

# **Tervita Corporation**

Babkirk Secure Landfill

British Columbia Ministry of Environment  
Permit 104460

*Tommy Lakes Road, BRITISH COLUMBIA*

56° 54' 9.27"N, 121° 54' 36.29"W

## ***Operations Plan***

***Version 1***

***JUNE 13, 2018***



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# HAZARDOUS WASTE REGULATION OPERATIONAL PLAN

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**Legal Description:** Lot 2819 Peace River District except Plan 29474

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## 1.0 General Information

The Operations Plan (the Plan) outlines the methods by which the Babkirk Facility is managed. The contents of this Plan are based on industry standards of practice and provide a practical common-sense approach to waste management. Operating standards will be updated on a regular basis in response to improving operational practices and/or changing regulatory requirements. All revisions to the Plan will be submitted to the Director for approval, as per Section 5.1 of Permit 104460.

### 1.1 General Site Information

The Babkirk Facility, Permit 104460, is located approximately 6.3km off the Tommy Lakes Road north of Fort St. John, British Columbia (BC), at 56°54' 9.27" N, 121°54' 36.29" W. The Facility is comprised of a Secure Landfill and a Soil Treatment Facility. Hydrocarbon contaminated soils from the oil & gas industry have been received at the existing Soil Treatment Facility since 1998. The development of a Secure Landfill has broadened the range of materials the Babkirk facility can deal with in an environmentally responsible manner. During development of the Secure Landfill the facility will retain the ability to store 90,000 tonnes of waste soil for bioremediation while adding permanent storage of 750,000 tonnes of waste soil in the Secure Landfill. Permission to develop the Secure Landfill is given in Environmental Assessment Certificate (EAC), WD08-03 issued by the BC Environmental Assessment Office (EAO).

### 1.2 Environmental Assessment

Information gathered during the comprehensive site evaluation provided primary basis for design of the facility. Babkirk was issued an Environmental Assessment Certificate (EAC) WD08-03 (Appendix 1) by the BC Environmental Assessment Office (EAO) for Secure Landfill development. Tervita made commitments to the EAO in the original application which should be reviewed by Tervita staff in Appendix 2.

### 1.3 Regulatory Consideration

Babkirk applied for a change in the requirements of the *Hazardous Waste Regulation* (HWR). The application for change in the requirements was approved by the MOE. The Section 51 application and requirements need to be reviewed by staff to understand compliance commitments. The change in requirements are detailed below:

#### 1. Portable Structures

Section 26(3) states that the owner of a Secure Landfill must as one or more cells are being filled,

- a) operate under cover of a portable structure that acts as a roof to keep out rain and snow,
- b) design another system to prevent generation during operation.

Due to the general operations of the landfill and the general scope and size, operating under a portable structure is not feasible to minimize leachate generation. Tervita will incorporate an appropriately designed leachate collection and extraction system; implement proper landfilling procedures and operations including daily compaction of

waste and consistent waste contouring to direct surface run off to the LCS; implement timely progressive capping and to reduce leachate generation.

## 2. Landfill Cell Slopes

Section 27(8)(b)(v) states that:

(8) The owner of a secure landfill must during the closure of the landfill or any cell,

(b) install and construct for the secure landfill a final cover with the following minimum characteristics.

(v) graded and maintained to prevent ponding and having slopes of 3% to 5%.

Tervita will grade capped waste cells to a maximum slope of 33% (3:1) along all external edges and a minimum slope of 5% (20:1) throughout the top surface of the cell. The design of the landfill includes consideration to slope stability, run-off infiltration, erosion of the waste profile and final closure surface condition.

## 3. Free Liquid Test Procedure

Schedule 4, Part 3 outlines the Free Liquids Test Procedure.

Tervita will use the US EPA Method 9095B, Paint Filter Liquids Test to determine free liquid in waste and landfill suitability.

## 4. Wastes Prohibited from Secure Disposal

See Section 6.1 of Permit 104460 for the waste prohibited for disposal at Babkirk.

# 1.4 Contact Information

General inquiries regarding the Tervita Babkirk Facility can be directed to the facility manager by phone at (250) 827-6834.

**In the case of an emergency please phone the Tervita's 24-hour Emergency Response line: 1-800-327-7455**

## 2.0 Main Design Elements

### 2.1 Facility Infrastructure

The works authorized under permit 104460 are the portions of three hazardous waste treatment biodegradation cells each approximately 3 hectares in size, their associated skimming ponds, evaporation ponds, surface run-off and leachate control works that at the time are not being converted to a Secure Landfill. All storage cells and biodegradation beds are surrounded with a 1m wide by .5m high compacted native clay berm and the Hazardous Waste Storage and Treatment Facility (HWSTF) will be built to maintain a 5m of cover over the bedrock formation. The HWSTF will not exist once all 3 proposed landfill cells are constructed.

Landfill design details meet or exceed the design requirements for secure landfills as detailed in Section 27 of the HWR. A detailed Technical Memorandum, detailing how the Landfill design meets Secure Landfill HWR Performance Standards is in Appendix 3. Specific design details and construction quality assurance and control plans (QA/QC) will be submitted for Director approval prior to construction. Once construction is complete a QA/QC summary and as-built will be submitted to the Director. Once the first Landfill cell is complete, the facility will still retain two short term storage cells for the treatment of hazardous soils. As the Secure Landfill is expanded into the proposed 3 cells, the Facility will lose the capacity for short term storage and treatment.

#### 2.1.1 Liner Materials

##### **Secure Landfill**

The design significantly exceeds the above requirements for a dual liner system. The top liner is composite consisting of a 1.5 mm thick HDPE geomembrane underlain by a 500-mm thick compacted clay liner (CCL). The CCL meets the HWR definition for an impermeable liner as it meets the required permeability of less than  $1 \times 10^{-7}$  cm/s.

##### **Hazardous Waste Storage and Treatment Facility**

A native clay was used as the liner for the storage cells and the biodegradation beds, with a minimum of five meters of cover maintained over the bedrock formation. The top .5m of the clay liner was laid down and compacted in 20cm (8") sections. The liner material was compacted to 95 percent of standard proctor. Laboratory permeability testing of a remolded clay sample compacted to 95 percent of Standard Proctor Maximum Dry Density was found to be approximately  $3.4 \times 10^{-9}$  cm/sec.

### 2.2 Leachate Management System

Precipitation and run-off falling onto the soil treatment cells or landfill cells without their final cover will be captured by the leachate collection/management systems to prevent this material discharging into the surrounding environment. Leachate at site is directed by the Leachate Collection System (LCS) in the cell to the pre-existing leachate evaporation and

hydrocarbon skimming ponds. Leachate drains to the clay lined hydrocarbon skimming pond. As per Section 25(5)(b) of the HWR, the leachate system is designed to collect and control water draining from cells of the secure landfill during a storm with a magnitude that is exceeded, on average, only once in 25 years.

Progressive capping will be utilized to prevent precipitation contacting the waste and turning into leachate, helping reduce overall leachate generation. Progressive capping includes, temporary cap to reduce leachate generation and can include materials such as Linear Low-Density Polyurethane (LLDPE).

The LCS including the hydrocarbon skimming and evaporation pond levels will be checked weekly during operations and containment measures will be implemented as necessary to prevent overflow. Stringers spaced at a maximum of 5m apart extending across the pond, equipped with flags or reflective devices will be installed on the landfill leachate pond to deter waterfowl. The freeboard space of the ponds will be documented weekly and after any major storm event to ensure there is enough volume to allow for a 1 in 25-year storm event. Any leachate discharged from the evaporation pond will have the date, volume discharged and analytical records of the leachate kept on file.

Tervita does not have plans to install leachate storage tanks at this time. If tanks are installed, leachate will be transferred with and enclosed pump and hoses. Pumps and hoses will be routinely inspected for cracks, tears and general wear to ensure the integrity of the transfer system. If leachate is hauled off-site and the leachate is hazardous, Tervita will ensure the carrier has the appropriate License to Transport (LT) hazardous waste from the MOE.

## **2.3 Leak Detection System**

As per Section 27(3)(a) of the HWR there is a leak detection system installed between the two clay liners. The leak detection system is used to determine if there are liner integrity issues associated with the landfill. The HWSTF does not have a leak detection system. Leaks on the HWSTF are detected doing visual inspections of the containment.

## **2.4 Surface Water Management System**

The existing soil treatment pads are surrounded by earthen berms to prevent surface water-run on. In addition to earth berms, ditching is in place to prevent surface water from ponding near the landfill area. The ditches and roads are sloped to allow for drainage around and away from the landfill cells. The Babkirk Facility does not have a surface water pond. Water hitting the landfill or treatment pad footprint is collected as leachate and directed to a leachate pond in the SW corner of each cell. The leachate pond is connected to a polishing pond via an inverted weir, so hydrocarbons remain in the leachate pond. Water in the polishing pond is tested against Schedule 1.2 of the HWR prior to discharge.

## **2.5 Cover Material**

Currently, there are no soil stockpiles from the original Babkirk construction stored at site. During closure and capping, appropriate cover material will be sourced that meets the requirements of the HWR.

## **2.6 Equipment**

All landfill staff that operates site equipment must be familiar with maintenance requirements of the equipment. The landfill operator is responsible to ensure the equipment is regularly and properly maintained in good, safe working condition.

Detailed operating and maintenance information for all site equipment is available on site. Items recommended in equipment maintenance schedules and safety checks are carried out and documented. All problems identified are reported immediately to the landfill manager.

### **2.6.1 Survey Equipment**

A 3<sup>rd</sup> party will perform landfill surveys for Tervita on an as needed basis.

## **2.7 Fencing**

The Babkirk Landfill Cell will be surrounded by a 2.28m high game fence topped by 3 strands of barb wire.

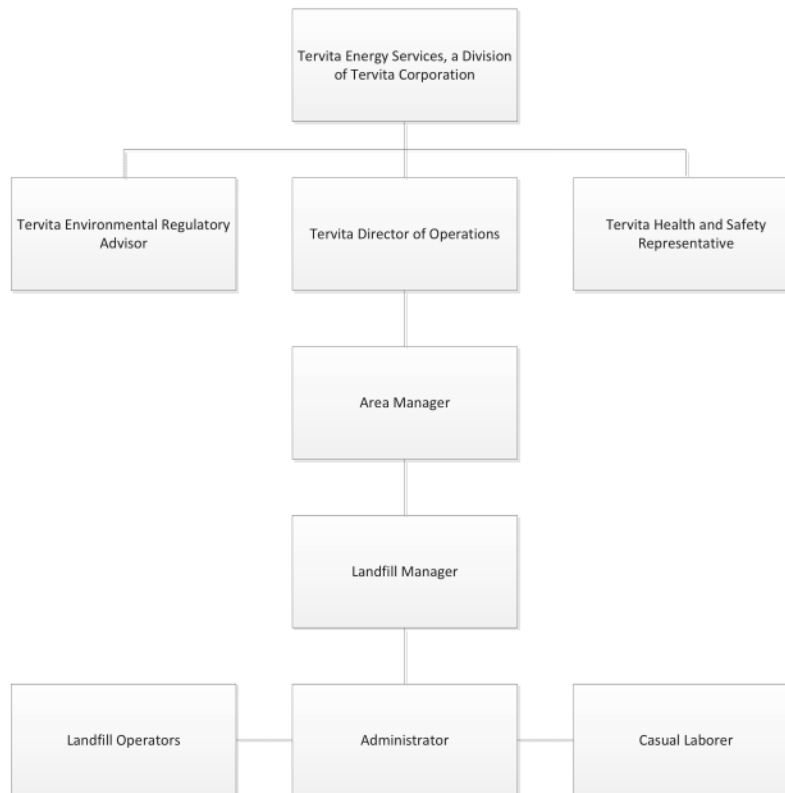
## **3.0 Landfill Policy**

The Operations Plan describes concepts and operational procedures. It will be updated in cooperation with the MOE as changes in processes occur (with approval of the Director), as information becomes obsolete (such as changes in phone numbers) and/or as new standards are developed.



### 3.1 Organizational Structure Plan

The following is an organization chart for the Tervita Babkirk Facility.



### 3.2 Hours of Operation

Babkirk is not permanently staffed; therefore, all loads at Babkirk must be pre-booked and will only be accepted during daylight hours unless to accept emergency spill material.

### 3.3 Signage

Warning signs compliant with Section 8(d) of the HWR are posted at the entrance to the facility. There is also sign at the entrance of the facility with company name, name of facility, location information and Tervita's 24-hour emergency number.

### 3.4 Site Access Security

There is a game fence around the landfill with a controlled entry. All valves, pumps, doors, and controls accessible if security were breached are to be locked.

### 3.5 Process Modifications

Tervita will notify the Director, in writing prior to implementing changes to the authorized works or to any process that may affect the quality and/or quantity of the discharge.

### 3.6 Waste Acceptance

The Babkirk Secure Landfill and Treatment Facility can store and treat prescribed quantities of hazardous and non-hazardous waste. The protocol for management and landfilling of contaminated soils and other hazardous and non-hazardous waste streams are outlined in more detail in Section 3.6.1 of this Operations Plan.

*As per the HWR:*

**Hazardous Waste** means:

- a) dangerous goods if they
  - a. are no longer used for their original purpose, and
  - b. meet the criteria for Class 2,3,4,5,6,8 or 9 of the federal dangerous goods regulations, including those that are recycled, treated, abandoned, stored or disposed of, intended for recycling, treatment or disposal,
- b) PCB wastes,
- c) waste containing dioxin,
- d) waste oil,
- e) waste asbestos (friable)
- f) waste pest control product containers and wastes containing pest control products, including wastes,
- g) leachable toxic waste,
- h) waste containing tetrachloroethylene,
  - 1. waste listed in Schedule 7,
  - 2. Repealed. [BC Reg. 261/2006, s.1 (b).]
- i) waste containing polycyclic aromatic hydrocarbon, and
  - 1. Repealed. [BC Reg. 319/2004, s.3 (e).]

but does **not** include

- j) household refuse that is collected from residential premises,
- k) domestic sewage,
- l) dangerous goods that are defective, surplus or otherwise not usable for their intended purpose and that are defective or otherwise not usable for their intended purpose and that are in the process of being returned directly to a manufacture or supplier,
- m) asphalts and tars used in the manufacture of asphaltic concrete and roofing materials, and
- n) Repealed. [BC Reg. 214/2004, s.1 (l).],
- o) waste wood products treated with wood preservatives or wood protection products registered under the *Pest Control Products Act (Canada)*,
- p) household hazardous waste that
  - a. is removed from a return collection facility in accordance with an authorization from the owner of the return collection facility, and
  - b. is to be used for its originally intended purpose,
- q) wood ash, or pulp mill dregs and grit, that would be hazardous waste only because they are classified under the federal dangerous goods regulations as class 8, or
- r) waste that:
  - (i) has a pH greater than or equal to 2.0 and less than or equal to 12.5, and
  - (ii) would be a hazardous waste only because it is classified under the federal dangerous goods regulations as Class 8 because of pH.

**Leachable Toxic Waste** – means waste when subject to the extraction procedure described in the US EPA Method 1311(TCLP) produces an extract with a contaminant concentration greater than those prescribed in Table 1 of Schedule 4.

**Waste Oil** - The HWR defines waste oil as: automotive lubricating oil, cutting oil, fuel oil, gear oil, hydraulic oil, or any other refined petroleum-based oil or synthetic oil, including diesel fuel where:

- the oils are in the waste in a total concentration greater than 3% by weight and
- the oils through use, storage, or handling have become unsuitable for their original purpose due to the presence of impurities or loss of original properties.

### 3.6.1 Waste Acceptance Policies and Procedures

Tervita landfill facilities' waste handling standards will strictly align with jurisdiction waste management regulations. These standards are designed to protect human and environmental health, the landfill asset and ensure compliance with the governing approval requirements. The initial evaluation of the waste's acceptability for delivery to a landfill takes place between landfill operations and the waste generator. Acceptability is reviewed against Section 6.1, Prohibited Waste, of Permit 104460 to ensure it is acceptable for treatment or disposal. The following program standards are in place to prevent prohibited waste from being disposed of in a landfill cell:

- a) Representative samples are taken by the generator or the generator's representative at point of origin.
- b) Analysis by an independent Standards Council of Canada accredited laboratory.
- c) Completion of a Waste Approval Application (WAA).
- d) Facility owner/operator review of waste documentation for issuance of Waste Confirmation Form (WCF).
- e) Waste acceptance or refusal. Waste acceptance is conditional on the results of gate screening.
- f) The waste is weighed prior to unloading with all documentation in place at that time.

### 3.6.2 Acceptable Waste

The Babkirk Landfill only accepts solid, non-hazardous and select hazardous wastes per BC. Permit 104460. The select hazardous waste allowed for discharge into the secure landfill, as per section 6.1 (e), (h) through (j) includes:

- Solids containing Flammable Liquids UN3175 (TDG Class 4.1)
- Waste Oil
- Benzene, Toluene, Ethylbenzene and/or Xylenes (BTEX), in total combined concentration less than 1,000 mg/kg
- Wastes which contain halogenated organic compounds, except for tetrachloroethylene, in total concentration less than 100 mg/kg
- Wastes which contain tetrachloroethylene in total concentration less than 500 mg/kg
- Wastes which contain dioxin TEQ, as defined by the HWR, in a concentration less than 100 parts per billion by weight.

The Tervita Landfill is not permitted to accept the following prohibited waste, as per section 6.1 of Permit 104460:

- Liquids,
- Waste material which contain free liquids,
- Containers with:
  - i. Liquids, or
  - ii. Waste materials which contain free liquid.
- Empty waste containers unless they are crushed, shredded or similarly reduced in volume to the maximum practical extent,
- Materials having the properties of substance defined and regulated in Class 1 through 6 and Class 8 for the Transportation of Dangerous Goods Regulations of Canada (TDG) EXCLUDING Class 4.1 UN3175 Solids Containing Flammable Liquids,
- Materials having properties of substances defined and regulated in Class 9 of the TDG,
- Materials listed as “forbidden” in column 3 of Schedule 1 of the TDG,
- Waste which contain Benzene, Toluene, Ethylbenzene and/or Xylene(s) (BTEX) in total combined concentration greater than 1,000 mg/kg,
- Waste which contain halogenated organic compounds, except for tetrachloroethylene, in total concentrations greater than 100 mg/kg,
- Wastes which contain tetrachloroethylene in total concentrations greater than 500 mg/kg,
- Waste which contain dioxin TEQ, as defined by the HWR, in a concentration greater than 100 parts per billion by weight,
- Waste which when subjected to the Modified Leachate Extraction Procedure, reference in Part 2 of Schedule 4 of the HWR, produce an extract which contains one or more contaminants in Column 1 Of Table 1 of Schedule 4 in concentrations equal to or greater than the concentration specified for each contaminant in Column II of the Table EXCEPT for BTEX,
- Oil products covered under the BC Used Oil Management Association, including but not limited to oil, oil filters and containers,
- Recyclable Oily Rags,
- PCB Wastes (> 50 ppm PCBs) as defined in Section 1 of the HWR

Radioactive wastes, except for Natural Occurring Radioactive Material (NORM) which meets and is handled in accordance with the requirements of Section 6.4 of the Permit

### 3.6.3 Waste Approval Application

Sampling is a component of the initial waste screening process and determines the acceptability of waste for delivery to a secure landfill. Sampling is undertaken by the waste generator (or his representative) and attached to a WAA. All waste coming into the Facility will be tested for the following parameters, noting Tervita uses professional judgment when reviewing the source of waste and parameters required may be decreased or increased.

- Flashpoint
- pH
- Paint Filter Test
- Leachable Metals
- Leachable BTEX
- Total BTEX

Certain waste may be accepted into Babkirk without analysis. Some examples include (but are not limited to):

- Purged Pipe Liners;
- Cement (dry);
- Asphalt Pavement;
- Construction and Demolition Waste (industrial);
- Treated Wood and Wood Waste (i.e. railroad ties);
- Empty Drilling Fluid Product Packaging and Containers;
- Rig Liners and Rig Tank Liners;
- Storage Liners;
- Pipe or scrap metal.

### 3.6.4 Approved Laboratories

Analytical provided by generators to characterize their waste for landfill acceptance must originate from a laboratory accredited for the parameters tested. An accredited laboratory conducts analysis work in accordance with ISO 17025. Laboratories accredited by the Canadian Association of Laboratory Accreditation (CALA) or the Standards Council of Canada (SCC) qualify. Ensuring that laboratory service providers meet the required standard takes place in the vendor selection process. Laboratory accreditation can be confirmed through the following directories:

- Directory of Laboratories provided by CALA.
- Directory of Laboratories provided by SCC.

### 3.6.5 Confirmation of Acceptable Waste

Acceptance and approval of waste to the landfill is confirmed with written documentation from the landfill operation to the waste generator. A formal Waste Confirmation Form (WCF) is issued to the waste generator to outline the waste description and acceptance procedures

### 3.6.6 Shipment of Waste

It is the generators responsibility to classify waste for meeting all provincial and federal shipping requirements. If Tervita ships out waste, Transportation of Dangerous Good (TDG) and HWR requirements will be met.

### 3.6.7 Receiving Waste

All transport units shipping waste approved for disposal or treatment will be weighed prior to and after disposal to determine the net weight. Waste depending on the classification could be hazardous or non-hazardous. Hazardous waste will only be received on a manifest as prescribed in the HWR and copies will be sent to the appropriate authorities upon receipt. The following details at a minimum will be recorded and kept on file at site:

- Generator's Name
- Generating Location
- Waste Type
- Weight of waste received
- Date received

Depending on the waste stream such as non-friable asbestos, internal special handling procedures will be implemented and followed to meet Occupation Health and Safety (OHS) requirements.

Tervita will implement a truck check program when accepting waste. Trucks coming across the scale will be inspected to ensure there was no loss of containment during transport. Visible checks for free liquid breaching the tailgate will be noted. If breaches of containment are noted, the scale attendant will log the date, transporter, generator and manifest number associated with the waste. The transporter of the waste will be notified of the possible breach of containment. If the transporter has three occurrences of possible breaches, the generator of the waste will be contacted by Tervita to notify them. It will be up to the generator to rectify the deficiency to ensure the safe handling of their waste.

### **3.6.8 Waste Rejection**

The rejection of waste shall occur for all waste that is deemed prohibited waste. Waste acceptance procedures such as the WAA (pre-delivery), gate screening and random sampling by scale house personnel have been implemented to assist in the waste acceptance/rejection process. If a waste stream rejection occurs, the landfill will contact the generator about re-directing the waste to another appropriately regulated or approved facility. Waste that was awaiting placement in the landfill, but has been deemed unacceptable by waste gate screening or random sampling, will normally be removed from the site within 72 hours of arrival or according to the approval. The Landfill Manager will contact the generator about removing the waste. The waste rejection and rationale will be documented on the Waste Discrepancy Report (WDR) Form. The facility has the right and obligation to refuse any load it deems unsuitable for landfill disposal.

### **3.6.9 Waste Gate Screening**

To ensure the safety of employees, contractors and site visitors and the efficiency of waste acceptance, all gate screening done on waste, except for radioactivity testing, will be conducted in the landfill scale house. Waste gate screening is defined as a spot-check of loads, upon delivery at the scale. All waste received at Babkirk landfill may be subject to gate screening. A minimum of two loads per day will be gate screened when more than five loads are received.

Waste gate screening parameters must meet landfill acceptance criteria for the waste to remain acceptable for receipt at the Landfill. The documented results of waste gate screening are retained on file at the site for a minimum of ten years.

### **3.6.10 NORM Waste Screening**

The NORM Waste Screening Procedure is found in Appendix 4.

### **3.6.11 Waste Random Sampling**

The facility is required to retrieve a random sample from received waste loads to confirm waste standards and acceptance protocol integrity.

#### Frequency

One sample monthly or for every 10,000 tonnes of solids delivered to the site, on a cumulative annual basis (whichever is more frequent). Landfill operations will track waste volumes received and complete the cumulative or monthly sampling as required.

#### Procedure

All random sampled loads will be isolated within the Landfill cell to prevent admixing. If the results of the random sampling are found to meet landfill acceptance criteria and the analysis received by Tervita is consistent with the waste generator's analysis, the load will be placed within the active landfill cell. If the results of the random sampling meet landfill acceptance criteria but the analysis received by Tervita is not consistent with the waste generator's analysis, the load will not be placed within the landfill cell and the waste generator will be contacted by the Landfill Manager and the analysis will be discussed. If the load does not meet landfill acceptance criteria, the waste is re-sampled and tested for the complete analytical package. If the subsequent analysis from the second sample does not meet landfill acceptance criteria, the Landfill Manager or Operations staff will contact the generator and coordinate removal of the waste from the landfill. The random sampling must be documented on a Landfill Random Sample Report and the use of a Waste Discrepancy Report Form is recommended for failed waste loads.

#### Analytical Parameters

All samples are third-party analyzed at an accredited laboratory to determine if the waste meets landfill acceptance criteria. At a minimum, all loads that undergo random sampling will be tested for the identical analytical parameters completed by the waste generator (submitted with the WAA).

#### Documentation

The results of all random sampling will be documented and filed onsite for a minimum of ten years.

### **3.6.12 Waste Location**

The final disposal location of the accepted waste is recorded daily using a three-dimensional alpha-numeric grid system and a surveyed elevation. The grid system has posts installed at pre-determined intervals along the outer edges of the landfill berms to allow visual estimation of waste location horizontally. The vertical distance above the cell base is also estimated.

### **3.6.13 Hazardous Waste Storage and Treatment Facility Waste Acceptance**

Tervita currently does not intend to actively accept waste into the Hazardous Waste Storage and Treatment Facility at Babkirk. If waste is to be accepted Tervita will follow the below procedure to determine if the soil is treatable prior to acceptance.

1. Tervita will only accept hydrocarbon contaminated soils for treatment and storage if the hydrocarbon contaminated soil meets the specifications of the HWR section 41.1(1)(b).
2. The generator of the waste must fill out the WAA as detailed in Section 2.1.1 of this Operational Plan.

3. Tervita staff will review the basic analytical package as listed in Section 2.1.1 of this Operational Plan to determine if Waste Oil, or BTEX is present in the waste. Common hydrocarbon contaminated waste streams are listed in Table 3.6.13-1.
  - a. The waste must not be hazardous due to other constituents other than hydrocarbon parameters.
4. If the waste is deemed treatable, Tervita will provide written notification to the Director prior to acceptance detailing the waste stream and treatment options.
5. If treatment is unsuccessful, the waste will be moved into the Secure Landfill.

**Table 3.6.13-1: Secure Landfill Waste Storage**

<b>Common Treatable Hydrocarbon Wastes</b>
Gasoline Impacted Soils
Diesel Impacted Soils
Crude Oil Impacted Soils
Refined Oil Impacted Soils

### 3.7 Waste Generated at the Facility

Tervita does not expect a large amount of waste to be generated at the facility. Common waste may include:

- Used Oil
- Refined Fuel/Oil Spills
- Daily garbage from operations

Used oil from equipment will be collected by the maintenance company and taken off-site. Spills from site processes will be scraped/dug up and characterized appropriately and go through the facilities' waste acceptance process before being placed in the landfill. The small amount of daily garbage created at site will be landfilled in the secure cell.

### 3.8 Waste Types, Maximum Quantities and Maximum Daily Capacity

Waste types, and maximum storage quantities are detailed in Table 3.8-1 and Table 3.8-2 for the Landfill and Treatment Pads respectively.



**Table 3.8-1: Secure Landfill Waste Storage**

<b>Waste Name</b>	<b>Max Quantity Stored (tonnes)</b>	<b>Anticipated Acceptance Rate (tonnes/annum)</b>	<b>Treatment Rate</b>	<b>Recycling Rate</b>	<b>Discharge Rate</b>
Non-Regulated (Hydrocarbon Contaminated Soils)	750,000	12,000	N/A	N/A	N/A
Leachable Toxic Waste (Hydrocarbon Contaminated Soils)	750,000	12,000	N/A	N/A	N/A
Waste Oil (Hydrocarbon Contaminated Soils)	750,000	6,000	N/A	N/A	N/A

**Table 3.8-2: Hazardous Waste Storage and Treatment Facility.**

<b>Waste Name</b>	<b>Max Quantity Stored at any Given Time (tonnes)</b>	<b>Anticipated Acceptance Rate (tonnes/annum)</b>	<b>Treatment Rate(tonnes/annum)</b>	<b>Recycling Rate</b>	<b>Discharge Rate (tonnes)</b>
Non-Regulated (Hydrocarbon Contaminated Soils)	90,000	100	90,000	N/A	90,000
Leachable Toxic Waste (Hydrocarbon Contaminated Soils)	90,000	100	90,000	N/A	90,000
Waste Oil (Hydrocarbon Contaminated Soils)	90,000	100	90,000	N/A	90,000

### 3.9 Waste Discharges

The facility discharges treated hazardous and non-hazardous waste to a Secure Landfill. Once waste has been treated on the pads, it may be moved to the Secure Landfill for final disposal. Treated waste is hydrocarbon soil as per Section 41.1 of the HWR.

### 3.10 Emergency Response Plan (Contingency Plan)

The Emergency Response Plan (ERP) is in Appendix 5.

### 3.11 Landfill Staff Training

Tervita Landfill Operators, as per section 13(1) through (3) of the HWR, will receive the required training. Training may include, but not be limited to Basic Requirements and Additional Requirements:

## **Basic Requirements**

- Solid Waste Associate of North America (SWANA)
- CPR
- First Aid
- Transportation of Dangerous Goods (TDG)
- Workplace Hazardous Information and Materials System (WHIMIS)
- H<sub>2</sub>S Alive
- SCBA Operation
- Heavy Equipment Operation
- NORM Awareness

## **Additional Requirements**

Additional Training will be undertaken as necessary to enable the operator to perform their duties in a safe, efficient manner. All records will be retained onsite as per Section 13(3) of the HWR.

### **3.12 Nuisance Control Program**

The facility will be kept clean and controls will be established and maintained to minimize the escape of waste/litter from the landfill site. All supporting structures, buildings and storage areas will be kept clean and in an orderly manner. All signs and equipment will be kept clean and in reasonable shape. Tervita will recover any waste or waste by products that are released from the cell.

Tervita does not anticipate large amounts of litter because of operations given that the majority of material accepted is not in a format that is easily dispersed. Tervita will however, ensure any litter that collects onsite is retrieved and disposed of appropriately on a regular basis. Any litter that is transported to adjacent properties or outside the limits of the Landfill will be retrieved promptly. If litter enters privately owned lands, proper landowner consent will be obtained prior to litter retrieval.

Light and noise effects on wildlife are expected to be minimal since the site won't be actively accepting waste and will only accept waste on a pre-booked basis during daylight hours.

### **3.13 Regulatory Compliance Plan**

Tervita has developed a compliance calendar detailing compliance items and associated timelines if applicable in Appendix 6. The HWR Compliance Matrix in Appendix 7 details how Babkirk meets all applicable parts of the HWR and details policies and procedures to meet HWR requirements.

## **4.0 Record Keeping**

### **4.1 Visitor Log Record Keeping**

A visitor log book is maintained to record all visits to the site. The book documents the name, company/organization, and date and time-in/time-out for the visitors.

## 4.2 Waste Records

It is important to maintain good records of visitors and vehicles entering and exiting the Landfill. The following waste records will be maintained as per Section 6 of the HWR.

- Waste generator identification;
- WAAs and associated independent lab analyses;
- WCFs
- Landfill Manifests
- Gate Screening and random sampling records
- WDR and supporting discrepancy documents
- Volume and grid location where material was landfilled as per Section 26(4)(b) of the HWR
- Emergency system testing as per Section 12 of the HWR
- Personal training records as per Section 13 of the HWR
- Landfill Surveys

All the above records are retained by Tervita for the minimum required timeframe, typically a period of ten (10) years.

## 4.3 Reporting

Landfill annual reports and required monitoring reports are compiled as per the requirements in Permit 104460. They will be submitted by March 31<sup>st</sup>, reporting the preceding year and will be submitted to [EnvironmentalReportin@gov.bc.ca](mailto:EnvironmentalReportin@gov.bc.ca)

### 4.3.1 Non-Compliance Reporting

If Tervita identifies a non-compliance with the Permit, the non-compliance will be reported to [EnvironmentalNonCompliance@gov.bc.ca](mailto:EnvironmentalNonCompliance@gov.bc.ca). The non-compliance report will include the following:

- Permit number
- Our company name (Tervita Corporation)
- Date of the non-compliance
- Description of the non-compliance
- Analytical (if available)
- Remedial actions and cause of the non-compliance (if available)

If there is a spill, facility staff notifies the Tervita Environment and Regulatory (E&R) Advisor. If the spill is deemed reportable the E&R Advisor will contact the Provincial Emergency Program (PEP) at 1-800-663-3456.

### 4.3.2 Landfill Construction

As per section 4.1 of Permit 104460, plans and specifications of any new works, future upgrades or modifications to existing works shall be submitted to the Director and his/her consent shall be obtained in writing before construction commences. All plans and specifications shall be generated by a Qualified Professional and include:

- a. Design Plan and Specifications for the proposed construction;
- b. A construction Quality Assurance Plan; and
- c. A construction Quality Control Plan.

Upon completion of construction and prior to accepting waste, all plans and specifications shall be stamped and signed by a Qualified Professional. As per Section 5.3 and 9.2 of Permit 104460, Tervita shall submit to the Director a summary report of the QA/QC program results confirming the integrity of the liners and leachate collection system(s), prior to depositing waste into any new landfill cell. The QA/QC program submitted details the inspection of liners during construction as required under Section 26(1)(a) of the HWR. Inspections of the liners will ensure tight seams and joints, absence of punctures and blisters. Landfill clay liners will be inspected for imperfections such as lenses, cracks and channels. As-built drawings certified correct and sealed by a Qualified Professional shall be submitted electronically within 60 days of completion of the work.

## 4.4 Auditing

An independent 3<sup>rd</sup> party will audit the facility every 3 years. The audit will identify and report on any approved changes in requirements (HWR Section 51). The audit report will include information on each requirement of the regulation indicating how the requirement is met, starting with Section 3: i.e. if siting standards for the facility are met (HWR Sec. 3), whether plans have been approved, the date of plan approval, whether they are still up-to-date and if the facility and its operation complies with the plans (HWR Sec. 4), how waste information is assessed and documented (HWR Sec. 5), etc. Any aspects or regulation requiring approval should indicate date of ministry approval. Any parts of the regulation that are not applicable should be noted. The audit will be submitted to [EnvironmentalReportin@gov.bc.ca](mailto:EnvironmentalReportin@gov.bc.ca), once the final report is received.

As a requirement of 9.3(i) of Permit 104460, a qualified professional will evaluate the discharges on the receiving environment from the previous year.

## 5.0 Facility Monitoring Programs

### 5.1 Groundwater Monitoring Program and Management Program

The Groundwater Monitoring Plan was developed in accordance with Section 26(2)(a) to (e) of the HWR. Groundwater monitoring is conducted on a quarterly basis and monitoring results are reported as specified by the Director. The groundwater monitoring program is reviewed annually for efficiencies and depending on ongoing results from the groundwater monitoring, Tervita may in the future request approval from BC Ministry of Environment to modify the range of parameters, monitoring locations and monitoring frequency, if appropriate. The surface water and groundwater monitoring plan is in Appendix 8.

### 5.2 Surface Water Monitoring Program

As per Section 26(b)(i) of the HWR, liners, covers, and drainage control facilities will be inspected weekly or immediately after a storm event for evidence of deterioration, malfunction of improper operation. Any deficiencies will be noted and fixed as soon as possible. The surface water and groundwater monitoring plan is in Appendix 8.

### 5.3 Leachate Monitoring

Leachate in the evaporation pond will be tested against Schedule 1.2 of the HWR, Discharges to the Environment. If values are found to be under parameter values listed in Column 2 of Schedule 1.2, then the leachate can be discharged to the environment. Environment around the site is composed mostly of upland forest, with lesser amounts of muskeg. The Babbirk Site has been historically developed for agriculture. Old cultivated fields exist along the eastern boundary. If values are found to be over parameter values listed in Column 2 of Schedule 1.2 another analytical will be run to confirm any exceedances. If values remain in exceedance viable on-site treatment options will be explored. Treatment options will vary depending on the parameter exceeding Column 2 of Schedule 1.2. If treatment is found to be ineffective, discharge to industrial works will be explored and analytical compared against Column 3 of Schedule 1.2. Prior to shipment of leachate off-site Tervita will also characterize the leachate to determine whether it is hazardous waste. Parameters at a minimum will include: flashpoint, leachable metals, leachable BTEX and pH. If the leachate is deemed hazardous, Tervita will ensure the off-site disposal has the appropriate Hazardous Waste Registered Site Number (RS#) in order to receive, treat and dispose of hazardous leachate.

Tervita also reserves the right to offer leachate to oil and gas producers for use in hydraulic fracturing. Leachate will pass the discharge to the environment criteria listed in Column 2 of Schedule 1.2 of the HWR and will not be hazardous waste as defined in the HWR.

### 5.4 Leak Detection Monitoring

The leak detection system is comprised of a layer of geonet material, which has a rigid construction, placed between the primary and secondary compacted clay liners. It is anticipated that the leak detection system will continuously have groundwater infiltration due to the shallow water table. Tervita monitors the leak detection weekly checking for any fluid accumulation. Analytical in leak detection fluids and measured fluid volumes removed are tracked monthly via an internal tracking form. Leak detection analytical is compared to groundwater monitoring data to determine if there any trends are results that can be attributed to a compromised liner.

### 5.5 Incoming Waste Characterization Monitoring

Waste is characterized by the generator and may include the following methods:

- Past knowledge and history of the waste stream
- Laboratory Analytical
- Safety Data Sheets

The generator then fills out the WAA as outlined in Section 2.1.1 and Tervita verifies the information is complete and accurate and may ask the generator for further waste characterization. Once waste is received Tervita staff ensures the shipping name on the shipping document matches the waste description on the WAA.

## 5.6 Waste Discharge Monitoring

Waste discharged to the Secure Landfill will have gone through Tervita's Waste Acceptance Procedures as detailed in Section 2.0 of this Operations Plan. As per Section 10 of the HWR, the facility will be inspected and monitored weekly to check for irregularities, malfunctions etc.

Soil that has been treated on the pads, may be either sampled against land use criteria as specified in the Contaminated Sites Regulation (CSR) or Hazardous Waste Criteria from the HWR, depending on the end use of the treated soil.

## 5.7 Hazardous Waste Storage and Treatment Facility Monitoring and Management Program

The Hazardous Waste Storage and Treatment Facility is authorized under Section 41.1 (1)(b) of the HWR and section 1.2 of permit 104460 which gives the authority for hydrocarbon contaminated soils to be treated and stored at a landfill for which an authorization has been issued under the Environmental Management Act (EMA). Before accepting soil for storage, treatment Tervita will:

- a) Provide written notification to the Director and storage and treatment will be carried out as per the Director's requirements.
- b) Ensure the soil is hazardous due only to the presence of one or more of the following and meets the following specifications:

<b>Standards for Management of Hydrocarbon Contaminated Soil</b>		
<b>Item</b>	<b>COLUMN I Parameter</b>	<b>COLUMN II Maximum Value (dry weight basis)</b>
1	total benzene	25 mg/kg
2	total ethylbenzene	250 mg/kg
3	total toluene	150 mg/kg
4	total xylene	250 mg/kg
5	total oil	10%

- c) Hydrocarbon soil will be spread in single layers not exceeding 0.3m in thickness per year or as otherwise approved by the Director

Currently, Tervita has no intention to offer hydrocarbon contaminated soil for the manufacture of asphalt.

Before depositing soil that has been treated into a landfill, Tervita will gain approval of:

- a) The landfill owner before disposal
- b) The Director

The treatment cells and any associated waste are inspected weekly. The treatment cells are inspected weekly in accordance with Section 29(1) of the HWR. The clay liner, drainage systems, berms and leachate systems will be inspected for evidence of deterioration, malfunction and leaks. If any deficiencies are noted repairs will be undertaken immediately to repair or correct any malfunctioning works.

## 6.0 Spilled Materials

Tervita has implemented an emergency procedure to manage materials contaminated by spills in a timely, environmentally responsible manner. This procedure recognizes the time constraints surrounding emergency events and ensures an appropriate method of acceptance for spill materials.

- 1) The generator of spill materials will contact Tervita by telephone to alert Tervita of an incoming spill load. The generator will confirm the nature of the contaminated materials; **classify the waste** by applying their knowledge of the waste including Safety Data Sheets (SDS) and generators understanding of the process that generated the waste.
- 2) Realizing that immediate containment of waste is in the best interest of the environment, Tervita will accept spill materials into the facility without 3<sup>rd</sup> party analytical. However, the spill material must still be not be classified as prohibited waste under Permit 104460. All other waste identification quality assurance procedures still apply to the waste (i.e. gate screening).
- 3) The generator will complete a WAA form and sign the Emergency Spill Acceptance waiver accepting liability and removal responsibility for any waste deemed prohibited.
- 4) The spill waste will be segregated from the active area of the landfill. Fencing and/or flagging will be used to segregate and identify the material.
- 5) Tervita will take a sample of the waste and send it to a 3<sup>rd</sup> party laboratory for analysis at the generator's expense.
- 6) Should the analytical meet landfill criteria, Tervita will place the waste into the active landfill and will send a Waste Confirmation letter to the generator.
- 7) Any materials not meeting landfill criteria will first be re-sampled to confirm the results. Should the second sample indicate the materials meet landfill criteria, Tervita staff will confirm with Tervita's E&R Department and the generator that the waste can be accepted.
- 8) Any materials not meeting landfill criteria upon the second sampling event will be removed, within 72 hours, by the generator at their expense (as per the signed WAA and Emergency Spill Acceptance waiver). A Waste Discrepancy Report will be completed by Tervita for any waste removed from the landfill.

All documentation involved in the process will be maintained at the facility, and is available for review upon request.

## 7.0 Security

Tervita retains a 3<sup>rd</sup> party Qualified Professional annually to detail the closure cost. The closure cost is submitted with the annual report proposing the security for the following year. Tervita will maintain financial security in the amount agreed to upon by the Director.

## 8.0 Closure Plan

Tervita will ensure that, to the satisfaction of the MOE, site fencing will remain around the landfill cells until the post-closure period of the Project, when leachate generation has either stopped or testing has shown leachate to consistently contain concentrations of contaminant below regulatory requirements.

If tanks (leachate and fuel) need to be decommissioned, it will be performed in accordance with the B.C. Fire Code, and/or other applicable regulations. Rentals tanks will be returned to the vendor. Tanks owned by Tervita and that are still in good condition may be moved to another site for use.

The closure plan for the Babkirk Facility is in Appendix 9.



## **Appendix 1 – Environmental Assessment Certificate**



Ref: 103724

December 2, 2013

Shad Watts  
Director, Environment and Regulatory  
Tervita Corporation  
500, 140 – 10 Avenue SE  
Calgary, AB T2G 0R1

Dear Mr. Watts:

Thank you for your letter of August 19, 2013, requesting a five-year extension of Environmental Assessment Certificate WD08-03 (Certificate) for the Babkirk Secure Landfill Project (Project). Tervita Corporation cited the need for awaiting the completion of legal proceedings as the reason for not having substantially started the Project.

On October 16, 2013, Environmental Assessment Office provided a copy of your letter requesting a five-year extension to the Certificate to the following members of the Working Group which participated in the original environmental assessment (EA):

- Ministry of Forests, Lands, and Natural Resource Operations
- Ministry of Environment
- Ministry of Community, Sport and Cultural Development
- Oil and Gas Commission
- Peace River Regional District
- Northern Health
- Ministry of Agriculture
- Blueberry River First Nation
- Doig River First Nation
- Fort Nelson First Nation
- Halfway River First Nation
- Prophet River First Nation

.../2

- Saulteau First Nations
- West Moberly First Nations
- Treaty 8 Tribal Association

I requested input from the Working Group on the EA Certificate extension request, and the only comment received was from the Ministry of Environment, indicating that they did not have any concerns.

On December 2, 2013, after reviewing the extension request and the reason provided, the Executive Lead, Environmental Assessments has decided to extend the deadline specified in the Certificate to December 3, 2018. I enclose an extension Order under section 18 of the *Environmental Assessment Act*. Please note that this is a one-time only extension and the Project must be substantially started by December 3, 2018 or the Certificate will expire.

Please also note that all other conditions and requirements previously specified in the Certificate and related schedules remain in effect.

Yours truly,

A handwritten signature in black ink, appearing to read 'D. Grace', with a stylized flourish at the end.

David Grace  
Project Assessment Manager

Enclosure

**IN THE MATTER OF  
THE ENVIRONMENTAL ASSESSMENT ACT S.B.C. 2002, c.43  
(ACT)**

**AND**

**AN APPLICATION TO EXTEND ENVIRONMENTAL ASSESSMENT CERTIFICATE  
WD08-03  
(CERTIFICATE)**

**BY  
BABKIRK LAND SERVICES INC.**

**FOR THE  
BABKIRK SECURE LANDFILL PROJECT  
(PROJECT)**

**EXTENSION UNDER SECTION 18**

**WHEREAS:**

- A. Under the Certificate the ministers required Babkirk Land Services Inc. (Holder) to substantially start the Project by December 3, 2013;
- B. On January 7, 2011, CCS Corporation (now Tervita Corporation) acquired Complete Environmental Inc., including its wholly-owned subsidiary, Babkirk Land Services Inc.;
- C. Under Section 18(2) of the Act, Tervita Corporation, acting as an agent of the Holder, applied to the Executive Director for an extension of the deadline for substantially starting the Project which was specified in the Certificate;
- D. Under Section 18(4) of the Act, the minister or Executive Director may extend the deadline specified in the Certificate, on one occasion only, for not more than five years; and,
- E. The Executive Director has delegated his power under s. 18(4) of the Act to the undersigned, and the undersigned has considered the reasons for the Proponent's application and any comments received from agencies and First Nations.

**NOW THEREFORE:**

I extend the date specified in the Certificate by which the Holder must have substantially started the Project to December 3, 2018.

A handwritten signature in cursive script, appearing to read 'mccarr', followed by a checkmark.

Michelle Carr  
A/Executive Lead, Environmental Assessments

Issued this 2 day of December 2013

**IN THE MATTER OF  
THE ENVIRONMENTAL ASSESSMENT ACT, S.B.C. 2002, c. 43 (ACT)**

**AND**

**IN THE MATTER OF  
AN APPLICATION FOR AN ENVIRONMENTAL ASSESSMENT CERTIFICATE  
(APPLICATION)**

**BY**

**BABKIRK LAND SERVICES INC.**

**FOR THE**

**BABKIRK SECURE LANDFILL PROJECT  
(PROJECT)**

**ENVIRONMENTAL ASSESSMENT CERTIFICATE # WD08-03  
(CERTIFICATE)**

**Whereas:**

- A. Babkirk Land Services Inc. (Proponent) proposes to develop the Project near Wonowon at Mile 115 of the Alaska Highway, within British Columbia Treaty 8 territory and approximately 110 km north of Fort St. John, BC;
- B. The Project is for the treatment and disposal of approximately 750,000 tonnes of hydrocarbon- and salt-contaminated solid waste generated from upstream oil and gas activities over an anticipated lifespan of 25 to 30 years;
- C. The Project constitutes a reviewable project pursuant to Part 6 of the *Reviewable Projects Regulation* (B.C. Reg. 370/02), because it is an off-site facility for the long-term storage or secure landfilling of hazardous wastes;
- D. On September 11, 2006, the Executive Director, in accordance with section 4 of the Act, delegated, as required, certain statutory and regulatory powers and duties in relation to the Project to a Project Assessment Manager;
- E. On January 16, 2007, the Project Assessment Manager issued an order under section 10(1)(c) of the Act, stating that the Project requires an environmental assessment certificate, and that the Proponent may not proceed with the Project without an assessment;

- F. On June 1, 2007, the Project Assessment Manager issued an order under section 11 of the Act setting the scope, procedures and methods for the environmental assessment of the Project;
- G. On February 27, 2008, the Project Assessment Manager issued an order under section 13 of the Act amending paragraph 12.5 of the section 11 order;
- H. On February 21, 2008, the Project Assessment Manager determined that the Application was complete and that consultation measures undertaken and proposed by the Proponent for both the public and First Nations were adequate, and accepted the Application for review;
- I. On May 16, 2008, the Project Assessment Manager established a public comment period for the review of the Application;
- J. On May 30, 2008, a 30-day public comment period was initiated. The Application was made available for review by the public, First Nations, and representatives from provincial and local government agencies;
- K. The Project Assessment Manager prepared a report on the potential effects of the Project, titled "Babkirk Secure Landfill Project Assessment Report" (Assessment Report);
- L. The Executive Director has referred the Application, the Assessment Report and Recommendations of the Executive Director pursuant to section 17 of the Act, to the Minister of Environment and the Minister of Community Development (Ministers); and,
- M. The Ministers have considered the Application, the Assessment Report, and the Recommendations of the Executive Director.

