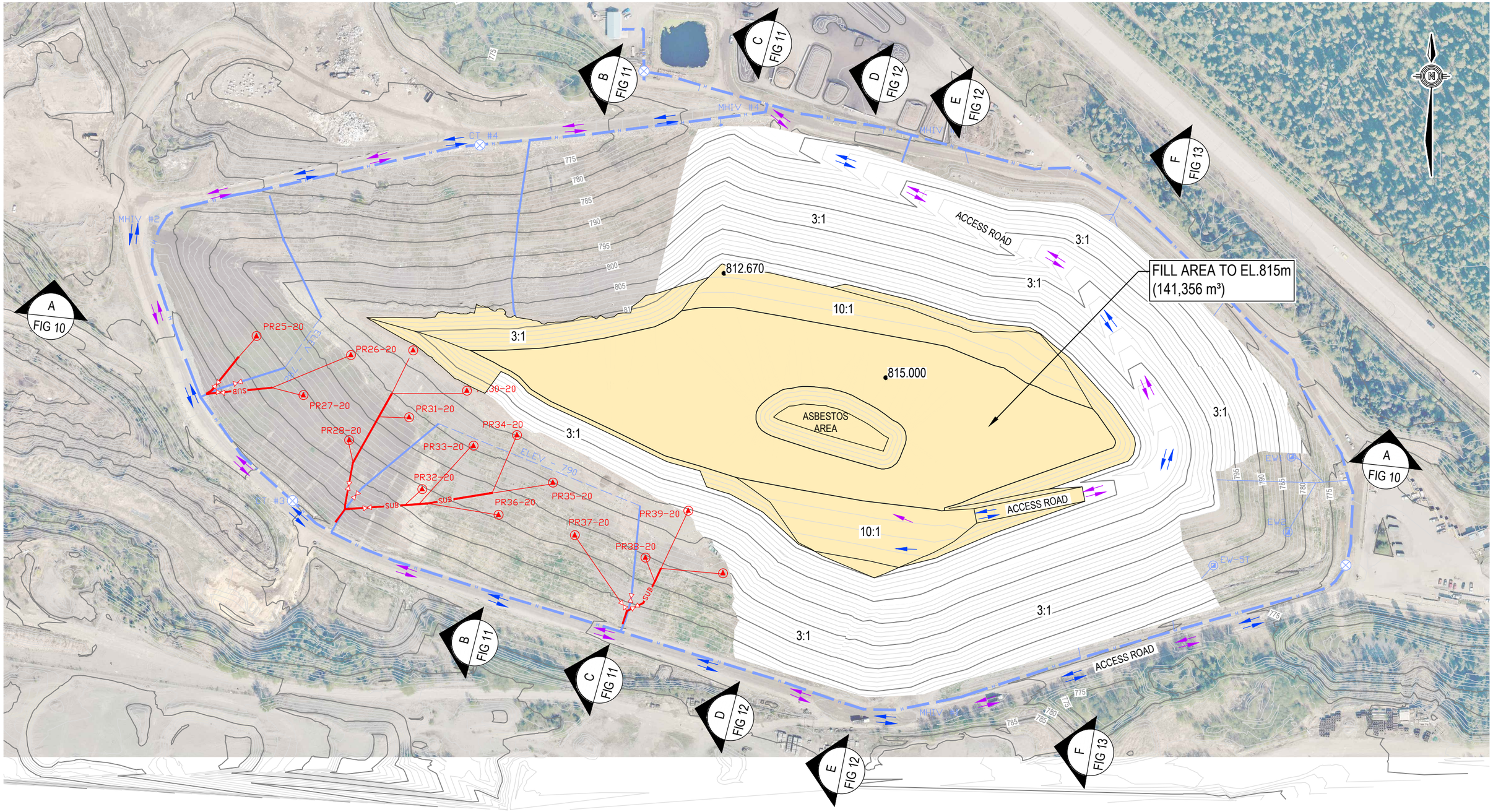
2023 LANDFILL FILL PLAN UPDATE
FOOTHILLS BOULEVARD REGIONAL LANDFILL

PLAN
FILL AREA TO ELEV. 811m

PROJECT NO.	DWN	CKD	REV
SWM.SWOP04882-02	DRG	ML	0
OFFICE: EDM	DATE: September 15, 2023		

Figure 7

Q:\Edmonton\Drafting\00_MASTER PROJECT BASE PLANS\Regional District of Fraser-Fort George\Production\SWM.SWOP04882-02-2023 Fill Plan Update\SWM.SWOP04882-02_FIG 1-7.dwg [FIGURE 7] September 19, 2023 - 4:08:05 pm (BY: GAMMIE, DON)