**Now Therefore,**

The Ministers, pursuant to section 17(3) of the Act, hereby issue this Certificate to the Proponent for the Project, subject to the following conditions (Conditions):

**Conditions**

- 1. The Proponent must cause the Project to be designed, located, constructed, operated and decommissioned in accordance with the Conditions of this Certificate, the documents listed in Schedule A, and the Proponent's Table of Commitments in Schedule B, and must comply with all of the Conditions of this Certificate to the reasonable satisfaction of the Minister of Environment (Minister).
- 2. Where, in the reasonable opinion of the Minister, there is a conflict or inconsistency between any of the documents listed in Schedule A, Condition 1 must be interpreted so that the contents of the later-dated document will vary,

repeal, rescind or supersede, as the case may be, the earlier-dated documents listed in Schedule A.

3. Where, in the reasonable opinion of the Minister, there is a conflict or inconsistency between any of the documents listed in Schedule A and the Proponent's Table of Commitments in Schedule B, Condition 1 must be interpreted so that Schedule B will vary, repeal, rescind or supersede, as the case may be, the earlier-dated documents listed in Schedule A.
4. Where, in the reasonable opinion of the Minister, there is a conflict or inconsistency between Schedules A or B and the Conditions which follow, these Conditions must take precedence over and supersede the relevant provision(s) of Schedules A or B.
5. The Proponent must submit a report to the Executive Director on the status of compliance with the Conditions of this Certificate, and the commitments in Schedule B, four weeks prior to surface disturbance during construction, four weeks prior to operation, and once a year following the start of operation of the Project until decommissioning or as required by the Executive Director.
6. This Certificate is of no force or effect until signed by the Ministers.
7. This Certificate does not constitute a permit, licence, approval or any other authority required under any other enactment.
8. The Proponent, except in connection with granting security to Project lenders or other financing entities or financing facilities, must obtain the written consent of the Minister, such consent not to be unreasonably withheld, prior to disposing, whether legally, beneficially or otherwise, of:
  - a) this Certificate or any right, title or interest conferred by this Certificate; and
  - b) the Project.

#### **Duration of Certificate**

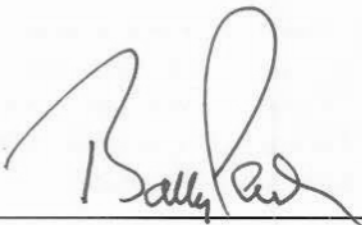
9. The Proponent must have, in the reasonable opinion of the Minister, substantially started the construction of the Project within five years of the date of issue of this Certificate, otherwise this Certificate expires.

#### **Suspension, Cancellation and Amendment of Certificate by Minister**


10. This Certificate may be subject to cancellation, suspension in whole or in part, amendments, or the attachment of new Conditions, for any of the following reasons:
  - a) the Minister has reasonable and probable grounds to believe that the Proponent is in default of:
    - i. an order of the Courts under section 35(2), 45 or 47 of the Act;



- ii. an order of the Minister made under section 34 or 36 of the Act; or,
  - iii. one or more requirements or Conditions of this Certificate.
- b) the Proponent or its officers or employees when acting on behalf of the Proponent, have been convicted of an offence under the Act, with respect to the Project; or,
- c) an order is made or a resolution is passed, for the winding up, or dissolution of the Proponent, or the Proponent is in receivership or bankruptcy proceedings, without such order or resolution being rescinded or stayed and, in the case of any of the foregoing, the Minister has reasonable and probable grounds to believe that a breach of, or default under, this Certificate has occurred or is likely to occur.



Honourable Barry Penner  
Minister of Environment

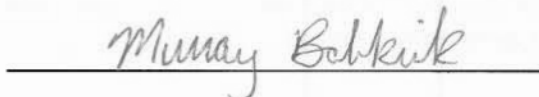


Honourable Blair Lekstrom  
Minister of Community Development

Issued this 3rd day of December, 2008, in Victoria, British Columbia.

The Conditions of this Certificate are agreed to by the Proponent this

10<sup>th</sup> day of Nov., 2008.



Murray Babkirk, President  
Babkirk Land Services Inc.



Kathy Babkirk, Secretary  
Babkirk Land Services Inc.

## **SCHEDULE A**

### **DOCUMENTATION AND CORRESPONDENCE FOR THE BABKIRK SECURE LANDFILL PROJECT**

*The items listed in the following schedule are intended to summarize significant correspondence, information and changes related to the Proponent's Application for an Environmental Assessment Certificate received by the EAO in the application review phase of the environmental assessment. The schedule does not include all correspondence, comments or issues raised by government agencies, First Nations or the general public during the review phase. Details of this information can be found in the tracking tables that form appendices to the Environmental Assessment Report.*

1. Application and supporting Appendices for an Environmental Assessment Certificate for the proposed Babkirk Secure Landfill Project (Project), submitted to the Environmental Assessment Office by Babkirk Land Services Inc. (Proponent) on May 21, 2008 (on separate enclosed CD).
2. E-mail from Kathy Babkirk, (on behalf of Proponent), providing a response to questions asked by the Project Assessment Manager to clarify information presented in the Application; sent to the EAO on October 9, 2008.
3. Letter from Susan Wood, (on behalf of Proponent), submitted to the EAO on September 29, 2008, providing an Update on Proponent's First Nations consultation activities during the Application review phase.
4. Letter from Susan Wood, (on behalf of Proponent), submitted to the EAO on August 26, 2008, providing results of Public Consultation Activities conducted during the Environmental Assessment Certificate Application review.
5. Letter from Kathy Babkirk, (on behalf of Proponent), submitted to the EAO on November 7, 2008, confirming Proponent's agreement to updated Table of Proponent's commitments.

## Appendix 2 – EAC Schedule of Commitments

## SCHEDULE B: Table of Proponent's Commitments

	Project Component and Phase	Project Commitments that Inherently Mitigate Potential Adverse Project Effects	Relevant Agency	Status
<b>GEOPHYSICAL ENVIRONMENT</b>				
1.	C/O/D	<ul style="list-style-type: none"> <li>The Proponent will ensure that spill kits are available on-Site to aid prompt response to accidental fuel or leachate discharges, should such occur, to the satisfaction of the MOE.</li> </ul>	MOE	
2.	O	<ul style="list-style-type: none"> <li>The Proponent will ensure that each Landfill Cell includes both a liner and a leachate management system that is designed and constructed to the satisfaction of the MOE</li> </ul>	MOE	
3.	O	<ul style="list-style-type: none"> <li>The Proponent will ensure that each Secure Landfill Cell will be built with a final cover that goes beyond the requirements of the HWR, to the satisfaction of the MOE</li> </ul>	MOE	
4.	C/O/D	<ul style="list-style-type: none"> <li>The Proponent will ensure that, to the satisfaction of the MOE, construction of the fuel and leachate storage tanks will include appropriate secondary containment to prevent accidental discharge from reaching the surrounding environment, should such occur;</li> </ul>	MOE	
5.	O/D	<ul style="list-style-type: none"> <li>The Proponent will ensure that, to the satisfaction of the MOE, leachate will be transferred by an enclosed pump and hose or by vacuum truck to holding tanks. This equipment will be regularly maintained to prevent malfunction and loss of containment;</li> </ul>	MOE	
6.	O/D	<ul style="list-style-type: none"> <li>The Proponent will ensure that, to the satisfaction of the MOE, licensed waste contractors will be used to transfer Contaminated leachate off-Site for disposal; and</li> </ul>	MOE	
7.	O/D	<ul style="list-style-type: none"> <li>The Proponent will ensure that for the duration of Contaminated leachate production, the leachate hydrocarbon skimming and evaporation pond levels will be monitored and containment measures will be implemented as necessary to control threatened overflow, to the satisfaction of the MOE.</li> </ul>	MOE	
8.	D	<ul style="list-style-type: none"> <li>The Proponent will ensure that, to the satisfaction of the MOE, landfill Cell structures will be inspected and maintained according to the Landfill Closure Plan (see Section 7) to prevent breaches in containment of waste for the duration of Contaminated leachate production;</li> </ul>	MOE	
9.	C	<ul style="list-style-type: none"> <li>The Proponent will ensure that groundwater wells are installed in accordance with the Groundwater Protection Regulations.</li> </ul>	MOE	

	Project Component and Phase	Project Commitments that Inherently Mitigate Potential Adverse Project Effects	Relevant Agency	Status
10.	O	<ul style="list-style-type: none"> <li>The Proponent will ensure that, to the satisfaction of the MOE:               <ol style="list-style-type: none"> <li>A 'truck check' program will be implemented at the Site.</li> <li>Site weigh scale operators will receive training in the containment measures required to be in place to prevent loss of wastes during transport.</li> <li>Weigh scale operators will note to drivers (and make a written note in the Site log book) obvious breaches of containment requirements.</li> <li>The Project Environmental Management Program will contain a procedure for this information to be forwarded to waste generators should drivers not rectify the deficiency.</li> </ol> </li> </ul>	MOE	
11.	D	<ul style="list-style-type: none"> <li>The Proponent will ensure that groundwater wells are decommissioned in accordance with the Groundwater Protection Regulations.</li> </ul>	MOE	
<b>AQUATIC ENVIRONMENT AND SURFACE HYDROLOGY</b>				
12.	C/O/D	<ul style="list-style-type: none"> <li>The Proponent will ensure that, to the satisfaction of the MOE, no Project activities will occur within surface water bodies or watercourses and there will be no direct releases of deleterious substances to surface water.</li> </ul>	MOE	
13.	C/O/D	<ul style="list-style-type: none"> <li>The Proponent will ensure that work in the area of the facility will be performed in accordance with Project EMPs and to the satisfaction of the MOE, which will include a requirement for use of appropriate sediment containment measures during heavy rain events</li> </ul>	MOE	
14.	C/O/D	<ul style="list-style-type: none"> <li>The Proponent will ensure that, to the satisfaction of the MOE, an off-Site surface water quality monitoring program will be implemented that will guide mitigation, if required.</li> </ul>	MOE	
<b>TERRESTRIAL ENVIRONMENT AND WILDLIFE</b>				
15.	O	<ul style="list-style-type: none"> <li>The Proponent will ensure that, to the satisfaction of the MOE, Contractors and staff will be required to comply with Project EMPs, which will include a requirement for reporting vehicle-wildlife collisions during waste transport or travel to work. These incidents will then be managed and reported as part of the Project Environmental Management Program.</li> </ul>	MOE	

	Project Component and Phase	Project Commitments that Inherently Mitigate Potential Adverse Project Effects	Relevant Agency	Status
16.	O	<ul style="list-style-type: none"> <li>The Proponent will ensure that, to the satisfaction of the MOE and the Blueberry River First Nations, fencing provides protection for wildlife by preventing direct contact with contaminated materials.</li> </ul>	MOE Blueberry River First Nations	
17.	C/O/D	<ul style="list-style-type: none"> <li>The Proponent will ensure that, to the satisfaction of the MOE, site fencing will remain in place until the post-closure period of the Project, when leachate generation has either stopped or testing has shown leachate to consistently contain concentrations of contaminant below regulatory requirements; and</li> </ul>	MOE	
18.	C/O/D	<ul style="list-style-type: none"> <li>The Proponent will ensure that, to the satisfaction of the MOE, each hydrocarbon skimming and evaporation pond will be fitted with measures to discourage use by waterfowl.</li> </ul>	MOE	
<b>ATMOSPHERIC ENVIRONMENT</b>				
19.	C/O/D	<ul style="list-style-type: none"> <li>The Proponent will ensure that, to the satisfaction of the MOE, fuel and leachate tank decommissioning will be performed in accordance with the B.C. Fire Code, and/or other applicable regulations.</li> </ul>	MOE	
20.	C/O/D	<ul style="list-style-type: none"> <li>The Proponent will ensure that, to the satisfaction of the MOE, non-surfaced (dirt) on-Site and Site access roads and Soils stored within the Bio-Cells or Landfill Cells will be watered down or covered during dust prone conditions to reduce emissions of fugitive dust.</li> </ul>	MOE	
21.	C/O/D	<ul style="list-style-type: none"> <li>Should air quality prove to be a problem, the Proponent will ensure that, to the satisfaction of the MOE, an air quality monitoring program will be implemented at the Site and that the results of this program will be used to guide any required mitigation.</li> </ul>	MOE	
<b>FIRST NATIONS SETTING, TRADITIONAL LAND USE AND ARCHAEOLOGY</b>				
22.	C/O/D	<ul style="list-style-type: none"> <li>The Proponent will ensure that, to the satisfaction of BC Treaty 8 First Nations, that First Nations are made aware of all opportunities for employment/contracts at the Project</li> </ul>	Blueberry River First Nations Treaty 8 Tribal Association	
23.	C/O/D	<ul style="list-style-type: none"> <li>The Proponent will ensure that, to the satisfaction of the Ministry of Tourism, Culture and the Arts, as part of the Construction QA/QC Plan, a member of staff will be employed/trained to monitor construction activities that involve new land clearance or excavation to identify any archaeological items discovered.</li> </ul>	Ministry of Tourism, Culture and the Arts	

	Project Component and Phase	Project Commitments that Inherently Mitigate Potential Adverse Project Effects	Relevant Agency	Status
24.	C/O/D	<ul style="list-style-type: none"> <li>The Proponent will ensure that, to the satisfaction of the Ministry of Tourism, Culture and the Arts, the Project Environmental Management Program will include a contingency plan to manage encounters with cultural materials, should any occur.</li> </ul>	Ministry of Tourism, Culture and the Arts	
25.	C/O/D	<ul style="list-style-type: none"> <li>The Proponent will ensure that, to the satisfaction of BC Treaty 8 First Nations and the MOE, that First Nations are included in all emergency response plans or actions and that First Nations are contacted as quickly as possible in the event of an emergency.</li> </ul>	Blueberry River First Nations Treaty 8 Tribal Association MOE	
26.	O	<ul style="list-style-type: none"> <li>The Proponent will notify BC Treaty 8 First Nations of all rejected loads, including the rationale for the load being rejected</li> </ul>	EAO	
<b>ENVIRONMENTAL MANAGEMENT PROGRAM</b>				
27.	Regulatory Compliance Plan	<p>The Proponent will develop a Regulatory Compliance Plan which will include, to the satisfaction of the MOE:</p> <ul style="list-style-type: none"> <li>a list of all applicable federal, provincial, and municipal regulations and permits for the Project.</li> <li>provision for any changes to these regulations and permits to be addressed by necessary changes to the management and operational practices for the Project.</li> <li>a procedure for regular review of compliance with these regulations and permits, through a checking (auditing) and corrective action mechanism.</li> </ul>	MOE	
28.	Construction Quality Assurance/ Quality Control Plan	<ul style="list-style-type: none"> <li>The Proponent will develop a Construction Quality Assurance/Quality Control (QA/QC) Plan which will describe, to the satisfaction of the MOE, the QA/QC procedures that will be in place during construction to ensure that the proposed environmental protection measures that are part of Project design are implemented as per specifications. Training of personnel for construction specific tasks will also be addressed within the plan.</li> </ul>	MOE	

	Project Component and Phase	Project Commitments that Inherently Mitigate Potential Adverse Project Effects	Relevant Agency	Status
29.	Prevention and Control of Noxious Weeds Plan	<ul style="list-style-type: none"> <li>The Proponent will develop a Prevention and Control of Noxious Weeds Plan which will include, to the satisfaction of the Ministry of Agriculture and Lands, procedures that waste generators will be requested to follow regarding cleaning and inspection of waste transfer vehicles prior to waste transport, and subsequent procedures for inspection of vehicles by Project staff at the Site entrance. The plan will also include procedures for monitoring for the presence of any new invasive species on the Site along with response procedures should such species occur.</li> </ul>	Ministry of Agriculture and Lands	
30.	Vegetation Management and Monitoring Plan	<ul style="list-style-type: none"> <li>The Proponent will develop a Vegetation Management and Monitoring Plan which will include, to the satisfaction of the MOE, the procedures for re-seeding of soils exposed due to Project activities, the management and monitoring of vegetation on the Secure Landfill cover, and general vegetation management.</li> </ul>	MOE	
31.	Wildlife Management and Monitoring Plan	<ul style="list-style-type: none"> <li>The Proponent will develop a Wildlife Management and Monitoring Plan which will include, to the satisfaction of the MOE, measures to prevent wildlife from entering the Project Site, methods to minimize impacts of the Project i.e., noise and light pollution on wildlife, preventative measures to minimize potential vehicle collisions with wildlife, and methods to protect secure landfill personnel from wildlife encounters. The plan will detail protective measures including those mitigation measures described for effects on wildlife described in Section 6, such as wildlife fencing. The plan will also include provision for records will be kept regarding vehicle-wildlife collisions.</li> </ul>	MOE	
32.	Hazardous Waste and Leachate Management Plans	<ul style="list-style-type: none"> <li>The Proponent will develop Hazardous Waste and Leachate Management Plans which will contain, to the satisfaction of the MOE, procedures for the appropriate receipt, handling, storage and final disposal of Hazardous Waste and leachate present at the Site, including procedures for characterization of waste materials to determine whether they are Hazardous Waste. The plan will also include procedures for records to be kept of Hazardous Waste volumes received and leachate volumes generated, the final disposal location of Hazardous Wastes and documentation obtained during disposal, for example, for off-Site disposal of leachate.</li> </ul>	MOE	



	Project Component and Phase	Project Commitments that Inherently Mitigate Potential Adverse Project Effects	Relevant Agency	Status
33.	Non-Hazardous Waste (Solid, Liquid and Sanitary) Management Plan	<ul style="list-style-type: none"> <li>The Proponent will develop a Non-Hazardous Waste Management Plan which will contain, to the satisfaction of the MOE, the procedures for the appropriate receipt (in the case of non-Hazardous Waste soils), storage, handling and disposal of each non-Hazardous waste stream generated or received at the Site. The plan will also include procedures for records to be kept of approximate non-Hazardous waste volumes generated and documentation obtained during disposal.</li> </ul>	MOE	
34.	Air Quality Monitoring Plan	<ul style="list-style-type: none"> <li>The Proponent will develop an Air Quality Monitoring Plan which will specify, to the satisfaction of the MOE, the measures to be implemented to protect air quality at the Project Site, including measures to be used to control airborne emissions associated with Project activities and an air quality monitoring program to guide further mitigation, should air quality prove to be a problem. The plan will detail the monitoring program, including the methodologies to be employed, the timing of monitoring activities, and procedures to be followed should performance indicators (including regulatory standards) be breached.</li> </ul>	MOE	
35.	Groundwater Quality Monitoring and Contingency Plan	<ul style="list-style-type: none"> <li>The Proponent will develop a Groundwater Quality Monitoring and Contingency Plan which will specify, to the satisfaction of the MOE, the measures to be implemented to protect groundwater quality at the Project Site, including measures to be used to control emissions to ground associated with Project activities and a groundwater quality monitoring program to guide further mitigation, if required. The plan will detail the monitoring program, including the methodologies to be employed, the analyte list, the timing of monitoring activities, and procedures to be followed should performance indicators (including regulatory standards) be breached.</li> </ul>	MOE	

	Project Component and Phase	Project Commitments that Inherently Mitigate Potential Adverse Project Effects	Relevant Agency	Status
36.	Surface Water Quality Monitoring Plan	<ul style="list-style-type: none"> <li>The Proponent will develop a Surface Water Quality Monitoring Plan which will specify, to the satisfaction of the MOE, the measures to be implemented to protect surface water quality at the Project Site, including those mitigation measures to be used to control emissions to surface water associated with Project activities and a surface water quality monitoring program to guide further mitigation, if required. The plan will detail the monitoring program, including the methodologies to be employed, the analyte list, the timing of monitoring activities, and procedures to be followed should performance indicators (including regulatory standards) be breached.</li> </ul>	MOE	
37.	Erosion and Sediment Control Plan (including surface water run-off control)	<ul style="list-style-type: none"> <li>The Proponent will develop an Erosion and Sediment Control Plan which will cover, to the satisfaction of the MOE, the surface water management for the entire Project Site, and include procedures for consideration of the need for implementation of necessary further mitigation measures, if necessary; for example, additional sediment control measures during Project activities outside of the Site perimeter containment berm.</li> </ul>	MOE	
38.	Dust and Odour Control Plan	<ul style="list-style-type: none"> <li>The Proponent will develop a Dust and Odour Control Plan which will address, to the satisfaction of the MOE, the measures to minimize potential dust and odour nuisance from Project activities, including watering down of Site surfaces as needed and restriction of vehicle speeds. The air quality monitoring program for the Site will include consideration of dust and odorous emissions. This plan is therefore closely linked to the Air Quality Monitoring Plan.</li> </ul>	MOE	
39.	Nuisance (Noise, Light) Control Plan	<ul style="list-style-type: none"> <li>The Proponent will develop a Nuisance (Noise, Light) Control Plan which will address, to the satisfaction of the MOE, the measures to minimize potential effects of noise and light on public health and wildlife. These mitigation measures include restricting most Project activities to daylight hours.</li> </ul>	MOE	

	Project Component and Phase	Project Commitments that Inherently Mitigate Potential Adverse Project Effects	Relevant Agency	Status
40.	Communications Plan	<ul style="list-style-type: none"> <li>The Proponent will develop a Communications Plan, to the satisfaction of the EAO, to guide the way in which the Proponent engages the public, First Nations and government agencies, as necessary. The plan will detail regulatory reporting requirements and procedures for receipt and management of public comments or complaint during all phases of the Project. The plan will also include procedures for meeting outstanding consultation commitments outlined in Section 2 and detailed in Appendix II Consultation Tracking.</li> </ul>	EAO	
41.	Energy Management Plan	<ul style="list-style-type: none"> <li>The Proponent will develop an Energy Management Plan, to the satisfaction of the Ministry of Energy, Mines and Petroleum Resources, to encourage the adoption of energy efficient practices during all phases of the Project. This will include practices such as shutting off vehicles when possible to reduce fuel use. The Plan will identify energy saving measures, as well as outlining ways in which Project personnel can propose to institute additional measures based on operational experiences. The plan will also include provision for energy efficiency to be considered when choosing between purchasing options for Project equipment and materials.</li> </ul>	MEMPR	
42.	Containment Measures Inspection and Maintenance Plan	<ul style="list-style-type: none"> <li>The Proponent will develop a Containment Measures Inspection and Maintenance Plan which will specify, to the satisfaction of the MOE, a methodology and schedule for inspection and maintenance of Project containment measures, including a process to be implemented should deficiencies in containment be identified. A procedure for record keeping for inspection and maintenance act</li> </ul>	MOE	

	Project Component and Phase	Project Commitments that Inherently Mitigate Potential Adverse Project Effects	Relevant Agency	Status
43.	Traffic Management Plan	<ul style="list-style-type: none"> <li>The Proponent will develop a Traffic Management Plan which will specify measures, to the satisfaction of the EAO, control vehicles on the Project Site and Site access road, to reduce the impact of vehicle movements on the surrounding environment, including noise, light, and exhaust emissions, creation of fugitive dust and vehicle-wildlife collisions. The plan will address the measures to minimize these potential impacts, including restricting vehicle speed limits using signage on the Site access road and at the Site entrance. The plan will also include a process for addressing non-conformance of drivers with posted speed limits.</li> </ul>	EAO	
44.	Vehicle Inspection and Maintenance Plan	<ul style="list-style-type: none"> <li>The Proponent will develop a Vehicle Inspection and Maintenance Plan which will specify, to the satisfaction of the EAO, a schedule for inspection and maintenance of Project vehicles and equipment, including a process to be implemented should deficiencies in vehicles or equipment be identified. Areas suitable for conductance of maintenance activities will be specified within the plan. A procedure for record keeping for inspection and maintenance activities will also be included in the plan.</li> </ul>	EAO	
45.	Accidents and Malfunctions Plan, Including Spill Prevention and Emergency Response	<ul style="list-style-type: none"> <li>The Proponent will develop an Accidents and Malfunctions Plan which will include, to the satisfaction of the MOE, procedures for implementation and maintenance of relevant mitigation measures such as the availability of spill kits at the Project Site. The plan will, for example, also include procedures for the prevention of fuel release to the environment during on-Site vehicle and equipment fuelling and other fuel handling activities such as tank re-filling. The plan will also cover failure of Project design and management mitigation measures, including procedures for immediate response to incidents, and also an incident review and reporting procedure, to include notification of applicable parties and implementation of remedial actions where necessary.</li> </ul>	MOE	

	Project Component and Phase	Project Commitments that Inherently Mitigate Potential Adverse Project Effects	Relevant Agency	Status
46.	Closure Plan	<ul style="list-style-type: none"> <li>The Proponent will develop a Closure Plan which will include, to the satisfaction of the MOE, procedures for the final covering of each Landfill Cell, and also a schedule and procedures for continued Project environmental monitoring and Project Site inspection and maintenance. The plan will also include procedures for the decommissioning of Site structures and necessary reporting for all closure activities.</li> </ul>	MOE	

### **Appendix 3 – Technical Design Memo**

Issue Date:	April 27, 2018	File:	2017.3525.22.E.05.00
Previous Issue Date:	January 10, 2018		
To:	Colin Penniket, B.Sc.		
From:	Norm Richards, P.Eng.		
Client:	Tervita Corporation		
Project Name:	Babkirk Landfill Development		
Project No.	2017-3525.220		
Subject:	Design Relative to HWR Requirements		

## TECHNICAL MEMORANDUM

This memo is intended to demonstrate how relevant design elements of the Babkirk Landfill Development – cell design meet the performance requirements contained in the British Columbia Hazardous Waste Regulation (HWR). The design related clauses of Section 27, Performance Standards, of the HWR are repeated below in bold font with our corresponding comments shown in italics.

### Performance Standards:

**27 (2) The owner of a secure landfill must design, construct, install and maintain a dual liner system**

- (a) to prevent any migration of wastes out of the landfill to the adjacent subsurface soil or groundwater during the operating life and after closure,**
- (b) with both liners constructed of impervious materials that prevent wastes from passing into or through the liner during the life of the facility, and**
  - (i) if composed of soil or clay, each being not less than 0.5 m thick, and**
  - (ii) if synthetic, each being at least 1 mm thick,**

*The proposed design significantly exceeds the above requirements for a dual liner system, in that the top liner is composite, consisting of a 1.5 mm thick HDPE geomembrane underlain by a 500 mm (min) thick compacted clay liner (CCL). The CCL meets the HWR definition for an impermeable liner as it meets the required permeability of less than  $1 \times 10^{-7}$  cm/s. Consequently, the proposed composite top liner is substantially superior to a single liner of either CCL or geomembrane.*

*The bottom liner in the dual liner system is comprised of a 500 mm thick CCL with a permeability less than  $1 \times 10^{-7}$  cm/s.*

*The liner system configuration is shown on the attached sketch.*

- (c) with both liners constructed of materials having appropriate chemical properties, strength and thickness to prevent failure due to any of the following:**
  - (i) pressure gradients;**

*It is not expected that there will be significant hydraulic pressure gradients exerted on the liner system, based on a site investigation in 2010 (NLR, 2010) which found that the permanent water table likely lies within the deeper bedrock unit. Any hydraulic upward gradients will, in*

*any event, be intercepted by the leak detection system layer, located below the top composite liner, to prevent any upward forces on the top composite liner.*

**(ii) contact with the waste or leachate to which the liners may be exposed;**

*The top component of the liner system is a 1.5 mm thick HDPE geomembrane. HDPE is generally accepted in western Canada and elsewhere as the material of choice for landfill liners, and has appropriate chemical and physical properties for the application.*

**(iii) climatic conditions;**

*The liner systems have appropriate properties for the climate at the site location. As noted in the specifications, liner installation can only take place during appropriate weather conditions. A frost protection layer of waste also needs to be placed within an appropriate time frame.*

**(iv) stress of installation and operations;**

*The construction specifications provide installation and QA/QC stipulations to ensure the final product meets the above requirements.*

**(d) with the liner system placed on base materials capable of providing support and resistance to pressure gradients above and below the liner system to prevent failure due to compression, uplift or settlement.**

*The material underlying the landfill consists of clay till which is stiff to very stiff in consistency. The clay till layer is overlying clay-shale and or sandstone. This is an adequate foundation of base materials for anticipated pressure gradients above and below the liner system.*

**(3) The owner of a secure landfill must design, construct, install and maintain a leachate detection, collection and removal system that includes the following minimum characteristics:**

**(a) a leak detection system between the 2 liners to detect any leaks or migration of liquid into the space between the liners;**

*A leak detection system between the two liners is included in the design.*

**(b) a leachate collection system that is**

**(i) installed at a slope greater than 2%, in a porous material drainage layer with a minimum thickness of 0.75 m and permeability greater than  $1 \times 10^{-3}$  cm/s immediately above the upper liner,**

*The proposed leachate collection system meets the above requirements.*



**(ii) constructed of materials that are**

**(A) chemically resistant to waste placed in the landfill and any leachate which might be generated, and**

*The main component of the leachate collection system will be a layer of natural granular material (i.e. sand or gravel) with a minimum thickness of 0.75 m and minimum permeability (hydraulic conductivity) of  $1 \times 10^{-3}$  cm/s.*

*A layer of two-sided geocomposite will also be provided between the granular leachate drainage layer and the geomembrane liner to both provide protection to the liner and additional leachate flow capacity (this additional flow capacity will be greater than the required flow capacity of the leachate drainage layer as defined in the HWR).*

*These materials are chemically resistant to expected constituents of the leachate or waste.*

**(B) of sufficient strength to prevent failure due to pressure of overlying loads in the secure landfill, and**

*The materials in the leachate collection system are suitable for anticipated overlying loads while maintaining the required permeability.*

**(iii) designed and constructed to prevent clogging during the life of the facility;**

*Potential clogging has been allowed for in the design capacity of the system. As noted above, redundant flow capacity will be provided in the form of a two-sided geocomposite layer below the primary leachate drainage layer. The two-sided geocomposite will be protected from any potential clogging by the 0.75 m thick granular layer above.*

*Also, the proposed leachate collection trenches are comprised of a perforated leachate pipe surrounded by drainage gravel with a minimum hydraulic conductivity of  $1 \times 10^{-2}$  m/s. The drainage gravel is wrapped in non-woven geotextile to prevent clogging of the drainage gravel. This system has been proven on past projects to be sufficient in preventing clogging of the leachate collection system.*

**(c) a storage facility suitable to allow removal of leachate.**

*Leachate will be directed to a sump area at the southwest corner of the landfill from where it will drain into the leachate pond. The sump area will be left open until cap construction is underway.*

**(5) The owner of a secure landfill must design, construct and maintain**

**(a) a system capable of preventing water from draining onto any cells of the secure landfill, and**

*A system of berms and ditches are included in the design to prevent surface water run-on from at least a 1:25 year 24-hour storm event.*

- (b) a system to collect and control water draining from any cells of the secure landfill during a storm with a magnitude that is exceeded, on average, only once in 25 years.**

*The sump area at the south end of the landfill will be left open until cap construction is underway to allow for at least a 1:25 year storm event to enter the leachate collection system and drain into the leachate pond.*

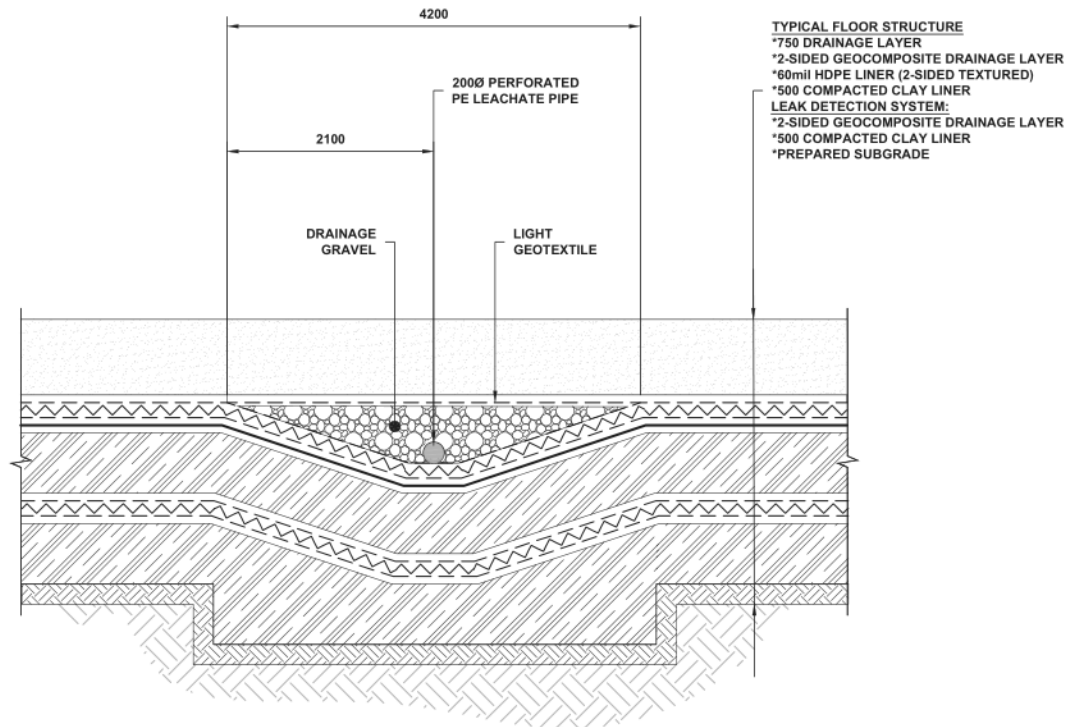
In our opinion, the Babkirk Landfill Development – cell design meets or exceeds the design Performance Standards of the HWR.

Please contact me if you have any questions.

Regards,



Norm Richards, P.Eng.  
Project Manager



EARTH MATTERS

**NLR/AE**  
CONSULTANTS

## BABKIRK LANDFILL DEVELOPMENT - CELL1

**PROPOSED FLOOR & LEACHATE COLLECTION STRUCTURE**

**3525-22-SK1001**

## **Appendix 4 – NORM Waste Screening Procedure**

# **Tervita Corporation**

Babkirk Secure Landfill

British Columbia Ministry of Environment  
Permit 104460

*Tommy Lakes Road, BRITISH COLUMBIA*

56° 54' 9.27"N, 121° 54' 36.29"W

## ***NORM Waste Screening Procedure***

***Version 1***

***Jan 31 2018***



Contact: Andrea Snodgrass  
Environment & Regulatory Advisor  
Radiation Safety Officer  
587-233-3204  
asnodgrass@tervita.com

## Babkirk NORM Screening Procedure

When conducting the gate screening as detailed in Section 2.6 of the Operation Plan, a Ludlum 3-97 and GM-49 Pancake probe will be used to scan for gamma radiation and when required (i.e. additional sampling), surface contamination. The Ludlum will be placed 1-2 cm from the wall of the transport unit. The detector will be moved up and down the sides and back of the transport unit in a sweeping motion to cover as much surface area as possible while continually observing the measurements. Scanning will occur on each side of the transport unit except between the transport box and cab of the truck due to safety concerns.

If the Ludlum reading is less than 2x natural background, or < 200 counts per minute (CPM) the load is appropriate for acceptance into the landfill as a non-NORM waste. If the Ludlum reading exceeds 2x natural background, or > 200CPM it is indicative of NORM contamination, and will require further investigation as per below:

The Landfill Manager will be notified immediately and the following two options can be presented to the waste generator:

- 1) A Waste Discrepancy Form is to be filled out, and the waste returned to the generator immediately, or
- 2) The waste load can be unloaded, isolated and properly marked in the landfill. A representative sample will be taken and sent to an accredited lab for further NORM testing. Once analytical results are received, and the sum of ratios is less than 1, the waste can be accepted. If the sum of ratios is greater than or equal to 1, the waste is deemed NORM and the waste generator must remove the isolated waste pile and a Waste Discrepancy Form filled out.

The measured dose limits for each load will be recorded on the Waste Gate Screen Form, with indication of pass/fail for radiation testing. If the waste is found to pass all other gate screening tests, the waste is appropriate for acceptance and may be placed within the landfill.

This procedure has been reviewed and approved by a Certified Radiation Safety Officer:



Andrea Snodgrass

## Appendix 5 – Contingency Plan

# **Tervita Corporation**

Babkirk Secure Landfill

British Columbia Ministry of Environment  
Permit 104460

*Tommy Lakes Road, BRITISH COLUMBIA*

56° 54' 9.27"N, 121° 54' 36.29"W

## ***Contingency Plan***

***Version 1***

***Dec 1 2017***



Contact: Peter Nelson  
Environment & Regulatory Advisor  
403-234-4875  
pnelson@tervita.com



**Company Name (as registered with BC Corporate Registry):**

Tervita Corporation

**Doing business as Name:**

Tervita Corporation

**Business License Number:**

A0073826

**Mailing Address:**

1600, 140 10<sup>th</sup> Avenue SE, Calgary, AB, Canada, T2G 0R1

**Facility Address:**

District Lot 2819, Peace River District

**Facility Contact:**

Lisa Jordan

**Phone:** 250 827 6834

**Fax:** 250 827 6835

**E-mail:** lijordan@tervita.com

**Landowner:**

Tervita Corporation

1600, 140 10<sup>th</sup> Avenue SE, Calgary, AB, Canada, T2G 0R1

**Contact Name:** Lisa Jordan

**Phone:** 250 827 6834

**Email:** lijordan@tervita.com

**Legal Description:** District Lot 2819, Peace River District, Survey Plan 17TR3, Peace River

**Property ID:** 014-927-250

**Lat Coordinates:** 56.902575

**Long Coordinates:** -121.910081

**Ministry Authorization Number(s):** PE 104460

**Operational Plan Version No.:** 1.0

**Operational Plan Date:** 1-Dec-2017

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## 1.0 Elements of Emergency Planning

### 1.1 Identification of Hazards and Risks

Table 1 : Waste types and associated hazards

<b>Waste Type</b>	<b>Maximum Quantity Stored (tonnes)</b>	<b>Hazards</b>	<b>Interactions</b>	<b>Risks to Employees</b>
Solids Containing Flammable Liquids, UN3175	750,000	Flammability	Minimal. Keep away from strong oxidizers	Fires
Leachable Waste (Soil contaminated with Benzene, Toluene, Ethylbenzene, and Xylene)	750,000	Inhalation	Minimal. Keep away from strong oxidizers	Inhalation
Non-Regulated Solids (Hydrocarbon Contaminated Solids)	750,000	Inhalation	Minimal. Keep away from strong oxidizers	Inhalation

### 1.2 Legislation and Industry Standards

Table 2: Waste type and reportable spill amounts

<b>Waste Type</b>	<b>Reportable Spill Amounts</b>
Solids Containing Flammable Liquids, UN3175	25 kg
Leachable Waste (Soil contaminated with Benzene, Toluene, Ethylbenzene, and Xylene)	200 kg
Non-Regulated Solids (Hydrocarbon Contaminated Solids)	200 kg

Tervita has internal management policies to direct staff for incident and spill reporting.

### 1.3 Emergency Organization and Responsibilities

The position of Incident Commander and the positions on the Tervita Incident Management Team (IMT) will be filled by the following people or outsourced to service companies or other industrial operators where mutual aid is available. Communications networks most likely to be used during an emergency are e-mails and cellular calls.

Contact	Office	Cellular
<b>24-Hour Emergency Number</b>	<b>1-800-327-7455</b>	
Mike Johnson, Area Manager	250-794-4191	s.22
Lisa Jordan, Landfill Manager	250-827-6834	
Ted McGuire, Landfill Operator	250-827-6834	
Lela Gauthier, HSE Advisor	780-830-3333	
Peter Nelson, E&R Advisor	403-234-4875	

#### Incident Command Post (ICP)/Remote Command Post (RCP)

Tervita Fort St. John Office 250-262-0140

Fort St. John Office Fax 2 250-261-0151

Address Tervita Corporation  
10215 100 Street  
Fort St. John, BC,V1J 3Y8

#### Contacts for the Incident Command Post (ICP)/Remote Command Post (RCP)

Contact	Office	Cellular
Mike Johnson, Area Manager	250-794-4191	s.22
Alternate – Lisa Jordan, Facility Manager	250-827-6834	

### 1.4 Resources

Safety equipment is documented and regularly inspected so that equipment is readily available with minimum chance of failure. The major safety/emergency response equipment and location are listed in the following tables:

Quantity	Description
<b>Tervita Silverberry TRD Facility in LS 16-7-88-20 W6M</b>	
1	First aid kits

2	20 lb fire extinguishers
1	Spill kit

#### Safety Contractors

Company	Location	Telephone Number
Firemaster Oilfield Services Inc.	Central Dispatch	403-342-7500
Fire Power Oilfield Firefighting Ltd.	Central Dispatch	1-800-463-3187
HSE Integrated Ltd.	Central Dispatch	1-866-347-3911
Trojan Safety Services Ltd.	Fort St. John, BC	1-877-785-9558 250-785-9557
	Red Deer, AB	403-309-3025
	Grande Prairie, AB	780-567-3440
United Safety Ltd.	Central Dispatch	1-800-432-1809

#### Mobile Air Monitoring Services

Company	Location	Telephone Number
Firemaster Oilfield Services Inc. (1 unit, Red Deer; 1 unit, Grande Prairie)	Central Dispatch	403-342-7500
HSE Integrated Ltd. (3 units, Red Deer)	Central Dispatch	1-866-347-3911
Promet Environmental Group Ltd. (2 units, Calgary)	Calgary, AB	1-877-577-6638
Trojan Safety Services Ltd. (1 unit, Fort St. John; 1 unit, Grande Prairie; 4 units, Red Deer)	Fort St. John, BC	1-877-785-9558 250-785-9557
	Red Deer, AB	403-309-3025
	Grande Prairie, AB	780-567-3440

#### Western Canadian Spill Services Ltd. (WCSS)

Oil Spill Coop (Regional Custodian)	Location	24-hour	Cellular
<b>WCSS 24-Hour Emergency Contact Number - 1-866-541-8888</b>			

**NOTE: Regional Custodian, Clean Harbors confirmed that when a WCSS member company calls Clean Harbors; Clean Harbors will roll the required equipment to the requested WCSS Control Point and utilize their “roster” of WCSS responders to mobilize the manpower to the WCSS Control Point to deploy and operate that equipment.**

<b>Zone 6 Co-op C</b> Clean Harbors Environmental Services (Jamie Wilson)	Clean Harbors Surface Rentals 6715 - 85th Avenue Fort St. John, BC	-	250-785-4577
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Refer to the Emergency Planning Base Area Map for the Spill Control Point locations. Each Control Point has an Access Map. To locate a Spill Control Map complete the following steps:

1. Click on the following website link:  
<http://www.wcss.ab.ca/maps/Area%20C%20Control%20Points%20set.pdf>
2. Type “Ctrl-F” and enter the specific Control Point Number in the “Find” box and press “enter”.

#### Support Services

Company	Location	Telephone Number
<b>Construction Contractors and Equipment</b>		
D-W Wilson	Fort St. John, BC	250-785-7737 250-262-9711
Gas Link Industries Ltd.	Fort St. John, BC	250-785-9022
IPAC Services	Fort St. John, BC	250-263-9330
Rhyason Contracting Ltd.	Fort St. John, BC	250-785-0515
<b>Fire Fighting Services</b>		
Firemaster Oilfield Services Inc.	Central Dispatch	403-342-7500
Fire Power Oilfield Firefighting Ltd.	Central Dispatch	1-800-463-3187
HSE Integrated Ltd.	Central Dispatch	1-866-347-3911
Trojan Safety Services Ltd.	Fort St. John, BC	1-877-785-9558 250-785-9557
Safety Boss Inc.	Central Dispatch Fort St. John, BC	1-800-882-4967 250-785-2721
<b>Helicopters</b>		
Bailey Helicopters Ltd.	Fort St. John, BC	1-877-822-2245 250-785-2518
Canadian Helicopters Ltd. an HNZ Company	Fort St. John, BC	250-787-0431
<b>Steamers</b>		

Energetic Services Inc.	Fort St. John, BC	1-877-785-4769 250-785-4761
Tempest Energy Services Inc.	Goodlow, BC	250-781-3515
Troyer Ventures Ltd.	Fort St. John, BC	1-888-785-5332 250-785-5332
<b>Tank Rentals</b>		
Raven Oilfield Rentals	Fort St. John, BC	1-800-799-7188 250-787-8474
Tempest Energy Services Inc.	Goodlow, BC	250-781-3515
<b>Tank/Water Trucks</b>		
Energetic Services Inc.	Fort St. John, BC	1-877-785-4769 250-785-4761
Tempest Energy Services Inc.	Goodlow, BC	250-781-3515
Troyer Ventures Ltd.	Fort St. John, BC	1-888-785-5332 250-785-5332

## 1.5 Internal and External Notifications

### First Responders

Organization	Location	Telephone Number
<b>Ground Ambulance</b>		
BC Ambulance Service (24 hours) (Daytime only)	Fort St. John, BC	911 or 1-800-461-9911 250-785-5559
BC Ground Ambulance (Calls from outside BC)	BC-wide	1-800-663-4561
<b>Air Ambulance Services</b>		
BC Air Ambulance (Calls from Alberta and BC only)	BC-wide	1-800-561-8011
<b>Fire Departments</b>		
<b>NOTE: This area is NOT covered by a fire department. Any wellsite fire or secondary fire must be handled by contract oilfield firefighting services. The Fort St. John Fire Department will ONLY respond to motor vehicle accidents and medical emergencies.</b>		
Fort St. John Fire Department (24 hours)	Fort St. John, BC	911 or 250-785-4333
BC Wildfire Reporting Line (24 hours)	BC-wide	1-800-663-5555 or ★5555 from a cell phone

**NOTE: The Prince George Fire Centre has requested that industry not contact the fire zone directly, call the Prince George Fire Centres 24 hour number and the Fire Control Officer (FCO) will dispatch the appropriate fire zone for response.**

BC Ministry of Forests, Lands and Natural Resource Operations, Wildfire Management Branch - Prince George Fire Centre (24 hours)	Prince George, BC	250-565-6126
BC Ministry of Forests, Lands and Natural Resource Operations, Wildfire Management Branch - Fort St. John Fire Zone (Office)	Fort St. John, BC	250-785-6349
<b>RCMP Detachment</b>		
Fort St. John RCMP Detachment (24 hours)	Fort St. John, BC	911 or 250-787-8100

#### Lead Agencies and Priority Contacts

Organization	Location	Telephone Number
<b>Emergency Management British Columbia (EMBC)</b>		
<b>NOTE: All oil and gas and environmental emergencies are to be reported through Emergency Management British Columbia (EMBC).</b>		
EMBC Incident Reporting Number	BC-wide	1-800-663-3456
EMBC Regional Office (Daytime only)	Prince George, BC	250-612-4172
<b>Peace River Regional District</b>		
<b>NOTES: The Peace River Regional District has been granted the powers of a municipality under the Emergency Program Act.</b>		
<b>All oil and gas and environmental emergencies are to be reported through Emergency Management British Columbia (EMBC).</b>		
Emergency (24 hours)	Dawson Creek, BC	250-784-3200 or 1-800-670-7773
Local Contractors/Residents	None within EPZ	None within EPZ





## Peace River Regional District

1981 Alaska Avenue, Box 810, Dawson Creek, BC V1G 4H8  
Tel: (250) 784-3200 Fax: (250) 784-3201 www.prrd.bc.ca

### Local Authority (Regional District)

Peace River Regional District has a formal Emergency Management Plan which outlines the measures and sources of assistance that can be obtained to support emergency response efforts within their jurisdiction. Upon request from the Oil and Gas Commission (OGC), the Regional District may address emergency response capabilities, expectations and preparedness. If required, the Regional District may activate their emergency plan in order to achieve any of the following:

- Dispatch representative(s) to the OGC's Emergency Operations Centre (EOC), if established
- Provide support to ensure notification of endangered area residents.
- Provide support to coordinate and deliver emergency social services to evacuated residents
- If necessary, declare a State of Local Emergency and issue an evacuation Alert, Order and Rescind
- Assist in a public information service (joint OGC, Industry, local government)
- Provide building re-entry procedures.