TRAFFIC PATTERN:

- TRAILERS
- COMMERCIAL / CURBSIDE

NOTES

EXISTING GROUND CONTOURS AND AERIAL IMAGE BASED ON MAY 11, 2023 SURVEY BY AERO GEOMETRICS LTD.

PROJECTION: UTM ZONE 10 NAD 83

STATUS

ISSUED FOR REVIEW

0 100 m

Scale: 1: 2 500

CLIENT

REGIONAL DISTRICT of Fraser-Fort George

TETRA TECH

2023 LANDFILL FILL PLAN UPDATE
FOOTHILLS BOULEVARD REGIONAL LANDFILL

PLAN
FILL AREA TO ELEV. 815m

PROJECT NO.	DWN	CKD	REV
SWM.SWOP04882-02	DRG	ML	0
OFFICE: EDM	DATE: September 15, 2023		

Figure 8

TOP FILL AREA TO FINAL ELEVATION
(100,114 m³)

817.000
819.157
820.655
820.750
818.756
816.854

3:1
10:1

ACCESS ROAD

MHIV #2
MHIV #3
MHIV #4
CT #3
CT #4
EW-ST

PR25-20
PR26-20
PR27-20
PR28-20
PR30-20
PR31-20
PR32-20
PR33-20
PR34-20
PR35-20
PR36-20
PR37-20
PR38-20
PR39-20
SUB

ELEV - 790

A FIG 10
B FIG 11
C FIG 11
D FIG 12
E FIG 12
F FIG 13

TRAFFIC PATTERN:
- TRAILERS
- COMMERCIAL / CURBSIDE

NOTES
EXISTING GROUND CONTOURS AND AERIAL IMAGE BASED ON MAY 11, 2023 SURVEY BY AERO GEOMETRICS LTD.

PROJECTION: UTM ZONE 10 NAD 83

STATUS
ISSUED FOR REVIEW

0 100 m
Scale: 1: 2 500

CLIENT
REGIONAL DISTRICT of Fraser-Fort George

TETRA TECH

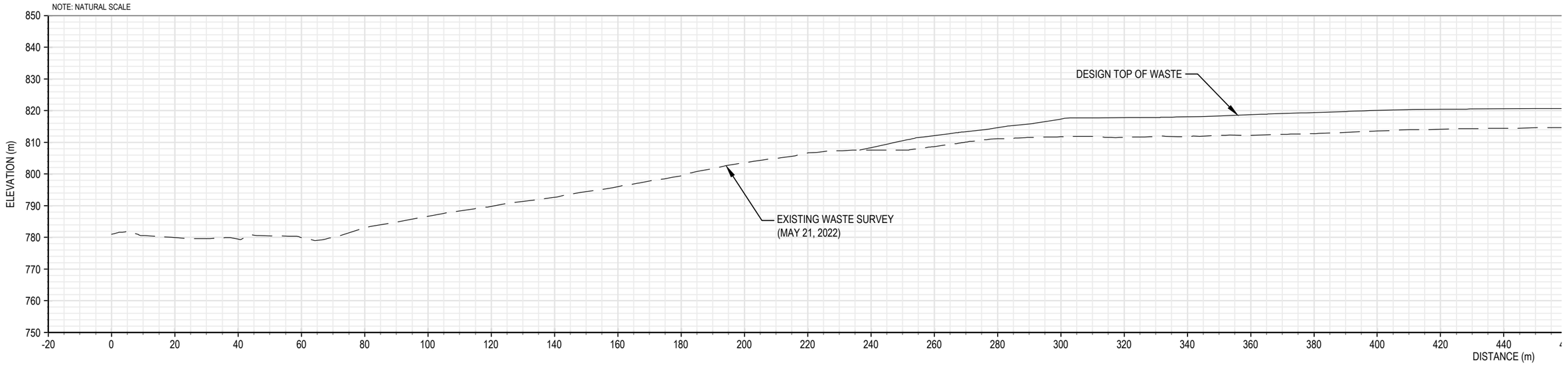
2023 LANDFILL FILL PLAN UPDATE
FOOTHILLS BOULEVARD REGIONAL LANDFILL

PLAN
FILL AREA TO FINAL ELEVATION

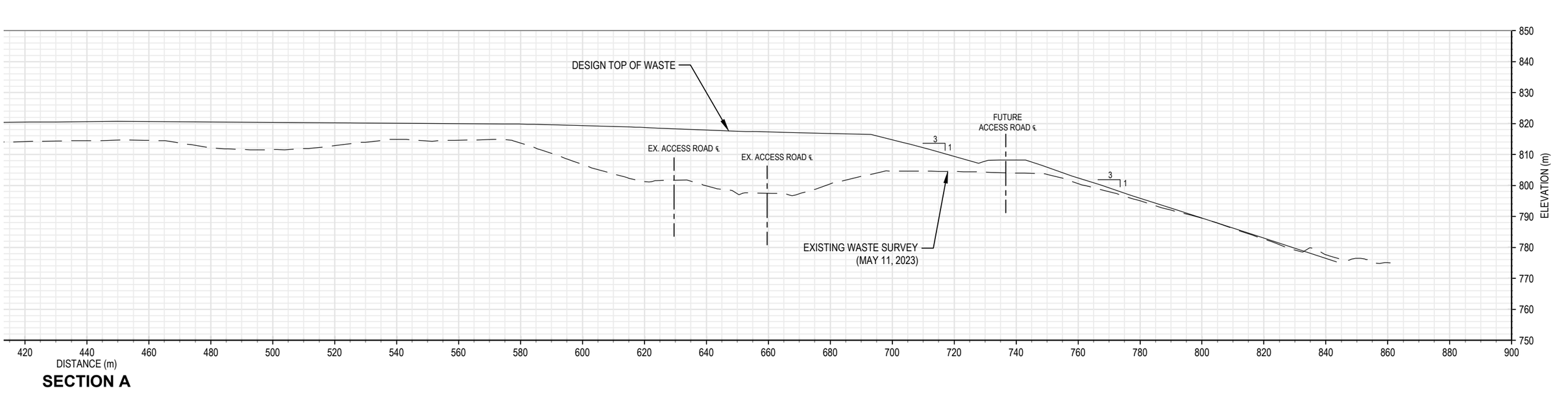
PROJECT NO.	DWN	CKD	REV
SWM.SWOP04882-02	DRG	ML	0
OFFICE: EDM	DATE: September 15, 2023		

Figure 9

Q:\Edmonton\Drafting\00_MASTER PROJECT BASE PLANS\Regional District of Fraser-Fort George\Production\SWM.SWOP04882-02-2023 Fill Plan Update\SWM.SWOP04882-02_FIG 1-7.dwg [FIGURE 9] September 19, 2023 - 4:09:15 pm (BY: GAMMIE, DON)



SECTION A



SECTION A

0 200 m

Scale: 1: 4 000

NOTES
EXISTING GROUND CONTOURS AND AERIAL IMAGE BASED ON MAY 11, 2023 SURVEY BY AERO GEOMETRICS LTD.