*Revised October 27, 2010*

### Supporting Agencies and Priority Contacts

Organization	Location	Telephone Number
<b>BC Safety Authority - Boiler and Pressure Vessel Branch and BC Safety Authority - Electrical Branch</b>		
Emergency (24 hours)	BC-wide	1-866-566-7233
Office (Daytime only)	Fort St. John, BC	250-263-0156
<b>BC Ministry of Agriculture, Food and Fisheries</b>		
Office (Daytime only)	Fort St. John, BC	250-787-3240
<b>BC Ministry of Environment - All Divisions</b>		
<b>NOTE: All oil and gas and environmental emergencies are to be reported through Emergency Management British Columbia (EMBC).</b>		
Office (Daytime only)	Fort St. John, BC	250-787-3411
<b>BC Ministry of Forests, Lands and Natural Resource Operations (FLNR) - Peace District - Range Management</b>		
<b>NOTE: All oil and gas and environmental emergencies are to be reported through Emergency Management British Columbia (EMBC).</b>		
Office (Daytime only)	Dawson Creek, BC	250-784-1200
<b>Northern Health and Health Emergency Management BC (HEMBC)</b>		

**NOTES: For Emergency events that require immediate connection with Northern Health (i.e. Public Health, Acute Care, etc.) please call the Northern Health and Health Emergency Management BC (HEMBC) emergency 24-hour number listed below.**

**Northern Health can be reached 24 hours a day through the Prince George Hospital.**

Northern Health and Health Emergency Management BC (HEMBC) Emergency (24 hours)	BC-wide	1-855-55-HEMBC (1-855-554-3622)
Prince George Hospital Switchboard (24 hours) Medical Health Officer On-Call	Prince George, BC	250-565-2000
Office (Daytime only)	Fort St. John, BC	250-263-6000

#### **Hospital**

Fort St. John Hospital (24 hours) (H <sub>2</sub> S protocol in place)	Fort St. John, BC	250-262-5200
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#### **WorkSafeBC**

**NOTE: WorkSafeBC is NOT notified through Emergency Management British Columbia (EMBC).**

Emergency (Daytime - Monday to Friday from 08:30 to 16:30)	BC-wide	1-888-621-SAFE (1-888-621-7233)
Emergency After-hours Answering Service	BC-wide	1-866-922-4357
Office (Daytime only)	Fort St. John, BC	250-785-1283

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## Emergency Response Roles & Responsibilities

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## Appendix I

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NH Chief Medical Health Officer approval: July 5, 2016  
Rev. Oct 5, 2016 - HEMBC North

## 1.6 Public Affairs

All media or public questions can be directed to:

Kelly Sansom

587-233-3639

[media.relations@tervita.com](mailto:media.relations@tervita.com)

## 2.0 Emergency Response Procedures

If there is an emergency situation staff will muster at the pre-determined and signed muster areas. All equipment and machinery will be shut down, if safe to do so, prior to mustering. For minor incidents such as spills, every effort will be made to prevent the spill from spreading. Equipment on-site can be utilized to make earthen berms in additions to other spill measures such as absorbent booms. If 3<sup>rd</sup> party resources need to be called for support, some numbers are listed in Section 1.5 of this Contingency Plan. Any spill related material will be isolated and characterized prior to disposal. Characterization can include SDS sheets or analytical. Incident reporting processes follow internal Tervita procedures and are evaluated to determine learnings that can be applied in the future. Any future monitoring plans required as a result of incidents will developed in conjunction with the Ministry of Environment. Tervita staff must also follow the Corporate Emergency Response Plan.

In the event of an emergency, Tervita will notify the local First Nations identified in Table 2.0-1

**Table 2.0-1: First Nation Call Out List**

First Nation	Contact Number
Fort Nelson First Nation	Band Office: 250-774-7257
	Lands Office: 250-774-6313
Prophet River First Nation	Band Office: 250-773-6555
Halfway River First Nation	Band Office: 250-772-5058
Doig River First Nation	Band Office: 250-827-3776
Blueberry River First Nations	Band Office: 250-630-2800
Saulteau First Nations	Band Office: 250-788-3955
	Lands Office: 250-788-7290
West Mobery First Nations	Band Office: 250-788-3663
	Lands Office: 250-

	788-3676
Treaty 8 Tribal Association	Reception: 250-785-0612

### 3.0 Site Restoration/Remediation

Tervita will decontaminate the area affected by the spill/release and endeavor to return it to its original state in consultation with regulatory agencies. Tervita will ensure that requirements of the Provincial Spill Cost Recovery Regulation, Contaminated Sites Regulation, and local/municipal requirements (e.g. regarding soil relocation) are met, as required. Tervita will hire a qualified environmental consultant to assist in the clean-up process, as required. For example, a consultant will be hired should certification be required to confirm the site is appropriately evaluated and remediated.

Corrective measures will include, but are not limited to:

- assessing the quantity spilled/released and the area affected and spill/release destination by sensing, monitoring, and/or sampling;
- assessing potential impacts to human and environmental health and potential for evaporation and or/biodegradation due to the spill/release and clean-up activities;
- employment of clean-up technologies (e.g. skimmers, vacuum trucks, pumps, manpower, high-pressure washing dispersants, chemical cleaning, bioremediation, etc.); and
- removal of contaminated surface materials

### 4.0 Training and Practice Drills

Tervita Landfill operators, as per section 13(1) through (3) of the HWR, will receive the required training. Training and practice drills must also follow the guidance outlined in the Corporate Emergency Response Plan.

Training may include, but not be limited to Basic Requirements and Additional Requirements:

#### Basic Requirements

- Solid Waste Association of North America (SWANA)
- Basic Landfill Operations and Management
- CPR
- First Aid
- Transportation of Dangerous Goods (TDG)
- Workplace Hazardous Information Materials System (WHIMS)
- H2S Alive
- SCBA Operation
- Heavy Equipment Operation
- NORM Awareness

### **Additional Requirements**

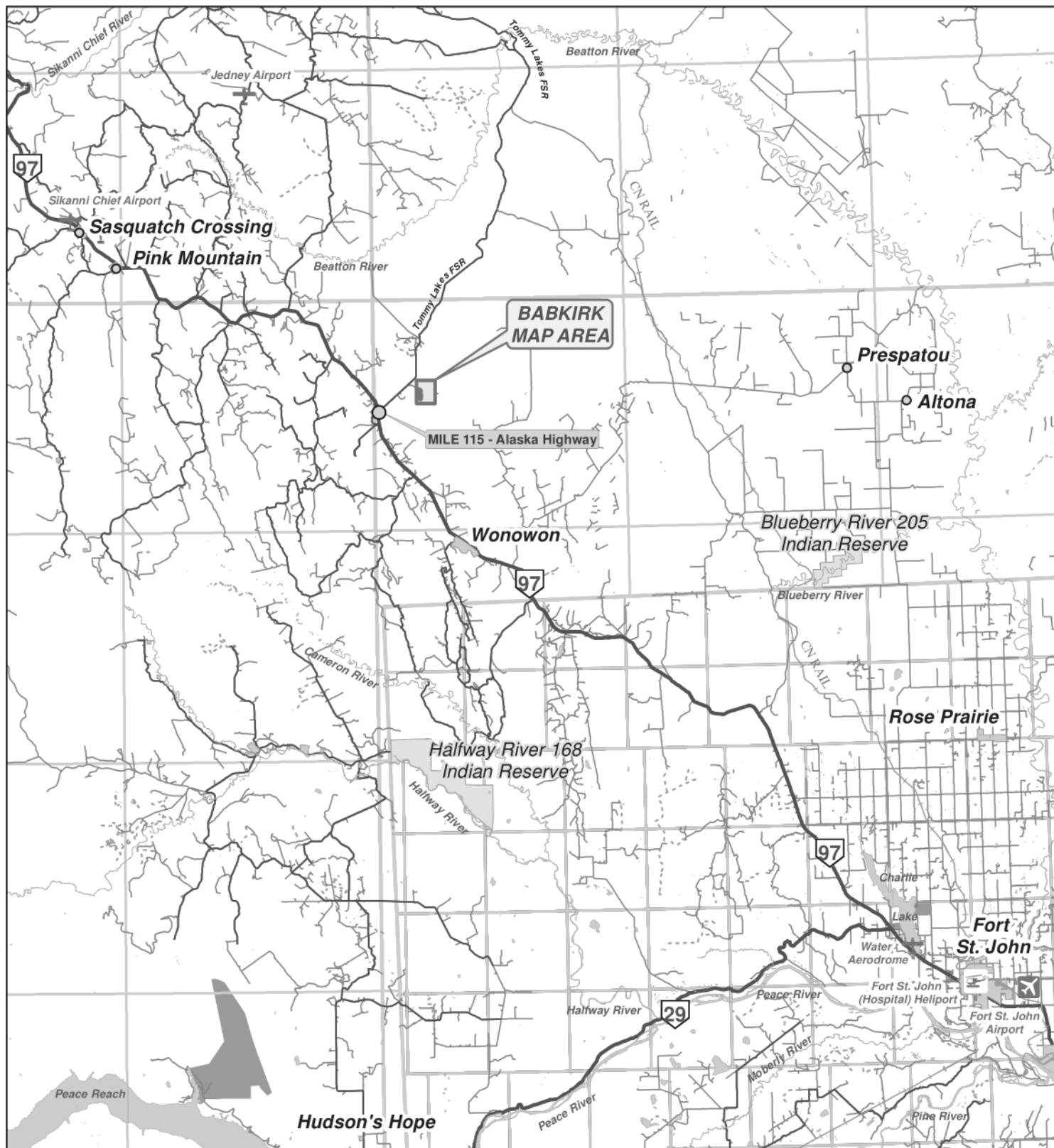
Additional training will be undertaken as necessary to enable the operator to perform their duties in a safe, efficient manner. All records will be retained onsite as per section 13(3) of the HWR.

## **5.0 Plan Evaluation**

The plan will be reassessed at a minimum on an annual basis. Learnings from major incidents will be reviewed annually and applicable changes will be made to the contingency plan.

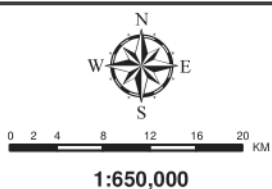


## **Appendix A - General Area Map**



#### LEGEND

- |  |                  |  |                       |
|--|------------------|--|-----------------------|
|  | Airfield/Airport |  | Babkirk Project Area  |
|  | Heliport         |  | Population Centre     |
|  | Railway          |  | First Nations Reserve |
|  | Access Road      |  | Protected Area        |
|  | Highway          |  |                       |



#### BABKIRK AREA GENERAL AREA MAP



PREPARED BY: BEHR INTEGRATED SOLUTIONS

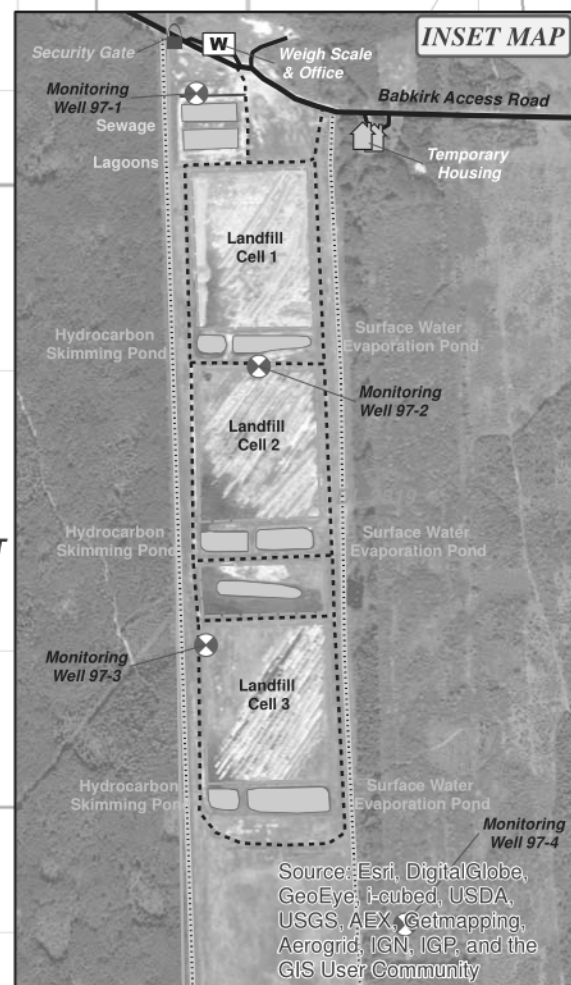
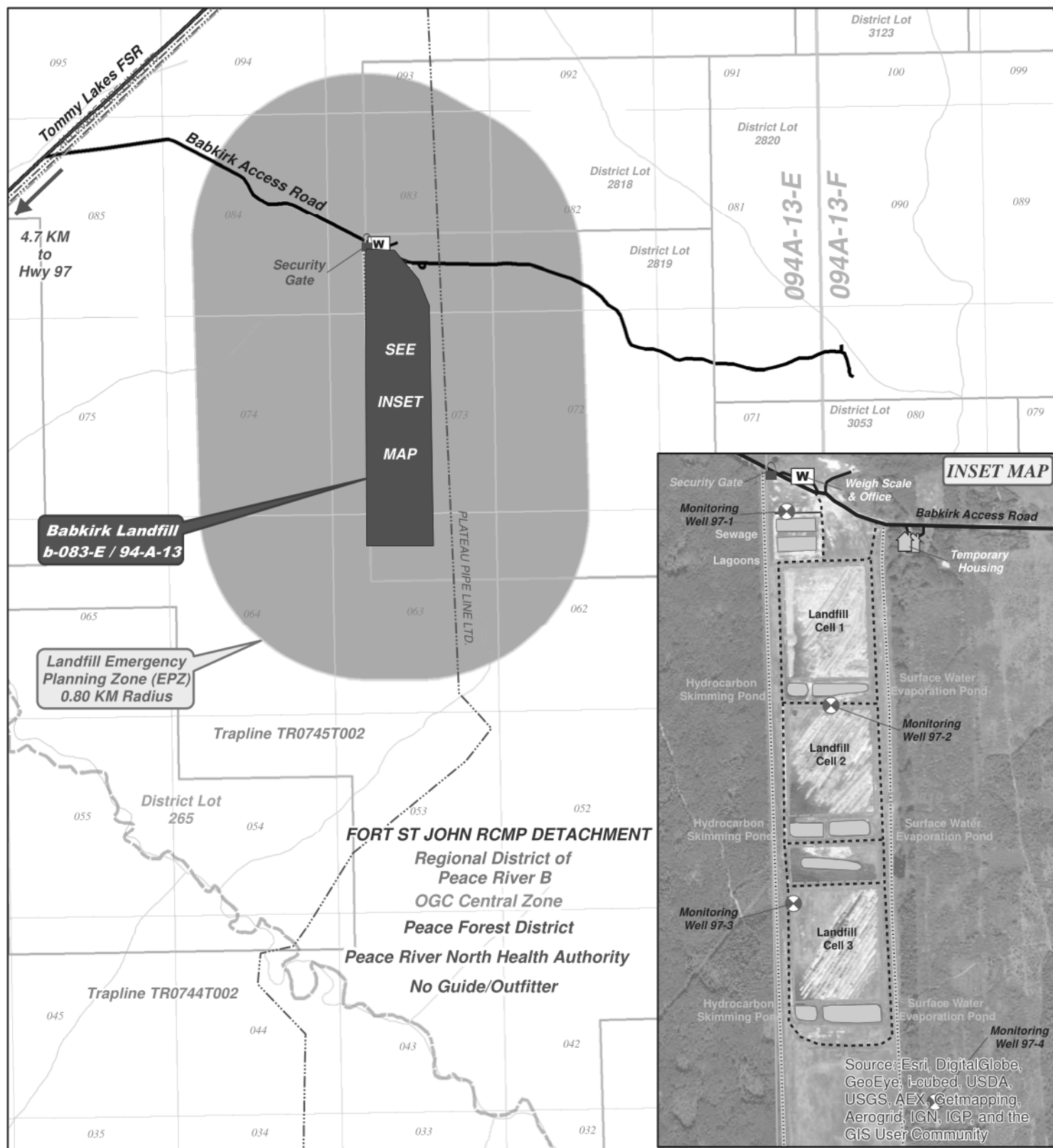
PROJECT NO.: 11881

DRAFTING: BM

DRAFT DATE: NOV. 14, 2017

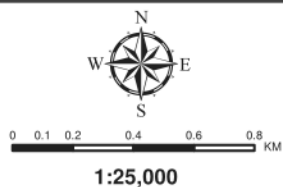
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## **Appendix B – Emergency Planning Base Area Map**



**LEGEND**

	Temporary Accommodations		Emergency Planning Zone
	Security Gate		Landfill Area
	Monitoring Well		Pond / Lagoon
	Weigh Station / Office		Landfill Cell
	Trapline Boundary		Service Access
	Access Road		Berm (4 meter)
	Gas Pipeline		



PREPARED BY: BEHR INTEGRATED SOLUTIONS INC.  
DRAFTING: BM

DRAFT DATE: NOV. 15, 2017

PROJECT NO.: 11881  
REV DATE:

## BABKIRK AREA EMERGENCY PLANNING BASE AREA MAP

## Appendix 6 – Compliance Calendar

Media	Task	Task Types	Submitted to/record retention	Task Frequency	Due Date	Month												Responsibility	Regulatory Citation	Reference	Related Documents
						Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec				
Construction	-Construction of the Secure Landfill must be substantially started by December 3, 2018	Report	EAO Onsite	As needed	As needed												▼	Facility Manager Environment and Regulatory	Environmental Assessment Act	EAC Amendment Letter, Dec 2 2013	N/A
Operations	- Closure costs must be updated by an independent qualified professional for closure and a minimum 25 year post closure period. The cost estimate must be submitted with the annual report. Update financial security accordingly.	Report	Ministry of Environment Onsite	Annually	Within 30 days of audit			▼										Environment and Regulatory	Environmental Management Act Hazardous Waste Regulation	LF Approval 104460 Condition (2.1 & 2.2 )	N/A
Auditing	-The facility shall be audited by a qualified independent 3rd part a minimum of once every three years. The results of the audit shall be submitted to the director within 30 days of completing the audit.	Report	Ministry of Environment Onsite	Every 3 years	Every 3 years												▼	Environment and Regulatory	Environmental Management Act Hazardous Waste Regulation	LF Approval 104460 Condition (4.2)	N/A
Operations	-Provision for fencing, site access, vehicle safety barriers, surface water diversionary works, firebreaks, and site restoration as required shall be carried out to the satisfaction of the director.	Monitoring	E&R Department Onsite	Weekly	Weekly	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	Facility Manager	Environmental Management Act Hazardous Waste Regulation	LF Approval 104460 Condition (4.3)	N/A
Operations	-Provide adequate security for the facility and restrict access to authorized personnel. All valves, pumps, doors and controls, accessible if security were breached are to be locked.	Monitoring	E&R Department Onsite	Weekly	Weekly	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	Facility Manager	Environmental Management Act Hazardous Waste Regulation	LF Approval 104460 Condition (4.4)	N/A
Waste	- The maximum quantity of waste authorised to be discharged into the secure landfill is 750,000 tonnes	Submit data	E&R Department Onsite	Monthly	End of month	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	Facility Manager E&R Department	Environmental Management Act	LF Approval 104460 Condition (1.1)	Environmental Management Act (Part 6 - Clean Air Provisions)
Waste	-The maximum amount of waste authorized for storage and treatment is 90,000 tonnes	Submit data	E&R Department Onsite	Monthly	End of month	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	Facility Manager E&R Department	Environmental Management Act Hazardous Waste Regulation	LF Approval 104460 Condition (1.2.1)	N/A
Operations	-Warning signs conforming to section 8(d) of the Hazardous Waste Regulation are to be posted at each entrance to the facility and at other location as required by the Director	Monitoring	E&R Department Onsite	Weekly	Weekly	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	Facility Manager	Environmental Management Act Hazardous Waste Regulation	LF Approval 104460 Condition (4.5)	N/A
Operations	-Inspect authorized works regularly and maintain them in good working order. In the event of an emergency or condition beyond the control of the permitted which prevents continuing operation of the approved method of pollution control, the permitted shall take appropriate remedial action and notify Director immediately.	Monitoring	E&R Department Onsite	Weekly	Weekly	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	Facility Manager Environment and Regulatory	Environmental Management Act Hazardous Waste Regulation	LF Approval 104460 Condition (4.7)	N/A
Operations	-Notify the Director, Environmental Protection, of any non-compliance with requirements of the permit. Identify the non-compliance, and any remedial action taken to deal with the non-compliance. Written confirmation of all non-compliance events is required within 24 hours of the original notification unless otherwise noted by the Director.	Report	Ministry of Environment Onsite	As needed	As needed												▼	Facility Manager Environment and Regulatory	Environmental Management Act Hazardous Waste Regulation	LF Approval 104460 Condition (4.8)	N/A
Operations	-Notify the Director, in writing, prior to implementing changes to the authorized works or to any process that may affect the quality and/or quantity of the discharge.	Report	Ministry of Environment Onsite	As needed	As needed												▼	Facility Manager Environment and Regulatory	Environmental Management Act Hazardous Waste Regulation	LF Approval 104460 Condition (4.9)	N/A
Operations	-Sampling and analysis is to be carried out in accordance with procedures described in the most current edition of the BC Field Sampling Manual and BC Laboratory Methods Manual For The Analysis of Water, Wastewater, Sediment, Biological Materials, and Discrete Ambient Air Samples	Report	Onsite	As needed	As needed												▼	Facility Manager Environment and Regulatory	Environmental Management Act Hazardous Waste Regulation	LF Approval 104460 Condition (8.1 & 8.2)	N/A
Operations	-Submit and annual report to the Director for approval before March 31 each year	Report	Ministry of Environment Onsite	Annually	March 31st			▼										Environment and Regulatory	Environmental Management Act Hazardous Waste Regulation	LF Approval 104460 Condition (9.3)	N/A
Operations	-Report the actual tonnage of waste discharge for the 12 month period commencing 60 days prior to the anniversary date of the permit. The report is due annually 30 days prior to the anniversary of the permit.	Report	Ministry of Environment Onsite	Annually	June						▼							Facility Manager Environment and Regulatory	Environmental Management Act Hazardous Waste Regulation	LF Approval 104460 Condition (9.1)	N/A

Media	Task	Task Types	Submitted to/record retention	Task Frequency	Due Date	Month												Responsibility	Regulatory Citation	Reference	Related Documents
						Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec				
Closure/Operation	-Ensure that spill kits are available and onsite and promptly accidental fuel or leachate discharges to the satisfaction of the MoE	Inspection	Onsite	Weekly	Weekly	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	Facility Manager Environment and Regulatory	Environmental Assessment Act	EAC WD08-03 Schedule B Condition 1	N/A
Operation	-Impacts on the discharges on the environment shall be carried out by a qualified independent professional annually	Report	Onsite	Annually	March 31st			▼										Facility Manager Environment and Regulatory	Environmental Management Act Hazardous Waste Regulation	LF Approval 104460 Condition (9.1 (ii))	N/A
Construction	-Director consent must be obtained in writing before construction commences. Plans must be obtained and generated by a Qualified Professional and include: a) Design Plan and Specifications for the proposed construction b) Construction Quality Assurance Plan c) Construction Quality Control Plan Upon completion of the work all plans and specifications shall be stamped and signed by a Qualified Professional	Report	Ministry of Environment Onsite	As needed	As needed												▼	Facility Manager Environment and Regulatory Landfill Services	Environmental Management Act Hazardous Waste Regulation	LF Approval 104460 Condition (4.1 )	N/A
Operations	-All loads entering the facility shall be screened at the gate for NORM by a screening procedure developed by a qualified professional. Any waste material that exceeds the limits specified in Tables 5.1, 5.2 or 5.3 of the Canadian Guidelines for the Management of Naturally Occurring Radioactive Materials is prohibited for disposal	Inspection	Onsite	As needed	As needed												▼	Facility Manager Environment and Regulatory	Environmental Management Act Hazardous Waste Regulation	LF Approval 104460 Condition (4.11)	N/A
Operations	-Prior to accepting any material for treatment and prior to conversion of the treatment cells to a Secure Landfill an Operational Plan shall be submitted to and approved by the Director	Report	Ministry of Environment Onsite	As needed	As needed												▼	Facility Manager Environment and Regulatory	Environmental Management Act Hazardous Waste Regulation	LF Approval 104460 Condition (5.1)	N/A
Operations	-Compact and contour the landfill daily	Monitor	Onsite	Daily	Daily	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	Facility Manager Environment and Regulatory	Environmental Management Act Hazardous Waste Regulation	LF Approval 104460 Condition (5.2)	N/A
Construction	-During the construction phase and/or addition of new works a QA/QC program shall be carried out by a qualified independent 3rd party. Submit the summary report of the QA/QC program results confirming the integrity of the liners and leachate collection system prior to depositing waste into any new landfill cell.	Report	Ministry of Environment Onsite	As needed	As needed												▼	Facility Manager Environment and Regulatory Landfill Services	Environmental Management Act Hazardous Waste Regulation	LF Approval 104460 Condition (5.2)	N/A
Operations	-Ensure prohibited wastes are not accepted for disposal	Inspection	Onsite	Daily	Daily	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	Facility Manager Environment and Regulatory	Environmental Management Act Hazardous Waste Regulation	LF Approval 104460 Condition (6.0)	N/A
Operations	-Large metallic waste shall be segregated into a separate area of the landfill. All recyclable metals wastes shall be recycled.	Inspection	Onsite	Daily	Daily	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	Facility Manager Environment and Regulatory	Environmental Management Act Hazardous Waste Regulation	LF Approval 104460 Condition (6.3)	N/A
Operations	-Carry out monitoring as outlined in the Operations Plan	Report	Onsite	As needed	As needed												▼	Facility Manager Environment and Regulatory	Environmental Management Act Hazardous Waste Regulation	LF Approval 104460 Condition (7.0)	N/A
Construction	-As-built drawings certified correct and sealed by a qualified professional shall be submitted electronically within 60 days of completion of the work or as otherwise specified by the Director.	Report	Ministry of Environment Onsite	As needed	As needed												▼	Facility Manager Environment and Regulatory Landfill Services	Environmental Management Act Hazardous Waste Regulation	LF Approval 104460 Condition (9.2)	N/A
Closure	-Submit a closure plan before prior to start up of the facility	Report	Ministry of Environment Onsite	As needed	As needed												▼	Facility Manager Environment and Regulatory Landfill Services	Environmental Management Act Hazardous Waste Regulation	LF Approval 104460 Condition (10)	N/A
Operations/Closure	-Specifications for the final cap shall be submitted at least 60 days in advance of each area of the landfill reaching final elevation. Details shall include thickness and permeability of barrier and drainage layers, information on topsoil, vegetative cover, and erosion control preventions.	Report	Ministry of Environment Onsite	As needed	As needed												▼	Facility Manager Environment and Regulatory Landfill Services	Environmental Management Act Hazardous Waste Regulation	LF Approval 104460 Condition (10)	N/A
Closure	-One year in advance of decommissioning the landfill or as otherwise specified by the Director a Post Closure Plan shall be submitted for approval by the Director	Report	Ministry of Environment Onsite	As needed	As needed												▼	Facility Manager Environment and Regulatory Landfill Services	Environmental Management Act Hazardous Waste Regulation	LF Approval 104460 Condition (10)	N/A
Operation	-Ensure that landfill cells have a liner and leachate management system that is designed and constructed to the satisfaction of the MoE	Report	Ministry of Environment Onsite	As needed	As needed												▼	Facility Manager Environment and Regulatory Landfill Services	Environmental Assessment Act	EAC WD08-03 Schedule B Condition 2	N/A
Closure/Operation	-Ensure each landfill cell be built with final cover that goes beyond the requirements of the HWR to satisfaction of the MoE	Report	Ministry of Environment Onsite	As needed	As needed												▼	Facility Manager Environment and Regulatory Landfill Services	Environmental Assessment Act	EAC WD08-03 Schedule B Condition 3	N/A

Media	Task	Task Types	Submitted to/record retention	Task Frequency	Due Date	Month												Responsibility	Regulatory Citation	Reference	Related Documents
						Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec				
Construction/ Operation	-Construction of fuel and leachate storage tanks will include appropriate secondary containment to prevent accidental discharge from reaching the surrounding environment	Report	Ministry of Environment Onsite	As needed	As needed												▼	Facility Manager Environment and Regulatory Landfill Services	Environmental Assessment Act	EAC WD08-03 Schedule B Condition 4	N/A
Operation	-Ensure leachate will be transferred by an enclosed pump and hose or by vacuum truck to holding tanks. The equipment will be regularly maintained to prevent malfunction and loss of containment.	Inspection	Onsite	As needed	As needed												▼	Facility Manager	Environmental Assessment Act	EAC WD08-03 Schedule B Condition 5	N/A
Operation	-Licensed waste contractors will be used to transfer leachate offsite for disposal	Inspection	Onsite	As needed	As needed												▼	Facility Manager	Environmental Assessment Act	EAC WD08-03 Schedule B Condition 6	N/A
Operation	-The leachate ponds will be monitored and containment measures implemented as necessary to control overflow.	Inspection	Onsite	Weekly	Weekly	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	Facility Manager	Environmental Assessment Act	EAC WD08-03 Schedule B Condition 7	N/A
Closure	-Cell structures will be inspected and maintained according to the landfill closure plan to prevent breaches in containment of leachate	Inspection	Onsite	Weekly	Weekly	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	Facility Manager	Environmental Assessment Act	EAC WD08-03 Schedule B Condition 8	N/A
Construction	-Groundwater wells will be installed in accordance with the Groundwater Protection Regulation	Report	Ministry of Environment Onsite	As needed	As needed												▼	Facility Manager Environment and Regulatory Landfill Services	Environmental Assessment Act	EAC WD08-03 Schedule B Condition 9	N/A
Operation	-A truck check program must be implemented at site -Weigh scale operators will receive training in containment measures required to be in place to prevent loss of wastes during transport -Weigh scale operators will note to drivers and make a written note in the site log book of any breaches in containment requirements -The Project Environmental Management Program will contain a procedure for this information to be forwarded to waste generators should drivers not rectify the deficiency	Report	Ministry of Environment Onsite	As needed	As needed												▼	Facility Manager	Environmental Assessment Act	EAC WD08-03 Schedule B Condition 10	N/A
Closure	-Ensure that groundwater wells are decommissioned in accordance with the Groundwater Protection Regulations	Report	Ministry of Environment Onsite	As needed	As needed												▼	Facility Manager Environment and Regulatory Landfill Services	Environmental Assessment Act	EAC WD08-03 Schedule B Condition 11	N/A
Operation	-No project activities will occur within surface water bodies or watercourses and there will be no direct releases of deleterious substances to surface water.	Inspection	Onsite	Daily	Daily	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	Facility Manager Environment and Regulatory Landfill Services	Environmental Assessment Act	EAC WD08-03 Schedule B Condition 12	N/A
Operation	-Work in the area of the facility will be performed in accordance with the project EMPs and to the satisfaction of the MoE which will include a requirement for use of appropriate sediment containment measures during heavy rain events.	Inspection	Onsite	Daily	Daily	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	Facility Manager Environment and Regulatory Landfill Services	Environmental Assessment Act	EAC WD08-03 Schedule B Condition 13	N/A
Operation	-Ensure that to the satisfaction of the MoE, an offsite surface water quality monitoring program will be implemented to guide mitigation	Monitor	Onsite	Annually	Annually			▼										Facility Manager Environment and Regulatory	Environmental Assessment Act	EAC WD08-03 Schedule B Condition 14	N/A
Operation	-Ensure contractors and staff comply with project environmental management plans including reporting wildlife collisions. Incidents will be managed and reported as part of the project environmental management plan	Report	Onsite	Daily	Daily	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	Facility Manager Environment and Regulatory	Environmental Assessment Act	EAC WD08-03 Schedule B Condition 15	N/A
Operation	-Ensure that to the satisfaction of the MoE and Blueberry River First Nations, fencing provides protection for wildlife by preventing direct contact with contaminated materials	Report	Onsite	As needed	As needed												▼	Facility Manager Environment and Regulatory	Environmental Assessment Act	EAC WD08-03 Schedule B Condition 16	N/A
Closure	-Fencing will remain in place throughout closure	Inspection	Onsite	Daily	End of Closure	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	Facility Manager Environment and Regulatory	Environmental Assessment Act	EAC WD08-03 Schedule B Condition 17	N/A
Operations	-Ensure that each hydrocarbon skimming and evaporation pond be fitted with measures to discourage use by waterfowl	Monitor	Onsite	Weekly	Weekly	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	▼▼	Facility Manager Environment and Regulatory	Environmental Assessment Act	EAC WD08-03 Schedule B Condition 18	N/A
Closure	-Fuel and leachate tank decommissioning will be performed in accordance with BC Fire Code and other applicable regulations	Report	Onsite	As needed	As needed												▼	Facility Manager Environment and Regulatory	Environmental Assessment Act	EAC WD08-03 Schedule B Condition 19	N/A
Operations	-Non-surfaced onsite and access roads and soils stored within the bio-cells or landfill cells will be watered down or covered during dust prone conditions	Inspection	Onsite	As needed	As needed												▼	Facility Manager Environment and Regulatory	Environmental Assessment Act	EAC WD08-03 Schedule B Condition 20	N/A



Media	Task	Task Types	Submitted to/record retention	Task Frequency	Due Date	Month												Responsibility	Regulatory Citation	Reference	Related Documents
						Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec				
Operations	-If air quality is a problem, an air quality monitoring program will be implemented at site and results used to figure out any mitigation	Report	Ministry of Environment Onsite	As needed	As needed												▼	Facility Manager Environment and Regulatory	Environmental Assessment Act	EAC WD08-03 Schedule B Condition 21	N/A
Operation	-Ensure that to satisfaction of BC Treaty 8 First Nations that First Nations are made aware of all opportunities for employment/contracts at the Project	Report	Onsite	As needed	As needed												▼	Facility Manager Community and Aboriginal Relations	Environmental Assessment Act	EAC WD08-03 Schedule B Condition 22	N/A
Operation	-To the satisfaction of the Ministry of Tourism, Culture and the Arts, as part of the construction QA/QC plan, a member of the staff will be employed/trained to monitor construction activities that involve new land clearance or excavation to identify any archaeological items discovered.	Monitor	Ministry of Tourism, Culture and the Arts Onsite	As needed	As needed												▼	Facility Manager Environment and Regulatory	Environmental Assessment Act	EAC WD08-03 Schedule B Condition 23	N/A
Operation	-To the satisfaction of the Ministry of Tourism, Culture and the Arts, the Project Environmental Management Program will include a contingency plan to manage encounters with cultural materials, should any occur	Report	Ministry of Tourism, Culture and the Arts Onsite	As needed	As needed												▼	Facility Manager Environment and Regulatory	Environmental Assessment Act	EAC WD08-03 Schedule B Condition 24	N/A
Operation	-To the satisfaction of BC Treaty 8 First Nations and the MoE that First Nations are included in all emergency response plans or actions and that First Nations are contacted as quickly as possible in the event of an emergency.	Report	Treaty 8 FN Onsite	As needed	As needed												▼	Facility Manager Environment and Regulatory	Environmental Assessment Act	EAC WD08-03 Schedule B Condition 25	N/A
Operation	-Notify BC Treaty 8 First Nations of all rejected loads, including the rationale for the load being rejected	Report	Treaty 8 FN Onsite	As needed	As needed												▼	Facility Manager Environment and Regulatory	Environmental Assessment Act	EAC WD08-03 Schedule B Condition 26	N/A
Operation	-Develop a Regulatory Compliance Plan which will include:  - a list of all applicable federal, provincial, and municipal regulations and permits for the Project  -provision for any changes to these regulations and permits to be addressed by necessary changes to the management and operational practices of the project  -procedure for regular review of compliance with these regulations and permits through a checking (auditing) and corrective action mechanism	Report	Ministry of Environment Onsite	As needed	As needed												▼	Facility Manager Environment and Regulatory	Environmental Assessment Act	EAC WD08-03 Schedule B Condition 27	N/A
Operation	-Develop a QA/QC program which will describe the procedures that will be in place during construction to ensure that the proposed environmental protection measures that are part of the project design are implemented as per specifications. Training of personnel for construction specific tasks will also be addressed within the plan	Report	Ministry of Environment Onsite	As needed	As needed												▼	Facility Manager Environment and Regulatory	Environmental Assessment Act	EAC WD08-03 Schedule B Condition 28	N/A
Operation	-Develop a prevention and control of noxious weeds plan which will include to the satisfaction of the Ministry of Agriculture and Lands, procedures that waste generators will be requested to following regarding cleaning and inspection of waste transfer vehicles prior to waste transport, and subsequent procedures for inspection of vehicles by the project staff at the site entrance. The plan will also include procedures for monitoring for the presence of any new invasive species on the Site also with response procedures should such species occur	Report	Ministry of Agriculture and Lands Onsite	As needed	As needed												▼	Facility Manager Environment and Regulatory	Environmental Assessment Act	EAC WD08-03 Schedule B Condition 29	N/A
Operation	-The Proponent will develop a Vegetation Management and Monitoring Plan which will include, to the satisfaction of the MOE, the procedures for re-seeding of soils exposed due to Project activities, the management and monitoring of vegetation on the Secure landfill cover, and general vegetation management.	Report	Ministry of Environment Onsite	As needed	As needed												▼	Facility Manager Environment and Regulatory	Environmental Assessment Act	EAC WD08-03 Schedule B Condition 30	N/A

Media	Task	Task Types	Submitted to/record retention	Task Frequency	Due Date	Month												Responsibility	Regulatory Citation	Reference	Related Documents
						Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec				
Operation	-The Proponent will develop a Wildlife Management and Monitoring Plan which will include, to the satisfaction of the MOE, measures to prevent wildlife from entering the Project Site, methods to minimize impacts of the Project i.e., noise and light pollution on wildlife, preventative measures to minimize potential vehicle collisions with wildlife, and methods to protect secure landfill personnel from wildlife encounters. The plan will detail protective measures including those mitigation measures described for effects on wildlife described in Section 6, such as wildlife fencing. The plan will also include provision for records will be kept regarding vehicle-wildlife collisions.	Report	Ministry of Environment Onsite	As needed	As needed													Facility Manager Environment and Regulatory	Environmental Assessment Act	EAC WD08-03 Schedule B Condition 31	N/A
Operation	-The Proponent will develop Hazardous Waste and Leachate Management Plans which will contain, to the satisfaction of the MOE, procedures for the appropriate receipt, handling, storage and final disposal of Hazardous Waste and leachate present at the Site, including procedures for characterization of waste materials to determine whether they are Hazardous Waste. The plan will also include procedures for records to be kept of Hazardous Waste volumes received and leachate volumes generated, the final disposal location of Hazardous Wastes and documentation obtained during disposal, for example, for offsite disposal of leachate.	Report	Ministry of Environment Onsite	As needed	As needed													Facility Manager Environment and Regulatory	Environmental Assessment Act	EAC WD08-03 Schedule B Condition 32	N/A
Operation	-The Proponent will develop a Non-Hazardous Waste Management Plan which will contain, to the satisfaction of the MOE, the procedures for the appropriate receipt (in the case of non-Hazardous Waste soils), storage, handling and disposal of each non-Hazardous waste stream generated or received at the Site. The plan will also include procedures for records to be kept of approximate non-Hazardous waste volumes generated and documentation obtained during disposal.	Report	Ministry of Environment Onsite	As needed	As needed													Facility Manager Environment and Regulatory	Environmental Assessment Act	EAC WD08-03 Schedule B Condition 33	N/A
Operation	-The Proponent will develop an Air Quality Monitoring Plan which will specify, to the satisfaction of the MOE, the measures to be implemented to protect air quality at the Project Site, including measures to be used to control airborne emissions associated with Project activities and an air quality monitoring program to guide further mitigation, should air quality prove to be a problem. The plan will detail the monitoring program, including the methodologies to be employed, the timing of monitoring activities, and procedures to be followed should performance indicators (including regulatory standards) be breached.	Report	Ministry of Environment Onsite	As needed	As needed													Facility Manager Environment and Regulatory	Environmental Assessment Act	EAC WD08-03 Schedule B Condition 34	N/A
Operation	-The Proponent will develop a Groundwater Quality Monitoring and Contingency Plan which will specify, to the satisfaction of the MOE, the measures to be implemented to protect groundwater quality at the Project Site, including measures to be used to control emissions to ground associated with Project activities and a groundwater quality monitoring program to guide further mitigation, if required. The plan will detail the monitoring program, including the methodologies to be employed, the analyte list, the timing of monitoring activities, and procedures to be followed should performance indicators (including regulatory standards) be breached.	Report	Ministry of Environment Onsite	As needed	As needed													Facility Manager Environment and Regulatory	Environmental Assessment Act	EAC WD08-03 Schedule B Condition 35	N/A

Media	Task	Task Types	Submitted to/record retention	Task Frequency	Due Date	Month												Responsibility	Regulatory Citation	Reference	Related Documents
						Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec				
Operation	-The Proponent will develop a Surface Water Quality Monitoring Plan which will specify, to the satisfaction of the MOE, the measures to be implemented to protect surface water quality at the Project Site, including those mitigation measures to be used to control emissions to surface water associated with Project activities and a surface water quality monitoring program to guide further mitigation, if required. The plan will detail the monitoring program, including the methodologies to be employed, the analyte list, the timing of monitoring activities, and procedures to be followed should performance indicators (including regulatory standards) be breached.	Report	Ministry of Environment Onsite	As needed	As needed													Facility Manager Environment and Regulatory	Environmental Assessment Act	EAC WD08-03 Schedule B Condition 36	N/A
Operation	-The Proponent will develop an Erosion and Sediment Control Plan which will cover, to the satisfaction of the MOE, the surface water management for the entire Project Site, and include procedures for consideration of the need for implementation of necessary further mitigation measures, if necessary; for example, additional sediment control measures during Project activities outside of the Site perimeter containment berm.	Report	Ministry of Environment Onsite	As needed	As needed													Facility Manager Environment and Regulatory	Environmental Assessment Act	EAC WD08-03 Schedule B Condition 37	N/A
Operation	-The Proponent will develop a Dust and Odour Control Plan which will address, to the satisfaction of the MOE, the measures to minimize potential dust and odour nuisance from Project activities, including watering down of Site surfaces as needed and restriction of vehicle speeds. The air quality monitoring program for the Site will include consideration of dust and odorous emissions. This plan is therefore closely linked to the Air Quality Monitoring Plan.	Report	Ministry of Environment Onsite	As needed	As needed													Facility Manager Environment and Regulatory	Environmental Assessment Act	EAC WD08-03 Schedule B Condition 38	N/A
Operation	-The Proponent will develop a Nuisance (Noise, Light) Control Plan which will address, to the satisfaction of the MOE, the measures to minimize potential effects of noise and light on public health and wildlife. These mitigation measures include restricting most Project activities to daylight hours.	Report	Ministry of Environment Onsite	As needed	As needed													Facility Manager Environment and Regulatory	Environmental Assessment Act	EAC WD08-03 Schedule B Condition 39	N/A
Operation	-The Proponent will develop a Communications Plan, to the satisfaction of the EAO, to guide the way in which the Proponent engages the public, First Nations and government agencies, as necessary. The plan will detail regulatory reporting requirements and procedures for receipt and management of public comments or complaint during all phases of the Project. The plan will also include procedures for meeting outstanding consultation commitments outlined in Section 2 and detailed in Appendix II Consultation Tracking.	Report	EAO Onsite	As needed	As needed													Facility Manager Environment and Regulatory	Environmental Assessment Act	EAC WD08-03 Schedule B Condition 40	N/A
Operation	-The Proponent will develop an Energy Management Plan, to the satisfaction of the Ministry of Energy, Mines and Petroleum Resources, to encourage the adoption of energy efficient practices during all phases of the Project. This will include practices such as shutting off vehicles when possible to reduce fuel use. The Plan will identify energy saving measures, as well as outlining ways in which Project personnel can propose to institute additional measures based on operational experiences. The plan will also include provision for energy efficiency to be considered when choosing between purchasing options for Project equipment and materials.	Report	Ministry of Energy Onsite	As needed	As needed													Facility Manager Environment and Regulatory	Environmental Assessment Act	EAC WD08-03 Schedule B Condition 41	N/A

Media	Task	Task Types	Submitted to/record retention	Task Frequency	Due Date	Month												Responsibility	Regulatory Citation	Reference	Related Documents
						Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec				
Operation	-The Proponent will develop a Containment Measures Inspection and Maintenance Plan which will specify, to the satisfaction of the MOE, a methodology and schedule for inspection and maintenance of Project containment measures, including a process to be implemented should deficiencies in containment be identified. A procedure for record keeping for inspection and maintenance act.	Report	Ministry of Environment Onsite	As needed	As needed												▼	Facility Manager Environment and Regulatory	Environmental Assessment Act	EAC WD08-03 Schedule B Condition 42	N/A
Operation	-The Proponent will develop a Traffic Management Plan which will specify measures, to the satisfaction of the EAO, control vehicles on the Project Site and Site access road, to reduce the impact of vehicle movements on the surrounding environment, including noise, light, and exhaust emissions, creation of fugitive dust and vehicle-wildlife collisions. The plan will address the measures to minimize these potential impacts, including restricting vehicle speed limits using signage on the Site access road and at the Site entrance. The plan will also include a process for addressing non-conformance of drivers with posted speed limits.	Report	EAO Onsite	As needed	As needed												▼	Facility Manager Environment and Regulatory	Environmental Assessment Act	EAC WD08-03 Schedule B Condition 43	N/A
Operation	-The Proponent will develop a Vehicle Inspection and Maintenance Plan which will specify, to the satisfaction of the EAO, a schedule for inspection and maintenance of Project vehicles and equipment, including a process to be implemented should deficiencies in vehicles or equipment be identified. Areas suitable for conductance of maintenance activities will be specified within the plan. A procedure for record keeping for inspection and maintenance activities will also be included in the plan.	Report	EAO Onsite	As needed	As needed												▼	Facility Manager Environment and Regulatory	Environmental Assessment Act	EAC WD08-03 Schedule B Condition 44	N/A
Operation	-The Proponent will develop an Accidents and Malfunctions Plan which will include, to the satisfaction of the MOE, procedures for implementation and maintenance of relevant mitigation measures such as the availability of spill kits at the Project Site. The plan will, for example, also include procedures for the prevention of fuel release to the environment during on-Site vehicle and equipment fuelling and other fuel handling activities such as tank re-filling. The plan will also cover failure of Project design and management mitigation measures, including procedures for immediate response to incidents, and also an incident review and reporting procedure, to include notification of applicable parties and implementation of remedial actions where necessary.	Report	Ministry of Environment Onsite	As needed	As needed												▼	Facility Manager Environment and Regulatory	Environmental Assessment Act	EAC WD08-03 Schedule B Condition 45	N/A
Operation	-The Proponent will develop a Closure Plan which will include, to the satisfaction of the MOE, procedures for the final covering of each Landfill Cell, and also a schedule and procedures for continued Project environmental monitoring and Project Site inspection and maintenance. The plan will also include procedures for the decommissioning of Site structures and necessary reporting for all closure activities.	Report	Ministry of Environment Onsite	As needed	As needed												▼	Facility Manager Environment and Regulatory	Environmental Assessment Act	EAC WD08-03 Schedule B Condition 46	N/A
Operation	-The proponent must submit a report to the Executive Director on the status of compliance with the Conditions of the EAO Certificate and commitments in Schedule B four weeks prior to surface disturbance, four weeks prior to operation, and once a year following the start of operation until decommissioning	Report	EAO Onsite	As needed	As needed												▼	Facility Manager Environment and Regulatory	Environmental Assessment Act	EAC WD08-03 Condition 5	N/A

Media	Task	Task Types	Submitted to/record retention	Task Frequency	Due Date	Month												Responsibility	Regulatory Citation	Reference	Related Documents
						Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec				
Operations	-Perform groundwater monitoring. Report due on March 31st	Report	Ministry of Environment Onsite	Quarterly	March 31st	▼		▼	▼			▼			▼			Environment and Regulatory	Environmental Management Act Hazardous Waste Regulation	PE-104460 (condition 5.1 (e))	Hazardous Waste Regulation
Operations	- A 3rd party will calibrate the scale semi-annually and internally semi-annually	Report	Onsite	Quarterly	Quarterly	▼			▼			▼			▼			Facility Manager	Environmental Management Act Hazardous Waste Regulation		Measurement Canada
Waste	- Waste gate screening (spot check loads upon delivery at the scale) - Parameters tested onsite include: pH, Paint Filter, Flash Point, Reactivity and Radioactivity	Monitor	Onsite 10 years	Min. 1 load if ≤ 5 loads received. Min. of 2 loads when > 5 loads received.	Daily	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	Facility Manager	Environmental Management Act	PE-104460 condition 6	N/A
Waste	-Random sample every 10,000 tonnes or once every 3 months, whichever is more frequent	Report	Onsite	As needed	Daily if 5000T is hit	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	▼▼▼	Facility Manager	Environmental Management Act Hazardous Waste Regulation	PE-104460 condition 6	N/A
Operations	-Have an ERP mock drill and submit records to MoE	Report	Ministry of Environment Onsite	Annually	Annually												▼	Facility Manager Environment and Regulatory	Environmental Management Act Hazardous Waste Regulation	HWR Section 11	N/A
Operations	-Make sure personnel training meets requirements of the HWR and records are kept on site	Report	Ministry of Environment Onsite	Annually	Annually												▼	Facility Manager Environment and Regulatory	Environmental Management Act Hazardous Waste Regulation	HWR Section 13	N/A
Operations	-Update the Emergency Response Plan annually	Report	Onsite	Annually	Annually	▼												Facility Manager Health and Safety	Environmental Management Act Hazardous Waste Regulation	HWR Section 11	N/A

▼	Task to be done monthly
▼▼	Task to be done weekly
▼▼▼	Task to be done daily
▼	Report due date

## Appendix 7 – HWR Compliance Matrix

HWR Section	Requirement	Compliance Action
Section 5 Waste Information	<p>(1) An owner of a facility must not accept, handle, store, treat, destroy or dispose of hazardous waste at the facility or allow it to be accepted, handled, stored, treated, destroyed or disposed of at the facility without taking reasonable measures to identify all hazards associated with the hazardous waste through</p> <p>(a) physical, chemical or biological analyses,</p> <p>(b) published scientific documentation,</p> <p>(c) consultation with the waste generator, or</p> <p>(d) consultation with the manufacturer in the case of manufactured goods which become waste,</p> <p>and without limiting the generality of this, the owner must again inquire into and ascertain those hazards wherever that owner has reason to believe that</p> <p>(e) a process or operation generating a hazardous waste delivered to the facility has changed, or</p> <p>(f) the description of a hazardous waste received at the facility does not match the description of the hazardous waste on the accompanying waste manifest.</p>	<p>Tervita requires generators to fill out a Waste Approval Application (WAA) prior to waste acceptance. Tervita confirms waste characterization through analytical, relevant documentation such as Safety Data Sheets, generator knowledge etc. If the generating process has changed or there is a waste discrepancy upon receipt Tervita requires the generator to reclassify the waste.</p>
	<p>(2) The owner of a facility must not accept a hazardous waste that</p> <p>(a) does not match the description on the accompanying manifest, or</p> <p>(b) is not accompanied by a manifest,</p> <p>and where any person attempts to deliver such waste to the facility, the owner of the facility must immediately notify a director by telephone to seek</p> <p>(c) authorization to accept the hazardous waste, or</p> <p>(d) other instructions.</p>	<p>If there is a waste discrepancy upon receipt Tervita phones the generator to confirm the waste shipment. The load is rejected and sent back to the generator for further classification.</p>
	<p>(3) A person must not accept, at any hazardous waste facility, hazardous waste which is described as a quantity more than 100 kg or 100 L on the accompanying manifest without first determining the quantity of waste delivered by measuring the weight or volume of the shipment.</p>	<p>Waste being delivered to Babkirk is measure by going over a weigh scale and volumes verified on the manifest.</p>

	<p>(4) Where the quantity of hazardous waste received at a hazardous waste facility is either</p> <p>(a) 5% greater than, or</p> <p>(b) 5% less than</p> <p>the quantity described in Part A of the manifest, the owner of the facility must</p> <p>(c) describe the occurrence of the discrepancy on the manifest,</p> <p>(d) submit a copy of the manifest, including the description required under paragraph (c), to the director within 3 days of receiving the hazardous waste, and</p> <p>(e) include the description of the discrepancy in the annual summary required under subsection (5).</p>	<p>Volume discrepancies are noted on the manifest and appropriate copies sent to the BC Government.</p>
	<p>(5) If there has been an occurrence of a discrepancy as described in subsection (4), the owner of a hazardous waste facility must</p> <p>(a) prepare an annual summary of all occurrences of discrepancies for the previous year,</p> <p>(b) include in the annual summary an explanation of actions taken to reduce further occurrences of discrepancies, and</p> <p>(c) submit the annual summary to the director within 60 days of the end of the calendar year in which the discrepancies occurred.</p>	<p>If there are volume discrepancies an summary report will be provided to the Director,</p>
<p>Section 6 Waste Record</p>	<p>1) The owner of a hazardous waste facility must keep for inspection by an officer an operating record at his or her facility and must record in a written or retrievable electronic form the following information for each hazardous waste received, stored or shipped:</p> <p>(a) the description including</p> <p>(i) the name and identification number as described in the federal dangerous goods regulations, and</p> <p>(ii) the physical state (i.e. whether it is solid, liquid, gaseous or a combination of one or more of these);</p> <p>(b) the quantity in kilograms or liters;</p> <p>(c) the method and date of storing, repacking, treating or disposing at the facility, cross-referenced to specific manifest document numbers applicable to the hazardous waste;</p> <p>(d) the location of each hazardous waste within the facility and the quantity at each location</p>	<p>Tervita keeps manifest records on-site for a 2 year period. Disposal location, volume, disposal method is recorded and cross referenced with the manifest number.</p>



	(2) The owner of a hazardous waste facility must keep the records required under subsection (1) for a minimum of 2 years after the waste has been removed from the facility.	Tervita keeps manifest records on-site for a 2 year period.
Section 7 Weather Protection	A person must not operate a hazardous waste facility unless the facility has been designed, constructed and maintained so that elements of the weather such as precipitation, heat, frost, wind and humidity have no detrimental effect on the capability of the facility to manage hazardous waste	The facility has been design with leachate collection, and surface water management systems to avoid detrimental effects of weather
Section 8 Access Security	<p>A person must not operate a hazardous waste facility unless access to the facility by unauthorized persons or by animals is prevented by</p> <p>(a) a 24 hour surveillance system that continuously monitors and controls entry to the facility, and for this purpose television monitors or an approved system, or surveillance guards present at the facility must be used, or</p> <p>(b) a barrier such as</p> <p>(i) a 2.13 m high chain link fence topped with 3 strands of barbed wire to prevent scaling of the fence, or equally effective approved barrier, and</p> <p>(ii) a means of controlled entry, at all times, through gates or other entrances,</p> <p>(c) locks or locked covers on all valves, pumps, electrical controls and other operational controls which would be accessible if the prevention measures referred to in paragraph (a) or (b) above were breached, and</p> <p>(d) a sign, legible from a distance of at least 10 m, reading</p> <p>(i) "DANGER — UNAUTHORIZED PERSONNEL KEEP OUT",</p> <p>(ii) "DANGER — AUTHORIZED PERSONNEL ONLY", or</p> <p>(iii) "RESTRICTED AREA — AUTHORIZED PERSONNEL ONLY",</p> <p>or equivalent wording, posted at each entrance to the facility and at such other locations as a director may fix.</p>	A security fence will be in place when the Landfill is constructed with a controlled access point. Controls will be locked when not in operation. Warning signs are posted at each entrance to the facility.