PROJECTION: UTM ZONE 10 NAD 83

STATUS
ISSUED FOR REVIEW

CLIENT
REGIONAL DISTRICT of Fraser-Fort George

TETRA TECH

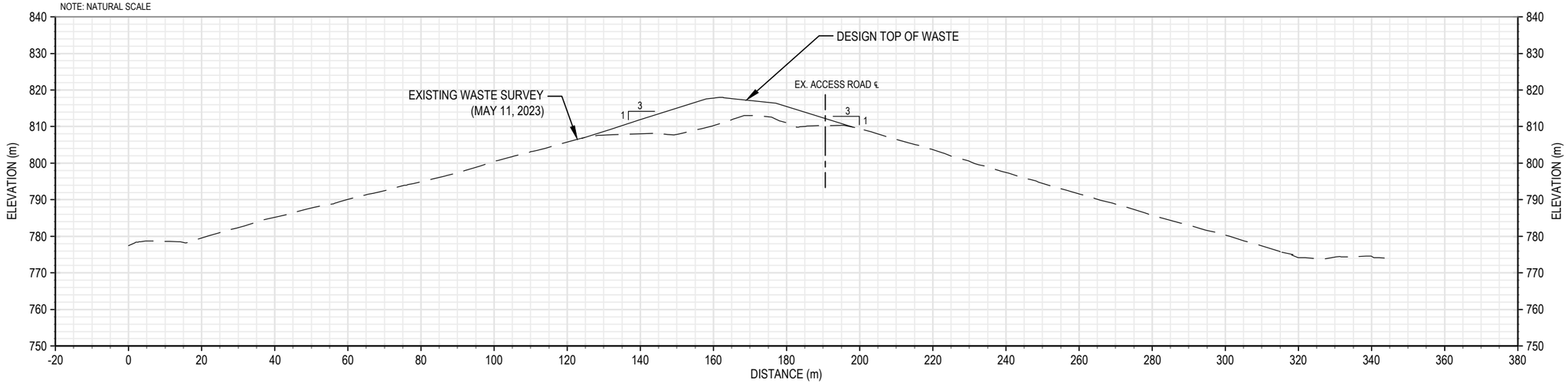
2023 LANDFILL FILL PLAN UPDATE
FOOTHILLS BOULEVARD REGIONAL LANDFILL

SECTION A

PROJECT NO.	DWN	CKD	REV
SWM.SWOP04882-02	DRG	ML	0
OFFICE: EDM	DATE: September 15, 2023		

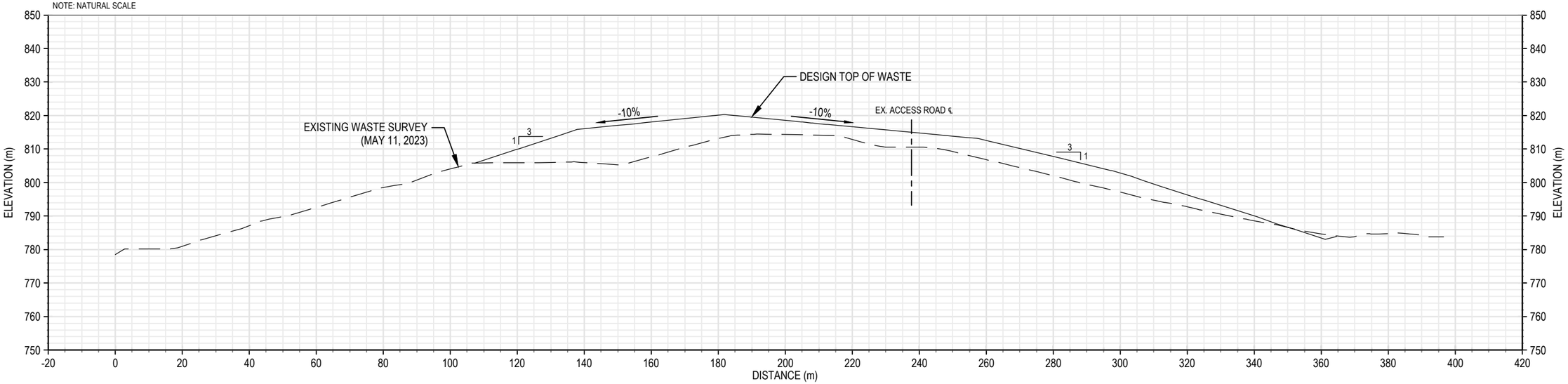
Figure 10

NOTE: NATURAL SCALE



SECTION B

NOTE: NATURAL SCALE



SECTION C

0 50 m

Scale: 1: 1 250

NOTES
EXISTING GROUND CONTOURS AND AERIAL IMAGE BASED ON MAY 11, 2023 SURVEY BY AERO GEOMETRICS LTD.