	<p>(1) The owner of a hazardous waste facility must prevent the accidental ignition or reaction of ignitable or reactive waste by protecting such waste from sources of ignition or reaction such as open flames, smoking, grinding and welding, hot surfaces, frictional heat, static, electrical or mechanical sparks, spontaneous ignition from heat producing chemical reactions and radiant heat by means of</p> <p>(a) electrical spark grounding where the potential for static buildup exists,</p> <p>(b) suitable separation distances or a barrier with a minimum fire rating of 2 hours between the waste and ignition sources, and</p> <p>(c) a warning sign, legible from a distance of 10 m, reading "DANGER — IGNITABLE/REACTIVE HAZARDOUS WASTE, NO OPEN FLAMES, SMOKING OR SPARKS".</p>	<p>Tervita marks all flammable sources at site with appropriate signage and hot work including smoking has to be done at a safe distance.</p>
<p>Section 9 Prevention of fire, explosion and accidental reactions</p>	<p>(2) The owner of any indoor hazardous waste facility which manages reactive or ignitable hazardous waste must</p> <p>(a) provide and maintain a continuous 24 hour fire alarm system with</p> <p>(i) smoke sensing alarms, and</p> <p>(ii) heat sensing alarms,</p> <p>capable of automatically stopping any forced air ventilation systems in the facility and summoning a 24 hour external emergency response through</p> <p>(iii) a local fire department,</p> <p>(iv) a local response team, or</p> <p>(v) on site security staff who have immediate communication access to a local response agency,</p> <p>(b) provide and maintain a fire suppression system specified by the Fire Commissioner or a local</p>	<p>Not applicable.</p>

	<p>assistant to the Fire Commissioner as defined in the Fire Services Act, or where not so specified provide and maintain</p> <p>(i) a permanent, automatic system which uses foam, inert gas or dry chemical, or</p> <p>(ii) one portable ABC rated fire extinguisher with a minimum 10 kg capacity for every 250 m2 of the facility's space,</p>	
	(c) provide and maintain sufficient aisle space between containers of hazardous waste to allow the unobstructed movement of persons, fire protection equipment, spill control equipment and decontamination equipment to any part of the facility,	Not applicable.
	(d) design and construct the facility so that the walls, doors and floor are noncombustible with a minimum fire rating of 2 hours, and	Not applicable.
	(e) ensure that any heat required for the facility is provided only by indirect means such as hot water, steam or electrical resistance and not by any device which uses an open flame within 10 m of where wastes are located, nor by any other device prohibited by the Fire Commissioner or a local assistant to the Fire Commissioner under the Fire Services Act.	Not applicable.
	<p>(3) The owner of a hazardous waste facility that treats, stores or disposes of ignitable or reactive waste must take precautions to prevent reactions which may do any of the following:</p> <p>(a) generate extreme heat or pressure, fire or explosions;</p> <p>(b) produce uncontrolled toxic mists, fumes, dusts or gases in sufficient quantities to threaten human health or the environment;</p> <p>(c) produce uncontrolled flammable fumes or gases in sufficient quantities to pose a risk of fire or explosion;</p> <p>(d) damage the structural integrity of the facility.</p>	Tervita reviews waste before acceptance to ensure incompatible waste is not placed together in the Landfill
10	<p>The owner of a hazardous waste facility must</p> <p>(a) provide and maintain an approved spill containment system to contain on site any release of spilled hazardous waste,</p>	All waste stored at site is placed into a treatment pad or secure landfill that meets the required performance standards

Section 10 Spill Protection and Reporting	<p>(b) inspect the facility monthly and, where any free liquid hazardous waste is stored at the facility,</p> <p>(i) provide and maintain a 24 hour spill alarm system appropriate for the hazardous waste managed at the facility, or</p> <p>(ii) inspect the facility weekly for any irregularities such as malfunctions, deterioration, operator error, leaks or spills which may lead to the escape of hazardous waste from the facility or may pose a threat to human health,</p>	The facility is inspected at a minimum weekly for any irregularities. No free liquid waste is stored at the facility.
	<p>(c) maintain at the facility a record of inspections conducted as required by paragraph (b) showing</p> <p>(i) any irregularities in the facility,</p> <p>(ii) dates that any such irregularities were discovered,</p> <p>(iii) corrective action taken, and</p> <p>(iv) date of corrective action, and</p>	Inspections are documented, detailing irregularities, date, corrective actions and dates of corrective actions.
	(d) immediately report any irregularities to a director.	Irregularities are reported to the Director
	<p>The owner of a hazardous waste facility must</p> <p>(a) prepare and maintain in up-to-date readiness a contingency plan, approved by a director, which documents procedures to be followed during emergencies, including</p> <p>(i) shut down procedures,</p> <p>(ii) communication networks to be used, and</p> <p>(iii) notification procedures for</p> <p>(A) police departments in the vicinity,</p> <p>(B) fire departments in the vicinity,</p> <p>(C) emergency response teams,</p> <p>(D) ambulance and medical services,</p> <p>(E) contractors carrying on business in the vicinity,</p> <p>(F) schools, hospitals and residents,</p>	Tervita has a Contingency Plan for Babkirk which will reviewed and updated annually

Section 11 Contingency Plan	<p>(G) federal, Provincial and municipal governments,</p> <p>(iv) evacuation procedures for facility staff,</p> <p>(v) abatement measures,</p> <p>(vi) inventories of spill response and cleanup equipment available</p> <p>(A) at the facility,</p> <p>(B) from contractors carrying on business in the vicinity,</p> <p>(C) from agencies operating in the vicinity, and</p> <p>(D) from regional suppliers,</p>	
	(b) appoint one person and at least one alternate to act as an Emergency Response Coordinator with authority to carry out action in accordance with the contingency plan,	The Emergency Response Coordinator is identified in the Contingency Plan.
	<p>(c) provide a copy of the contingency plan to</p> <p>(i) the Emergency Response Coordinator,</p> <p>(ii) each alternate Emergency Response Coordinator, and</p> <p>(iii) a director, and</p>	The Contingency Plan is made available to all Tervita staff and the MOE Director.
	(d) provide clean up equipment, sorbents and other material and protective equipment and clothing, for all emergency response staff at the facility, appropriate for all the hazardous wastes managed at the facility.	Clean-up equipment is made available at the Facility.
	<p>(1) The owner of a hazardous waste facility must test or inspect</p> <p>(a) the fire and explosion protection systems described in section 9 (2),</p> <p>(b) the spill protection systems described in section 10 (a) and (b), and</p> <p>(c) the contingency plan described in section 11 (a),</p> <p>at least once a year to ensure that such protective measures, systems, procedures, equipment and clothing are capable of proper operation in an emergency.</p>	An exercise is completed each year testing the emergency system

Section 12 Emergency Systems Testing	<p>(2) The owner of a hazardous waste facility must make a written record of each test carried out as required by subsection (1) and must include in the record</p> <ul style="list-style-type: none"> <li>(a) the measures, systems, procedures, equipment and clothing tested,</li> <li>(b) a description of the test methods,</li> <li>(c) the date of the tests on each component,</li> <li>(d) the results of the tests, and</li> <li>(e) description and date of any corrective action</li> </ul> <p>and the record must be available for inspection by an officer.</p>	A written record of the exercise is kept on file.
	<p>(3) Where a facility manages more than 20 tonnes of hazardous waste in a calendar year, the owner of the facility must submit a copy of the record referred to in subsection (2) to a director within 90 days after each test.</p>	A record of the systems testing is sent to the Director.
Section 13 Personnel Training	<p>(1) The owner of a hazardous waste facility must ensure that every person employed in the operation of the facility receives training which includes instruction on</p> <ul style="list-style-type: none"> <li>(a) the employed person's duties and responsibilities,</li> <li>(b) use of personnel protective equipment,</li> <li>(c) fire and explosion response procedures,</li> <li>(d) spill response procedures,</li> <li>(e) communications and alarm systems,</li> <li>(f) use of abatement and cleanup equipment,</li> <li>(g) shut down operations, and</li> <li>(h) hazards of all hazardous waste managed at the facility,</li> </ul> <p>before beginning employment in an operational capacity.</p>	Tervita staff is trained before beginning employment in an operational capacity.
	<p>(2) The owner of any facility must provide to each operational staff member an annual review of the training required by subsection (1).</p>	Training and learning is reviewed annually and on an on-going basis as standards are edited/developed.

	<p>(3) An owner of a facility referred to in subsection (1) must maintain and must produce for inspection whenever required by an officer a record of</p> <p>(a) all persons employed in the operations of the facility and their duties and responsibilities,</p> <p>(b) a description of the level of training received by each person so employed, and</p> <p>(c) the date of the last training session for each person so employed.</p>	All training records are kept on file.
Section 14 Closure	(1) The owner of a hazardous waste facility must not operate the facility unless that owner has prepared a written closure plan and has received approval of the plan.	A closure plan has been developed for Babkirk.
	<p>(2) A closure plan must include</p> <p>(a) a schedule of how and when the facility will be closed,</p> <p>(b) a description of decontamination procedures to be followed,</p> <p>(c) a description and estimate of the quantity of any hazardous waste residues which will remain at the site after closure, and</p> <p>(d) an estimate of the total time required to close the facility.</p>	This information is included in the Babkirk closure plan.
	(3) The owner of a hazardous waste facility must, whenever changes in the operating plans, facility design or the expected year of closure are intended, submit amendments to the closure plan for approval.	The closure plan is amended as the facility develops.
	<p>(4) The owner of a hazardous waste facility must</p> <p>(a) notify a director within 90 days after receiving or producing the final quantity of hazardous waste at the facility, and</p>	Tervita will notify the Director when closure will occur.
Section 24.1 Permit Requirement	(1) A person must not operate a secure landfill unless a permit has been issued under section 14 of the Act to operate the landfill.	Babkirk has been issued a Permit to operate a Secure Landfill
	(2) Subsection (1) does not apply in relation to an on-site hazardous waste landfill associated with contaminated site remediation activities undertaken in accordance with the Contaminated Sites Regulation,	Babkirk is currently not undergoing site remediation activities.
Section 25 Siting Requirements	Section (1) - (10)	Siting requirements were met during Babkirks Secure Landfill application process. Refer to original application

	<p>(1) The owner of a secure landfill must</p> <p>(a) at appropriate times during construction and installation, inspect</p> <p>(i) synthetic liners and covers to ensure tight seams and joints and the absence of punctures, blisters or tears, and</p> <p>(ii) soil or clay liners for imperfections (e.g. lenses, cracks, channels)</p> <p>which would increase permeability,</p>	<p>A QA/QC program is submitted prior to construction, detailing liner inspections.</p>
	<p>(b) during operation, inspect weekly and immediately after any storm event or catastrophic events</p> <p>(i) liners, covers and drainage control facilities for evidence of deterioration, malfunction, leaks or improper operation, and</p> <p>(ii) leak detection and leachate collection systems to ensure proper functioning and to determine if leachate is being generated or is accumulating, and</p>	<p>The leachate collection system and surface water management works are inspected weekly and records kept of the inspections.</p>
	<p>(c) immediately repair or correct any defects or malfunctioning works as determined by any inspections specified in paragraphs (a) and (b) to maintain the integrity of all works.</p>	<p>Any defects noted on the inspections will be rectified as soon as possible.</p>
	<p>(2) The owner of a secure landfill must carry out an approved monitoring program by</p> <p>(a) establishing a groundwater monitoring system with a sufficient number of wells, installed at appropriate locations (upgradient and downgradient) and depths to yield from the uppermost aquifer groundwater samples that</p> <p>(i) represent the quality of groundwater that would not be affected by any leakage from a secure landfill facility, and</p> <p>(ii) represent the quality of groundwater that would be affected by leachate, if any, from the secure landfill,</p>	<p>Please see Babkirks groundwater monitoring plan.</p>



Section 26 Operational Requirements

<p>(b) ensuring the quality of groundwater monitoring data by</p> <p>(i) casing sampling wells with appropriate materials to ensure the integrity of the boreholes,</p> <p>(ii) preventing contamination</p> <p>(A) of any part of the well during construction, and</p> <p>(B) from the surface during operation, and</p> <p>(iii) implementing procedures for</p> <p>(A) decontamination of sampling equipment,</p> <p>(B) sample collection,</p> <p>(C) sample preservation and shipment,</p> <p>(D) sample custody, and</p> <p>(E) analytical procedures and quality assurance,</p>	<p>Please see Babkirks groundwater monitoring plan.</p>
<p>(c) selecting indicator parameters (e.g. specific conductance, pH, total organic carbon) and chemical constituents for analysis of groundwater that</p> <p>(i) provide a reliable indication of the quality of groundwater below the secure landfill from the perspective of human health hazards and environmental quality,</p> <p>(ii) reflect the physical and chemical characteristics of the waste in the secure landfill, and</p> <p>(iii) provide a reliable indication of movement of any contaminant with groundwater flow,</p>	<p>Please see Babkirks groundwater monitoring plan.</p>
<p>(d) sampling groundwater sufficiently often to provide data that is representative of varying groundwater flow conditions, but in any case no less frequently than once every 3 months</p>	<p>Groundwater is sampled on a quarterly basis.</p>
<p>(e) measuring the groundwater surface elevation each time the groundwater is sampled,</p>	<p>Groundwater elevation is measure during each monitoring event.</p>
<p>(f) measuring volumes, sampling and analyzing any leachate collected by the leachate collection system,</p>	<p>Leachate volumes, date removed, analytical are all recorded and kept on file.</p>
<p>(g) ensuring detection of any liquid leaking into the space between the 2 liners, and</p>	<p>A leak detection system is in place at the landfill.</p>
<p>(h) reporting monitoring results at intervals specified by a director</p>	<p>Monitoring results are reported by March 31st, with the Annual Report</p>
<p>(3) The owner of a secure landfill must, as one or more cells are being filled,</p> <p>(a) operate under cover of a portable structure that acts as a roof to keep out rain and snow, or</p> <p>(b) design another system to prevent leachate generation during operation.</p>	<p>A Section 51 exemption was applied for and received. Tervita will progressively cap, compact waste etc. to minimize leachate generation.</p>

	<p>(4) The owner of a secure landfill must, as operations proceed,</p> <p>(a) record on a map the exact location and dimensions, including depth of each cell in relation to permanently surveyed benchmarks,</p> <p>(b) record the contents of each cell and the location of each hazardous waste type within each cell, and</p> <p>(c) keep records referred to in paragraphs (a) and (b) available for inspection by an officer.</p>	<p>Waste records are kept marking the location deposited, contents of the waste deposited.</p>
	<p>(5) The owner of a secure landfill must,</p> <p>(a) within 3 days after detection of leakage into the space between the 2 liners, report the leakage to a director, and</p> <p>(b) within 3 days after receiving monitoring data indicating non-compliance with respect to groundwater conditions, notify a director.</p>	<p>Tervita will monitor the leak detection system for the presence of fluid.</p>
	<p>(6) The owner of a secure landfill must empty any leachate or runoff storage facilities so as to maintain sufficient capacity to collect leachate and runoff at all times.</p>	<p>All leachate storage facilities are inspected weekly or after major storm events to ensure sufficient freeboard.</p>
	<p>(1) The owner of a secure landfill must not use or operate the secure landfill to dispose of any waste listed in Schedule 3.</p> <p>(2) The owner of a secure landfill must design, construct, install and maintain a dual liner system</p> <p>(a) to prevent any migration of wastes out of the landfill to the adjacent subsurface soil or groundwater during the operating life and after closure,</p> <p>(b) with both liners constructed of impervious materials that prevent wastes from passing into or through the liner during the life of the facility, and</p> <p>(i) if composed of soil or clay, each being not less than 0.5 m thick, and</p> <p>(ii) if synthetic, each being at least 1 mm thick,</p>	<p>Prohibited waste in Schedule 3 will not be disposed of at Babkirk. Tervita has a comprehensive waste characterization and screening process.</p> <p>The proposed design exceeds the requirements for a dual liner system. The top liner is composite consisting of a 1.5 mm thick HDPE geomembrane underlain by a 500 mm (min) thick compacted clay liner (CCL). The CCL meets the HWR definition for an impermeable liner as it meets the required permeability of less than <math>1 \times 10^{-7}</math> cm/s. The proposed composite top liner is substantially superior to a single liner of either CCL or geomembrane. The bottom liner in the dual liner system is comprised of a 500 mm thick CCL with a permeability less than <math>1 \times 10^{-7}</math> cm/s.</p>

<p>(c) with both liners constructed of materials having appropriate chemical properties, strength and thickness to prevent failure due to any of the following:</p> <p>(i) pressure gradients;</p> <p>(ii) contact with the waste or leachate to which the liners may be exposed;</p> <p>(iii) climatic conditions;</p> <p>(iv) stress of installation and operations, and</p>	<p>(i) It is not expected that there will be significant hydraulic gradients exerted on the liner system. Any hydraulic upward gradients will in any event be eliminated by the leak detection system layer to prevent any upward forced on the top composite liner.</p> <p>(ii) The top component of the liner system is a 1.5 mm thick HDPE geomembrane. HDPE is widely accepted as the material of choice for landfill liners and has appropriate chemical and physical properties for this application.</p> <p>(iii) The liner systems have appropriate properties for the climate. As noted in the specifications liner installation can only take place during appropriate weather conditions. A frost protection layer of waste also needs to be placed within an appropriate time frame.</p> <p>(iv) The construction specifications provide installation and QA/QC stipulations to ensure the final products meets requirements.</p>
<p>(d) with the liner system placed on base materials capable of providing support and resistance to pressure gradients above and below the liner system to prevent failure due to compression, uplift or settlement.</p>	<p>The material underlying the landfill consists of clay till which is stiff to very stiff in consistency. The clay till layer is overlying clay-shale and or sandstone. This is considered an adequate foundation for base materials.</p>
<p>(3) The owner of a secure landfill must design, construct, install and maintain a leachate detection, collection and removal system that includes the following minimum characteristics:</p> <p>(a) a leak detection system between the 2 liners to detect any leaks or migration of liquid into the space between the liners;</p>	<p>A leak detection system between the two liners is included in the design.</p>
<p>(b) a leachate collection system that is</p> <p>(i) installed at a slope greater than 2%, in a porous material drainage layer with a minimum thickness of 0.75 m and permeability greater than <math>1 \times 10^{-3}</math> cm/s immediately above the upper liner,</p>	<p>The Leachate Collection System (LCS) meets the requirements as outlined in the HWR and will be installed at a slope greater than 2%, have a minimum drainage layer of 0.75m or greater and meet the permeability requirements of <math>1 \times 10^{-3}</math> cm/s.</p>
<p>(ii) constructed of materials that are</p> <p>(A) chemically resistant to waste placed in the landfill and any leachate which might be generated, and</p>	<p>The main component of the leachate collection system is the geocomposite drainage layer which is comprise of polypropylene filter cloth on both sides of a polyethylene grid core. These materials are chemically resistance to expected possible constituents of the leachate or waste.</p>
<p>(B) of sufficient strength to prevent failure due to pressure of overlying loads in the secure landfill, and</p>	<p>The materials in the leachate collections system are suitable for anticipated overlying loads.</p>
<p>(iii) designed and constructed to prevent clogging during the life of the facility;</p>	<p>As noted above, potential clogging has been allowed for in the design capacity of the system.</p>
<p>(c) a storage facility suitable to allow removal of leachate.</p>	<p>A primary extraction point will be located at the south end of the landfill . A leachate storage pond adjacent to the Cell provides for substantial additional leachate storage.</p>
<p>(4) A secure landfill is in a non-compliance situation, with regard to groundwater quality, when analytical data from upgradient and downgradient groundwater monitoring wells for any parameters or chemical constituents are significantly different using approved statistical methods.</p>	<p>Groundwater reports are prepared by an independent 3rd party Qualified Professional. Trends and impacts are analyzed and sent in by March 31st each year to the Director.</p>
<p>(5) The owner of a secure landfill must design, construct and maintain</p> <p>(a) a system capable of preventing water from draining onto any cells of the secure landfill, and</p>	<p>A system of berms and ditches are included in the design to prevent surface water from at least 1:25 year 24 hour storm event.</p>
<p>(b) a system to collect and control water draining from any cells of the secure landfill</p>	<p>There will be adequate freeboard in the landfill cells to allow for collection of leachate for a 1:25 year storm event.</p>

(6) The owner of a secure landfill must ensure that any discharge of liquid effluent to the environment, to storm sewers or to a municipal or industrial effluent treatment works from the secure landfill meets the effluent criteria prescribed in Schedule 1.2.	Surface water is tested for Schedule 1.2 prior to discharge and analytical reviewed. All discharge volumes, date of discharge and analytical is kept on file.
(7) If particulate matter subject to wind dispersal is placed in the secure landfill, the owner must cover or otherwise manage the facility to prevent dispersal by wind.	This is covered in the Operational Plan under the Dust and Odor Control Plan
(8) The owner of a secure landfill must, during closure of the landfill or any cell,  (a) make any modifications to works including drainage control, leachate collection, leak detection, monitoring and storage facilities to ensure long term operation with minimum maintenance and security,	During closure, works will be modified to ensure minimal leachate generation.
(b) install and construct for the secure landfill a final cover with the following minimum characteristics:  (i) design and construction to function with minimum maintenance;	Final cover will meet the HWR requirements and seeded with an approved grass mixture. The cap will be inspected during closure and the cap maintained as needed.
(ii) a foundation layer with a minimum thickness of 0.75 m constructed of soil, or other suitable granular material, compacted to maximum density at optimum moisture content according to acceptable engineering practice, to ensure the overall structural integrity of the final cover;	Once final cover is installed the design will meet the HWR requirements and design submitted to the MOE for approval prior to construction.
(iii) an intermediate layer of  (A) not less than 0.50 m of impervious soil or clay, or  (B) an impervious synthetic material not less than 1 mm thick;	Upon closure Tervita will decide upon the most suitable impervious material. Details on the impervious material will be presented to the MOE in the design for approval prior to final cover installation.
(iv) a top layer of not less than 0.5 m of soil  (A) not containing waste, leachate or other material which would contaminate infiltrating water, and  (B) which would provide a suitable long term rooting medium;	Top soil is stockpiled during cell construction and will be used for the top layer during closure.
(v) graded and maintained to prevent ponding and having slopes of 3% to 5%;	A section 51 exemption was applied for and received. Maximum slopes will be 33% grade along the external edges and 5% throughout the top surface of the cells.
vi) vegetation which  (A) is suitable to the area,  (B) is established by approved agronomic practices, and  (C) does not have a rooting depth greater than the depth of the top layer.	Prior to closure, Tervita will engage local stakeholders on appropriate local vegetation to be seeded.

	<p>(9) An owner of a secure landfill must, before closure, prepare, to the satisfaction of a director, a post closure plan for</p> <p>(a) maintaining the integrity and effectiveness of the final cover,</p> <p>(b) maintaining and monitoring the leak detection system, reporting any migration of leachate through the liner,</p> <p>(c) maintaining and operating the leachate collection and removal system and keeping records of any leachate removed,</p> <p>(d) maintaining and operating the groundwater monitoring system,</p> <p>(e) maintaining the drainage control system, and</p> <p>(f) protecting and maintaining the survey benchmarks.</p>	Details on post-closure activities are detailed in the Closure Plan.
	<p>(10) On completion of closure the owner of the secure landfill site (including its buffer zone) must</p> <p>(a) comply with the post closure plan approved under subsection (9), and</p> <p>(b) transfer title of the property to the Crown.</p>	Tervita will maintain the landfill throughout post-closure and consult with the MOE prior to title transfer back to the Crown.
Section 41.1 Hydrocarbon Contaminated Soil	<p>(1) Subject to subsection (2), hydrocarbon contaminated soil is authorized for</p> <p>(a) Repealed. [B.C. Reg. 179/2016, App. 1, s. 5.]</p> <p>(b) treatment and storage at any landfill or facility for which an authorization has been issued under the Act, or</p> <p>(c) use in the manufacture of asphalt</p>	Soil will be treated at Babkirk Secure Landfill at previously approved treatment pads. Tervita does not intend to offer the soil for use in asphalt.
	<p>(2) A person must not store, treat or use hydrocarbon contaminated soil under the authority of subsection (1) unless</p> <p>(a) prior written notification of any proposed storage or treatment is provided to a director and the storage and treatment is carried out in accordance with the director's requirements,</p>	Tervita will notify the Director of soil being accepted for treatment.
	<p>(b) the hydrocarbon contaminated soil is a hazardous waste due only to the presence of one or more items listed in Column I of the table in subsection (1),</p>	Soil contaminated with Benzene, Ethylbenzene, Toluene, Xylene and Oil will be accepted for treatment. No other hazardous parameters in the soil are allowed.
	<p>(c) the hydrocarbon contaminated soil is spread in single layers not exceeding 0.3 meters in thickness per year or a greater thickness approved by the director, which approval must specify a method of aeration to be used with the greater thickness, and</p>	The soil will be spread in single layers not exceeding 0.3m unless otherwise directed

(d) the daily quantity of hydrocarbon contaminated soil, if disposed of in the manufacture of asphalt, is not more than 10% of the total material fed to the asphalt plant.	Tervita does not intend to offer the soil for use in asphalt.
(2.1) Total oil for the purposes of the standard established by subsection (1) must be measured in accordance with the method established for the purposes of this regulation in the British Columbia Laboratory Methods Manual: 2005 — for the Analysis of Water, Wastewater, Sediment, Biological Materials and Discrete Ambient Air Samples, Victoria, August 2005, as updated from time to time, published by the minister.	Tervita will adhere to the British Columbia Laboratory Methods Manual.
<p>(3) Hydrocarbon contaminated soil which has been treated so that it is no longer a hazardous waste may be disposed of in a landfill if</p> <p>(a) approval of the landfill owner is received before disposal takes place, and</p> <p>(b) the deposit is authorized by a director and carried out in accordance with requirements specified by the director.</p>	Before moving soil into a landfill the owner and Directors approval will be gained.

## **Appendix 8 – Groundwater and Surface Water Monitoring Plan**

**Tervita Corporation**

Babkirk Secure Landfill

British Columbia Ministry of Environment  
Permit 104460

*Tommy Lakes Road, BRITISH COLUMBIA*

56° 54' 9.27"N, 121° 54' 36.29"W

***Groundwater and Surface Water Monitoring Plan***

***Version 1***

***JUNE 13 2018***



Contact: Peter Nelson  
Environment & Regulatory Advisor  
403-234-4875  
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## 1.0 Surface Water Monitoring

As per Section 26(1)(b)(i) of the Hazardous Waste Regulation (HWR), surface water control works will be inspected weekly and/or immediately after a major storm or catastrophic event. Inspections are documented and retained on file. Any deficiencies noted during the inspection will be addressed and managed in a timely manner. The Babkirk Facility does not have a surface water pond. Water hitting the landfill or treatment pad footprint is collected as leachate and directed to a leachate pond in the SW corner of each cell. The leachate pond is connected to a polishing pond via an inverted weir, so hydrocarbons remain in the leachate pond. Water in the polishing pond is tested against Schedule 1.2 of the HWR prior to discharge.

To determine potential impacts of the discharged from the polishing pond, surface water quality surrounding the Facility will be monitored, with annual sampling at seven locations, subject to access. The results will be included in the annual groundwater monitoring report. Parameters to be sampled are in Table 1.0-1 and sampling locations are in Figure 1.

**Table 1.0-1 Surface Water Monitoring Parameters**

Field Parameters	Hydrocarbons	PAHs	Total Metals & Dissolved Metals	General & Inorganic
pH	Benzene	Acenaphthene	Aluminum	pH
EC	Toluene	Acridine	Antimony	EC
Temperature	Ethylbenzene	Anthracene	Arsenic	Calcium
DO	Xylenes	Benz(a)anthracene	Barium	Magnesium
ORP	LEPHw	Benzo(a)pyrene	Beryllium	Sodium
	HEPHw	Chrysene	Boron	Potassium
	VPHw	Fluoranthene	Cadmium	Chloride
		Fluorene	Chromium	Sulphate
		Naphthalene	Cobalt	Fluoride
		Phenanthrene	Copper	Nitrite (N)
		Pyrene	Iron	Nitrate (N)
		Quinoline	Lead	Nitrite + Nitrate (N)
			Lithium	Ammonia
			Manganese	
			Mercury	
			Molybdenum	
			Nickel	
			Selenium	
			Silver	
			Thallium	
			Tin	
			Titanium	
			Uranium	
			Vanadium	
			Zinc	

## ***1.1 Surface Water Performance Standards***

Surface water quality at monitoring points will be compared to historical monitoring results (once available), applicable BC CSR and BC Water Quality Guidelines. For comparison purposes, surface water quality will also be compared to leachate quality.

Should a non-compliance of a performance standard be identified the following corrective actions may be initiated:

- Review monitoring results and data confirming laboratory procedures and QA/QC
- Confirm monitoring results based on a review of sampling and laboratory procedures
- Review of landfill operating procedures to determine potential sources.
- Confirmatory surface water sampling

Depending upon the results of the initial evaluation process described above, further assessment may be required. More specifically, if confirmatory sampling establishes a statistical exceedance, then additional work to include mitigation and/or risk management will be implemented to include, but not necessarily limited to, the following:

- Halt any surface water/leachate discharges until the source of impacts are found.
- Modify Monitoring Plan (i.e. further investigation of soil/surface water/groundwater at the facility or increase monitoring frequency).
- Determine source/Define plume extent
- Evaluate risk of off-site migration
- Evaluation of risk to public
- Site wide hydrogeological review

Mitigation measures deemed necessary to prevent, for example, exposure or further release/migration will be developed including a suitable time-frame to implement mitigation measures and achieve overall objectives and will be submitted to the MOE for approval.

## **2.0 Groundwater Monitoring**

The Groundwater Monitoring Plan was developed in accordance with Section 26(2)(a) to (e) of the HWR. Groundwater monitoring is conducted on a quarterly basis and monitoring results are reported as specified by the Director. The groundwater monitoring program is reviewed annually for efficiencies and depending on ongoing results from the groundwater monitoring, Tervita may in the future request approval from BC Ministry of Environment to modify the range of parameters, monitoring locations and monitoring frequency, if appropriate.

### ***2.1 Groundwater Well Monitoring Network***

The groundwater monitoring well network has been designed to monitor groundwater quality in both the surficial glacial drift (silt, clay and clay till) and underlying bedrock (shale, sandstone) beneath the Facility. The monitoring network has been designed to incorporate the following key elements;

- Up-downgradient locations for establishing background groundwater quality unaffected by landfill operations; and
- Cross-gradient and down-gradient locations for compliance monitoring

The groundwater monitoring well network will continually be reviewed for effectiveness of the monitoring and sampling program and any necessary changes to the network will be communicated to the BC MOE. Groundwater reports showing the current network are submitted with the Annual Report to the MoE. A map showing the monitoring well network is in

## ***2.2 Groundwater Sampling Frequency***

Monitoring, analysis and reporting is conducted according to terms, conditions and requirements stipulated in section 7 of Permit 104460 and section 26(2) of the HWR. Qualified third party independent consultants conduct groundwater sampling quarterly. If results of the ongoing groundwater monitoring program indicate that the monitoring frequency can be reduced, Tervita will contact the MoE about submitting a Section 51 of the HWR (Application for change in requirements).

## ***2.3 Groundwater Chemical Parameters***

The chemical parameters selected for the groundwater monitoring program (Table 5.3-1) were based on;

- General groundwater quality indicators;
- Waste streams coming into the landfill facility; and
- BC Contaminated Sites Regulation

Additional chemical parameters may be selected for testing on collected groundwater samples if contaminants are identified in samples collected from the leak detection system. At this time Tervita is reviewing sampling methodology for landfills which includes the use of low-flow sampling which will facilitate the monitoring of field turbidity values.

If parameters are to be removed, Tervita will consult with the MoE and revise the Operations Plan as needed.

**Table 2.3-1: Groundwater Chemical Parameters Analysed**

Field Parameters	General & Inorganic	Dissolved Metals	Dissolved Hydrocarbons	PAHs
pH	pH	Aluminum	Benzene	Acenaphthene
EC	EC	Antimony	Toluene	Acridine
Temperature	Calcium	Arsenic	Ethylbenzene	Anthracene
DO	Magnesium	Barium	Xylenes	Benz(a)anthracene
ORP	Sodium	Beryllium	Styrene	Benzo(a)pyrene
	Potassium	Boron	VPH <sub>w</sub>	Chrysene
	Chloride	Cadmium	VH <sub>w</sub> (C <sub>8</sub> -C <sub>10</sub> )	Fluoranthene
	Sulphate	Chromium	EPH <sub>w</sub> (C <sub>10</sub> -C <sub>19</sub> )	Fluorene
	Fluoride	Cobalt	EPH <sub>w</sub> (C <sub>19</sub> -C <sub>32</sub> )	Naphthalene
	Nitrite (N)	Copper	LEPH <sub>w</sub> (C <sub>10</sub> -C <sub>19</sub> )	Phenanthrene
	Nitrate (N)	Iron	HEPH <sub>w</sub> (C <sub>19</sub> -C <sub>32</sub> )	Pyrene
	Nitrite + Nitrate (N)	Lead	Methyl t-Butyl Ether (MTBE)	Quinoline
	Ammonia	Lithium		
	Alkalinity	Manganese		
	Bicarbonate	Mercury		
	Hardness	Molybdenum		
	Phenol	Nickel		
	TOC	Selenium		
	COD	Silver		
	Dissolved Phosphorus	Thallium		
	TDS	Tin		
		Titanium		
		Uranium		
		Vanadium		
		Zinc		

Routine parameters (general and inorganic) and dissolved metals will be analyzed on a semi-annual basis as per the original groundwater monitoring plan for the facility. Field parameters, dissolved hydrocarbons and PAHs are analyzed during every sampling event.

## 2.4 Groundwater Collection Protocols

### Well Inspection

Wells included in the monitoring program will be inspected prior to sampling. If deficiencies are noted, corrective action(s) will be taken to repair the deficiency. If the well is in a condition where representative groundwater samples cannot be obtained Tervita will assess the need to repair, replace or decommission the monitoring well.

### Groundwater Elevation

Groundwater levels will be measured immediately prior to sampling of wells. An electronic water level indicator will be used and groundwater levels will be measured relative to top of casing. Groundwater elevations at each well will be calculated by subtracting measured depths of water from the surveyed top of casing elevations. The water level indicator will be properly cleaned between wells to prevent cross contamination.

### Sampling

Groundwater monitoring wells will be locked at all times except when sampling. Prior to obtaining a sample from the monitoring well, the well will be purged to allow a representative sample of formation water to enter the well. In general, purging will be

accomplished by removing a known volume of water from the well, e.g., a minimum of three well volumes or until well is dry, or purging from the well until indicator parameters (pH, temperature, electrical conductivity (EC), and/or dissolved oxygen) achieve stabilization.

Field observations of groundwater samples will include: colour, odour, visible sheen, and the presence of immiscible layers. Field measurements of pH, temperature, and EC will be performed prior to sample collection.

Groundwater samples will be obtained from the wells using an industry accepted method. Samples will be placed into the appropriate dedicated bottles supplied by the laboratory. Where required, samples will be filtered and/or preservatives will be added to the sample. Samples will be collected as soon as the well has recovered sufficiently to obtain a water sample. Samples will be handled and submitted to an accredited laboratory under an appropriate chain-of-custody protocol. Samples are to be collected following the most recent version of the BC Field Sampling Manual.

Field sampling and measurements will proceed in a direction from upgradient to downgradient to reduce the potential for cross-contamination of monitoring wells.

Tervita's experience is that monitoring wells with shallow depth to groundwater (<2 mbg) are typically frozen during the winter months and, therefore, we are not able to collect a complete data set during these monitoring events. Tervita's Qualified Professional will include a statement related to the seasonal variation of the sampling schedule to the Annual Groundwater Monitoring Reports.

## ***2.5 Groundwater Performance Standards***

Groundwater quality in compliance monitoring wells will be compared to the baseline groundwater quality established at upgradient monitoring wells, historical monitoring results and applicable BC CSR guidelines. For comparison purposes, groundwater quality will also be compared to leachate quality.

Should a non-compliance of a performance standard be identified the following corrective actions may be initiated:

- Review monitoring results and data confirming laboratory procedures and QA/QC
- Confirm monitoring results based on a review of sampling and laboratory procedures
- Review of landfill operating procedures to determine potential sources.
- Confirmatory groundwater sampling

Depending upon the results of the initial evaluation process described above, further assessment may be required. More specifically, if confirmatory sampling establishes a statistical exceedance, then additional work to include mitigation and/or risk management will be implemented to include, but not necessarily limited to, the following:

- Modify Monitoring Plan (i.e. increase number of groundwater monitoring wells or increase frequency).

- Determine source/Define plume extent
- Evaluate risk of off-site migration
- Evaluation of risk to public
- Site wide hydrogeological review

Mitigation measures deemed necessary to prevent, for example, exposure or further release/migration will be developed including a suitable time-frame to implement mitigation measures and achieve overall objectives and will be submitted to the MOE for approval.

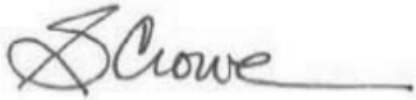
## ***2.6 Groundwater Monitoring Reporting***

The annual groundwater monitoring report will be submitted with the Landfill Annual Report by March 31<sup>st</sup> of each year, unless otherwise specified by the Director. Starting in 2019 Tervita will develop a Conceptual Hydrogeological Model (CHM) for submission with the Annual Groundwater Monitoring Report.

## **3.0 Closure**

We trust this information meets the requirements of the Director.

Respectfully submitted,  
**Tervita Corporation**




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Scott Crowe, P.Geo.  
Hydrogeologist




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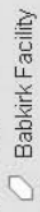
**reviewed by**  
Garry Chan, P.Geo. (BC), P. Geol. (AB)  
Senior Hydrogeologist and Tech Specialist

**Figure 1**  
**Surface Water Monitoring Locations**



# Babkirk Surface Water Monitoring and Discharge Locations

## Legend



Babkirk Facility



Leachate/Evaporation Discharge Points



Surface Water Monitoring Point



**Figure 2**  
**Groundwater Monitoring Locations**



- Wellhead - Abandoned
- Monitoring Well
- Underground Pipeline
- Cross-section Line

**Matrix Solutions Inc.**  
ENVIRONMENT & ENGINEERING

Tervita Corporation  
Babkirk Facility b-083-E/094-A-13

### Site Plan

Date: January 2017 Project: 2212-SP-16 Technical: A. Hum Reviewer: R. Reimer Drawn: R. Kane

## Appendix 9 – Closure Plan

FINAL

# Babkirk Secure Landfill and Hazardous Waste Storage and Treatment Facility Closure Plan

*Prepared for*

Tervita Corporation

November 2017



CH2M HILL Canada Limited  
540 12th Avenue SW  
Calgary, AB  
T2R 0H4

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# Acronyms and Abbreviations

BCMoE	British Columbia Ministry of Environment
BTEX	Benzene, Toluene, Ethylene, and Xylenes
Director	Director, Environmental Management Act
HWR	Hazardous Waste Regulation
HWSTF	Hazardous Waste Storage and Treatment Facility

# Introduction

The Babkirk Secure Landfill and Hazardous Waste Storage and Treatment Facility (The Facility) is located off the Mile 115 Road (Tommy Lakes Road), approximately 27 km north of Wonowon, BC (Figure 1). The Facility is permitted to have a Secure Landfill and a short term storage and treatment cell. The Facility is owned and operated by Tervita. To date, Tervita plans to develop a secure landfill in the existing treatment cells. The current facility includes hazardous waste treatment pads and associated surface run-on, run-off, groundwater and leachate management and control works. The Facility is permitted (Permit 104460) under the provisions of the BC Ministry of Environment (BCMoE) Environmental Management Act.

## 1.1 Facility Background

The Babkirk site was originally permitted (Permit 15032) as a Hazardous Waste Storage and Treatment Facility (HWSTF) and commenced operation in 1998 under the original owners, Babkirk Land Services Inc. In 2010 this permit was amended and superseded by Permit 104460 after a Major Amendment Application was submitted to BCMoE in 2009 for authorization to develop a Secure Landfill within the footprint of the HWSTF (Altec Inspection Ltd., 2009). The permit authorizes storage and treatment of up to 90,000 tonnes of hazardous waste at the HWSTF as well as discharge of up to 750,000 tonnes of waste to a Secure Landfill, although no Secure Landfill cells were ever constructed. Babkirk Land Services Inc. was subsequently acquired by Tervita in 2011 and to date the facility only operates the HWSTF as no Secure Landfill development has occurred.

The HWSTF ceased to receive material for treatment in 2007 and according to the *Babkirk Lands Acquisition Summary* prepared for Tervita by NLR Associates Inc. in 2010, there remain an estimated 30,000 to 45,000 cubic meters of hazardous waste on the treatment pads. Tervita intends to commence the development planning stage of the approved Secure Landfill in 2018 under the Permit #104460.

## 1.2 Facility Features

### 1.2.1 Existing Babkirk HWSTF

The Babkirk HWSTF currently includes the following key features (Figure 2):

- 3 Treatment Pads for hydrocarbon and salt contaminated soil
- Run-off water management system
- 3 Hydrocarbon-skimming Ponds
- 3 Leachate Evaporation Ponds
- 17 Groundwater Monitoring Wells
- Access Roads
- Site Office
- Weigh Scale
- Generator Shed Area
- Security Gate.

The treatment pads are each comprised of a 150 meter by 200 meter compacted clay liner (minimum thickness of 500 mm) and are surrounded by 1 meter high compacted clay containment berms. Each treatment pad drains to an adjacent, dedicated hydrocarbon-skimming pond which is connected via



inverted weir to a dedicated leachate evaporation pond (Morrow Environmental, 2008). Additional site works include the site office, weigh scale, access roads, security gate, chemical and fuel storage areas.

### 1.2.2 Proposed New Babkirk Secure Landfill and Hazardous Waste Storage and Treatment Facility

The Facility will be comprised of a new Secure Landfill (Figure 3). The Secure Landfill will consist of two cells for long-term storage. The new two long-term cells will be located on the existing treatment pads (biocells). Contaminated soil will be moved from the existing 3 treatment pads into the secure landfill cell once built.

The Facility will include the following key features:

- A Secure Landfill (2 long-term storage cells)
- Run-on / Run-off surface water control system
- Hydrocarbon-skimming Ponds
- Leachate Evaporation Ponds
- 22 Groundwater Monitoring Wells
- Access Roads
- Site Office
- Weigh Scale
- Generator Shed Area
- Security Fencing and Gates
- Sewage lagoons
- Accommodation

# Closure Plan

## 2.1 Regulatory Requirements

This closure plan has been developed per clause 10 of the facility permit PE-104460 and to meet the requirements of the *Environmental Management Act – Hazardous Waste Regulation*.

### 2.1.1 Existing HWSTF Closure

For the existing HWSTF, the BCMoE requirements for closure of a hazardous waste facility apply and are stipulated in Section 14 of the *Environmental Management Act - Hazardous Waste Regulation* (BCMoE, 2017):

- “(1) The owner of a hazardous waste facility must not operate the facility unless that owner has prepared a written closure plan and has received approval of the plan.
- (2) A closure plan must include
- (a) A schedule of how and when the facility will be closed,
  - (b) A description of decontamination procedures to be followed,
  - (c) A description and estimate of the quantity of any hazardous waste residues which will remain at the site after closure, and
  - (d) An estimate of the total time required to close the facility.”

### 2.1.2 New Secure Landfill and HWSTF Closure

The requirements of clause 10 of the permit (BCMoE, 2010) are specific to the closure of Secure Landfill and HWSTF and outlined as follows:

“A CLOSURE PLAN approved by the Director, shall be in place prior to start up of the facility.

Specifications for the landfill final cover system (cap) shall be submitted at least 60 days in advance of each area of the landfill reaching final elevations or as otherwise specified by the Director. Details shall include the thickness and permeability of barrier and drainage layers, information on topsoil, vegetative cover and erosion prevention controls.

At least one year in advance of decommissioning the landfill, or as otherwise specified by the Director, a Post Closure Plan shall be submitted for the approval of the Director which includes at least the requirements of Section 27 (9) of the HWR plus the following information:

- a) A topographic plan showing the final elevations of the landfill and surface water diversion and drainage controls;
- b) Proposed end use of the site;
- c) Provisions for maintenance and corrective measures for a minimum 25-year post-closure period.”

The requirements of closure plan for a secure landfill are same as other hazardous waste facilities and are stipulated in subsection 2 of Section 14 of the *Environmental Management Act - Hazardous Waste Regulation* (BCMoE, 2017):

“A closure plan must include

- (e) A schedule of how and when the facility will be closed,
- (f) A description of decontamination procedures to be followed,

- (g) A description and estimate of the quantity of any hazardous waste residues which will remain at the site after closure, and
- (h) An estimate of the total time required to close the facility.”

Specification the final cap and Post Closure Plan will be submitted prior to closure as specified in the permit.

## 2.2 Schedule of Closure

### 2.2.1 Existing HWSTF Closure

Closure of the HWSTF includes the following key requirements:

- Notify the Regional Waste Manager
- Retain an environmental consultant to prepare assessment, delineation, and remediation recommendations
- Mobilize equipment and establish containment and decontamination area and procedures if necessary
- Remove all residual hazardous waste and any affected soil to an approved depth from the site, as identified by the assessment and delineation report, and transport to an authorized facility in compliance with section 19 (2) and (3), of the *Hazardous Waste Regulation* (BCMoe, 2017)
- Discharge storm water or leachate in compliance with section 19 (1), of the *Hazardous Waste Regulation* (BCMoe, 2017)
- Remove liners
- Demolish and remove existing security gate, weigh scale, site office, chemical drum storage area, and above ground fuel storage area
- Site restoration and grading, backfill of hydrocarbon skimming ponds, leachate evaporation ponds, levelling of berms, and restoration of natural drainage pathways
- Place subsoil, topsoil, and seed with native grass mix
- Site survey and recordkeeping
- Decontamination and demobilization of equipment
- Independent verification to ensure reclamation objectives are achieved

More details on the key item requirements and timelines are included in the closure schedule found in Attachment A. Discharge of any residue from the HWSTF will comply with section 19 of the *Hazardous Waste Regulation*. (BCMoe, 2017)

### 2.2.2 New Secure Landfill and HWSTF Closure

Closure of the Secure Landfill and HWSTF includes the following key requirements:

- Notify the Regional Waste Manager
- Retain a qualified professional to prepare final capping design and Post Closure Plan for the Secure Landfill
- Retain an environmental consultant to prepare assessment, delineation, and remediation recommendations for short-term storage and treatment cell

- Prepare bidding and tendering
- Mobilize equipment
- Removal of waste residues from short-term storage and treatment cell to Secure Landfill
- Construction of final capping of Secure Landfill and remove liner of short-term storage and treatment cell (see Figure 4)
- Remove all residual hazardous waste and any affected soil to an approved depth from short term storage cell, as identified by the assessment and delineation report, and transport to an authorized facility in compliance with section 19 (2) and (3), of the *Hazardous Waste Regulation* (BCMoE, 2017). Discharge storm water or leachate in compliance with section 19 (1), of the *Hazardous Waste Regulation* (BCMoE, 2017)
- Demolish and remove existing security gate, weigh scale, site office, chemical drum storage area, and above ground fuel storage area
- Site restoration and grading, remove pond liner, backfill of hydrocarbon skimming ponds, leachate evaporation ponds, levelling of berms, and restoration of natural drainage pathways
- Place subsoil, topsoil, and seed with native grass mix
- Site survey and recordkeeping
- Demobilization of equipment

More details on the key item requirements and timelines are included in the closure schedule found in Attachment B.

## 2.3 Decontamination Procedures

### 2.3.1 Existing HWSTF Closure

Based on the results of the site assessment and delineation, decontamination procedures will be put in place to prevent any cross-contamination of public or private property.

Decontamination will include but is not limited to the following:

- Establish a decontamination facility and dedicated staging area
- All tools and equipment expected to be in contact with contaminated soil and/or groundwater shall be steam-cleaned before work begins
- All excavation equipment will be decontaminated prior to leaving site by removing any soil which may fall off during demobilization
- Detergents, buckets, and brushes will be available onsite for decontamination of tooling and tools and equipment
- Any debris or rinsate generated by decontamination or work activities shall be properly contained and disposed of at an authorized disposal facility

Prior to the start of excavation work, the contractor carrying out the closure must develop a comprehensive decontamination plan based on the site conditions as outlined in the consultant's remediation plan.

### 2.3.1 New Secure Landfill and HWSTF Closure

Same as section 2.3.1.

## 2.4 Hazardous Waste Residues

### 2.4.1 Existing HWSTF Closure

Since no Secure Landfill has been developed to date at the site, it is assumed that all hazardous waste residues are required to be discharged to another established and authorized Secure Landfill offsite. Material meeting the criteria of a hazardous waste residue will be identified by consultant assessment and delineation and will be removed and disposed of at the Silverberry Secure Landfill or another authorized site. Removal and discharge of the materials will comply with section 19 of the *Hazardous Waste Regulation*. (BCMoE, 2017)

### 2.4.2 New Secure Landfill and HWSTF Closure

Once the new secure landfill cells being constructed and operated, the hazardous waste residue from the short-term storage cells will be removed and placed in the secure landfill cell prior to placing final capping system during the closure of The Facility. Removal and discharge of the materials will comply with section 19 of the *Hazardous Waste Regulation*. (BCMoE, 2017). The maximum quantity of hazardous waste in Secure Landfill is 750,000 tonnes of waste as specified in the permit.

## 2.5 Estimated Time for Closure

The conceptual estimated duration of closure activities for existing HWSTF and new secure landfill and HWSTF are presented in Attachment A and B respectively, but subject to variation based on the results of the assessment and delineation. Post closure monitoring and maintenance will continue for a period of 25 years from the closure date of the site.

## 2.6 End Use

The closure of The Facility will be designed so as to return the facility footprint to an end-use of pasture land.

# Post Closure

Since Tervita intends to develop a secure landfill in near future, the current permit requirement of 25 years of post closure monitoring and maintenance is applied. This includes groundwater monitoring, leak detection system monitoring, and site inspection and maintenance. Detail Post Closure Plan will be submitted to the Director prior to closure as specified in the permit.

## 3.1 Groundwater Monitoring

Post closure groundwater monitoring will include continuation of the groundwater monitoring program for 25 years following closure, including monitoring well sampling and laboratory analysis semi-annually. The monitoring criteria are specific conductance, total petroleum hydrocarbons, BTEX, light hydrocarbons, phenols, pH, major ions, total organic carbon and dissolved heavy metals (BCMoe, 1999). Depending on results, changes to number of monitoring wells, frequency of monitoring or water quality parameters will be assessed and submitted for approval. At the end of the post closure period, the groundwater monitoring wells will be decommissioned in accordance with the *Groundwater Protection Regulation*; Section 6 of Attachment A, the *Code of Practice for Construction, Testing, Maintenance, Alteration and Closure of Wells in British Columbia* (BCMoe, 2004).

## 3.2 Leak Detection System Monitoring

Post closure leak detection system monitoring will include continuation of the leak detection monitoring program for 25 years following closure.

## 3.3 Inspection and Maintenance

Grass cutting and weed control will be continued as needed for 25 years post closure, and the surface will be inspected regularly and maintained for erosion and sedimentation control measures.

Groundwater monitoring wells and leachate collection and removal system will be visually inspected and maintained as needed over the course of the 25 year post closure period.

# References

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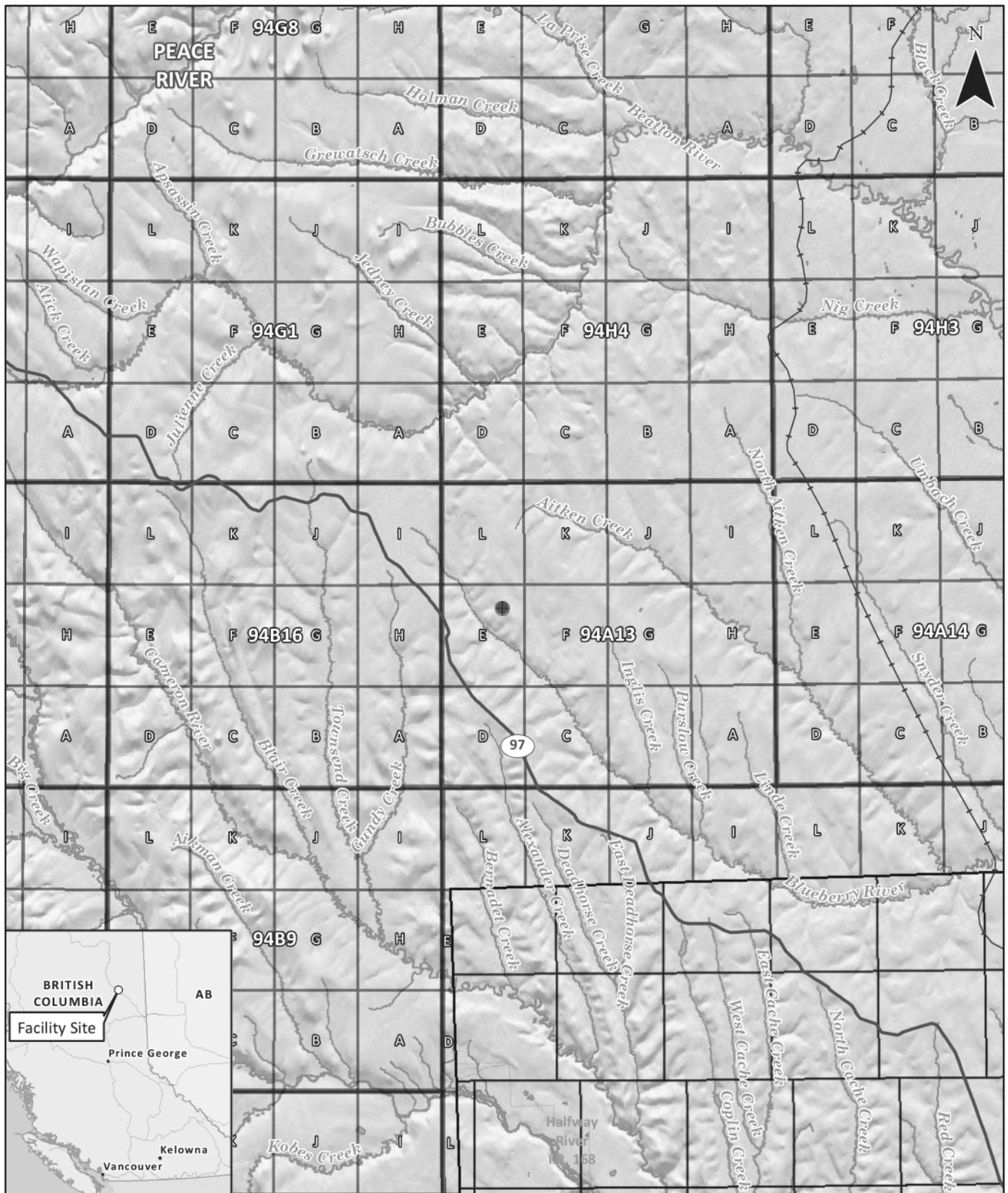
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## Figures





- Facility Site
- Highway
- Railway
- Watercourse
- City/Town/Village
- Indian Reserve/  
First Nation Settlement
- Waterbody

FIGURE 1

REGIONAL LOCATION

BABKIRK HAZARDOUS WASTE STORAGE  
AND TREATMENT FACILITY

**ch2m**

UTM Zone 10N  
Hillshade: TERA Environmental Consultants 2008; Grid: TERA Environmental Consultants 2009 and 2010; Roads: NRCAN  
2015; Railways: USNIMA 2000; Hydrography: IHS Inc. 2004; City/Town/Villages: IHS Inc. 2015; Indian Reserves:  
Government of Canada 2016.

Although there is no reason to believe that there are any errors associated with the data used to generate this product  
or in the product itself, users of these data are advised that errors in the data may be present.



SCALE: 1:500,000  
0 2 4 6 8 10 km  
(All Locations Approximate)

January 2016

668894

Mapped By: WL

Checked By: ER



**Figure 2 Existing Site Layout**

Note: Drawing extracted from 2008 Application for an Environmental Assessment Certificate - Babkirk Secure Landfill Project

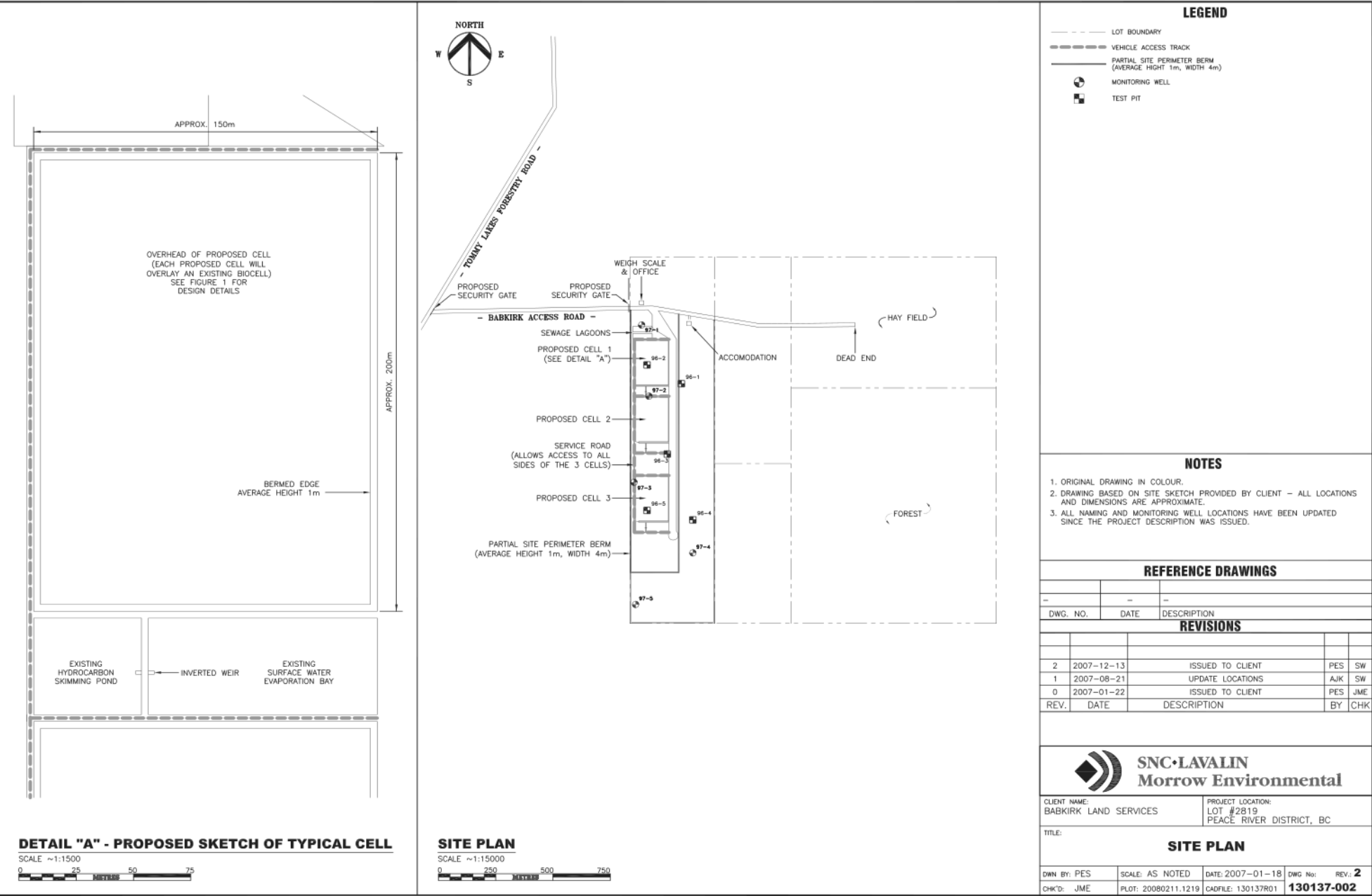


Figure 3 Site Plan for New Babkirk Secure Landfill and Hazardous Waste Storage and Treatment Facility

Note: Drawing extracted from 2008 Application for an Environmental Assessment Certificate - Babkirk Secure Landfill Project

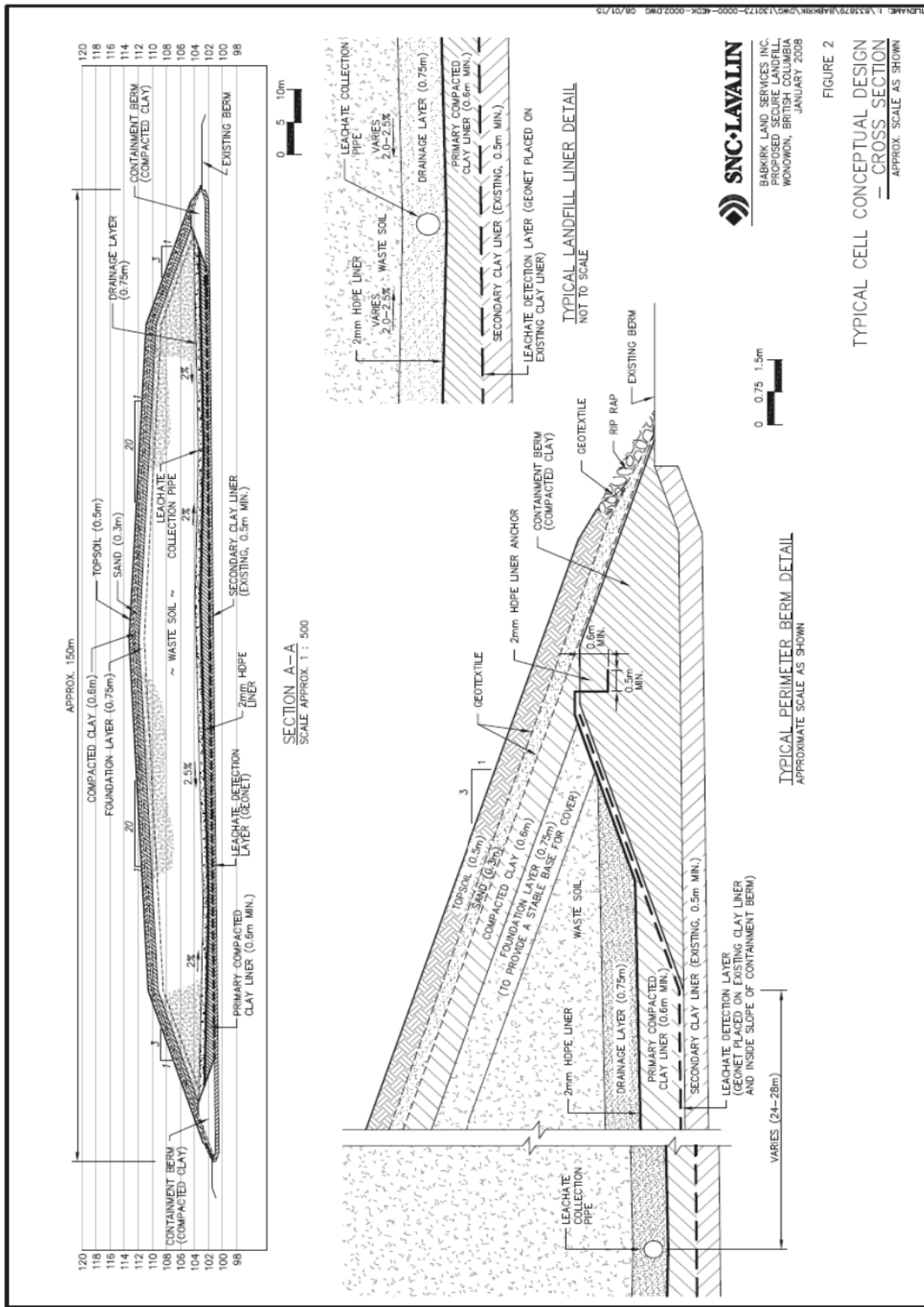
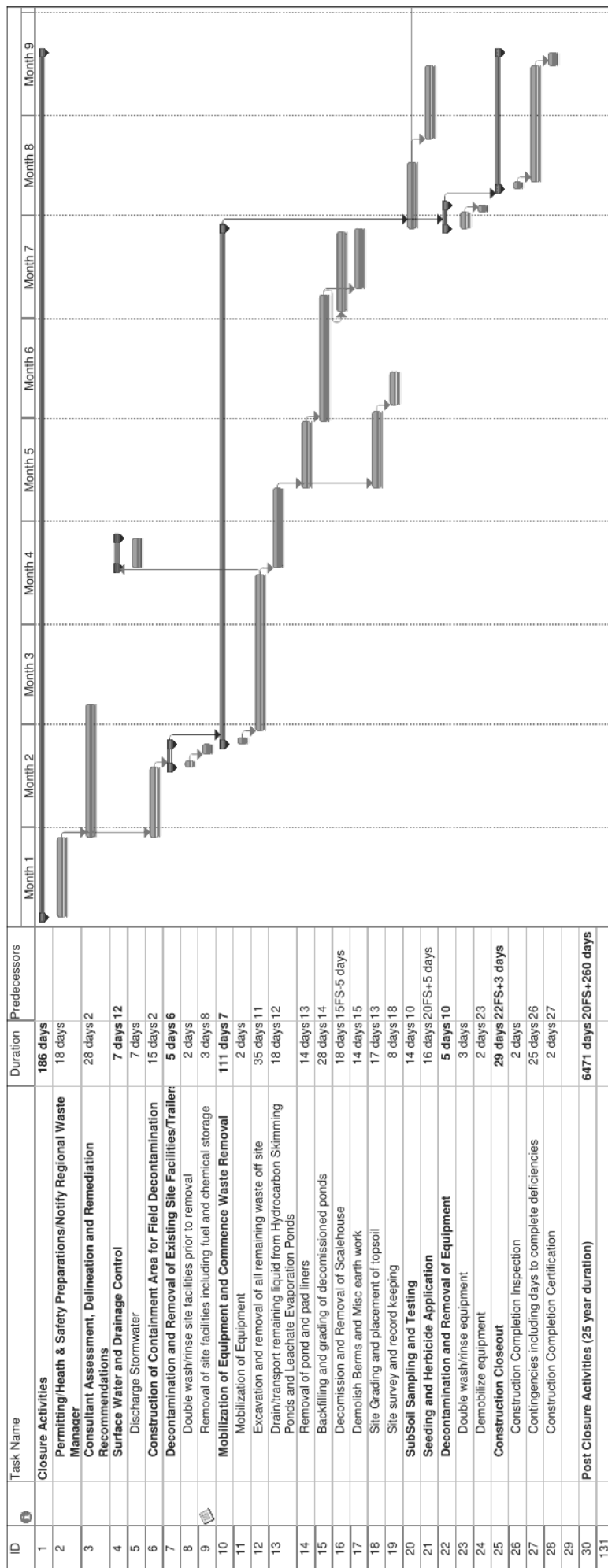


Figure 4 Conceptual Design for Liner and Final Cover for New Secure Landfill and Hazardous Waste Storage and Treatment Facility

## **Attachment 1**

### **Babkirk HWSTF Closure Schedule**

---



Project: Babkirk HWSTF Closure

Date: Tue 10/24/17

Task

Critical Task

Progress

Milestone

Summary

Rolled Up Task

Rolled Up Critical Task

Rolled Up Milestone

Rolled Up Progress

Split

External Tasks

Project Summary

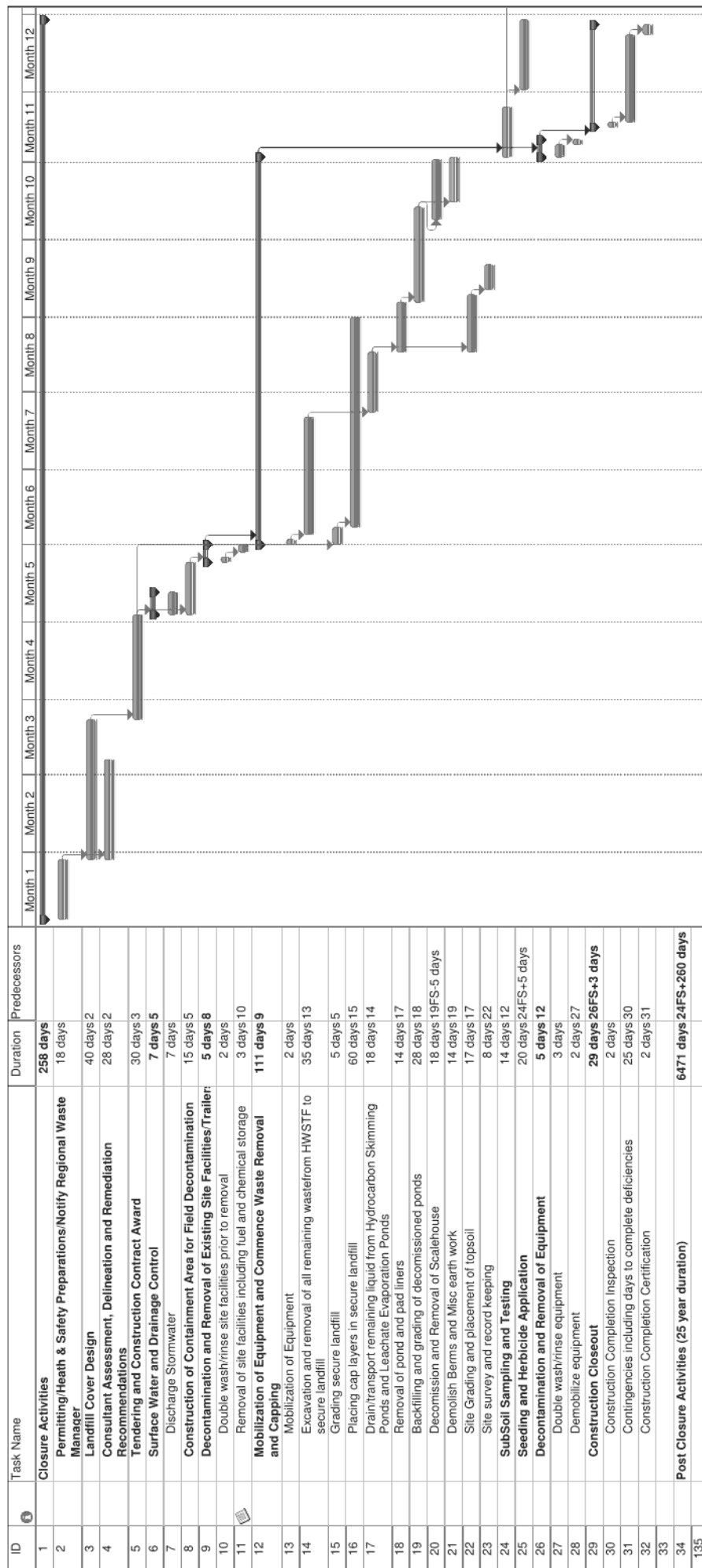
Group By Summary

Deadline

## **Attachment 2**

### **Babkirk Landfill and HWSTF Closure Schedule**

---





# HAZARDOUS WASTE REGULATION OPERATIONAL PLAN

**Company Name (as registered with BC Corporate Registry):**

Tervita Corporation

**Doing business as Name:**

Tervita Corporation

**Mailing Address:**

1600, 140 10<sup>th</sup> Avenue S.E., Calgary, AB, T2G 0R1

**Facility Address:**

A-77-G/94-J-10

**Facility Contact:**

Mike Johnson, Area Manager

**Phone:** 250-794-4191

**Fax:** 250-262-0151

**E-mail:** [mjohnson@tervita.com](mailto:mjohnson@tervita.com)

**Landowner:**

Tervita Corporation

1600, 140 10<sup>th</sup> Avenue S.E., Calgary, AB, T2G 0R1

**Contact:** Mike Johnson, Area Manager

**Phone:** 250-794-4191

**E-mail:** [mjohnson@tervita.com](mailto:mjohnson@tervita.com)

**Legal Description:** Lot 1692 Peace River District except Plan 29474

**Property ID:** 023-394-561

**Lat Coordinates:** 58.64375

**Long Coordinates:** -122.70313

**Ministry Reference Numbers:** PR-16078

**Version No.: 2**

**Date: 30 Oct 2016**

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**APPENDICES:**

**Appendix 1 – Tervita Northern Rockies Environmental Assessment Certificate**

**Appendix 2 – Tervita Northern Rockies EAO Report and Recommendations**

**Appendix 3 – Tervita Northern Rockies Ministry of Environment Section 51s**

**Appendix 4 – HWR Design and Performance Standards**

**Appendix 5 – Design Drawings**

**Appendix 6 – Tervita Northern Rockies Closure Plan**

## 1.0 General Information

This Operations Plan (the Plan) outlines the methods by which the Northern Rockies Landfill (the Landfill) is managed. The contents of this Plan are based on industry standards of practice and provide a practical and common-sense approach to waste management. Operating standards will be updated on a regular basis in response to improving operational practices and/or changing regulatory requirements. All revisions to the Operations Plan will be submitted to the Director for approval, as per Section 5.1 of Permit Number PR-16078.

The development of the Landfill has broadened the range of materials that the Facility can deal with in an environmentally responsible manner to include select hazardous waste streams as well as waste streams that are non-hazardous. The Facility is approved to accept non-hazardous and select hazardous solid waste for direct disposal. All waste accepted into the Facility is pre-approved through Tervita Corporation's (Tervita) internal Waste Acceptance Procedures.

### 1.1 General Site Information

Tervita owns and operates the Northern Rockies Landfill permitted under British Columbia Ministry of Environment (MoE) Permit PR-16078. The Landfill is situated approximately 20 km south of Fort Nelson, British Columbia (BC) at A-77-G/94-J-10. The latitude and longitude are 58° 38' 37.50" N, 122° 42' 11.25" W. Surrounding land is generally undeveloped forest, but a number of oil and gas facilities operate within the immediate vicinity of the site, and oil and gas production is generally the predominant commercial activity within the Fort Nelson area.

### 1.2 Environmental Assessment

Information gathered during the comprehensive site evaluation provided primary basis for design of the Facility. Tervita was issued Environmental Assessment Certificate (EAC), WD09-01 (Appendix 1) by the BC Environmental Assessment Office (EAO) prior to Secure Landfill development. **Tervita made commitments to the EAO in the original application which should be reviewed by Tervita staff in Appendix 2.**

### 1.3 Regulatory Consideration

The *Hazardous Waste Regulation* (HWR) governs approval and development of secure landfills in the province of BC. The Landfill design is intended to exceed minimum prevailing regulatory requirements with respect to overall objectives for secure long-term containment of wastes within the landfill. Before development of the Secure Landfill, Tervita was granted changes to the HWR. Original exemptions from the BC MoE are detailed below (Appendix 3).

#### 1) Section 25(3)

Section 25(3) states *"No person shall locate a secure landfill where the landfill (including the underlying dual liners) cannot be constructed...(a) entirely above the seasonally high water table, and (b) with a minimum separation depth of 3m of unsaturated soil material with a permeability less than  $1 \times 10^{-6}$  cm/s above a seasonally high water table including the zone of capillary rise."*

The issue of the proposed location of the landfill in a high water table area was considered in a review by the Ministry's Regional Hydrogeologist. His review concurred with Tervita's assessment that a benefit of locating the base of a landfill below the water table is a decrease in advective transport. In addition, Tervita has submitted detailed plans for installing a liner system which will meet the performance standards outlined in the HWR. As such, the potential for impacts to groundwater have been significantly reduced.

2) Section 26(3)

Section 26(3) states *"The owner of a secure landfill shall, as one or more cells are being filled,... (a) operate under cover of a portable structure that acts as a roof to keep out rain and snow, or (b) design another system to prevent leachate generation during operation."*

In light of the prohibited waste included in condition (3) below and the proposal for the leachate collection system design and maintenance, a roof to keep out rain and snow is deemed unnecessary.

3) Section 27(1)

Section 27(1) states *"The owner of a secure landfill shall not use or operate the landfill of any waste listed in Schedule 3."*

In general, this secure landfill is restricted to taking waste generated by upstream oil and gas activities. As such, Schedule 3 in the HWR shall be replaced with the following list of prohibited wastes...(See Section 6.1 of PR-16078 for the current list of prohibited wastes)

4) Section 27(3) (b) (i)

Section 27(3) (b) (i) states *"The owner of a secure landfill shall design, construct, install and maintain a leachate detection, collection and removal system that includes the following minimum characteristics: (b) a leachate collection system that is... (i) installed at a slope greater than 2%, in a porous material drainage layer with a minimum thickness of 0.75 m and permeability greater than  $1 \times 10^{-3}$  cm/s immediately above the upper liner,..."*

In consideration of the prohibited waste included in condition (3) and Tervita's proposal to construct a liner system which is designed to incorporate a geocomposite layer calculated to have almost two orders of magnitude greater flow capacity than that which is specified in the HWR for secure landfill drainage layers, the changes proposed by Tervita are acceptable.

5) Section 27(8) (b) (v)

Section 27(8) (b) (v) states *"The owner of a secure landfill shall, during closure of the landfill or any cell...(b) install and construct for the secure landfill a final cover with the following minimum characteristics: (v) graded and maintained to prevent ponding and having slopes of 3% to 5%."*

Section 27(8) (b) (v) shall be replaced with: “graded and maintained to prevent ponding and having slopes of a minimum 5% and a maximum 30%.”

6) Schedule 4 Part 3, Free Liquid Test Procedure

The US EPA 9095A *Paint Filter Liquids Test* shall replace the Free Liquid Test Procedure set out in Schedule 4 Part 3.

## **1.4 Contact information**

General inquiries regarding the Tervita Northern Rockies Landfill can be directed to the facility manager by phone at (250) 774-3027. Please see Section 11.0, of the Operations Plan for a detailed contact list.

**In the case of an emergency please phone the Tervita’s 24 hour Emergency Response line: 1-888-842-7833**

## **2.0 Main Design Elements**

### **2.1 Landfill Infrastructure**

Existing Landfill infrastructure includes a weigh scale, a site office building, a leachate containment pond and access roads exterior to the Landfill footprint. The site office, weigh scale and leachate containment pond are operated as part of the Tervita Northern Rockies Landfill facility. The Landfill access roads exterior to the Landfill footprint, would be used during the post-closure period to access the Landfill for inspection and maintenance purposes. A Technical Memorandum detailing how Tervita's landfill design meets the HWR's Secure Landfill Design Performance Standards is found in Appendix 4.

#### **2.1.1 Liner Materials**

##### **Anadarko Cell and Cell 1A**

The Non-Secure Landfill Cells – Anadarko and Cell 1A – are equipped with a composite liner system consisting of a 1.5 mm (60 mil) HDPE geomembrane underlain by a 600 mm thick compacted clay liner. The leachate collection system includes a 300 mm thick, free draining, sand layer over each cell floor. Perforated leachate collection pipe runs diagonally across each cell floor, from the northeast corner to the southwest, as well as north/south parallel to the toe of the intermediate berms. The sand layer is locally built up around the perforated pipe to facilitate drainage and leachate collection.

##### **Cell 1B**

The Non-Secure Landfill Cell 1B is equipped with a composite liner system consisting of a 1.5 mm (60 mil) HDPE geomembrane underlain by a 1000 mm thick compacted clay liner. The leachate collection system includes a drainage layer of single sided geocomposite, geonet down, over the entire Landfill floor. The drainage layer is underlain by a series of gravel filled trenches with perforated piping leading to the leachate extraction riser located in the southwest corner of Cell 1B. Leachate can be collected via this leachate extraction riser using portable pumps and/or vacuum trucks, and then be transported to an approved treatment facility.

##### **Cell 2**

The Non-Secure Landfill Cell 2 is equipped with a composite liner system consisting of a 1.5 mm (60 mil) HDPE geomembrane underlain by a 1100 mm thick compacted clay liner. The leachate collection system includes a drainage layer of single sided geocomposite, geonet down, over the entire Landfill floor. The drainage layer is underlain by a series of gravel filled trenches with perforated piping leading to the main leachate extraction manhole in the southwest corner of the overall Landfill footprint.

##### **Secure Landfill Cells**

The Secure Landfill cells are equipped with a double liner system with leak detection between the two liners. The upper liner is a composite liner with a 1.5 mm (60 mil) HDPE geomembrane underlain by a geosynthetic clay liner (GCL) and a 600 mm thick compacted clay layer. The lowermost liner is a 1000 mm thick compacted clay liner (CCL). Between the two liners is a leak detection system comprised of a two-sided geocomposite drainage layer in combination with collection trenches and extraction risers for the removal of any liquid collected within the leak



detection system. The leachate collection system includes a drainage layer, of sand and/or geocomposite over the entire Landfill floor. The drainage layer is underlain by a series of gravel filled trenches with perforated piping leading to the leachate extraction risers located in the southeast corner of Cell 3 and the southeast corner of Cell 5. Leachate can be collected via these leachate extraction risers using portable pumps and/or vacuum trucks, and then be transported to an approved disposal facility.

## **2.2 Leachate Management System**

The leachate collection and removal system (LCRS) consists of a series of gravel filled trenches with perforated collection piping above the liner system, overlain by a permeable granular layer across the entire base of the landfill cell.

Leachate filtering through the waste will drain laterally through the granular drainage layer to the collection trenches and from there to a collection sump/vault. The non-secure landfill cells have four separate leachate vaults for collection and the secure landfill has two leachate vaults. Leachate from the collection vaults can be directed to a 12,000 m<sup>3</sup> lined leachate pond. Both leachate ponds have a leak detection system. The leachate pond has encompassing netting overtop to act as a bird deterrent. There is also an 8,000 m<sup>3</sup> lined leachate storage pond and three (3) 60 m<sup>3</sup> tanks that are not being utilized at this time.

### **2.2.1 Theoretical Composition**

Leachate composition is an important consideration in various aspects of landfill design and operational planning. The leachate composition is monitored and compiled in the annual groundwater monitoring report.

### **2.2.2 Leachate Quantities**

Leachate generation has been conservatively estimated assuming all precipitation falling on the landfill area will become leachate (i.e. neglecting any reduction through evapotranspiration). This should closely approximate the extreme case, before any significant quantity of waste has been placed, but leachate quantities will decline substantially as waste is placed and cells are temporarily capped and/or the final cap is put in place.

## **2.3 Fugitive Emission Management**

Only solid, non-hazardous and select hazardous oilfield, forestry and industrial wastes are accepted for disposal at the Landfill. Third-party food wastes or other readily biodegradable wastes are not accepted for disposal at this facility. Therefore, gases resulting from the decomposition of landfilled wastes are not expected in significant volume.

Hydrocarbon odour may be present at times in the vicinity of the active landfilling area but is not expected to be detectable at the Tervita Northern Rockies Landfill property boundaries. Emission/odour management is maintained by applying good operational practices.

## **2.4 Leak Detection System**

Secure Landfill cells are equipped with a primary composite liner, consisting of a 60 mm HDPE liner underlain by a Geosynthetic Clay Liner (GCL) and 600 mm of embankment clay, a leak detection/secondary leachate collection layer consisting of 2-sided geocomposite drainage medium, a secondary minimum 1,000 mm CCL and leachate collection system. The leak

detection system between the primary composite liner and secondary CCL consists of high flow geonet synthetic drainage media connected to a drain system and collection sump. The non-secure landfill does not contain a leak detection system.

## **2.5 Cover Material**

Design grades are set to result in net surplus excavation quantities to provide soil for ongoing capping and ultimate closure requirements.

## **2.6 Equipment**

All landfill staff that operates site equipment must be familiar with maintenance requirements of the equipment. The landfill operator is responsible to ensure the equipment is regularly and properly maintained in a good, safe working condition.

Detailed operating and maintenance information for all site equipment is available on site. Items recommended in equipment maintenance schedules and safety checks are carried out and documented. Any problems identified are reported immediately to the landfill operator/manager.

### **2.6.1 Weigh Scale**

The Northern Rockies Landfill is equipped with a deck scale, which has been permanently installed at the site on concrete foundations supported by concrete piles. The concrete approach slabs at both ends extend to form a level entry to the scale. The scale is equipped with a digital display and is calibrated on a regular basis. Operation and maintenance information provided by the scale supplier is available onsite. If additional training on use or maintenance of the scale is required, management will arrange for onsite training by a representative of the scale supplier or manufacturer. The scale will be calibrated twice per year by an independent qualified professional and quarterly by landfill staff.

### **2.6.2 Survey Equipment**

A 3<sup>rd</sup> party performs landfill surveys annually for Tervita.

### **2.6.3 Fencing**

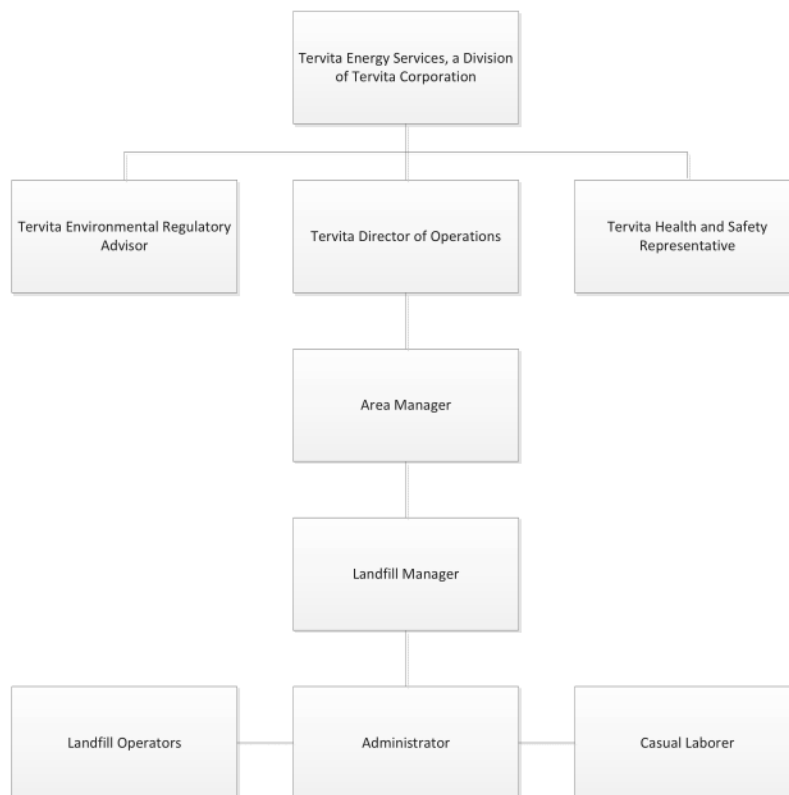
The Tervita Northern Rockies Landfill is located in a remote area of northern BC. Natural barriers and strategically placed game fencing are in place to protect the Landfill from accidental intrusion, unauthorized access and intrusion by wildlife. The fencing is built to satisfy Condition 15 of Schedule B of EAC WD09-01.

### 3.0 Landfill Policy

The Operating Plan describes proposed development concepts and operations procedures. It will be updated in cooperation with the BC MoE as changes in processes occur (with approval of the Director), the engineered landfill cell develops (record drawings), information becomes obsolete (such as changes in emergency phone numbers) and/or as new standards are developed.

### 3.1 Organization Structure Plan

The following is an organization chart for the Tervita Northern Rockies Landfill:



### 3.2 Hours of Operation

The Landfill is under full-time site supervision by the operations staff during all hours of operation. The regular operating hours are 7:00 am to 5:00 pm, Monday to Friday, or as needed on a job-specific basis. During non-operating hours, the landfill facility is closed and the site office and gate closed and locked to restrict public access to the Tervita Northern Rockies Landfill.

### 3.3 Signage

Warning signs compliant with Section 8(d) of the *Hazardous Waste Regulation* are posted at each entrance to the facility and also along the boundary of the site. Signs will also be posted in other locations if required by the Director.

### 3.4 Site Access Security

There is a game fence around the landfill with a controlled entry. All valves, pumps, doors, and controls accessible if security were breached are to be locked

### 3.5 Non-Compliance Reporting

If there is non-compliance Tervita will notify EnvironmentalCompliance@gov.bc.ca by e-mail of any non-compliance with the requirements of PR-16078. Tervita will identify the non-compliance and any remedial action taken. Written confirmation of all non-compliance events, including available test results are required within 24 hours of the original notification unless otherwise directed by the Director.

### 3.6 Process Modifications

Tervita will notify the Director, in writing, prior to implementing changes to the authorized works or to any process that may affect the quality and/or quantity of the discharge.

### 3.7 Waste Acceptance - Procedure

The following procedures are designed to protect the environment, the interests of Tervita Corporation, our customers and to aid in ensuring only solid, approved wastes are disposed of in the Tervita landfill facilities. All material intended for disposal is subject to the following acceptance protocols:

- a) Representative samples are taken by the generator or the generator's representative at point of origin.
- b) Analysis by an independent Standards Council of Canada accredited laboratory.
- c) Completion of a Waste Approval Application (WAA).
- d) Facility owner/operator review of waste documentation for issuance of Waste Confirmation Form (WCF).
- e) Waste acceptance or refusal. Waste acceptance is conditional on the results of gate screening.
- f) The waste is weighed prior to unloading with all documentation in place at that time.

As per Section 5(2) of the HWR the landfill will not accept hazardous waste that:

- Does not match the description on the accompanying manifest.
- Is not accompanied by a manifest.

Where the quantity of hazardous waste received on the manifest is +/- 5% than the quantity prescribed in Part A of the manifest, the landfill will:

- Describe the occurrence of the discrepancy on the manifest

- Submit a copy of the manifest to the Director within 3 days of receiving the hazardous waste
- Include the description of the discrepancy in an annual summary

If there is a waste discrepancy as described above, all occurrences will be documents and an annual report sent to the Director as detailed in Section 5(5) of the HWR.

### 3.7.1 General

The Tervita Northern Rockies Landfill only accepts solid, non-hazardous and select hazardous wastes per BC. Permit PR-16078 under the provisions of the *Environmental Management Act*, the *Hazardous Waste Regulation* (BC Reg. 63/88) and the *Waste Discharge Regulation* (BC Reg. 320/2004). The select hazardous waste allowed for discharge into the secure landfill, as per section 6.1 (e), (h) through (j) includes:

- Solids containing Flammable Liquids UN3175 (TDG Class 4.1)
- Waste Oil
- Benzene, Toluene, Ethylbenzene and/or Xylenes (BTEX), in total combined concentration less than 1,000 mg/kg
- Wastes which contain halogenated organic compounds, except for tetrachloroethylene, in total concentration less than 100 mg/kg
- Wastes which contain tetrachloroethylene in total concentration less than 500 mg/kg
- Wastes which contain dioxin TEQ, as defined by the *Hazardous Waste Regulation*, in a concentration less than 100 parts per billion by weight.

The Tervita Landfill is not permitted to accept the following prohibited waste, as per section 6.1 of Permit PR-16078:

- Liquids,
- Waste material which contain free liquids,
- Containers with:
  - i. Liquids, or
  - ii. Waste materials which contain free liquid.
- Empty waste containers unless they are crushed, shredded or similarly reduced in volume to the maximum practical extent,
- Materials having the properties of substance defined and regulated in Class 1 through 6 and Class 8 for the Transportation of Dangerous Goods Regulations of Canada (TDG) EXCLUDING Class 4.1 UN3175 Solids Containing Flammable Liquids,
- Materials having properties of substances defined and regulated in Class 9 of the TDG,
- Materials listed as "forbidden" in column 3 of Schedule 1 of the TDG,
- Waste which contain Benzene, Toluene, Ethylbenzene and/or Xylene(s) (BTEX) in total combined concentration greater than 1,000 mg/kg,
- Waste which contain halogenated organic compounds, except for tetrachloroethylene, in total concentrations greater than 100 mg/kg,
- Wastes which contain tetrachloroethylene in total concentrations greater than 500 mg/kg,
- Waste which contain dioxin TEQ, as defined by the HWR, in a concentration greater than 100 parts per billion by weight,
- Waste which when subjected to the Modified Leachate Extraction Procedure, reference in Part 2 of Schedule 4 of the HWR, produce an extract which contains one or more

contaminants in Column 1 Of Table 1 of Schedule 4 in concentrations equal to or greater than the concentration specified for each contaminant in Column II of the Table EXCEPT for BTEX,

- Oil products covered under the BC Used Oil Management Association, including but not limited to oil, oil filters and containers,
- Recyclable Oily Rags,
- PCB Wastes (> 50 ppm PCBs) as defined in Section 1 of the HWR
- Radioactive wastes, except for Natural Occurring Radioactive Material (NORM) which meets and is handled in accordance with the requirements of Section 6.4 of the Permit.