PROJECTION: UTM ZONE 10 NAD 83

STATUS
ISSUED FOR REVIEW

CLIENT
REGIONAL DISTRICT of Fraser-Fort George

TETRA TECH

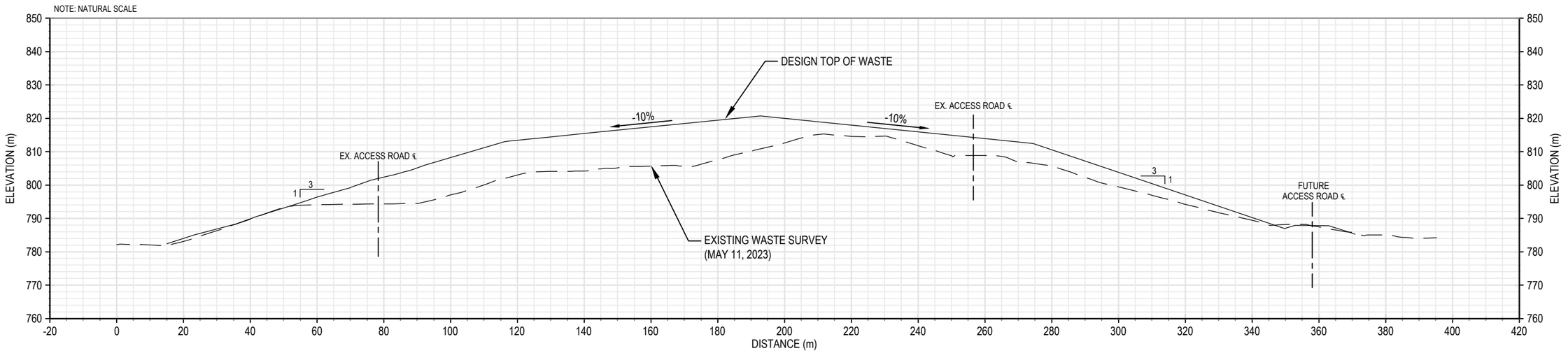
2023 LANDFILL FILL PLAN UPDATE
FOOTHILLS BOULEVARD REGIONAL LANDFILL

SECTIONS B AND C

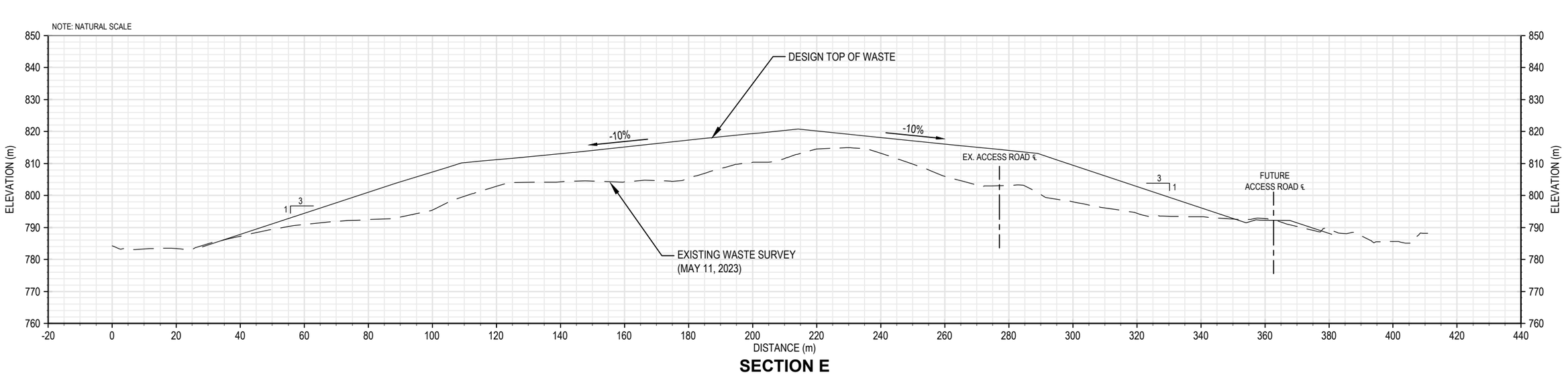
PROJECT NO.	DWN	CKD	REV
SWM.SWOP04882-02	DRG	ML	0

OFFICE: EDM
DATE: September 15, 2023

Figure 11



SECTION D



SECTION E

0 50 m

Scale: 1: 1 250

NOTES
EXISTING GROUND CONTOURS AND AERIAL IMAGE BASED ON MAY 11, 2023 SURVEY BY AERO GEOMETRICS LTD.