### **3.7.2 Exempted Wastes**

The following lists of wastes are acceptable for management at the secure and non-secure landfill without characterization, Safety Data Sheets (SDS) or minimal (pH) characterization:

- Lime (that would be hazardous only because it is classified under the federal dangerous goods regulations as Class 8 because of pH as per Part 1 (s)(ii) of the HWR)
- Fly ash (that would be hazardous only because it is classified under the federal dangerous goods regulations as Class 8 because of pH as per Part 1 (s)(ii) of the HWR)
- Treated wood/railway ties
- Construction and demolition debris
- Asphalt and pavement
- Wood ash, or pulp mill dregs and grit (that would be hazardous only because it is classified under the federal dangerous goods regulations as Class 8 because of pH as per Part 1 (s)(ii) of the HWR)
- Cement (dry)
- Non-recyclable oily rags
- Empty pails/containers (crushed, shredded or similarly reduced in volume to the maximum practical extent)
- Non-Friable Asbestos (including treated asbestos to render it non-friable)
- Expired/unusable commercial product(s)

### **3.7.3 Industrial Sources of Waste**

As per Section 1.2.2 of Permit 16078, industrial sources of waste must be identified in the Operational Plan. Tervita anticipates the following sources industrial solid waste:

- Oil and Gas Service Industry
- Environmental Service Companies
- Pulp and Paper/Forestry Industry
- Spill Response Companies
- Construction Industry
- Waste Management Industry

### 3.7.4 Waste Characterization

This section will describe the methodologies used to both characterize solid wastes as hazardous or non-hazardous, as well as detail the procedure for the management of the characterized solid wastes.

*As per the Hazardous Waste Regulation:*

**Hazardous Waste** means:

- a) dangerous goods if they
  - a. are no longer used for their original purpose, and
  - b. meet the criteria for Class 2,3,4,5,6,8 or 9 of the federal dangerous goods regulations, including those that are recycled, treated, abandoned, stored or disposed of, intended for recycling, treatment or disposal,
- b) PCB wastes,
- c) waste containing dioxin,
- d) waste oil,
- e) waste asbestos (friable)
- f) waste pest control product containers and wastes containing pest control products, including wastes,
- g) leachable toxic waste,
- h) waste containing tetrachloroethylene,
  - 1. waste listed in Schedule 7,
  - 2. Repealed. [BC Reg. 261/2006, s.1 (b).]
- i) waste containing polycyclic aromatic hydrocarbon, and
  - 1. Repealed. [BC Reg. 319/2004, s.3 (e).]

but does **not** include

- j) household refuse that is collected from residential premises,
- k) domestic sewage,
- l) dangerous goods that are defective, surplus or otherwise not usable for their intended purpose and that are defective or otherwise not usable for their intended purpose and that are in the process of being returned directly to a manufacturer or supplier,
- m) asphalts and tars used in the manufacture of asphaltic concrete and roofing materials, and
- n) Repealed. [BC Reg. 214/2004, s.1 (l).],
- o) waste wood products treated with wood preservatives or wood protection products registered under the *Pest Control Products Act (Canada)*,
- p) household hazardous waste that
  - a. is removed from a return collection facility in accordance with an authorization from the owner of the return collection facility, and
  - b. is to be used for its originally intended purpose,
- q) wood ash, or pulp mill dregs and grit, that would be hazardous waste only because they are classified under the federal dangerous goods regulations as class 8, or
- r) waste that:
  - (i) has a pH greater than or equal to 2.0 and less than or equal to 12.5, and
  - (ii) would be a hazardous waste only because it is classified under the federal dangerous goods regulations as Class 8 because of pH.

**Leachable Toxic Waste** – means waste when subject to the extraction procedure described in the US EPA Method 1311(TCLP) produces an extract with a contaminant concentration greater than those prescribed in Table 1 of Schedule 4.

**Waste Oil** - The HWR defines waste oil as: automotive lubricating oil, cutting oil, fuel oil, gear oil, hydraulic oil, or any other refined petroleum-based oil or synthetic oil, including diesel fuel where:

- the oils are in the waste in a total concentration greater than 3% by weight and
- the oils through use, storage, or handling have become unsuitable for their original purpose due to the presence of impurities or loss of original properties.

**Manage** – means to handle, transport, store, treat, destroy or dispose of hazardous waste.

### **3.7.5 Non-Friable Asbestos Acceptance and Disposal**

Non-friable asbestos is not defined as hazardous waste as per the HWR and may be accepted at the Northern Rockies Landfill for disposal. Industrial sources are from asbestos abatement projects not originating from oil and gas activities. Waste Approval Applications that indicate the presence of non-friable asbestos will be reviewed for acceptance and disposal by the Tervita Corporation. If the waste is deemed suitable for disposal at the Tervita Northern Rockies Landfill, job-specific controls will be implemented to ensure that any additional hazards are mitigated and internal Standard Operating Procedure (SOP), TWP-SOP-3000-040, as amended, will be followed.

- All loads must be schedule into the facility a minimum of 24hrs in advance to ensure proper site preparation.
- All asbestos must be double bagged in 6 mil thick polyethylene bags as a minimum.
- Asbestos waste must be identified on every container; this must be labeled to indicate asbestos containing material.
- Asbestos waste will be offloaded into the prepared area and covered with a minimum of 25 cm of cover material immediately.
- Orange snow fence will be placed on top of the 25 cm of cover above the asbestos waste material so that if movement of the soil in the area occurs, the asbestos will be identified well in advance. 125 cm of final cover material will be placed over the orange snow fence.

### **3.7.6 Natural Occurring Radioactive Material (NORM) Acceptance and Disposal**

Tervita Northern Rockies Landfill does not currently accept NORM waste for disposal. If Tervita would like to pursue the acceptance of NORM, handling procedures and an updated Operations Plan must be approved by the Director, prior to acceptance.



### **3.7.7 Leachable Waste Characterization Process for Disposal**

### **3.7.8 Scale House Procedures**

The overall acceptance of a waste at the scale office is intended to be a three-part plan to aid in ensuring wastes received meet necessary criteria, where:

1. Proper documentation informs landfill personnel the waste stream is an approved waste stream as identified by the WCF.
2. Onsite gate screening procedures aid in ensuring a reasonable comfort level that all waste received is an acceptable waste.
3. The equipment operator acts as the last line of defense and is responsible for observing each load received for any questionable discrepancies.

The following waste acceptance procedures shall be adhered to at the facility:

All documentation (WAA, supporting analytical data and WCF) regarding the waste stream must be filed on site prior to acceptance.

- A minimum of a 24 hour notice must be given to the landfill representative prior to shipping of waste stream. This is required to prevent unnecessary delays at the landfill facility.
- Each waste stream load arriving at the facility for disposal shall have a completed waste manifest, indicating at a minimum the type of waste, the generator, the generator contact, phone number, generating location, and the unique WAA identification number.
- Waste streams that are subjected to a gate screen are analyzed for the following parameters:
  - flashpoint,
  - pH,
  - reactivity,
  - free liquids, and
  - radioactivity.

A minimum of two (2) loads are gate screened per day on volumes received over five (5) loads. Five (5) loads or less will result in one (1) load being gate screened.

If suspect waste is identified, the load(s) will be isolated for further assessment and testing by the generator, if necessary.

Wastes found to be unacceptable will be rejected. Information regarding waste rejection shall be recorded on a Waste Discrepancy Report.

### **3.7.9 Random Sampling Procedure**

The Landfill is required to retrieve a random sample from received waste loads to confirm waste standards and acceptance protocol integrity.

### Frequency

One sample every 10,000 tonnes of solids delivered to the site, on a cumulative annual basis. Landfill operations will track waste volumes received and complete the cumulative sampling, as required.

### Procedure

All random sampled loads will be isolated within the Landfill cell to prevent mixing. If the results of the random sampling are found to meet landfill acceptance criteria and the analysis received by Tervita is consistent with the generator's analysis, the load will be finally placed within the active landfill cell. If results of the random sampling meet landfill acceptance criteria but the analysis received by Tervita is not consistent with the waste generator's analysis, the load will remain isolated within the landfill cell and the waste generator will be contacted by the Landfill Manager and the analysis will be discussed. If the load does not meet landfill acceptance criteria, the waste is re-sampled and tested for the complete original analytical package. If the subsequent analysis from the second sample does not meet landfill acceptance criteria, the Landfill Manager will contact the generator and coordinate removal of the solid waste from the facility, at the generators cost. The random sampling must be documented on a Landfill Random Sample Report and the use of a Waste Discrepancy Report (WDR) is to be used for all failed waste loads.

### Analytical Parameters

All samples are third-party analyzed at an accredited laboratory to determine if the waste meets landfill acceptance criteria. At a minimum, all loads that undergo random sampling will be tested for the identical original analytical parameters completed by the waste generator (submitted with the WAA).

### Documentation

The results of all random sampling will be documented and filed onsite for a minimum of ten (10 years). The following internal Tervita policies and forms are in place to properly audit and document sample loads:

- TWP-ERMP-9650-044 Landfill Random Sample – BC Solid Waste.
- TWP-FCD-9650-018 BC Landfill Random Sample Report.
- TWP-FCD-9650-015 Waste Discrepancy Form.

## **3.8 Prohibited Wastes and Identifying Prohibited Wastes**

Although only non-hazardous and select hazardous materials will be accepted at the facility, it is necessary to have a response and secondary inspection plan in effect to ensure that only approved waste streams are accepted.

The Facility operating personnel will not accept waste and will notify the Landfill Manager if:

- The waste is in barrels or other sealed containers. Containers or barrels must be opened and its contents verified as an acceptable waste material prior to its acceptance for disposal with the exception of bagged solid waste and non-friable asbestos.
- The waste is a liquid or contains free liquid (i.e. as determined by the paint filter test).
- The waste is a powder or gaseous.
- The waste hauler does not have proper documentation.
- The waste has an unusual appearance or smell.

- The waste is in a container with warning labels (with the exception of non-friable asbestos).
- The facility operating personnel are not familiar with the waste.

Should any waste material be unloaded and found to be suspect, the following procedure will be followed:

- Attempt to identify the waste and isolate it from other waste.
- Obtain information from the hauler including the driver's name, company name, license number, the origin of the waste and a description of the driver and the hauling vehicle.
- The Facility Manager, Environment and Regulatory Advisor, and/or Health and Safety Advisor will be notified.
- A sample will be taken and analyzed.

If the material is found to be unacceptable:

- The material will be removed by the waste generator.
- A WDR will be completed.

Regulatory agencies will be notified as per Section 5(5) of the HWR.

### **Gate Screening**

The gate screening parameters below will be measured in-house at the Tervita Northern Rockies Landfill in the event that a waste load is suspected to be unacceptable.

#### **pH**

Before the rejection of a waste load based on unacceptable pH, Facility Operators will: Collect a second sample and perform a second pH procedure. If unacceptable, the load may be rejected. At the generator's request and expense, both samples may be submitted to an independent laboratory for analysis. The independent results will deem the correct pH and whether the load is acceptable.

#### **Reactivity**

Prior to rejection based on reactivity, a second sample will be collected and observed for reactivity. If confirmed, the waste load shall be rejected.

#### **Free Liquids**

All waste loads failing the paint filter test for free liquids or obviously containing free liquids shall be rejected.

#### **Radiation**

Every screened load with radiation levels greater than or equal to 200nS/hr will be segregated. The generator will be contacted and will have two options:

1. The load will be rejected and returned to origin.
2. The load will be segregated in the landfill and sampled to verify the NORM.
  - a) If the sum or ratios on the analytical is  $\geq 1$  the load must be rejected and sent to an alternate disposal that can accept NORM waste, at the waste generator's expense.

- b) If the sum or ratios on the analytical is  $<1$  the load can be accepted into the secure landfill.

### **Other Discrepancies**

If a discrepancy between the description provided in the WAA and an incoming waste load is detected, the load will be segregated and/or rejected or portions of the load rejected.

However, every effort will be undertaken to:

Determine, after the discrepancy is corrected, if the waste is acceptable and if so, revise the WAA.

## **3.9 Documentation of Waste Location**

### **3.9.1 Waste Tracking**

Tervita utilizes an internal System "QFAIM" to support and document the scale operations of the landfill. Recorded data on the QFAIM system includes date received, WAA identification number, waste type, weigh ticket number, manifest number, quantity received and location of the waste within the cell.

### **3.9.2 Waste Location**

The final disposal location of the accepted waste is recorded daily using a three-dimensional alpha-numeric grid system and a surveyed elevation. The grid system has posts installed at 10m intervals along the outer edges of the landfill berms to allow visual estimation of waste location horizontally. The vertical distance above the cell base is also estimated. This information is recorded in QFAIM.

## **3.10 Fire Control**

The Facility Manager will train staff accordingly and ensure all operators review fire control procedures in the Emergency Response Plan (ERP).

Any fires will be followed up with an incident investigation, a written incident report and as per section 4.8 of Permit PR-16078: Non-Compliance Reporting notification to the Regional Manager and [EnvironmentalCompliance@gov.bc.ca](mailto:EnvironmentalCompliance@gov.bc.ca)

## **3.11 Occupational Health and Safety Program**

All applicable safety regulations must be followed, including the British Columbia Occupational Health and Safety Act (OHSA). All landfill staff will have access to a copy of the BC OHSA and Regulations and comply with Part 3 (Rights and Responsibility's) and any applicable orders:

- Site personnel must be properly trained and equipped with appropriate Personal Protective Equipment (PPE).
- Landfill staff will directly supervise all waste acceptance and disposal activities.
- Site staff will have regular safety meetings.
- Site staff is trained in WHMIS, CPR, NORM Awareness, First Aid and regular in-house safety training.
- All incidents are documented on the Tervita Incident 4-Hour Notification Form, as amended

All landfill staff is expected to be familiar with the Tervita Health & Safety Manual and Site-Specific ERP.

Copies of the Tervita Health & Safety Manual, ERP and the BC OHSA are kept at the landfill site office.

### **3.12 Emergency Response Plan**

The Tervita Health and Safety Department have established a written, site-specific ERP. Landfill staff will implement the ERP in response to all emergency situations. The ERP is updated annually and meets Section 11 of the HWR.

A mock exercise is done annually and results sent to the Director within 90 days of the emergency systems testing. Emergency systems testing will meet the requirements in Section 12 of the HWR.

All employees and contracted staff are trained in the implementation of the Northern Rockies ERP and the applicable requirements of the BC Occupational Health and Safety and Workers Compensation Board Legislation. The on-site facility supervisor will act as the emergency response coordinator whose duties will include:

- Maintaining liaison with local authorities and organizations such as Police, Fire and Medical Services.
- Addressing current employee safety issues and reviewing them on a regular basis.
- Notifying responsible authorities of any potential risk to public health or the environment.
- Notifying their Tervita Compliance Advisor, Health and Safety Advisor and Area Manager of any emergency situations.
- Supervising emergency activities by:
  - (i) Assessing the situation.
  - (ii) Notifying response agencies (Fire, Police, and Medical Services).
  - (iii) Maintain a list of available equipment.

### **3.13 Regulatory Requirements**

Tervita will adhere to all relevant regulations and guidelines including:

- BC Ministry of Environment Permit No. 16078
- BC *Environmental Management Act (SBC 2003) Chapter 53*
- BC *Water Act (RSBC 1996) Chapter 483*
- BC *Hazardous Waste Regulation (BC Reg. 63/88)*
- BC *Waste Discharge Regulation (BC Reg. 87/2012)*
- BC *Contaminated Sites Regulation (BC Reg. 375/96)*
- BC *Spill Reporting Regulation (BC Reg. 376/2008)*
- BC *Groundwater Protection Regulation (BC Reg. 91/2009)*

### **3.14 Landfill Staff Training**

Tervita Landfill operators, as per section 13(1) through (3) of the HWR, will receive the required training.

Training may include, but not be limited to Basic Requirements and Additional Requirements:

## Basic Requirements

- Solid Waste Association of North America (SWANA)
- Basic Landfill Operations and Management
- CPR
- First Aid
- Transportation of Dangerous Goods (TDG)
- Workplace Hazardous Information Materials System (WHIMS)
- H<sub>2</sub>S Alive
- SCBA Operation
- Heavy Equipment Operation
- NORM Awareness

## Additional Requirements

Additional training will be undertaken as necessary to enable the operator to perform their duties in a safe, efficient manner. All records will be retained onsite as per section 13(3) of the HWR.

### 3.15 Communications Onsite

The scale house is equipped with a phone, internet and fax machine for outside communications and utilizes a two-way radio and/or hand-held system to allow for direct communications with the equipment operators at all times.

### 3.16 Housekeeping

The Tervita landfill facility is kept clean and free of waste and litter outside the containment areas. The landfill operator(s) will establish and maintain controls to minimize the tracking of waste outside of the engineered containment area. Tervita will recover any and all waste or waste residues that are tracked out of the active cell(s) to prevent any potential impact to the environment. In the unlikely event that a release causes adverse effects, Tervita will create and implement a remediation plan to mitigate impacts and inform the Director as per section 4.8 of Permit 16078: Non-Compliance Reporting. Tervita will also adhere to Sections 2 and 3 of the *Spill Reporting Regulation* from the *Environmental Management Act*.

All signs and equipment are kept clean and in good repair as per section 4.5 of Permit PR-16078 and section 8(d) of the HWR. All fences will be maintained and necessary repairs undertaken. All lighting stands are maintained and kept in good working order.

## 4.0 Record Keeping

### 4.1 Visitor Log Record Keeping

A visitor log book is maintained to record all visits to the site. The book documents the name, company/organization, and date and time-in/time-out for the visitors.

### 4.2 Landfill Facility Filing System

The following two record keeping systems are utilized at the Tervita Northern Rockies Landfill. The first system maintains all information pertaining to waste streams received at the facility. This system is alpha-numeric and each waste stream file is filed alphabetically by customer name, and numerically by WAA approval number. The second system maintains records and information pertaining to all other aspects of the facility operations.

### 4.3 Waste Records

It is important to maintain good records of visitors and vehicles entering and exiting the Landfill. The weigh scale ticketing system and the computer program utilized (QFAIM) are designed to document specific and complete information regarding the waste haulers using the Landfill. The following waste records will be maintained until the end of the post-closure period, records include the following as per Section 6 of the HWR:

- Waste generator identification;
- Waste Acceptance Application (WAA) and associated independent lab analyses;
- Waste Confirmation Forms (WCF);
- Landfill manifest(s);
- Gate screening and random sampling records;
- Waste Discrepancy Reports (WDR) and supporting discrepancy documents which include the annual summary and actions taken as per section 5(5) of the *Hazardous Waste Regulation*;
- Volume and grid location where material was landfilled as per Section 26(4)(b) of the *Hazardous Waste Regulation*;
- Emergency system testing as per section 12 of the *Hazardous Waste Regulation*;
- Personal training records as per section 13 of the *Hazardous Waste Regulation*; and
- Tervita conducts Annual Landfill Surveys as per section 26(4)(a) of the *Hazardous Waste Regulation*.

All of the above records are retained by Tervita Corporation for the minimum required timeframe, typically a period of ten (10) years. Groundwater and leachate monitoring information are retained for a minimum of five (5) years. All groundwater monitoring information (chemistry) is compiled and maintained indefinitely in subsequent groundwater reports. Copies of the Permits are kept on file at the facility or available electronically.

### 4.4 Daily Operations Log

The plant manager/designated operator will maintain a record of conditions and events, while on-duty, including:

- Daily Weather Conditions.
- Any other miscellaneous information deemed noteworthy requires a record of:
  - a) Any inspections conducted;
  - b) Daily activities;
  - c) Operational problems, and
  - d) Public complaints and Tervita's responses.

## 4.5 Regulatory Requirements

In addition to the records mentioned above, other required records on-site include:

- A copy of BC Ministry of Environment Permit No. PR-16078 along with any other permits for the site.
- Environmental Assessment Certificate, WD09-01
- Survey records and record drawings showing the location and development of excavations, fill areas, final grades and structural components.
- The current version of the Design and Operations Plans.
- All documentation as required by Permit PR-16078.
- Records of the handling, amounts accepted and disposal locations of any wastes accepted at the facility, including wastes requiring special handling.
- Results of environmental monitoring programs.
- Groundwater Monitoring Program results.
- Records of the quantity and quality of surface water discharged to the environment.
- Any remedial action taken as a result of environmental monitoring.

The following information shall be recorded and retained by Tervita, typically for a minimum of ten (10) years:

- The names and addresses of all persons who discover any contravention of applicable Acts, regulations or the operating Permit;
- The names and addresses of all persons who take any remedial actions arising from contravention of applicable Acts, regulations or the operating Permit;
- A detailed description of the remedial measures taken in respect of a contravention of applicable Acts, regulations or the operating Permit;
- The place, date and time of all sampling required by the Permit;
- The dates sample analyses were performed;
- The analytical techniques, methods or procedures used in sample analysis;
- The names of the persons who collected and analyzed each sample; and
- The results of sample analyses.

## 4.6 Reporting

### 4.6.1 Landfill Construction

As per section 4.1 of Permit No. PR-16078, plans and specifications of any new works, future upgrades or modifications to existing works shall be submitted to the Director and his/her consent shall be obtained in writing before construction commences. All plans and specifications shall be generated by a Qualified Professional and include:



- a) Design Plan and Specifications for the proposed construction;
- b) A construction Quality Assurance Plan; and
- c) A construction Quality Control Plan.

Upon completion of construction and prior to accepting waste, all plans and specifications shall be stamped and signed by a Qualified Professional. As per Section 5.3 and 9.2 of PR-16078, Tervita shall submit to the Director a summary report of the QA/QC program results confirming the integrity of the liners and leachate collection system(s), prior to depositing waste into any new landfill cell. The QA/QC program submitted details the inspection of liners during construction as required under Section 26(1)(a) of the HWR. Inspections of the liners will ensure tight seams and joints, absence of punctures and blisters. Landfill clay liners will be inspected for imperfections such as lenses, cracks and channels. As-built drawings certified correct and sealed by a Qualified Professional shall be submitted electronically within 60 days of completion of the work.

#### **4.6.2 Annual Landfill Report**

An Annual Landfill Operation Report, covering the calendar year from January 1 to December 31, is submitted to BC Ministry of Environment by March 31, of each year for the previous year's operations. The annual report will comply with requirements of Section 9.3 of Permit No. PR-16078.

### **4.7 Auditing/Environmental Review**

#### **Audits**

The Tervita Northern Rockies Landfill is audited at least once every three years, by a qualified independent third-party to assess compliance of design, construction, and operation of the landfill as per section 4.2 of Permit No. PR-16078. Audit documents will be submitted within 30 days of completion to the Director. All audit results will be available onsite and/or electronically.

#### **Internal Inspections**

The Tervita Environment and Regulatory Advisor may conduct an internal environmental Audit inspection to confirm compliance with the Permit, unless a third party audit has been conducted. Results/recommendations are communicated to the Landfill Manager for implementation. The internal inspection is intended for internal use only, to ensure operational compliance.

#### **Review of Discharges**

As a requirement of 9.3(i) of PR-16078, a qualified independent professional will evaluate the discharges on the receiving environment from the previous year.

## 5.0 Groundwater Monitoring

The Groundwater Monitoring Plan is made to satisfy Section 26(2) (a) to (e) of the HWR. The groundwater monitoring plan is detailed in this section.

Section 26(2)(a) to (e) of the HWR:

*The owner of a secure landfill must carry out an approved monitoring program by*

- (a) Establishing a groundwater monitoring system with a sufficient number of wells, installed at appropriate locations (upgradient and downgradient) and depths to yield from the uppermost aquifer groundwater samples that*
  - i. Represent the quality of the groundwater that would not be affected by any leakage from a secure landfill facility, and*
  - ii. Represent the quality of the groundwater that would be affected by leachate, if any, from the secure landfill,*
- (b) Ensuring the quality of the groundwater monitoring data by*
  - i. Casing sampling wells with appropriate materials to ensure the integrity of the boreholes,*
  - ii. Preventing contamination*
    - A. of any part of the well during construction, and*
    - B. from the surface during operation, and*
  - iii. Implementing procedures for*
    - A. decontamination of sampling equipment,*
    - B. sample collection,*
    - C. sample preservation and shipment,*
    - D. sample custody, and*
    - E. analytical procedures and quality assurance,*
- (c) Selecting indicator parameters (e.g. specific conductance, pH, total organic carbon) and chemical constituents for analysis of groundwater that*
  - i. Provide a reliable indication of the quality of groundwater below the secure landfill from the perspective of human health hazards and environmental quality,*
  - ii. Reflect the physical and chemical characteristics of the waste in the secure landfill, and*
  - iii. Provide a reliable indication of movement of any contaminant with groundwater flow,*
- (d) Sampling groundwater sufficiently often to provide data that is representative of varying groundwater flow conditions, but in any case no less frequently than once every 3 months,*
- (e) Measuring the groundwater surface elevation each time the groundwater is sampled,*

Depending on ongoing results from the groundwater monitoring, Tervita may in the future request approval from BC Ministry of Environment to modify the range of parameters and/or monitoring frequency, if appropriate.

## **5.1 Groundwater Monitoring Plan**

Tervita will maintain the groundwater monitoring plan as outlined below.

## **5.2 Groundwater Characterization**

The groundwater monitoring results indicate the presence of a shallow water table that varied between 0.04 m to 10.80 m below ground in 2015. The depth to groundwater is deepest in the north central portion of the Facility. Local groundwater flow is interpreted to be north-northwest towards the Prophet River.

Results of previous groundwater sampling programs indicate that background shallow groundwater chemistry is variable; the dominant cations are calcium and magnesium, and the dominant anions are sulphate and bicarbonate. Total dissolved concentrations ranged from 262 to 3,350 mg/L in 2015, indicating that groundwater at the site is low to moderately mineralized.

## **5.3 Groundwater Well Monitoring Network**

The current groundwater monitoring well network consists of 16 wells located in hydraulically upgradient, cross-gradient and downgradient locations to the facility. All monitoring wells were designed to evaluate the characteristics of shallow and, in some areas, deep groundwater in the unconsolidated surficial deposits. The monitoring network has been designed to incorporate the following key elements;

- Upgradient locations for establishing groundwater quality; and
- Perimeter and downgradient locations for detection and response monitoring

The well network may be expanded if required as landfill operations proceed and additional landfill cells are constructed. Groundwater reports showing the current network and discussing any recent changes to the sampling and monitoring program are submitted annually with the Annual Report to the MoE. The groundwater well network is shown in Figure 1.

## 5.4 Groundwater Sampling Frequency

Qualified third party independent consultants conduct groundwater sampling no less than once every three (3) months, as per section 26(2)(d) of the HWR. If Tervita would like to reduce the monitoring frequency, they will contact the MoE about submitting a Section 51 of the HWR (Application for change in requirements). Monitoring, analysis and reporting is conducted according to terms, conditions and requirements stipulated in section 7 of Permit No. PR-16078 and section 26(2) of the HWR.

## 5.5 Groundwater Chemical Parameters

The chemical parameters selected for the groundwater monitoring program (Table 1) were based on and Section 26(2)(c) of the HWR;

- General groundwater quality indicators;
- Waste streams coming into the landfill facility; and
- *BC Contaminated Sites Regulation*

Additional chemical parameters may be selected for testing on collected groundwater samples if contaminants are identified in samples collected from the leak detection system. Modifications to the groundwater monitoring plan require an updated Operations Plan, approval from the Director as per Section 5.1 and 9.3 of PR-16078.

**Table 1: Groundwater Chemical Parameters Analysed**

Field Parameters	General & Inorganic	Dissolved Metals	Dissolved Hydrocarbons	PAHs
pH	pH	Aluminum	Benzene	Acenaphthene
EC	EC	Antimony	Toluene	Acridine
Temperature	Calcium	Arsenic	Ethylbenzene	Anthracene
	Magnesium	Barium	Xylenes	Benz(a)anthracene
	Sodium	Beryllium	Styrene	Benzo(a)pyrene
	Potassium	Boron	VPH <sub>w</sub>	Chrysene
	Chloride	Cadmium	VH <sub>w</sub> (C <sub>8</sub> -C <sub>10</sub> )	Fluoranthene
	Sulphate	Chromium	EPH <sub>w</sub> (C <sub>10</sub> -C <sub>19</sub> )	Fluorene
	Nitrite-N	Cobalt	LEPH <sub>w</sub> (C <sub>10</sub> -C <sub>19</sub> )	Naphthalene
	Nitrate-N	Copper	HEPH <sub>w</sub> (C <sub>19</sub> -C <sub>32</sub> )	Phenanthrene
	Nitrite + Nitrate	Iron		Pyrene
	Ammonia	Lead		Quinoline
	Total Phosphorous-P	Lithium		
	COD (Select Wells)	Manganese		
	BOD	Mercury		
	Alkalinity	Molybdenum		
	Bicarbonate	Nickel		
	Hardness	Selenium		
	TDS	Silver		
	TSS	Strontium		
	TOC (Select Wells)	Thallium		
		Tin		
		Titanium		
		Uranium		
		Vanadium		
		Zinc		

## **5.6 Groundwater Collection Protocols**

### **Well Inspection**

Wells included in the monitoring program will be inspected prior to sampling. If deficiencies are noted, corrective action(s) will be taken to repair the deficiency. If the well is in a condition where representative groundwater samples cannot be obtained the monitoring well will be decommissioned, repaired or a new monitoring well installed if required.

### **Groundwater Elevation**

Groundwater elevations will be determined immediately prior to sampling of wells. An electronic water level indicator tape will be used. The water level indicator will be properly cleaned between wells to prevent cross contamination. The depth to water level will be measured from the top of the well casing. Groundwater elevations at each well will be calculated by subtracting measured depths to water from the surveyed top of PVC casing elevations.

### **Sampling**

Prior to obtaining a sample from the monitoring well, the well will be purged to allow a representative sample of formation water to enter the well. Purging will be conducted until pH, temperature and electrical conductivity (EC) measurements are constant (low flow sampling), until three well volumes have been removed, or until the well is purged dry.

Field observations of groundwater samples will include: colour, odour and visible sheen. Field measurements of pH, temperature, and EC will be performed after purging and prior to sample collection.

Groundwater samples will be obtained from the wells using an industry accepted method. Samples will be placed into the appropriate bottles supplied by the laboratory. Where required, preservatives will be added to the sample. Samples will be collected once purging is deemed completed.

Field sampling and measurements will generally proceed in a direction from upgradient to downgradient to reduce the potential for cross-contamination of monitoring wells. In addition, all sampling equipment will be thoroughly cleaned upon completion of each well to reduce the potential for cross-contamination.

## **5.7 Groundwater Performance Standards**

Groundwater quality in perimeter and downgradient monitoring wells will be compared to the baseline groundwater quality established at upgradient monitoring wells. Variations between baseline and downgradient groundwater quality will be identified on the basis of geo-statistical methods. Groundwater quality will also be compared to the British Columbia Environmental Management Act CSR guidelines, which provide a regulatory framework for water assessments based on Schedule 6 and Schedule 10 of the regulation. As per Section 27(4) of the HWR, a secure landfill is in a non-compliance situation, with regard to groundwater quality, when

analytical data from upgradient and downgradient groundwater monitoring wells for any parameter or chemical constituents are significantly different using approved statistical methods.

Should a non-compliance of a performance standard be identified the following corrective actions may be initiated:

- Confirm monitoring results based on a review of sampling and laboratory procedures (surface water, groundwater and/or leachate).
- Review of landfill operating procedures.
- Conduct a re-sampling event.

If the same non-compliance of a performance standard is noted during subsequent monitoring events an appropriate action based process will be initiated. The action initiated will be a function of the degree and characteristics of the non-compliance issue. In general the process will likely include:

- Re-evaluation of the surface drainage design, hydrogeology, and/or landfill design (depending on non-compliance issue identified).
- Modify Monitoring Plan (i.e. increase number of groundwater monitoring wells or increase frequency of monitoring, depending upon non-compliance).
- Develop mitigation plans (if required).

## **5.8 Groundwater Monitoring Reporting**

The annual ground water monitoring report will be submitted with the Landfill Annual Report by March 31 of each year, unless otherwise specified by the Director.

## **6.0 Leachate Management and Monitoring**

### **6.1 Leachate Characterization**

A representative sample of leachate will be obtained semi-annually from the leachate ponds to characterize for disposal purpose. If conditions allow, leachate is also collected on a groundwater monitoring program event and analyzed for the same parameters as groundwater, as shown in Table 1. The sampling of leachate for parameters in Table 1 allows Tervita to verify if there are any contaminants of concerns from waste(s), leaching into the groundwater. Each leachate vault is analyzed separately, to analyze between the secure and non-secure landfill leachate characteristics.

Leachate will be tested against Schedule 1.2 of the HWR to determine disposal. If leachate does not meet the discharge parameters in Schedule 1.2, then leachate will be disposed of at an authorized disposal facility. Leachate will be characterized against the authorized disposal facilities acceptance criteria.

### **6.2 Leachate Removal and Disposal**

Leachate will be tested against Schedule 1.2 of the HWR to determine disposal. If leachate does not meet the discharge parameters in Schedule 1.2, then leachate will be disposed of at an authorized disposal facility. Leachate will be characterized against the authorized disposal facilities acceptance criteria.

Leachate collected in the leachate drainage network will be managed in the following ways:

- Discharge to the environment, if it meets criteria in Schedule 1.2 of the HWR
- Deepwell disposal, if it meets the criteria of the authorized disposal facility
- Reuse for hydraulic fracturing in the oil and gas industry, if it meets criteria in Schedule 1.2 of the HWR
- Recirculation, on landfill cells

#### **Discharge to the Environment**

As per schedule 1.2 of the HWR Tervita will conduct the parameters stated in Column 1. Results will be summarized and the leachate and applicable criteria discussed with the MoE. Depending on results leachate may be reused as makeup water for oilfield fracturing operations and/or other industrial uses where the leachate can be used to offset the use of regional fresh water. Tervita will work with the end user of the leachate to ensure the proper regulatory requirements are in place before withdrawals occur.

#### **Deepwell Disposal**

Leachate will be tested for parameters required by the authorized treatment and disposal facility. Tervita's Oilfield Waste Management Facilities also process waste and ensure QA/QC programs are established to ensure fluids meet 1b criteria prior to injection.

## **Reuse for hydraulic fracturing in the oil and gas industry**

As per schedule 1.2 of the HWR Tervita will conduct the parameters stated in Column 1. If the leachate meets the standard for discharges to the environment the leachate may be reused as makeup water for oilfield fracturing operations and/or other industrial uses where the leachate can be used to offset the use of regional fresh water. Tervita will work with the end user of the leachate to ensure the proper regulatory requirements are in place before withdrawals occur.

## **Recirculation**

Leachate generated from the landfill may be recirculated back into the waste fill or utilized for dust control within the active landfill area.

## **6.3 Leachate Management**

Throughout the operation period, prior to final capping, waste is placed a minimum of 1.0 m below the top of berm (top of liner) elevation. Interior grading is maintained such that surface water run-off from the waste is contained within the cell(s). This liquid is dealt with as leachate and eventually removed via the leachate collection system. During operation, the leachate collection systems will be inspected weekly and after any storm or catastrophic event to ensure proper functioning and to determine if leachate is being generated and accumulating. If any deficiencies or malfunctions are noted during the inspection the works will be immediately repaired.

The leachate collection system is comprised of a combination of geocomposite, granular drainage media, perforated and solid pipe, leachate removal risers and a leachate storage pond. The base of the landfill geocomposite membrane is covered by one-sided geocomposite drainage medium (5mm thickness) designed to convey leachate over the cell floor to perimeter trenches. The leachate collection trenches are positioned to properly intercept and convey mass flow to the removal system and are comprised of perforated polyethylene pipe, drainage rock, geocomposite laid directly over the liner and a filter fabric placed over the top of the granular material.

The leachate removal systems consist of a sloped or vertical leachate riser. The riser is equipped with a pumping system capable of maintaining the landfill cell in a compliant state with respect to leachate head. The leachate can be removed from the individual risers or directed to the leachate ponds for storage. The leachate ponds are lined with two HDPE liners, which are also separated by a bi-planer geonet. The primary liner (upper) and secondary liner have a 60 mil and 40 mil thickness, respectively. The geonet serves as a leak detection mechanism allowing any potential leakage through the primary liner to flow to the leachate leakage detection sump. The pump-out riser serves as a mechanism to detect leakage through the 60 mil liner, as well as to remove and dispose back into the pond any potential leachate leakage. The leachate ponds are sized for nominal capacities of approximately 8,000m<sup>3</sup> and 12,000m<sup>3</sup>.

## **Snow Removal**

Snow which has accumulated within the cell area but has not come in contact with the waste is removed, stockpiled within the cell(s), tested and then disposed of in the run-on control system of ditches and natural drainage contours. Surface discharge of the stockpiled snow will occur



following sampling and analysis for the parameters listed in Schedule 1.2 of the *Hazardous Waste Regulation* or for parameters approved by the BC Ministry of Environment. Tervita will exercise extreme care when clearing snow within the Landfill to insure there is no loss of containment integrity at the Landfill. This care includes no heavy equipment work near berms or exposed liner sections.

Due to the protective layer of waste on the liner, much of the snow in the cell(s) may be in contact with waste. Snow accumulated in the active area of the Landfill will be managed as leachate.

## **6.4 Leachate Monitoring**

Leachate must regularly be removed from the system to maintain operating levels as per Section 26(6) of the HWR. As per Section 26(1) (b) (ii) of the HWR, the leachate collection systems of the secure and non-secure landfill will be inspected weekly and/or immediately after a major storm or catastrophic event to ensure proper functioning and to determine if leachate is being generated or accumulated. This leachate may be moved to the leachate storage ponds or storage tanks. Secondary containment for leachate storage tanks must be 110% of the volume of the largest tank. Leachate monitoring will be reported to the Ministry of Environment in the Annual Report submission, as per section 9.3(j) of Permit No. PR-16078.

Leachate monitoring includes:

- leachate network inspections,
- analytical results,
- recording of leachate levels, and
- volume disposed/discharged/sent for alternate re-use.

## **7.0 Surface Water Management and Monitoring**

### **7.1 Surface Water Characterization**

Surface water is collected for the whole landfill footprint with no differentiation between the secure and non-secure landfill. Prior to any surface water release, a sample is collected and analyzed as per the parameters listed in Schedule 1.2 of the HWR. In the first sampling event of the year all parameters of Schedule 1.2 will be conducted and if it passes reduced sampling will be conducted for subsequent discharge events. The timing of the first sampling even may vary but is usually late spring when ice has melted. Table 2, shows the parameters to be conducted prior to surface water discharge. Toxicity, and BOD are not run in subsequent events because surface water is discharged to land and not an aquatic environment thus have little bearing on the environment's health. Dioxin TEQ, Phenol, PCBs, Total Chlorinated Phenols and Total Organic Halogens will not be run in subsequent events because Tervita does not routinely accept waste impacted with these parameters.

**Table 2: Surface water Sampling Parameters**

Parameter	First Sampling Event of the Year	Subsequent Sampling Events
pH	6.5 to 8.5	6.5 to 8.5
Temperature	32°C	32°C
Total Suspended Solids	20	20
Toxicity	100% effluent	
Aluminum, Dissolved	0.5	0.5
Ammonia, total (expressed as nitrogen)	2.0	2.0
Antimony, Dissolved	0.25	0.25
Arsenic, Dissolved	0.1	0.1
Barium, Dissolved	1.0	1.0
Boron, Dissolved	10.0	10.0
Cadmium, Dissolved	0.05	0.05
Chromium, Dissolved (hexavalent)	0.1	0.1
Chromium, Total	0.5	0.5
Cobalt, Dissolved	0.1	0.1
Copper, Dissolved	0.1	0.1
Cyanide, (weak and dissociable)	0.1	0.1
Fluoride, Dissolved	15	15
Lead, Dissolved	0.1	0.1
Manganese, Dissolved	0.5	0.5
Mercury, Total	0.001	0.001
Molybdenum, Dissolved	0.5	0.5
Nickel, Dissolved	0.5	0.5
Selenium, Dissolved	0.05	0.05
Tin, Dissolved	0.5	0.5
Zinc, Dissolved	0.2	0.2
5 day BOD	20.0	
Dioxin TEQ	15 pg/L	
Oil	10	10
Phenol	0.2	
Polychlorinated Biphenyls, total	0.005	
Total chlorinated phenol	0.006	
Total organic halogens (as Cl)	1.0	

\* Maximum concentration or range in (mg/L) unless otherwise specified. pg/L is the abbreviation for picograms per litre.

\*\* pH units are the negative log of the hydrogen ion concentration.

## 7.2 Surface Water Removal and Disposal

Prior to any surface water release a sample is collected and analyzed as per the parameters listed in Table 2 or for parameters approved by the BC Ministry of Environment.

Surface water collected in the drainage network and pond will be managed in the following ways:

- Discharge to the environment.

- Deepwell disposal, if the water does not meet discharge requirements and treatment is cost prohibitive
- Site Use for construction and dust control.
- Reuse for hydraulic fracturing in the oil and gas industry.

### **Discharge to the Environment**

As per Table 2, Tervita will conduct the sampling and analyses of the parameters prior to release and will pass Schedule 1.2 of the HWR. If the surface water meets the standard for discharges, the water will be released to land. Surface water is pumped out to Tervita land directly north and northwest of the surface water pond. If the surface water fails discharge criteria, treatment may be considered depending on the economics and feasibility. Treatment options will vary depending on the failed parameters.

### **Deepwell Disposal**

If the surface water fails discharge to the environment criteria, Tervita has the ability to send the water to an approved disposal facility if treatment is not economically feasible. Surface water will be tested for parameters required by the authorized treatment and disposal facility. Tervita's Oilfield Waste Management Facilities also process waste and have QA/QC programs in place to ensure fluids meet 1b criteria prior to injection.

### **Site Use**

Surface water may be used at the Facility for construction and/or dust suppression. Prior to use on-site the water will be tested for criteria stated in Table 2 and will pass Schedule 1.2 of the HWR.

### **Reuse for hydraulic fracturing in the oil and gas industry**

If the surface water meets the criteria in Table 2 and passes Schedule 1.2 of the HWR, the surface water may be reused as makeup water for oilfield fracturing operations and/or other industrial uses where the surface water can be used to offset freshwater. Tervita will work with the user(s) of the surface water to ensure the proper regulatory requirements are in place before withdrawal(s) occur.

## **7.3 Surface Water Management**

### **Run-on Controls**

As shown in design drawings (Appendix 5), the landfill cell is surrounded by earth berms. The berms are approximately one (1) meter in height, and consist of compacted native clay till placed above a prepared subgrade. In addition to earth berms, ditching is in place to prevent surface water from ponding in the vicinity of the landfill area. The ditches and roads are sloped to allow for drainage around and away from the landfill cells.

No surface water can enter the landfill cell unless water depth exterior to the cell exceeds the berm height of one (1) meter. Ditches along the perimeter direct water to the surface water collection and retention pond.

## **Run-off Controls**

Any precipitation falling directly on the treatment or landfill cell areas is contained within the cell and eventually enters the leachate collection system and is managed as leachate. The leachate is removed and disposed of at an approved disposal facility or can be re-circulated onto the waste fill for dust control during the summer months.

Waste placement procedures require that one (1) meter of freeboard be maintained within the Landfill cells to prevent breaches of containment during periods of elevated run-off.

## **Surface water Collection / Retention System**

The surface water collection and retention system consists of a scheme of graded drainage ditches and swales, minimizing run-on from adjacent lands, while intercepting, controlling and guiding surface water from the Landfill site to the surface water retention pond and minimizes the possibility of site surface water entering landfill cells. The drainage system will contain storm water that falls upon the working areas of the Landfill site and discharge it to the retention pond. The retention pond has been designed to accommodate and contain site storm water for a 1 in 25 year, 24 hour storm event. The volume stored in the retention pond is maintained to allow for sufficient surface water retention in the event of a 1 in 25 year storm event. As additional landfill cells are approved and developed, the drainage ditches and swales will be modified to address site drainage needs as required.

## **7.4 Surface Water Monitoring**

Surface water must regularly be removed from the system to maintain operating levels as per Section 26(6) of the HWR. As per Section 26(1)(b)(i) of the HWR, the surface water collection system will be inspected weekly and/or immediately after major storm or catastrophic event. The inspection of the surface water system will include the inspection of liners and covers to check for evidence of deterioration, malfunction or leaks. Surface water monitoring will be reported to the Ministry of Environment in the Annual Report submission as per section 9.3(i) of Permit No. PR-16078. Surface water monitoring includes: inspections of the surface water controls, analytical and volume disposed/discharged/sent for alternate reuse.

## **8.0 Landfill Leak Detection Monitoring**

Secure landfill cells are equipped with a primary composite liner, consisting of a 60 mil HDPE liner underlain by a GCL and 600 mm of embankment clay, a leak detection/secondary leachate collection layer consisting of 2 sided geocomposite drainage medium, a secondary minimum 1,000 mm CCL and leachate collection system. The leak detection system between the primary composite liner and secondary CCL consists of high flow geonet synthetic drainage media connected to a drain system and collection sump.

The leak detection system will be inspected weekly and immediately after any storm event or catastrophic event to ensure proper functioning. If any deficiencies or malfunctions are noted during the inspection the works will be immediately repaired.

It is anticipated that the leak detection system will continuously have groundwater infiltration due to the shallow water table. Tervita monitors select analytical in leak detection fluids and measures volumes removed monthly via an internal tracking form. If or when fluid(s) are, detected Tervita will initiate an investigation to determine the source of the fluid(s). If it is determined through the investigative process that the fluid(s) are a result of leaks, Tervita will report; as per section 26(5) of the HWR. Parameters run on leak detection fluids are listed in Table 3 and are indicator parameters are can be compared against groundwater results If results don't indicate a leak, then water can be transferred to the surface water management system. If fluid indicates a leak, then the leak detection fluid will be directed to the leachate management system.

**Table 3: Leak Detection Sampling Parameters**

Parameters	Results
Chlorides	
pH	
Oil and Grease	
Total Suspended Solids (TSS)	
Sulphate	
Benzene	
Toluene	
Ethyl Benzene	
Xylenes	
Aluminum, dissolved	
Antimony, dissolved	
Arsenic, dissolved	
Barium, dissolved	
Cadmium, dissolved	
Cobalt, dissolved	
Copper, dissolved	
Lead, dissolved	
Manganese, dissolved	
Molybdenum, dissolved	
Nickel, dissolved	
Selenium, dissolved	
Tin, dissolved	
Zinc, dissolved	
Mercury, Total	

## 9.0 Landfill Cell Development

### 9.1 Soil Conservation

Where practical, topsoil and subsoil is salvaged and stockpiled separately. The stockpiles are located in a stable area unaffected by landfilling operations and are separated by a minimum of three (3) meters. All topsoil stockpiles are located on undisturbed topsoil and all subsoil stockpiles are located on undisturbed subsoil.

Relocation of existing stockpiles may be required as part of landfill development and additional clearing activity may be required for stockpile relocation.

The topsoil stockpiles are contoured, stabilized and seeded to prevent soil loss by wind and water erosion. If necessary, stockpiles will be wetted to prevent wind erosion.

Topsoil and subsoil salvage are immediately suspended for the preservation of topsoil and subsoil as per the below examples:

- wet or frozen field conditions will result in the admixing, degradation or compaction of topsoil or subsoil; or
- high wind velocities create the potential for the loss of topsoil or subsoil; or
- any other field conditions will result in the admixing, degradation or loss of topsoil or subsoil.

During the placement of final cover on cells, the stockpiled soil and subsoil will be used as part of the final cover system. Subsoil and topsoil will be placed in a 400 mm and 100 mm thick layers respectively before being revegetated.

### 9.2 Waste Filling Operations

All waste to be landfilled is weighed over the scale and pertinent information recorded. Site orientations help in directing unloading operations. In addition, landfill personnel are present when loads are being dumped. This is important to ensure that the dumping operation is properly supervised and that landfill staff can observe the nature of material being unloaded. This screening ensures the waste matches the description of the material provided by the generator prior to disposal.

Access for solid waste filling is via the access road and ramps leading into the operating cell. This access road system is maintained throughout active filling operations. The road is maintained by grading, gravel surfacing and removal of any contaminated material on an as-needed basis.

After unloading at the location specified by the landfill operator, trucks exit the landfill along the same access road. Vehicles with known tare weights will immediately exit the landfill. All other vehicles are weighed out upon exit. Care must be taken to ensure vehicles using the weigh scale on the exit do not hinder incoming traffic. Site equipment is used to place material into its final location.

In order to tie-in the progressive cap, the waste is placed to 1.0 meters below the inside top of the perimeter berm. A general slope of 3% - 5% or greater is used across working areas to ensure and maintain good drainage as per Section 27(8)(b)(v) of the *Hazardous Waste Regulation*.

Exterior final slopes will be graded at a maximum 30% incline. Progressive placement of final cover on slopes that have been filled to grade will ensure long term stabilization of the slopes. Final design grades for the waste fill have been set based on an expected practical height from an operations perspective.