PROJECTION: UTM ZONE 10 NAD 83

STATUS
ISSUED FOR REVIEW

CLIENT
REGIONAL DISTRICT of Fraser-Fort George

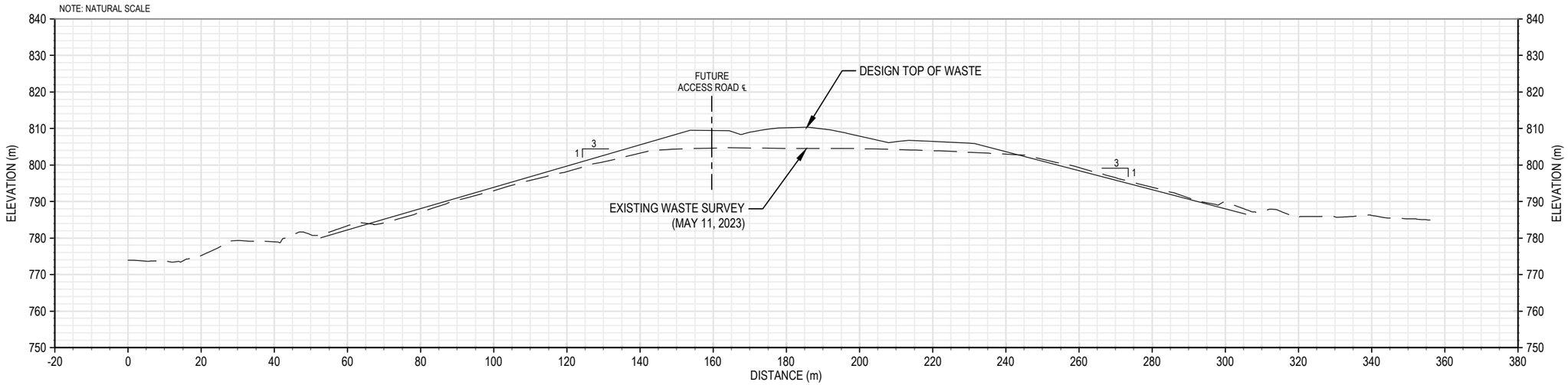
TETRA TECH

2023 LANDFILL FILL PLAN UPDATE
FOOTHILLS BOULEVARD REGIONAL LANDFILL

SECTIONS D AND E

PROJECT NO.	DWN	CKD	REV
SWM.SWOP04882-02	DRG	ML	0
OFFICE: EDM	DATE: September 15, 2023		

Figure 12



SECTION F

0 50 m

Scale: 1: 1 250

NOTES
EXISTING GROUND CONTOURS AND AERIAL IMAGE BASED ON MAY 11, 2023 SURVEY BY AERO GEOMETRICS LTD.