### 9.3 Cover Operations

Ongoing cover operations will meet the full intent of BC MoE regulations by providing sufficient cover to reduce odours and prevent dusting, while also meeting operational requirements.

The climate at the Tervita Northern Rockies and the moisture content of the incoming waste should limit the potential for “dusting problems”. Regardless, water will be applied as required to prevent dust dispersal. Within the cell, leachate may be used for dust control where possible. Surface water that passes the criteria in Table 2 may be used for dust control on roadways and will pass Schedule 1.2 requirements of the HWR.

Cover requirements are largely dependent on the nature and volume of incoming wastes. Cover operations for the site will be refined through ongoing observation and assessment. Daily cover is not required at the Landfill due to the nature of the waste accepted, but must be compacted and contoured daily.

### 9.4 Liner Damage

In the event that damage to the geomembrane and/or compacted clay liner occurs during operations, the following steps will be taken:

- Operations will cease in the area where liner damage has been identified and the area will be cordoned off.
- The Landfill Manager will immediately contact the Area Manager.
- The Landfill Manager will notify the facility Environment and Regulatory Advisor and/or the Health and Safety Advisor.
- In the event of a spill/release from the damaged area, the Environment and Regulatory Advisor will notify BC MoE - Environmental Protection Division, within one (1) business day (24 hours not including weekends, holidays etc.) as per Section 4.8 of Permit PR-16078. Tervita will also adhere to the process and procedures presented in the BC *Spill Reporting Regulation* (Sections (2) and (3)) if a spill is released to the environment.
- Landfill staff will use hand equipment (shovels) to carefully clear any material well away from the immediate area of liner damage and will examine the liner to determine the extent of the damage.
- Landfill operations staff will assess whether damage occurred as a result of operations, i.e., dozer blade causing a tear, or whether the defect could have been a result of other causes. For all damage and repairs, the landfill operator will precisely locate (by means of the waste placement grid) and document the damage. Documentation and photographs will be taken and kept on file at the landfill. A copy of all documentation will be sent to the Environment and Regulatory Advisor and/or the Health and Safety Advisor in the form of a 4-Hour Notification Form.
- A Tervita incident report will be sent to the Environment and Regulatory Advisor and/or the Health and Safety Advisor (cc: Operations support, Area Manager).
- Operations will then contact the Operations Support Representative in Engineering and Construction to discuss the damage and best methodology for repair.

- Operations will schedule and oversee the repair.
- Operations will obtain a detailed repair log from the repair contractor.
- Operations will submit the repair log (referenced to the incident report) to the Environment and Regulatory Advisor and/or Health and Safety Advisor.
- The Environment and Regulatory Advisor will submit the incident report along with the repair log as part of the Annual Landfill Report.

## **10.0 Nuisance Control Program**

The facility will be kept clean and controls will be established and maintained to minimize the escape of waste/litter from the landfill site. All supporting structures, buildings and storage areas will be kept clean and in an orderly manner. All signs and equipment will be kept clean and in reasonable shape. Tervita will recover any waste or waste by products that are released from the cell.

Tervita does not anticipate large amounts of litter as a result of operations given that the majority of material accepted is not in a format that is easily dispersed. Tervita will however, ensure any litter that collects onsite is retrieved and disposed of appropriately on a regular basis. Any litter that is transported to adjacent properties or outside the limits of the Landfill will be retrieved promptly. If litter enters privately owned lands, proper landowner consent will be obtained prior to litter retrieval.

## **11.0 Closure/Post-closure**

### **11.1 Progressive Closure**

To reduce leachate generation and to satisfy Section 26(3)(b) of the HWR, Tervita will place either linear low-density polyethylene (LLDPE), or other suitable material. A 3<sup>rd</sup> party engineering company will assess the stability and settling of the waste under the temporarily capped waste. Instances where the a 3<sup>rd</sup> party engineer has deemed an area suitable for final cover/temporary cap based on the geotechnical analysis, final cover or temporary cap will be placed to reduce leachate generation.

### **11.2 Closure Cost Estimate**

Tervita will provide an updated closure cost estimate for the Facility each year with the annual report proposing the security for the following year. The cost estimate will be prepared or reviewed by a suitably qualified, independent third party.

### **11.3 Closure Plan**

As per section 14(4)(a) of Hazardous Waste Regulation, Tervita will notify the Director within 90 days after receiving or producing the final quantity of hazardous waste at the facility. Tervita will implement the approved Closure Plan as seen in Appendix 6, which will address the requirements under Section 14(4)(b) of the HWR.



## 11.4 Post - Closure

Tervita will prepare a Post-Closure Plan prior to the closure of the Northern Rockies Landfill as per section 27(9) of the Hazardous Waste Regulations. The following components will be addressed in the Post-Closure Plan:

- Maintaining the integrity and effectiveness of the final cover,
- Maintaining and monitoring the leak detection system, reporting any migration of leachate through the liner,
- Maintaining and operating the leachate collection and removal system and keeping records of any leachate removed,
- Maintaining and operating the groundwater monitoring system,
- Maintaining the drainage control system, and
- Protecting and maintaining the survey benchmarks.

## 12.0 Contact Information

### Northern Rockies Landfill Contact Information

Area Manager

Mike Johnson

BC

(250) 794-4191 (office)

s.22

(cell)

Northern Rockies Landfill

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(250) 774-3027 (office)

Office

(250) 774-3028 (fax)

---

Landfill Manager

Chris Shaver

(250) 774-3027 (office)

s.22

(cell)

Tervita – Area Environment and Regulatory Advisor

Peter Nelson

(403) 234-4875 (office)

s.22

cell)

Tervita – Area Health and Safety Advisor

Lela Gauthier

(780) 830-3333 (office)

**Tervita 24 hour Emergency Response**

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**1-888-842-8733**

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## General Response Information

BC Ministry of Environment 1-800-663-7867

Spill Reporting (Emergency Management BC) 1-800-663-3456

## **Appendix 1 – Tervita Northern Rockies Environmental Assessment Certificate**

**In the matter of the  
ENVIRONMENTAL ASSESSMENT ACT  
S.B.C. 2002, c. 43  
(Act)**

and

**in the matter of an  
APPLICATION  
for an  
Environmental Assessment Certificate  
(Application)**

by

**CCS CORPORATION  
(Proponent)**

for the

**NORTHERN ROCKIES SECURE LANDFILL PROJECT  
(proposed Project)**

**ENVIRONMENTAL ASSESSMENT CERTIFICATE # WD09-01**

**Whereas:**

- A. The Proponent proposes to develop the Project at its existing Northern Rockies Landfill at Mile 285 of the Alaska Highway, within British Columbia Treaty 8 territory, and approximately 20 km south of Fort Nelson, BC. The proposed Project is for the long-term storage of up to 2,200,000 cubic metres of hydrocarbon- and salt-contaminated materials generated from upstream oil and gas activities over an anticipated lifespan of 25 to 30 years;
- B. The proposed Project constitutes a reviewable project pursuant to Part 6 of the *Reviewable Projects Regulation* (B.C. Reg. 370/02), since the proposed Project would be a secure landfill for the long-term, off-site storage of hazardous wastes;
- C. On March 28, 2007, the Executive Director, in accordance with section 4 of the Act, delegated certain statutory and regulatory powers and duties in relation to the proposed Project to a Project Assessment Manager;

- D. On March 28, 2007, the Project Assessment Manager issued an Order under section 10(1)(c) of the Act, stating that the proposed Project requires an environmental assessment certificate;
- E. On July 5, 2007, the Project Assessment Manager issued an Order under section 11 of the Act, outlining specific procedures for the assessment, including notification procedures, opportunities for agencies, First Nations and the public to provide comments, and time limits for various steps in the assessment procedure;
- F. On February 27, 2008, the Project Assessment Manager issued an Order under section 13 of the Act amending paragraph 12.5 of the section 11 Order;
- G. On October 6, 2008, the Project Assessment Manager determined that the Application submitted by the Proponent contained the required information, thereby starting the application review stage of the environmental assessment;
- H. From October 24, 2008 to November 23, 2008, the Environmental Assessment Office invited public comment on the Application;
- I. The Project Assessment Manager prepared a report on the assessment of the proposed Project entitled the "Northern Rockies Secure Landfill Assessment Report" (Assessment Report);
- J. The Executive Director referred the Application, the Assessment Report and Recommendations of the Executive Director pursuant to section 17 of the Act, to the Minister of Environment and the Minister of Community Development (Ministers); and,
- K. The Ministers have considered the Application, the Assessment Report, and the Recommendations of the Executive Director.

**Now Therefore,**

The Ministers, pursuant to section 17(3) of the Act, hereby issue this Certificate to the Proponent for the proposed Project, subject to the following conditions (Conditions):

**Conditions**

1. The Proponent must cause the proposed Project to be designed, located, constructed, operated and decommissioned in accordance with the Conditions of this Certificate, the documents listed in Schedule A, and the Proponent's Table of Commitments in Schedule B, and must comply with all of the Conditions of this Certificate to the reasonable satisfaction of the Minister of Environment (Minister).
2. Where, in the reasonable opinion of the Minister, there is a conflict or inconsistency between any of the documents listed in Schedule A, Condition 1 must be interpreted so that the contents of the later-dated document will vary,

repeal, rescind or supersede, as the case may be, the earlier-dated documents listed in Schedule A.

3. Where, in the reasonable opinion of the Minister, there is a conflict or inconsistency between any of the documents listed in Schedule A and the Proponent's Table of Commitments in Schedule B, Condition 1 must be interpreted so that Schedule B will vary, repeal, rescind or supersede, as the case may be, the earlier-dated documents listed in Schedule A.
4. Where, in the reasonable opinion of the Minister, there is a conflict or inconsistency between Schedules A or B and the Conditions which follow, these Conditions must take precedence over and supersede the relevant provision(s) of Schedules A or B.
5. The Proponent must submit a report to the Executive Director on the status of compliance with the Conditions of this Certificate, and the commitments in Schedule B, four weeks prior to significant surface disturbance during construction, four weeks prior to full scale operation, and once a year following the start of operation of the proposed Project until decommissioning or as required by the Executive Director.
6. This Certificate is of no force or effect until signed by the Ministers.
7. This Certificate does not constitute a permit, licence, approval or any other authority required under any other enactment.
8. The Proponent, except in connection with granting security to proposed Project lenders or other financing entities or financing facilities, must obtain the written consent of the Minister, such consent not to be unreasonably withheld, prior to disposing, whether legally, beneficially or otherwise, of:
  - a) this Certificate or any right, title or interest conferred by this Certificate; and
  - b) the proposed Project.

#### **Duration of Certificate**

9. The Proponent must have, in the reasonable opinion of the Minister, substantially started the construction of the proposed Project within five years of the date of issue of this Certificate, otherwise this Certificate expires.

#### **Suspension, Cancellation and Amendment of Certificate by Minister**

10. This Certificate may be subject to cancellation, suspension in whole or in part, amendments, or the attachment of new Conditions, for any of the following reasons:
  - a) the Minister has reasonable and probable grounds to believe that the Proponent is in default of:
    - i. an order of the Courts under section 35(2), 45 or 47 of the Act;
    - ii. an order of the Minister made under section 34 or 36 of the Act; or,

iii. one or more requirements or Conditions of this Certificate.

- b) the Proponent or its officers or employees when acting on behalf of the Proponent, have been convicted of an offence under the Act, with respect to the proposed Project; or,
- c) an order is made or a resolution is passed, for the winding up, or dissolution of the Proponent, or the Proponent is in receivership or bankruptcy proceedings, without such order or resolution being rescinded or stayed and, in the case of any of the foregoing, the Minister has reasonable and probable grounds to believe that a breach of, or default under, this Certificate has occurred or is likely to occur.



Honourable Barry Penner  
Minister of Environment



Honourable Kevin Krueger  
Minister of Community Development

Issued this 31<sup>st</sup> day of March, 2009, in Victoria, British Columbia.

The Conditions of this Certificate are agreed to by the Proponent this

19<sup>th</sup> day of MARCH, 2009.



Rick Wise  
Vice President, Engineering, Regulatory and Midstream Development  
CCS Corporation



## **SCHEDULE A**

### **DOCUMENTATION AND CORRESPONDENCE FOR THE NORTHERN ROCKIES SECURE LANDFILL PROJECT (proposed Project) Produced for CCS Corporation.**

October 6, 2008	Application and supporting Appendices for an Environmental Assessment Certificate for the proposed Project, submitted to the Environmental Assessment Office by CCS Inc. (Proponent) on October 6, 2008, (on separate enclosed CD).
March 11, 2009	Letter from Alastair Graham (on behalf of Proponent) requesting that if an EA Certificate is issued for this proposed Project, it should be issued to CCS Corporation rather than CCS Inc.
March 12, 2009	Letter from Alastair Graham (on behalf of Proponent) providing a correction to terminology in the Application, specifically changing references to a "Traditional Land Use/Traditional Environmental Knowledge Study" to a "First Nations Site Assessment".
March 18, 2009	Letter from Lana Lowe (on behalf of Fort Nelson First Nation) to the Project Assessment Manager, regarding the Proponent's commitments with respect to the acceptance of wastes containing elevated levels of Naturally Occurring Radioactive Material at the proposed Project.
March 18, 2009	Letter from Alastair Graham (on behalf of Proponent) regarding the Proponent's commitments regarding acceptance of naturally occurring radioactive material

## **Appendix 2 – Tervita Northern Rockies EAO Report and Recommendations**

Schedule B: Table of Proponent Commitments - Proposed CCS Northern Rockies Secure Landfill					
Ref #	Impact Type	Activity Type(s)	Potential Impact(s)	Commitment	Status
Construction Phase					
1	Soil	Site preparation, grading, compacting	Loss or mixing of topsoil due to surface disturbance	The Proponent will ensure to the satisfaction of the Ministry of Environment that a final topsoil and subsoil salvage, storage, and reclamation plan will be developed for the site prior to construction. The location of soil stockpiles will be documented in the plan. Soil stockpiles will be re-vegetated to minimize losses through wind and/or water erosion. Re-vegetation will take place as soon as practicable. Salvaged topsoil and subsoil will be used in reclamation during landfill development and in final reclamation of the site.	
2	Wildlife	Site preparation, grading, compacting	Reduced habitat effectiveness	The Proponent will ensure to the satisfaction of the Ministry of Environment that any additional clearing activity required is scheduled to occur outside of the breeding period for any bird species nesting in the vicinity of the Project site when possible. Final timelines for construction are contingent upon receipt of all required approvals.	
3	Wildlife	Construction equipment and traffic	Direct animal mortalities	The Proponent will ensure that CCS personnel are aware of the need to abide by all speed limits on site and in transit to the site and encourage contractors to do so.	
4	Wildlife	Construction equipment and traffic	Direct animal mortalities	The Proponent will ensure to the satisfaction of the Ministry of Environment that a no firearms/no hunting/no pets policy for all CCS personnel and contractors on the Project site is enforced.	
5	Surface Water	Landfill development	Increased sediments in storm water runoff	The Proponent will ensure to the satisfaction of the Ministry of Environment that potentially impacted storm water run-off from the proposed Secure Landfill development will be directed to an existing catchment pond and that on-site erosion control is utilized if required.	
6	Surface Water	Landfill development	Contamination of surface water due to accidental release of chemicals and fuel during construction	The Proponent will ensure to the satisfaction of the Ministry of Environment that all surface water runs to a collection pond on site. This pond will be visually inspected on a weekly basis and tested prior to release of water.	

7	Surface Water	Landfill development	Contamination of surface water due to accidental release of chemicals and fuel during construction	The Proponent will ensure to the satisfaction of the Ministry of Environment that chemical and fuel storage during the construction phase is limited to small volumes in temporary areas (i.e. truck mounted fuel tanks for excavating equipment, cases of lube oil stored in equipment storage locker).	
8	Surface Water/Soil	Landfill development	Contamination of surface water due to accidental release of chemicals and fuel during construction	As a precaution to deal with the potential for accidental release of chemicals, the Proponent will ensure to the satisfaction of the Ministry of Environment that the construction contractor maintains a spill response plan to manage the surface assessment, mitigation and remediation, including notification to the BC Ministry of Environment, of any spills.	
9	Groundwater	Landfill development	Groundwater contamination	The Proponent will ensure to the satisfaction of the Ministry of Environment that monitoring of groundwater wells continues during the construction phases if applicable.	
10	Noise	Site preparation, grading, compacting	Noise from construction activities at seasonal residence 650 m away from site.	The Proponent will ensure to the satisfaction of the Regional Municipality of Fort Nelson that construction noise occurs only during the daylight hours and there is no construction at night.	
11	Air	Site preparation, grading, compacting	Dust from the movement of construction vehicles	The Proponent will ensure to the satisfaction of the Regional Municipality of Fort Nelson that roadways are watered to reduce the amount of dust created during construction, if required.	
12	Surface Water/Soil/ Ground Water	Environmental monitoring	Contamination of surface water/soil/ground water	The Proponent will ensure to the satisfaction of the Ministry of Environment that storage of process chemicals or fuel (petroleum hydrocarbons) will not be located below ground. The design of above ground storage of these products will reduce of the possibility of uncontrolled release.	
<b>Operation Phase</b>					
13	Soil	Waste acceptance and placement/ ongoing operation	Soil contamination	The Proponent will ensure to the satisfaction of the Ministry of Environment that design standards for the engineered liners and leachate collection system meet or exceed regulatory requirements.	
14	Soil	Waste acceptance and placement/ ongoing operation	Soil contamination	The Proponent will ensure to the satisfaction of the Ministry of Environment that leachate is actively moved to storage ponds.	

15	Wildlife	Waste acceptance and placement/ ongoing operation	Direct animal mortalities/morbidity, bioaccumulation	The Proponent will ensure to the satisfaction of the Ministry of Environment that all active treatment and disposal cells are fenced to avoid access by and unnecessary conflict with wildlife and that the design of such fencing does not incorporate the use of barbed wire as determined through consultation with Fort Nelson First Nation.	
16	Wildlife	Work force	Direct animal mortalities	The Proponent will ensure that CCS personnel are aware of the need to abide by all speed limits on site and in transit to the site and encourage contractors to do so.	
17	Wildlife	Work Force	Direct animal mortalities	The Proponent will ensure that a no firearms/no hunting/no pets policy for all CCS personnel and contractors on the Project site is enforced.	
18	Surface Water	Waste acceptance and placement/ ongoing operation	Contamination of surface water	The Proponent will ensure to the satisfaction of the Ministry of Environment that a surface water run-off system is in place so that all surface water runs to the run-off catchment pond in the northern portion of the facility. Pond water will be sampled prior to release to ensure it meets discharge criteria and the pond will be visually inspected on a weekly basis.	
19	Surface Water	Cell development and capping	Contamination of surface water	The Proponent will ensure to the satisfaction of the Ministry of Environment that a surface water run-on system is in place and designed to prevent contact between surface water run-on and waste materials.	
20	Surface Water	Environmental monitoring	Contamination of surface water	The Proponent will ensure to the satisfaction of the Ministry of Environment that all water within the disposal cells and any water that comes in contact with waste is treated as leachate.	
21	Soil/ Ground Water	Waste acceptance and placement/ ongoing operation	Contamination of soil / ground water	The Proponent will ensure to the satisfaction of the Ministry of Environment that a leak detection system is in place for the primary liner system and that the leak detection system is monitored routinely as directed by the Ministry of Environment.	
22	Ground water	Waste acceptance and placement/ ongoing operation	Contamination of ground water	The Proponent will ensure to the satisfaction of the Ministry of Environment that the ground water monitoring plan/program is updated by a qualified 3rd party professional.	
23	Ground Water	Cell development and capping	Contamination of ground water	The Proponent will ensure to the satisfaction of the Ministry of Environment that no groundwater is used at the facility during construction.	

24	Soil/Air/Surface Water	Waste transportation	Release of waste	The Proponent will ensure to the satisfaction of the Ministry of Environment that wastes transported to the site are inspected to determine that they have been covered during transportation to minimize loss during transit and take appropriate action if they are not.	
25	Surface Water/Soil/ Ground Water	Environmental monitoring	Contamination of surface water/soil/ground water	The Proponent will ensure to the satisfaction of the Ministry of Environment that storage of process chemicals or fuel (petroleum hydrocarbons) will not be located below ground. The design of above ground storage of these products will reduce of the possibility of uncontrolled release.	
26	Surface Water/Soil/ Ground Water	Waste acceptance and placement/ ongoing operation/ final capping and reclamation	Contamination of surface water/soil/ground water	As a precaution to deal with the potential for accidental release of chemicals, the Proponent will ensure to the satisfaction of the Ministry of Environment that a spill response plan is maintained at the facility to manage the surface assessment, mitigation and remediation, including notification to the BC Ministry of Environment, of any spills.	
27	Social	Employment	Employment opportunities	The Proponent will ensure that when hiring or contracting for construction and operation phases, fair consideration will be given to local employment when possible.	
28	Safety	Employment	Safety	The Proponent will ensure that staff and contractors are briefed of known hazards and the need to obey posted speed limits and signal well in advance of the landfill entrance.	
29	First Nations Concerns	Environmental Assessment	Ongoing Consultation	The Proponent will host a tour of the Northern Rockies facility for Doig River First Nation.	
30	First Nations Concerns	Environmental Assessment	Ongoing Consultation	To the satisfaction of the Ministry of Environment and in consultation with First Nations the proponent will evaluate the effectiveness of waterfowl landing deterrent measures in place at the facility and modify them if required.	

31	First Nations Concerns	Environmental Assessment	Ongoing Consultation	The Proponent will ensure that wastes with elevated levels of NORM above background at Northern Rockies are not accepted without Fort Nelson First Nation's involvement in determining the level of NORM to be accepted and until Fort Nelson First Nation is sufficiently aware of the risks, including the long term risks, associated with the disposal of waste containing elevated levels of NORM at Northern Rockies. If after one year from the date of issuance of an Environmental Assessment Certificate, Fort Nelson First Nation and CCS cannot come to agreement on an appropriate NORM disposal strategy for Northern Rockies, we note that final decision making authority is retained by BC Ministry of Environment.	
32	First Nations Concerns	Environmental Assessment	Ongoing Consultation	The Proponent will ensure that reasonable resources are provided to Fort Nelson First Nation to assist in verifying the limits proposed by the Radiological Assessment Report and making an informed decision on what level can be accepted without posing any long term risk to the environment or the community.	
33	First Nations Concerns	Environmental Assessment	Ongoing Consultation	The Proponent will comply with its commitment to BC Treaty 8 First Nations to apply the terms of the December 11th, 2007 Settlement Agreement between the Proponent and Treaty 8 First Nations and the Treaty 8 Tribal Association to the proposed Project should it be determined that conditions for the disposal of NORM similar to those in effect at CCS' Silverberry Secure Landfill near Fort St John are appropriate for the proposed Project. The potential application of this agreement to the proposed Project as it relates to the contribution to the "environment fund" is described in section 6.2 of the Settlement Agreement.	
34	First Nations Concerns	Environmental Assessment	Ongoing Consultation	The Proponent will share information with Fort Nelson First Nation including information regarding NORM containing loads received, trends in radiation levels at the site, NORM gate monitoring results, groundwater and surface water NORM monitoring results and general information regarding radiation and radioactive materials.	
35	First Nations Concerns	Closure	Ongoing Consultation	The Proponent will seek input from First Nations on compatible land use when decommissioning the facility.	

36	First Nations Concerns	Ongoing Operation /Closure	Ongoing Consultation	As part of its commitment to ongoing consultation with BC Treaty 8 First Nations throughout the construction, operating and decommissioning of the proposed Project, the Proponent will ensure that Annual Landfill Reports (prepared in accordance with BC Ministry of Environment Permit PR-16078) are available in the landfill office for review by First Nations.	
37	Regulatory	Environmental Assessment	Ongoing Consultation	The Proponent will ensure to the satisfaction of the Regional Municipality of Fort Nelson that landowners, residents and occupants in the vicinity of the existing facility are updated as the Project progresses.	
38	Regulatory	Ongoing Operation	Regulatory	The Proponent will ensure to the satisfaction of the Ministry of Environment that an Operations Plan is in place for the site that includes required information on ground water monitoring, leak detection monitoring, leachate management and surface water management plans.	
39	Regulatory	Ongoing Operation	Regulatory	The Proponent will continue reporting in accordance with BC Ministry of Environment Permit PR-16078.	
40	Regulatory	Ongoing Operation	Regulatory	The Proponent will ensure that a gate monitor is in place to detect unscheduled NORM containing waste loads in accordance with BC Ministry of Environment Permit PR-16078.	
41	Regulatory	Ongoing Operation	Regulatory	The proponent will submit construction Quality Assurance/Quality Control information to BC Ministry of Environment in accordance with Permit PR-16078.	
42	Regulatory	Closure	Regulatory	The Proponent will ensure that financial security is retained throughout the construction, operating and decommissioning phases in accordance with BC Ministry of Environment Permit PR-16078.	
43	Regulatory	Closure	Regulatory	The Proponent will ensure that a seed mix approved by BC Ministry of Environment is used for revegetation at the facility.	
44	Regulatory	Ongoing Operation /Closure	Regulatory	The Proponent will ensure the facility is audited in accordance BC Ministry of Environment Permit PR-16078.	
45	Regulatory	Ongoing Operation /Closure	Regulatory	The Proponent will comply with the terms of BC Ministry of Environment Permit PR-16078.	



### **Appendix 3 – Tervita Northern Rockies Ministry of Environment Section 51s**

June 25, 2009

**REGISTERED MAIL**

CCS Corporation  
Suite 2400, 530-8<sup>th</sup> Avenue SW  
Calgary AB T2P 3S8

Dear CCS Corporation:

**Re: Applications Under Section 51 of the Hazardous Waste Regulation, by CCS Corporation, Dated August 22, 2008**

In accordance with Section 51.(8) of the *Hazardous Waste Regulation*, CCS's requests for changes in requirements of the *Hazardous Waste Regulation*, as outlined below, are granted subject to the following conditions:

**1) Section 25(3)**

*Section 25(3) states "No person shall locate a secure landfill where the landfill (including the underlying dual liners) cannot be constructed... (a) entirely above the seasonally high water table, and (b) with a minimum separation depth of 3m of unsaturated soil material with a permeability less than  $1 \times 10^{-6}$  cm/s above a seasonally high water table including the zone of capillary rise."*

The issue of the proposed location of the landfill in a high water table area was considered in a review by the Ministry's Regional Hydrogeologist. His review concurred with CCS's assessment that a benefit of locating the base of a landfill below the water table is a decrease in advective transport. In addition, CCS has submitted detailed plans for installing a liner system which will meet the performance standards outlined in the *Hazardous Waste Regulation*. As such, the potential for impacts to groundwater have been significantly reduced.

**2) Section 26(3)**

*Section 26(3) states "The owner of a secure landfill shall, as one or more cells are being filled,... (a) operate under cover of a portable structure that acts as a roof to keep out rain and snow; or (b) design another system to prevent leachate generation during operation."*

In light of the prohibited waste included in condition (3) below and the proposal for the leachate collection system design and maintenance, a roof to keep out rain and snow is deemed unnecessary.

### 3) Section 27(1)

*Section 27(1) states "The owner of a secure landfill shall not use or operate the secure landfill to dispose of any waste listed in Schedule 3."*

In general, this secure landfill is restricted to taking waste generated by upstream oil and gas activities. As such, Schedule 3 in the *Hazardous Waste Regulation* shall be replaced with the following list of prohibited wastes:

1. Liquids,
2. Waste materials which contain free liquids,
3. Containers with:
  - a. Liquids, or
  - b. Waste materials which contain free liquid,
4. Empty waste containers unless they are crushed, shredded or similarly reduced in volume to the maximum practical extent,
5. Materials having properties of substances defined and regulated in Class 1 through Class 8 of the Transportation of Dangerous Goods Regulations of Canada (TDG) excluding UN3175 Solids Containing Flammable Liquids,
6. Materials having properties of substances defined and regulated in Class 9 of the TDG,
7. Materials listed as "forbidden" in column 3 of Schedule 1 of the TDG,
8. Wastes which contain Benzene, Toluene, Ethylbenzene and/or Xylene (BTEX) in total combined concentrations greater than 1,000 mg/kg,
9. Wastes which contain halogenated organic compounds, except for tetrachloroethylene, in total concentrations greater than 100 mg/kg,
10. Wastes which contain tetrachloroethylene in total concentrations greater than 500 mg/kg,
11. Wastes which contain dioxin TEQ, as defined by the *Hazardous Waste Regulation*, in a concentration greater than 100 parts per billion by weight,
12. Waste which when subjected to the Modified Leachate Extraction Procedure, referenced in Part 2 of Schedule 4 of the *Hazardous Waste Regulation*, produce an extract which contains one or more contaminants in Column 1 of Table 1 of Schedule 4 in concentrations equal to or greater than the concentration specified for each contaminant in Column II of the Table except for BTEX,

13. Oil products covered under the BC Used Oil Management Association, including but not limited to oil, oil filters and oil containers,
14. Recyclable Oily Rags,
15. PCB Wastes,
16. Radioactive wastes, except for Naturally Occurring Radioactive Material (NORM) which meets and is handled in accordance with the requirements of Section 6.4 of Permit 16078.

#### 4) Section 27(3) (b) (i)

*Section 27 (3) (b) (i) states "The owner of a secure landfill shall design, construct, install and maintain a leachate detection, collection and removal system that includes the following minimum characteristics: (b) a leachate collection system that is... (i) installed at a slope greater than 2%, in a porous material drainage layer with a minimum thickness of 0.75 m and permeability greater than  $1 \times 10^{-5}$  cm/s immediately above the upper liner,..."*

In consideration of the prohibited waste included in condition (3) and CCS's proposal to construct a liner system which is designed to incorporate a geocomposite layer calculated to have almost two orders of magnitude greater flow capacity than that which is specified in the *Hazardous Waste Regulation* for secure landfill drainage layers, the changes proposed by CCS are acceptable.

#### 5) Section 27(8) (b) (v)

*Section 27(8) (b) (v) states "The owner of a secure landfill shall, during closure of the landfill or any cell...(b) install and construct for the secure landfill a final cover with the following minimum characteristics: (v) graded and maintained to prevent ponding and having slopes of 3% to 5%."*

Section 27(8) (b) (v) shall be replaced with: "graded and maintained to prevent ponding and having slopes of a minimum 5% and a maximum 30%."

#### 6) Schedule 4 Part 3, Free Liquid Test Procedure

The *US EPA 9095A Paint Filter Liquids Test* shall replace the Free Liquid Test Procedure set out in Schedule 4 Part 3.

The above changes in the requirements of the *Hazardous Waste Regulation* have been requested by CCS Corporation to accommodate the nature of the waste being landfilled. The changes apply exclusively to the proposed CCS secure landfill located south of Fort Nelson within District Lot 1692, Peace River District, except Plan 29474. All other provisions of the *Hazardous Waste Regulation* remain in effect.

These changes are conditional on operating the facility in compliance with the terms and conditions of a valid *Environmental Management Act* Permit issued to CCS Corporation authorising the operation of a secure landfill.

Under the provisions of Section 51.(10), the director may cancel or amend this decision.

Yours truly,

A handwritten signature in black ink, appearing to read 'Del Reinheimer', with a long horizontal flourish extending to the right.

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

/bvn

## **Appendix 4 – HWR Design and Performance Standards**

Date: March 24, 2017 File: 2014.3525.06.E.05.00  
To: Tervita Corporation - Colin Penniket  
From: Norm Richards, P.Eng.  
Project: Northern Rockies Landfill - Cell 6 Expansion  
Subject: Design Relative to HWR Requirements

## MEMO

This memo is intended to demonstrate how relevant design elements of the Northern Rockies Landfill Expansion – Cell 6 meet the performance requirements contained in the British Columbia Hazardous Waste Regulation (HWR). The design related clauses of Section 27, Performance Requirements, of the HWR are repeated below in bold font with our corresponding comments shown in italics.

### Performance Standards:

- 27 (2) The owner of a secure landfill must design, construct, install and maintain a dual liner system**
- (a) to prevent any migration of wastes out of the landfill to the adjacent subsurface soil or groundwater during the operating life and after closure,**
  - (b) with both liners constructed of impervious materials that prevent wastes from passing into or through the liner during the life of the facility, and**
    - (i) if composed of soil or clay, each being not less than 0.5 m thick, and**
    - (ii) if synthetic, each being at least 1 mm thick,**

*The proposed design significantly exceeds the above requirements for a dual liner system. The top liner is composite consisting of a 1.5 mm thick HDPE geomembrane underlain by a geosynthetic clay liner (GCL) and a 600 mm compacted clay layer. The GCL meets the HWR definition for impermeable as it meets the required permeability of less than  $1 \times 10^{-7}$  cm/s. The proposed composite top liner is substantially superior to a single liner of either GCL or geomembrane.*

*The bottom liner in the dual liner system is comprised of a 1000 mm thick compacted clay liner (CCL) with a permeability less than  $1 \times 10^{-7}$  cm/s.*

*The liner system configuration is shown on Drawing 107 of the expansion design drawings.*

- (c) with both liners constructed of materials having appropriate chemical properties, strength and thickness to prevent failure due to any of the following:**

- (i) pressure gradients;**

*It is not expected that there will be significant hydraulic gradients exerted on the liner system. Any hydraulic upward gradients will, in any event, be eliminated by the leak detection system layer to prevent any upward forces on the top composite liner.*

- (ii) contact with the waste or leachate to which the liners may be exposed;**

*The top component of the liner system is a 1.5 mm thick HDPE geomembrane. HDPE is widely accepted as the material of choice for landfill liners and has appropriate chemical and physical properties for the application.*

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March 24, 2017

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**(iii) climatic conditions;**

*The liner systems have appropriate properties for the climate. As noted in the specifications liner installation can only take place during appropriate weather conditions. A frost protection layer of waste also needs to be placed within a maximum time frame.*

**(iv) stress of installation and operations, and**

*The construction specifications provide installation and Quality Assurance and Quality Control (QA/QC) stipulations to ensure the final product meets requirements.*

**(d) with the liner system placed on base materials capable of providing support and resistance to pressure gradients above and below the liner system to prevent failure due to compression, uplift or settlement.**

*Based on data compiled for the Site for the Proposed Groundwater Monitoring Program (June 2009) the material underlying the landfill comprises an approximately 35 m-thick succession of low permeability clay/silt till with interbedded, discontinuous sands. This is an adequate foundation of base materials to provide support and resistance to pressure gradients above and below the liner system to prevent failure due to compression, uplift or settlement.*

**(3) The owner of a secure landfill must design, construct, install and maintain a leachate detection, collection and removal system that includes the following minimum characteristics:**

**(a) a leak detection system between the 2 liners to detect any leaks or migration of liquid into the space between the liners;**

*A leak detection system between the two liners is included in the design.*

**(b) a leachate collection system that is**

**(i) installed at a slope greater than 2%, in a porous material drainage layer with a minimum thickness of 0.75 m and permeability greater than  $1 \times 10^{-3}$  cm/s immediately above the upper liner,**

*The main consideration in a leachate system drainage layer is long term flow capacity. The flow capacity of a system as described in point (i) above can be calculated as follows (not including potential reduction factors for items such as biological and chemical clogging); the volume flow rate is equal to the thickness multiplied by hydraulic conductivity (permeability) and the slope of the base. The flow rate would then be equal to  $0.75 \text{ m} \times 1 \times 10^{-5} \text{ m/s} \times 0.02 \times 1.0 \text{ m (unit width)} = 1.5 \times 10^{-7} \text{ m}^3/\text{s}$  per metre width of drainage media.*

*The proposed leachate drainage system is comprised of a two-sided geocomposite drainage layer with a required transmissivity of at least  $3 \times 10^{-3} \text{ m}^2/\text{s}$ . The transmissivity is equal to the hydraulic conductivity multiplied by the layer thickness. Since the proposed Cell 6 floor is*



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*sloped at approximately 1.5%, the volume flow (again, neglecting reduction factors) would be  $3 \times 10^{-3} \text{ m}^2/\text{s} \times 0.015 \times 1.0 \text{ m (unit width)} = 4.5 \times 10^{-5} \text{ m}^3/\text{s}$  per metre width of drainage media.*

*Applying reduction factors as per GRI-GM 13 for biological clogging (1.3), chemical clogging (2.0) and long term creep (2.0) results in a corrected flow volume of  $8.65 \times 10^{-6} \text{ m}^3/\text{s}$ .*

*The proposed geocomposite drainage layer will also be protected by a 200 mm thick sand buffer layer between the waste and geocomposite.*

**(ii) constructed of materials that are**

**(A) chemically resistant to waste placed in the landfill and any leachate which might be generated, and**

*The main component of the leachate collection system is the geocomposite drainage layer which is comprised of polypropylene filter cloth on both sides of a polyethylene grid core. These materials are chemically resistant to expected possible constituents of the leachate or waste.*

**(B) of sufficient strength to prevent failure due to pressure of overlying loads in the secure landfill, and**

*The materials in the leachate collection system are suitable for anticipated overlying loads.*

**(iii) designed and constructed to prevent clogging during the life of the facility;**

*As noted above, potential clogging has been allowed for in the design capacity of the system.*

**(c) a storage facility suitable to allow removal of leachate.**

*A primary leachate sump and extraction point is located at the east end of the landfill cell 5. A leachate storage pond at the south of the facility provides for substantial additional leachate storage.*

**(5) The owner of a secure landfill must design, construct and maintain**

**(a) a system capable of preventing water from draining onto any cells of the secure landfill, and**

*A system of berms and ditches are included in the design to prevent surface water from at least 1:25 year 24 hour storm event.*

**(b) a system to collect and control water draining from any cells of the secure landfill during a storm with a magnitude that is exceeded, on average, only once in 25 years.**

*Tervita is aware that they will need to provide adequate temporary storage within the cell for interior run-off from a 1:25 year storm or greater.*

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In our opinion, the Northern Rockies Landfill Expansion – Cell 6 design meets or exceeds all design Performance Standards of the HWR.

Please contact me if you have any questions.

Regards,



Norm Richards, P.Eng.  
Project Manager

## **Appendix 5 – Design Drawings**



EARTH MATTERS

NORTHERN ROCKIES  
LANDFILL EXPANSION - CELL 6  
INDUSTRIAL WASTE MANAGEMENT FACILITY  
SECURE LANDFILL  
FORT NELSON, BRITISH COLUMBIA

FEBRUARY 2017  
PROJECT NUMBER: 20163525-14  
ISSUED FOR: TENDER AND CONSTRUCTION

**NLR/AE**  
**CONSULTANTS**

LIST OF DRAWINGS

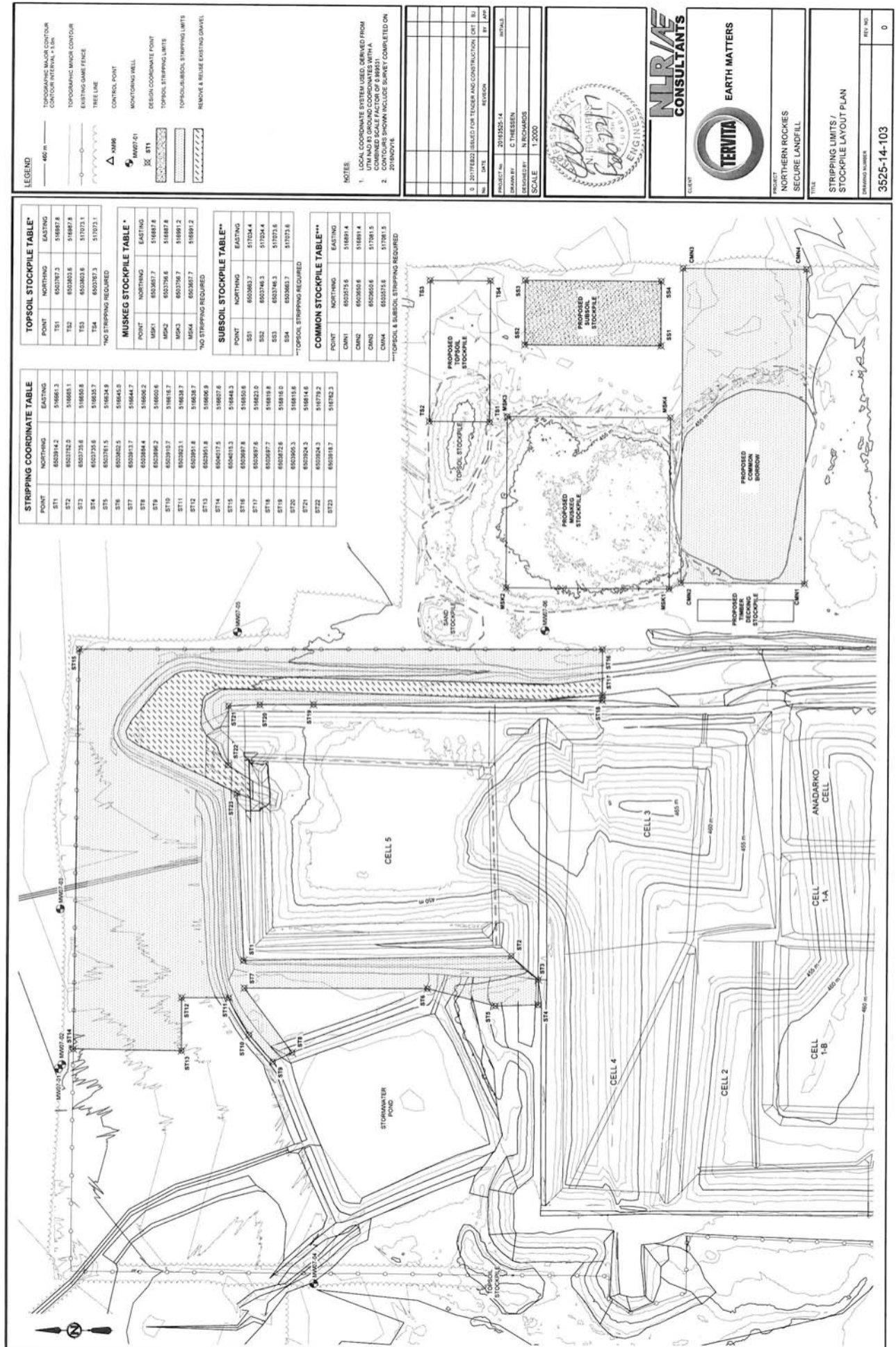
3525-14-000	COVER PAGE
<b>LANDFILL CELL</b>	
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3525-14-102	CLEARING & GRUBBING LAYOUT PLAN
3525-14-103	STRIPPING LIMITS / STOCKPILE LAYOUT PLAN
3525-14-104	CELL 6 ROAD LAYOUT PLAN
3525-14-105	CELL 6 DEVELOPMENT PLAN
3525-14-106	CELL 6 DEVELOPMENT SECTIONS
3525-14-107	DETAILS SHEET 1 OF 6
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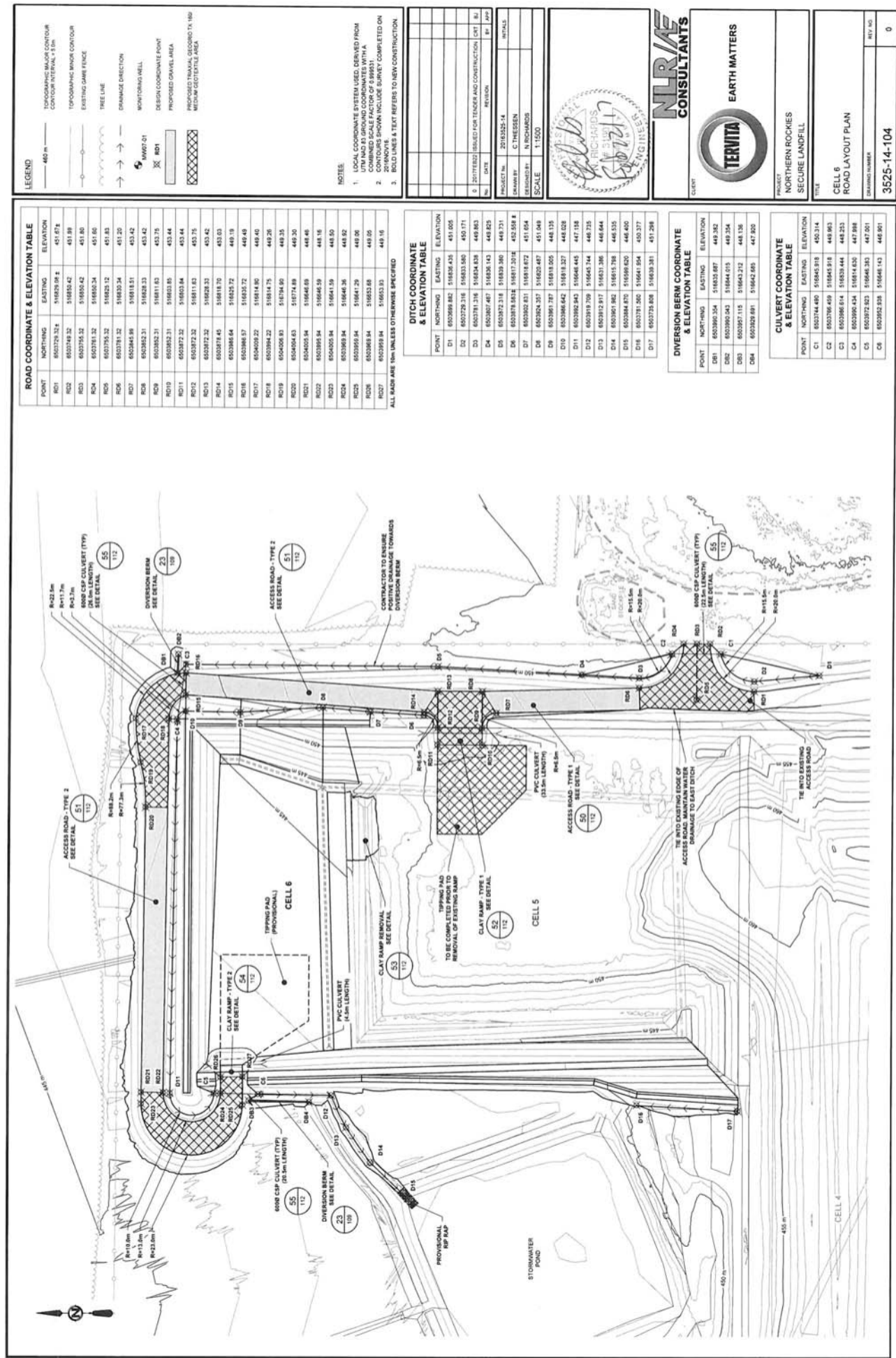
*Brett Bell* February 22, 2017  
PROJECT MANAGER DATE











# LEGEND

- TOPOGRAPHIC MAJOR CONTOUR
- TOPOGRAPHIC MINOR CONTOUR
- EXISTING GAME FENCE
- TREE LINE
- DRAINAGE DIRECTION
- MONITORING WELL
- DESIGN COORDINATE POINT
- PROPOSED GRAVEL AREA
- PROPOSED TYPICAL GRASSING 1:1, 1:2
- MEDIUM GEOTEXTILE AREA

# NOTES

- LOCAL COORDINATE SYSTEM USED. DERIVED FROM UTM AND IS GROUND COORDINATES WITH A COMBINED SCALE FACTOR OF 0.999931.
- ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.
- ALL ROAD ARE 5M UNLESS OTHERWISE SPECIFIED.