PROJECTION: UTM ZONE 10 NAD 83

STATUS
ISSUED FOR REVIEW

CLIENT
REGIONAL DISTRICT of Fraser-Fort George

TETRA TECH

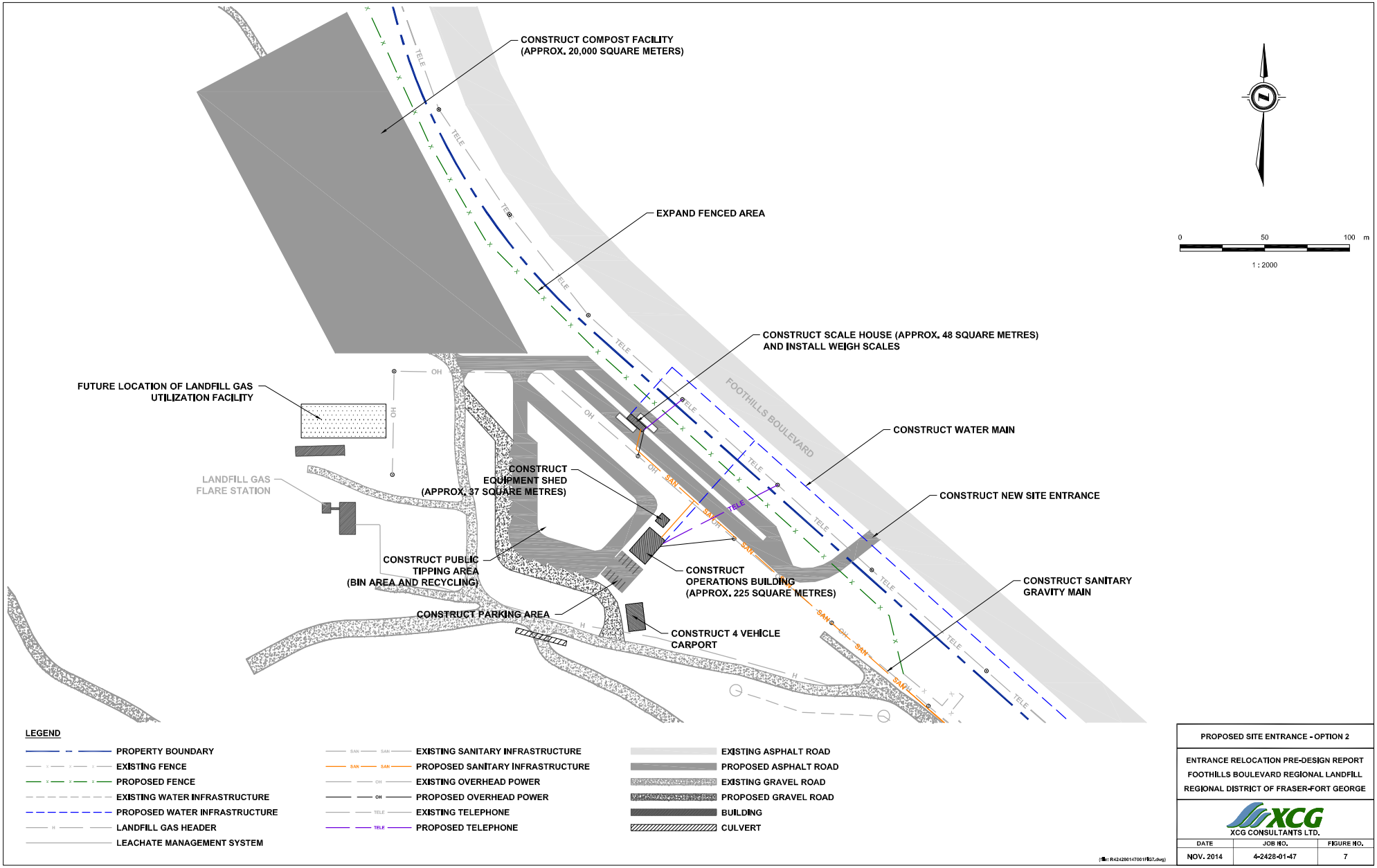
2023 LANDFILL FILL PLAN UPDATE
FOOTHILLS BOULEVARD REGIONAL LANDFILL

SECTION F

PROJECT NO.	DWN	CKD	REV
SWM.SWOP04882-02	DRG	ML	0
OFFICE: EDM	DATE: September 15, 2023		

Figure 13

APPENDIX I – ENTRANCE RELOCATION CONCEPTUAL LAYOUT



LEGEND

- PROPERTY BOUNDARY
- EXISTING FENCE
- PROPOSED FENCE
- EXISTING WATER INFRASTRUCTURE
- PROPOSED WATER INFRASTRUCTURE
- LANDFILL GAS HEADER
- LEACHATE MANAGEMENT SYSTEM
- EXISTING SANITARY INFRASTRUCTURE
- PROPOSED SANITARY INFRASTRUCTURE
- EXISTING OVERHEAD POWER
- PROPOSED OVERHEAD POWER
- EXISTING TELEPHONE
- PROPOSED TELEPHONE
- EXISTING ASPHALT ROAD
- PROPOSED ASPHALT ROAD
- EXISTING GRAVEL ROAD
- PROPOSED GRAVEL ROAD
- BUILDING
- CULVERT

(file: R4242801470019FIG7.dwg)

PROPOSED SITE ENTRANCE - OPTION 2

ENTRANCE RELOCATION PRE-DESIGN REPORT
FOOTHILLS BOULEVARD REGIONAL LANDFILL
REGIONAL DISTRICT OF FRASER-FORT GEORGE

XCG CONSULTANTS LTD.

DATE	JOB NO.	FIGURE NO.
NOV. 2014	4-2428-01-47	7