# DITCH COORDINATE & ELEVATION TABLE

POINT	NORTHING	EASTING	ELEVATION
D1	603299.82	518326.42	451.005
D2	603279.216	518333.565	450.171
D3	603271.316	518324.838	449.863
D4	603267.487	518326.143	448.821
D5	603272.118	518329.360	448.731
D6	603278.848	518171.316	452.581
D7	603282.831	518181.872	451.654
D8	603284.257	518202.487	451.548
D9	603281.737	518181.505	448.135
D10	603286.642	518181.327	448.028
D11	603282.243	518646.445	447.158
D12	603291.709	518645.744	448.735
D13	603292.927	518631.266	446.644
D14	603297.802	518615.786	446.535
D15	603284.870	518599.420	446.400
D16	603271.500	518641.954	450.377
D17	603279.808	518639.381	451.288

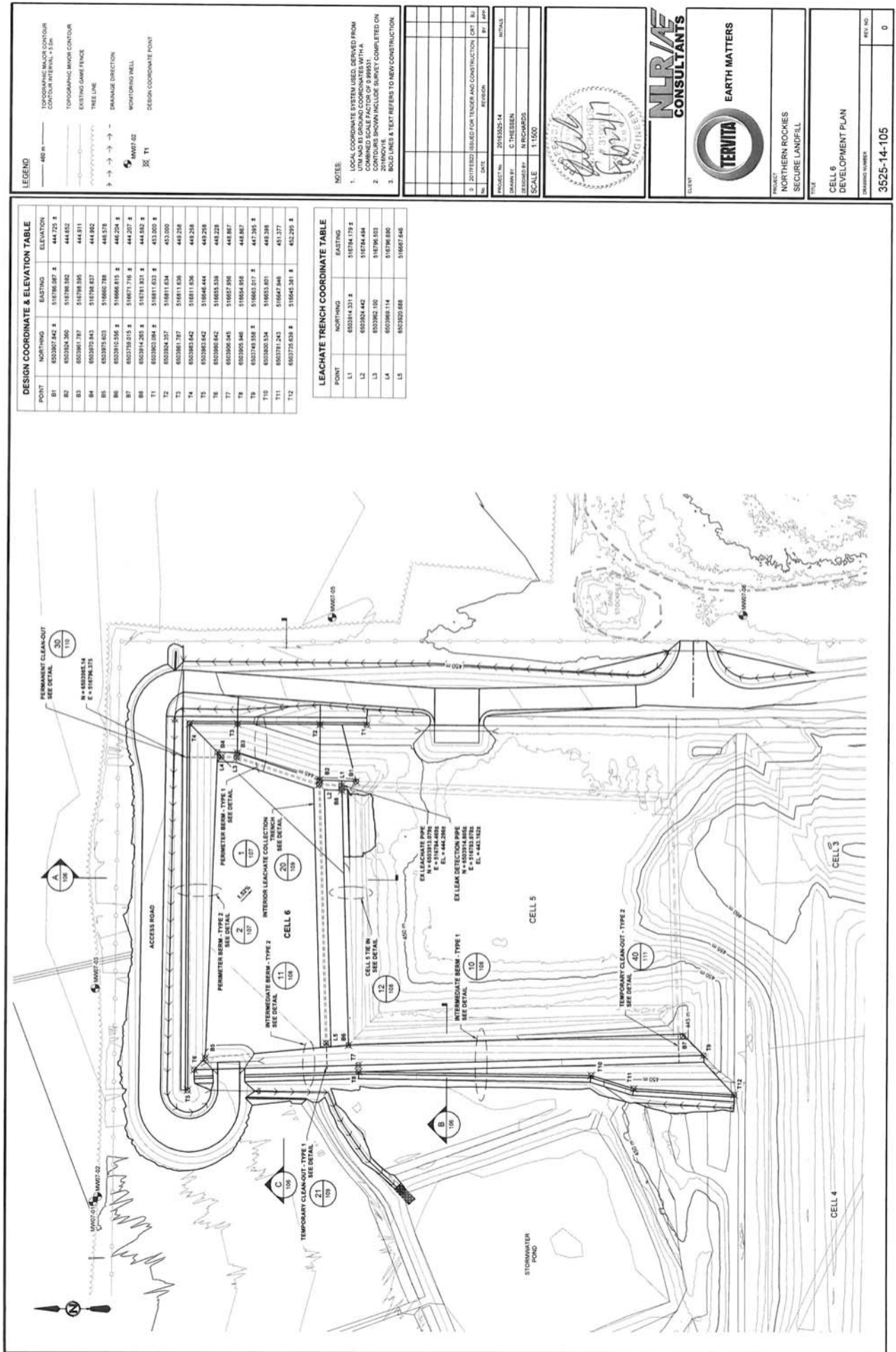
# DIVERSION BERM COORDINATE & ELEVATION TABLE

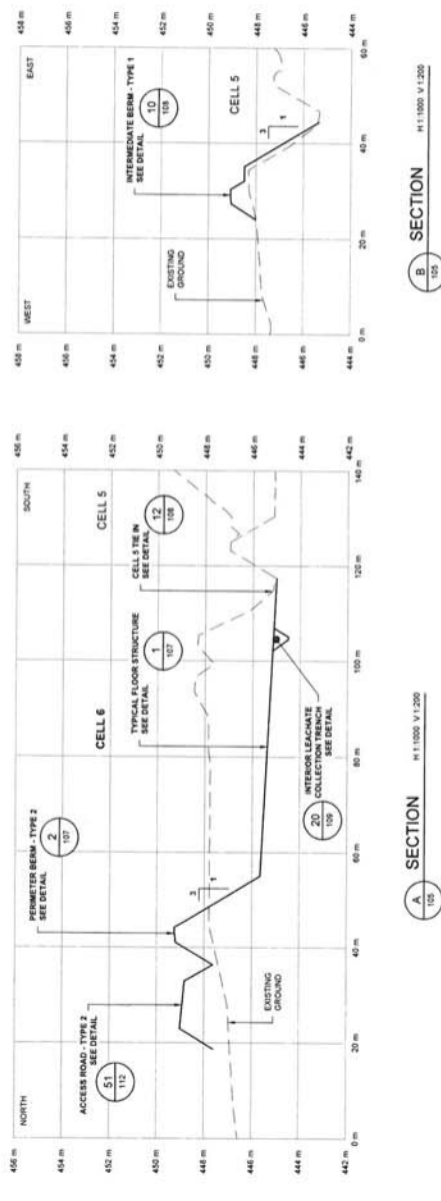
POINT	NORTHING	EASTING	ELEVATION
DB1	603290.354	518322.887	449.382
DB2	603290.043	518644.075	449.354
DB3	603297.115	518643.272	448.136
DB4	603292.891	518642.680	447.800

# CULVERT COORDINATE & ELEVATION TABLE

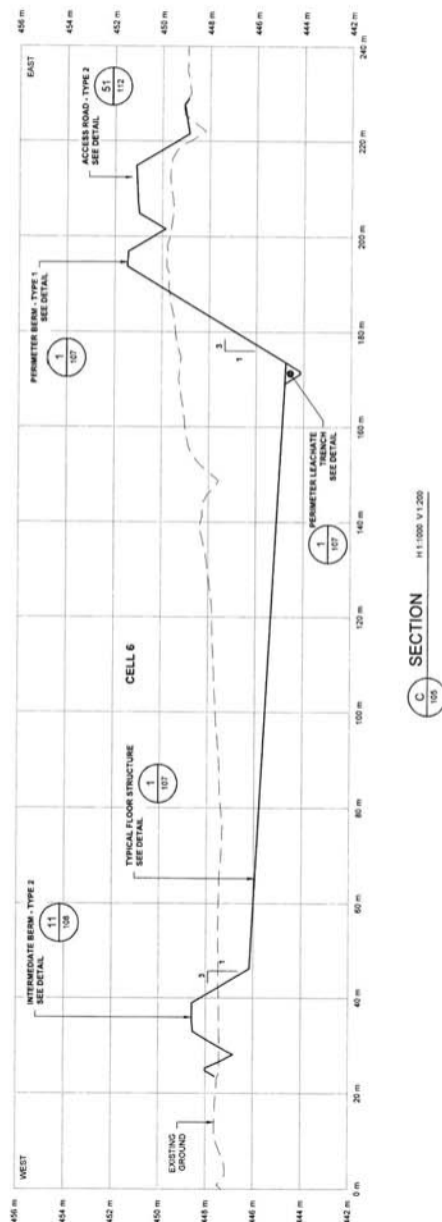
POINT	NORTHING	EASTING	ELEVATION
C1	603274.480	518645.818	450.314
C2	603276.459	518645.818	449.963
C3	603286.614	518639.444	448.253
C4	603286.434	518614.620	447.888
C5	603272.923	518646.383	447.501
C6	603292.925	518646.143	446.901







**A** SECTION  
H:1:1000 V:1:200



**C** SECTION  
H:1:1000 V:1:200

**NOTES**

1. SOLID LINE & TEXT REFERS TO NEW CONSTRUCTION
2. DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED

NO.	DATE	REVISION	BY	APP.
1	20170823	BASED FOR TENDER AND CONSTRUCTION	CHT	BU
2	20170823	REVISION	BY	JAP
3	20180525	14	INITIALS	
4	20180525	14	DESIGNED BY	C. THEISEN
5	20180525	14	DRAWN BY	N. RICHARDS
6	20180525	14	CHECKED BY	N. RICHARDS
7	20180525	14	SCALE	AS SHOWN



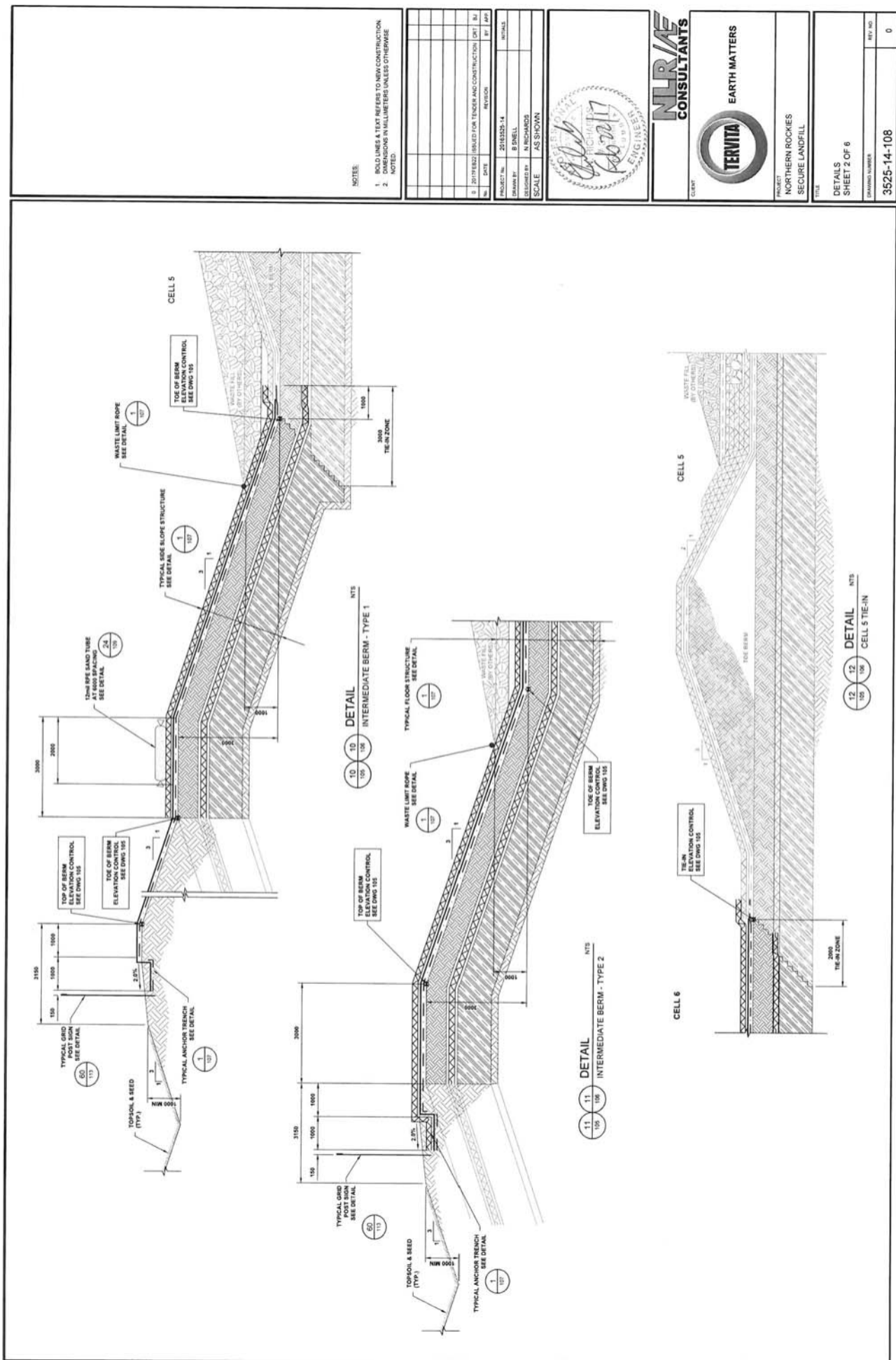
**NLR/AE**  
**CONSULTANTS**

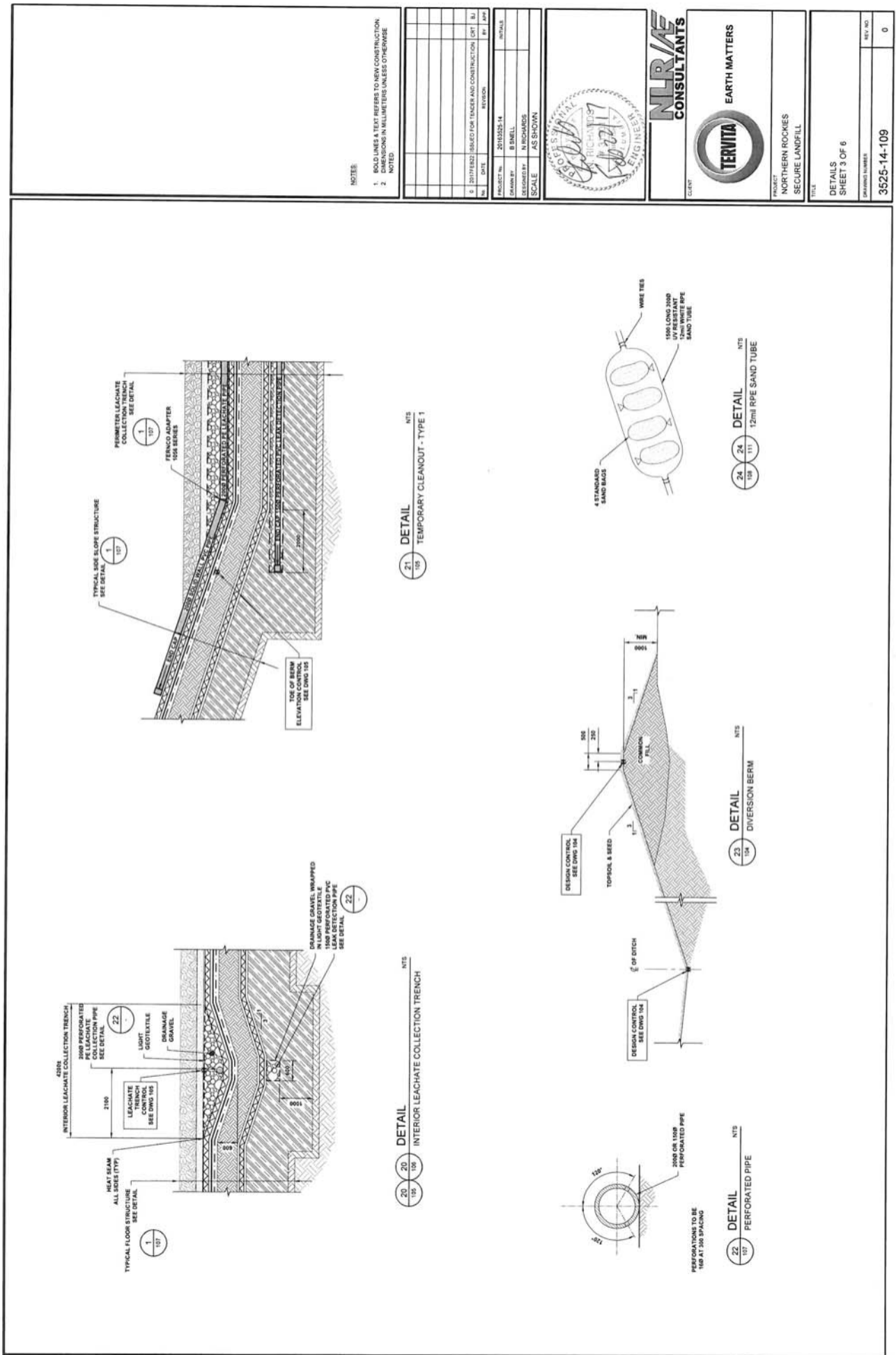


PROJECT  
NORTHERN ROCKIES  
SECURE LANDFILL

TITLE	CELL 6 DEVELOPMENT SECTIONS
DRAWING NUMBER	3525-14-106
REV. NO.	0







NOTE:

1. BOLD LINE & TEXT REFERS TO NEW CONSTRUCTION.
2. DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.

NO.	DATE	REVISION	BY	APP.
1	20150514	INITIALS		
2	20150514	INITIALS		
3	20150514	INITIALS		
4	20150514	INITIALS		
5	20150514	INITIALS		
6	20150514	INITIALS		
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8	20150514	INITIALS		
9	20150514	INITIALS		
10	20150514	INITIALS		

PROJECT NO.	20150514
DRAWN BY	B. SMITH
DESIGNED BY	N. RICHARDS
SCALE	AS SHOWN



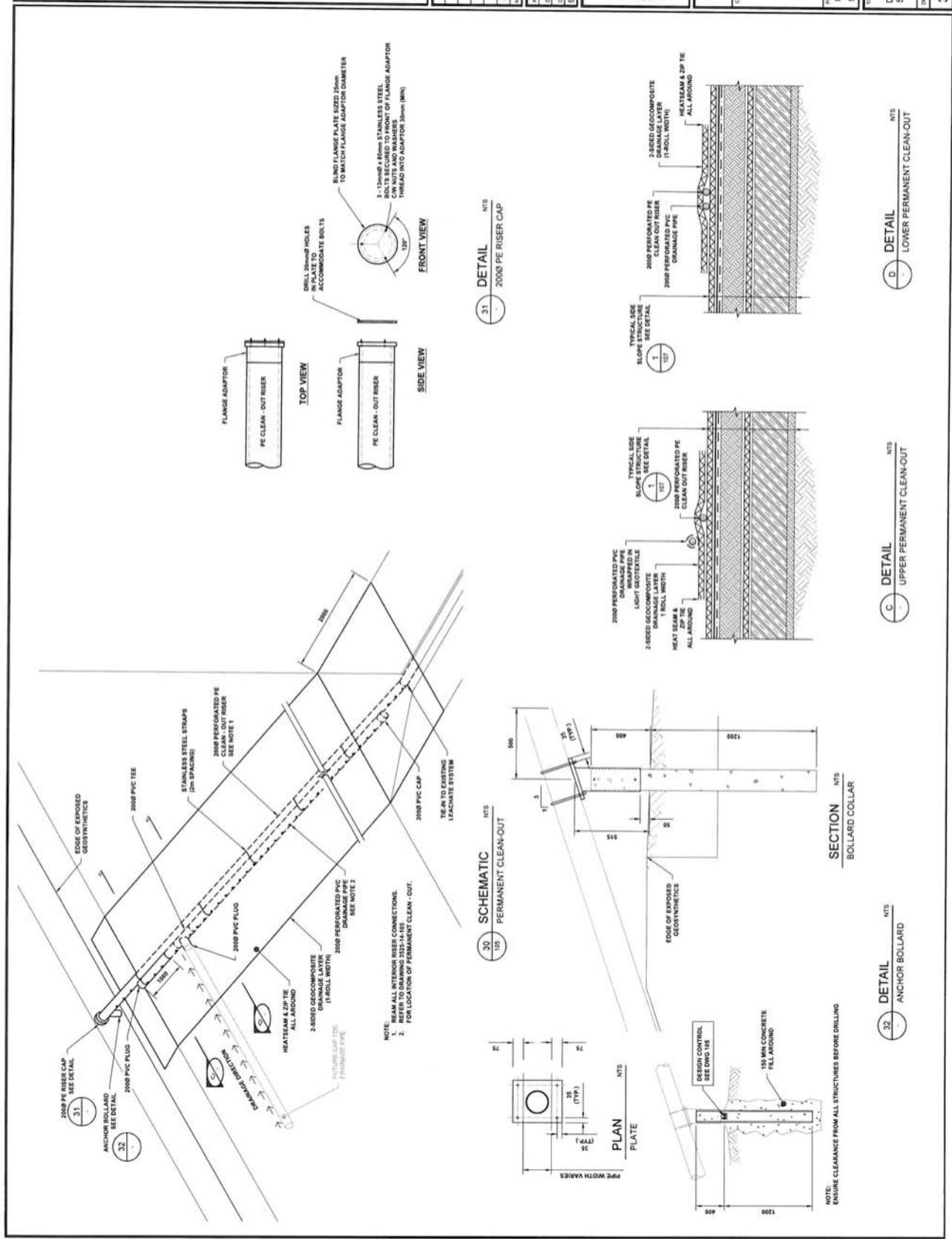
**NLR/AE**  
CONSULTANTS



PROJECT  
NORTHERN ROCKIES  
SECURE LANDFILL

TITLE  
DETAILS  
SHEET 3 OF 6

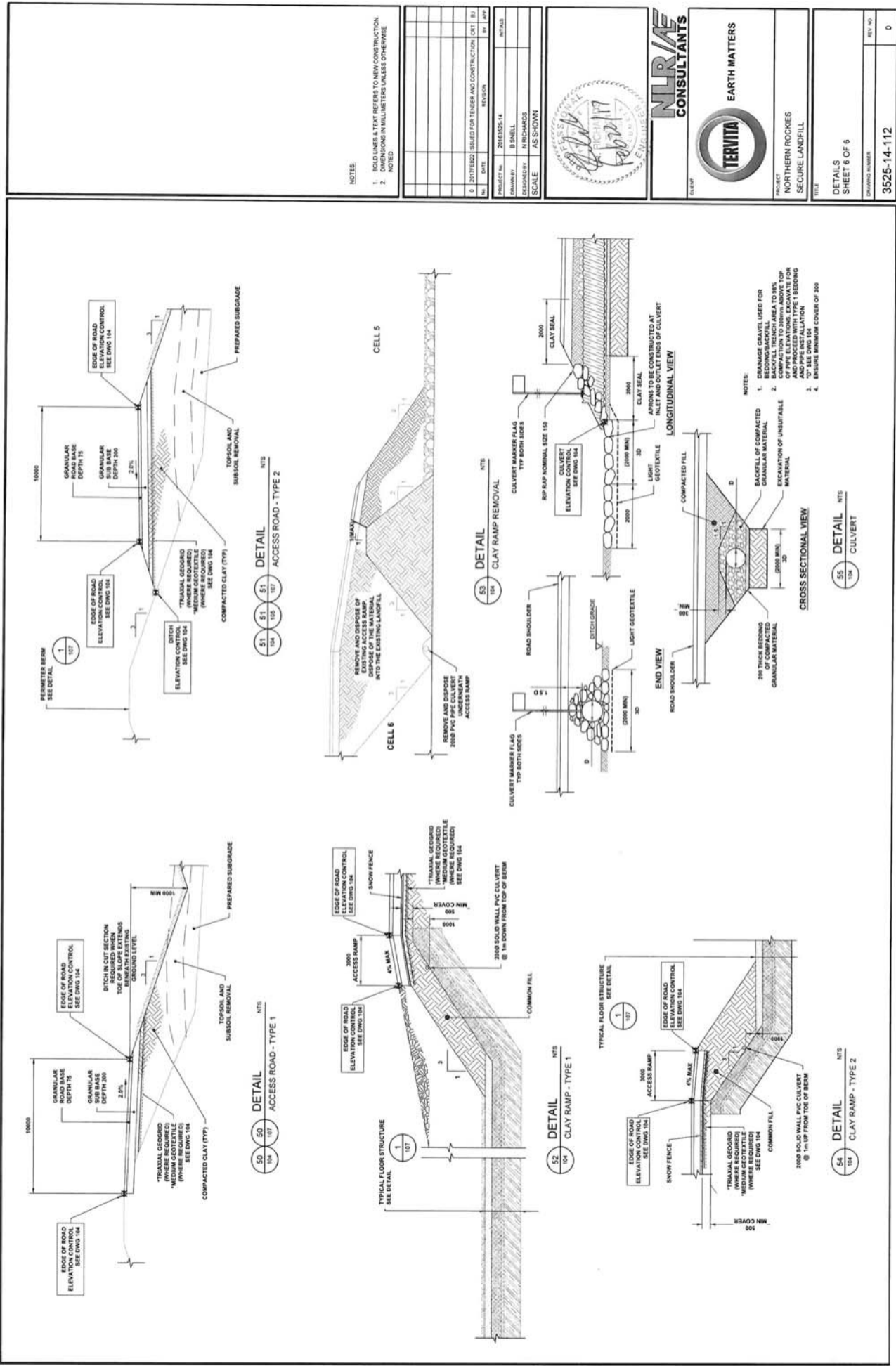
3525-14-109



<p><b>NOTE:</b></p> <ol style="list-style-type: none"> <li>1. SOLID LINES &amp; TEXT REFERS TO NEW CONSTRUCTION.</li> <li>2. DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED.</li> </ol>		<p>DATE: 2018-03-14</p> <p>BY: JPP</p> <p>PROJECT NO: 2018-03-14</p> <p>DESIGNED BY: B. SNELL</p> <p>ENGINEER: N. RICHARDS</p> <p>SCALE: AS SHOWN</p>	<p><b>NLR/AE CONSULTANTS</b></p> <p><b>TERVITA</b></p> <p><b>EARTH MATTERS</b></p> <p><b>NORTHERN ROCKIES</b></p> <p><b>SECURE LANDFILL</b></p>	<p>TITLE: DETAILS</p> <p>SHEET 4 OF 6</p> <p>DRAWING NUMBER: 3525-14-110</p> <p>REV: 0</p>
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**NOTES:**

1. NO DIMENSIONS ARE TO BE CONSIDERED UNLESS OTHERWISE NOTED.
2. DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.

NO.	DATE	REVISION
1	2017/05/14	INITIALS
2	2017/05/14	INITIALS
3	2017/05/14	INITIALS
4	2017/05/14	INITIALS
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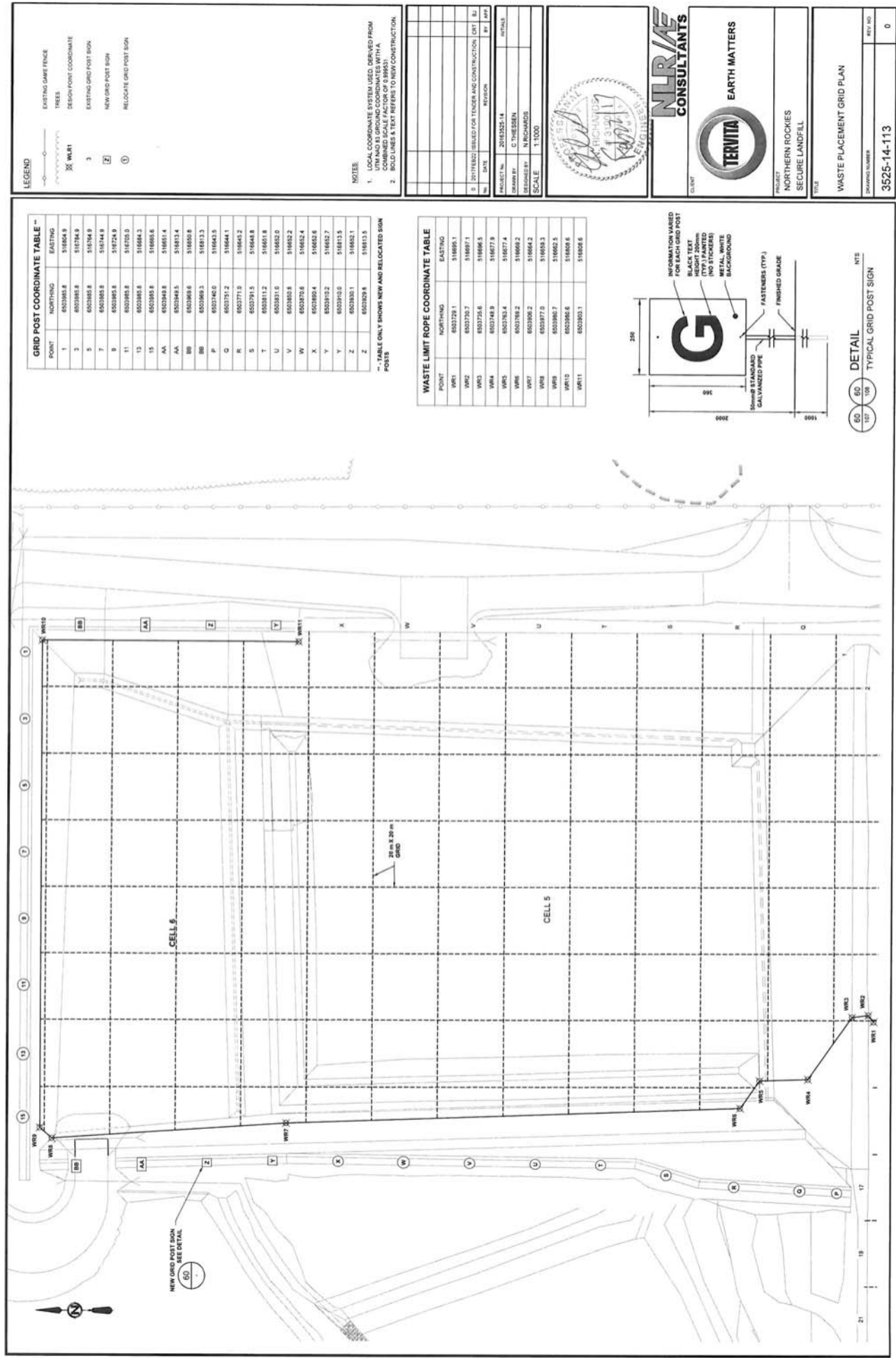
**NLR/AE CONSULTANTS**



**PROJECT**  
NORTHERN ROCKIES  
SECURE LANDFILL

<b>TITLE</b>	DETAILS
<b>SHEET</b>	6 OF 6
<b>DRAWING NUMBER</b>	3525-14-112
<b>REV. NO.</b>	0



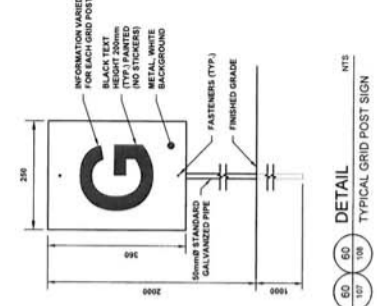


**GRID POST COORDINATE TABLE**

POINT	NORTHING	EASTING
1	603285.8	516564.9
2	603285.8	516744.9
3	603285.8	516744.9
4	603285.8	516744.9
5	603285.8	516744.9
6	603285.8	516744.9
7	603285.8	516744.9
8	603285.8	516744.9
9	603285.8	516744.9
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**WASTE LIMIT ROPE COORDINATE TABLE**

POINT	NORTHING	EASTING
W1	603279.1	516695.1
W2	603279.1	516695.1
W3	603279.1	516695.1
W4	603279.1	516695.1
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W6	603279.1	516695.1
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W89	603279.1	516695.1
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W96	603279.1	516695.1
W97	603279.1	516695.1
W98	603279.1	516695.1
W99	603279.1	516695.1
W100	603279.1	516695.1



DETAIL  
TYPICAL GRID POST SIGN

**LEGEND**

- EXISTING GAME FENCE
- TREES
- DESIGN POINT COORDINATE
- EXISTING GRID POST SIGN
- NEW GRID POST SIGN
- RELOCATE GRID POST SIGN

**NOTES**

- LOCAL COORDINATE SYSTEM USED DERIVED FROM CANADIAN DATUM 1983 WITH A COMBINED SCALE FACTOR OF 0.9993.
- BOLD LINES & TEXT REFERS TO NEW CONSTRUCTION.



**NLR/CONSULTANTS**

**TERVITA**

**EARTH MATTERS**

**NORTHERN ROCKIES SECURE LANDFILL**

**WASTE PLACEMENT GRID PLAN**

**3525-14-113**

## **Appendix 6 – Tervita Northern Rockies Closure Plan**

## REPORT

### Tervita Corporation

#### Northern Rockies Secure Landfill Closure Plan

(Site Reference Number E276103)

Revision 1



**August 2016**

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# REPORT

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9

## 1 Introduction

Tervita Corporation (Tervita) owns and operates the Northern Rockies Secure Landfill Facility (Landfill) located approximately 25 km south of the Town of Fort Nelson, British Columbia. The Landfill is located on a parcel of land within District Lot 1692 (BC/NTS location A-77G/94-J-10) 1.5 km west of Hwy 97 (Alaska Hwy) near Mile 285.

At least (or as otherwise specified by the Director) one (1) year in advance of decommissioning the Landfill, the following Closure Plan, as amended, will be submitted for the approval of the Director.

The purpose and objective of this closure plan (Plan) is to meet the requirements of the Hazardous Waste Regulation (HWR) Sections:

### Section 14(2)

- a) a schedule of how and when the facility will be closed;
- b) a description of decontamination procedures to be followed;
- c) a description and estimate of the quantity of any hazardous waste residues which will remain at the site after closure;
- d) an estimate of the total time required to close the facility;

### Section 27(9)

- a) maintaining the integrity and effectiveness of the final cover;
- b) maintaining and monitoring the leak detection system, reporting any migration through the liner(s);
- c) maintaining and operating the leachate collection system and keeping records of any leachate removed;
- d) maintaining and operating the groundwater monitoring system;
- e) maintaining the drainage control system; and
- f) protecting and maintaining the survey benchmarks.

As required by Section 10 of Permit 16078 the Plan will also contain the following information:

- a) a topographic plan showing the final elevations and contours of the landfill and surface water diversion and drainage controls;
- b) proposed end use of the site;
- c) provisions for monitoring radioactivity at the property boundaries, groundwater, surface water, landfill gas, erosion and settlement for a minimum 25 year post closure period; and
- d) provisions for maintenance and corrective measures for a minimum 25-year post-closure period.

This Closure Plan applies only to the Secure Landfill component of the Northern Rockies Facility.

## 2 Background

The Tervita Northern Rockies Landfill was originally permitted as a British Columbia Ministry of Environment (MoE) approved landfill, and was designed for the containment of industrial solid waste discharged by the oil and gas and the forestry sectors. The facility was permitted to dispose of a variety of non-hazardous waste streams. The Landfill was previously owned by the Wright family at the time it was purchased by Tervita in 2004.

At the time of purchase the Landfill was deemed to be an Engineered Landfill by the current Ministry standards. Waste Cell 1A was the portion of the future Waste Cell 1 that was constructed and completed in the year 2001. The remaining portion of Cell 1 had been designated Waste Cell 1B. The Anadarko Waste Cell was a constituent of the Landfill designated for a specific client, Anadarko Canada Corporation.

In 2007 Tervita expanded the Northern Rockies facility with the construction of Non-Secure Cell 2. A permit (Permit No. 16078) for a Secure landfill was issued under provisions of the Environmental Management Act on June 18, 2009 for all subsequent future cells that have been constructed at Northern Rockies.

## 3 Site Setting

Site topography, as shown on **Figure 101** attached in **Appendix A**, generally comprises a knob and kettle terrain. The area is comprised primarily of a morainal plain, with isolated pockets of slough-like areas. A series of ditches and a surface water retention/storm-water pond, installed as part of site operations and previous landfill development, provide surface water control and have modified and improved natural drainage toward the north-northwest. A small creek lies approximately 350 m west of the main operational area. A small, east-west trending, unnamed tributary to the Fort Nelson River lies approximately 1.2 km north of the site's northern property boundary.

Surrounding land use includes several well leases and relatively large industrial operations to the northeast (sited adjacent to the unnamed creek near its confluence with the Fort Nelson River). Undeveloped lands are characteristically tree-covered – commonly including black spruce.

The waste management facility currently includes the following major components/areas as shown on **Figure 101**:

- Secure Landfills Cells:
  - Cell 2
  - Cell 3
  - Cell 4
  - Cell 5



- Non-Secure Landfills Cells:
  - Anadarko Cell
  - Cell 1A
  - Cell 1B
  - Special Waste Holding Cells and Treatment Facility
  - Sanitary Wastewater Disposal and Treatment Facility; and
  - Offices

Additional facilities include the “Petro-Canada” waste treatment pad (not in operation), and oil/gas well-site located in the southwestern portion of the site boundaries, and scrap metal yard immediately north of the main office structures. Tervita office structures are located along the eastern part of the facility, near the main access from Hwy. 97.

## 4 Landfill Design

### 4.1 LANDFILL INFRASTRUCTURE

Existing Landfill infrastructure includes a weigh scale, a site office building, a leachate containment pond and access roads exterior to the Landfill footprint. The site office, weigh scale and leachate containment pond are operated as part of the Tervita Northern Rockies Landfill Facility as shown on **Figure 101**.

The Landfill access roads exterior to the Landfill footprint, would be used during the post-closure period to access the Landfill for inspection and maintenance purposes.

### 4.2 LINER AND LEACHATE COLLECTION SYSTEM

#### 4.2.1 Anadarko Cell and Cell 1A

The Non-Secure Landfill Cells – Anadarko and Cell 1A – are equipped with a composite liner system consisting of a 1.5 mm (60 mil) HDPE geomembrane underlain by a 600 mm thick compacted clay liner.

The leachate collection system includes a 300 mm thick, free draining, sand layer over each cell floor. Perforated leachate collection pipe runs diagonally across each cell floor, from the northeast corner to the southwest, as well as north/south parallel to the toe of the intermediate berms. The sand layer is locally built up around the perforated pipe to facilitate drainage and leachate collection.

#### 4.2.2 Cell 1B

The Non-Secure Landfill Cell 1B is equipped with a composite liner system consisting of a 1.5 mm (60 mil) HDPE geomembrane underlain by a 1000 mm thick compacted clay liner.

The leachate collection system includes a drainage layer of single sided geocomposite, geonet down, over the entire Landfill floor. The drainage layer is underlain by a series of gravel filled trenches with perforated piping leading to the leachate extraction riser located in the southwest corner of Cell 1B. Leachate can be collected via this leachate extraction riser using portable pumps and/or vacuum trucks, and then be transported to an approved treatment facility.

#### 4.2.3 Cell 2

The Non-Secure Landfill Cell 2 is equipped with a composite liner system consisting of a 1.5 mm (60 mil) HDPE geomembrane underlain by a 1100 mm thick compacted clay liner.

The leachate collection system includes a drainage layer of single sided geocomposite, geonet down, over the entire Landfill floor. The drainage layer is underlain by a series of gravel filled trenches with perforated piping leading to the main leachate extraction manhole in the southwest corner of the overall Landfill footprint.

#### 4.2.4 Secure Landfill Cells

The Secure Landfill cells are equipped with a double liner system with leak detection between the two liners. The upper liner is a composite liner with a 1.5 mm (60 mil) HDPE geomembrane underlain by a geosynthetic clay liner (GCL) and a 600 mm thick compacted clay layer. The lowermost liner is a 1000 mm thick compacted clay liner (CCL). Between the two liners is a leak detection system comprised of a two-sided geocomposite drainage layer in combination with collection trenches and extraction risers for the removal of any liquid collected within the leak detection system.

The leachate collection system includes a drainage layer, of sand and/or geocomposite over the entire Landfill floor. The drainage layer is underlain by a series of gravel filled trenches with perforated piping leading to the leachate extraction risers located in the southeast corner of Cell 3 and the southeast corner of Cell 5. Leachate can be collected via these leachate extraction risers using portable pumps and/or vacuum trucks, and then be transported to an approved treatment facility.

### 4.3 WASTE FILL

The Northern Rockies Secure Landfill is currently authorized to accept 2,200,000 m<sup>3</sup> of waste. At an estimated density of 1.7 tonnes/m<sup>3</sup> this would equate to approximately 3,740,000 tonnes of waste. As of the end of October 2014, the Landfill had received 284,866 m<sup>3</sup> of waste since operations began in 2009.

Operations of the Northern Rockies Non-Secure Landfill began in 2001 and are currently authorized to accept 238,000 m<sup>3</sup> of waste.

**Figure 102** in **Appendix A** shows the Maximum Final Grades Plan for the overall Landfill capping.

**Appendix B** contains the development plan for the Landfill, as updated at the time of Cell 5's construction (2012). The development plan shows the planned sequential development of the Landfill, including cell layout, waste filling and phased final cap installation.

### 4.4 FINAL CAP DESIGN

As shown in **Figure 104**, the final cap is proposed to consist of a geomembrane (either bituminous or linear low-density polyethylene (LLDPE)) placed directly on the graded waste material followed by 500 mm soil layer. A vegetation cover consisting of a representative native grass mix will be established and maintained on top of the completed Landfill.

As shown in **Figure 103**, a significant portion of the developed area has been filled to final grade. The intended strategy is to defer placement of the geomembrane and soil components of the final cap for a period of time to, ensure that no significant settlement or movement of the waste(s) will take place. Any necessary remedial action can then happen, before placing the final cap components.

## 5 Landfill Development Plan

### 5.1 CELL LAYOUT AND WASTE FILL VOLUMES

The overall Landfill development plan is shown in **Drawings DP101 through DP108** in **Appendix B**. The development plan shows proposed development to completion of the currently approved waste footprint.

The current status of development is shown in **Figure 103**. As shown, the Anadarko Cell, Cells 1A and 1B, and Cells 2 through 5 have been constructed with Cells 6 through 9 remaining in the currently approved Landfill footprint. A summary of waste capacities for each cell is shown on **Drawing DP 104** in **Appendix B**.

### 5.2 FINAL COVER REQUIREMENTS

As required by the HWR, Division 6 – Performance Standards, Section 27 (8)(b), the final cover configuration will consist of (from top down) vegetation cover, 500 mm thick soil layer and finally a geomembrane barrier layer. A 750 mm thick foundation layer of compacted waste soil, which will be placed as part of operations, will underlay the geomembrane component of the cap structure.

Therefore, if the Landfill needed to be decommissioned and capped between now and the next closure cost update in a year, the cover requirements have been calculated to be as follows:

Compacted Foundation Layer	–	64,185 m <sup>3</sup>	(85,580 m <sup>2</sup> @ 750 mm thick)
Geomembrane	–	137,560 m <sup>2</sup>	(minimum 1 mm thick)
Soil Layer	–	68,780 m <sup>3</sup>	(137,560 m <sup>2</sup> @ 500 mm thick)

### 5.3 SITE LIFESPAN AND FINAL END USE

The lifespan of the currently approved footprint is difficult to estimate due to the variable nature of annual waste volumes for an industrial landfill of this type. At the current average rate of approximately 160,000 tonnes per year, the remaining lifespan of the Landfill is about twenty three years.

As required by the HWR, Division 6 - Performance Standards, Section 27 (10)(b), the property title will be transferred to the Crown. The intended end land use is of a non-intensive, open, green space, re-vegetated with native grasses, allowing the former landfill area to revert to open pasture land.

## 6 Closure

### 6.1 SCHEDULE OF CLOSURE

Items relating to the schedule of closure are as follows:

- Notify the current regulatory agency, as required by the HWR, Section 14 (4)(a);
- Implement capping and closure design requirements;
- Conduct an internal Phase I assessment based on current infrastructure existing on-site;
- Decommission and remove infrastructure as required; and
- Conduct a third party Phase II assessment and assess recommendations for decontamination;

No hazardous waste is to remain on-site post-closure, with the exception of post-closure maintenance materials such as fuel for lawn care equipment. Total time of closure will depend on operational and capping requirements.

## 7 Post-Closure Care

As per Section 27(9) of the HWR and Section 10 of the Permit, a Post-Closure Plan will be prepared and submitted for approval by the Director, addressing (but not limited to) the following detail stated below.

### 7.1 LEACHATE

As indicated in the approved current Landfill Operations Plan (June 2009), Tervita will manage and maintain records of the Landfill leachate generated for a minimum 25 years from the final closure. Fluids will be removed and disposed of at an approved deep well disposal facility, or as otherwise approved by the Director.

### 7.2 LEAK DETECTION SYSTEM

The leak detection system currently present in the Secure Landfill Cells 3 through 5 consists of a geocomposite drainage layer between the composite primary liner and the secondary compacted clay liner. This layer drains to the collection risers. The monitoring of the leak detection will be conducted at the same time as the leachate monitoring event.

### 7.3 SURFACE WATER

The surface water retention pond(s) will be monitored routinely on a bi-annual (twice a year) basis. As the Landfill cells will be capped and the operations footprint will be removed, Tervita does not foresee any impacts to the generated surface waters. If the 3 year Post-Closure analytical results meets the applicability of surface water discharge criteria, Tervita will request the approval to remove the retention

pond for direct release of the surface waters to the surrounding environment or potentially for industrial purposes (pending the Director's approval), without the required analytical.

#### **7.4 GROUNDWATER**

Monitoring of the groundwater at the Northern Rockies Landfill will continue to be carried out four times per year, as part of the scheduled monitoring program set out in the approval to operate. As with the surface water, the 3 years of Post-Closure groundwater monitoring analytical results will be reviewed. If the results of the groundwater quality can be statistically demonstrated to be at a steady state or improving within the footprint of the Landfill, Tervita may request the Director's approval to reduce and/or modify the following:

- i. monitoring frequency to twice per calendar year;
- ii. identify upgradient and downgradient compliance monitoring wells to demonstrate there is not an unacceptable level of groundwater impact as a result of the Landfill's operation; and
- iii. identify key chemical indicator parameters, to ensure proper monitoring of Landfill's impact on the groundwater quality.

#### **7.5 LANDFILL GAS**

Tervita does not anticipate any landfill gases due to the types of wastes accepted, and due to the fact that the Northern Rockies Secure Landfill does not accept Municipal Solid Wastes (MSW).

#### **7.6 RADIOACTIVITY**

Tervita will continue to conduct an annual radioactivity monitoring program to ensure the public dose constraint of 0.3 mSv/a is satisfied. Tervita may reduce and/or cease monitoring, pending that the monitoring results demonstrate a NORM monitoring value below the required 0.3 mSv/a, pending the Director's approval.

#### **7.7 CAP STRUCTURE INTEGRITY**

The cap structure should be inspected at least twice annually. Remedial action will be implemented as warranted.

## 7.8 WATER MANAGEMENT

Any precipitation falling within developed areas of the Landfill footprint are contained within the Landfill leachate collection system from which the leachate is removed at regular intervals and is disposed of at an approved disposal facility. Precipitation falling outside of the developed Landfill footprint is controlled through a system of ditches and culverts, and is directed to an on-site stormwater pond north of Cell 4, within the currently approved overall landfill footprint. On-site drainage patterns and drainage controls are shown on **Figure 101**.

## 7.9 SURVEY BENCHMARKS

An as-built survey will be completed once the final landfill cap system and surface water management infrastructure has been installed. Permanent survey monuments will be installed for the measurement of cap performance (settlement), as well as, to reference any post closure infrastructure. The monuments will be located outside of any areas that may be subject to degradation or change.

# 8 Estimated Closure and Post-Closure Cost

Closure costs have been estimated based on the unplanned closure of the Landfill. As per Section 2.1 of the Permit, closure cost shall be reviewed by a suitable independent third party. An updated closure cost will be submitted each year with the Annual Report proposing security for the following year. Post-closure costs are based on ongoing maintenance and monitoring costs for a period of 25 years.

The table on following page presents estimated closure and post- closure costs.

# REPORT

**Table 8-1**  
**Estimated Closure and Post-Closure Costs**


<b>Tervita Northern Rockies Secure landfill - Financial Security Calculation - Annual Update</b>				
<b>Item Description</b>	<b>Units</b>	<b>Unit Rate</b>	<b>Total Quantity</b>	<b>Total Cost</b>
<b>Closure Capital Cost</b>				
Grading and compaction of 0.75 m waste foundation layer	sq.m.	s.21		s.21
Soil layer	sq.m.			\$
Geomembrane (1 mm thick)	sq.m.			\$
Cap vegetation	sq.m.			\$
Removal of site infrastructure	L.S.	\$		\$
General site restoration	L.S.	\$		\$
			Sub-total	\$
			Engineering and contingency @ 20%	\$
			<b>Estimated Closure Cost</b>	\$
<b>Post-Closure (ongoing annual costs)</b>				
Leachate management	cu.m.	s.21		\$
Environmental monitoring	\$/yr			\$
Landfill cap maintenance	\$/yr			\$
General site maintenance	\$/yr			\$
			Sub-total	\$
			Engineering and contingency @ 20%	\$
			<b>Estimated Annual Post Closure Cost</b>	\$
				\$
			<b>Total Closure and Post Closure Costs</b>	\$
			<b>Total Inflation Adjusted Cashflow</b>	\$
			<b>Total PV of Inflated Adjusted Cashflow</b>	\$

# REPORT

## Certification Page

This report presents our findings regarding the Tervita Corporation  
Northern Rockies Secure Landfill Closure Plan (Site Reference Number E276103)



<b>ASSOCIATED ENGINEERING QUALITY MANAGEMENT SIGN-OFF</b>	
Signature:	<u></u>
Date:	<u>Aug 10, 2016</u>



## **Appendix A – Figures**









DRAWING NUMBER	REV. NO.
3525-18-FG104	E

NOTES:

1. DIMENSIONALITY

E	2015JAN09	ISSUED FOR INFORMATION	NAR	BJ	
D	2016JUN10	ISSUED FOR INFORMATION	JH	BJ	
C	2015JUN20	ISSUED FOR INFORMATION	NB	BJ	
B	2016MAY11	ISSUED FOR 90: REVIEW	NB	BJ	
A	2015JAN20	ISSUED FOR DRAFT	AS	BJ	
	DATE	REVISION	BY	APP	

PROJECT	DATE	SCALE	DESIGNED BY	DRAWN BY	PROJECT NO.	DATE	SCALE
			N RICHARDS	A SCHWARTZ	20143525-18		INITIALS

## **Appendix B - Landfill Development Plan**



EARTH MATTERS

# NORTHERN ROCKIES INDUSTRIAL WASTE MANAGEMENT FACILITY - SECURE LANDFILL LANDFILL DEVELOPMENT PLAN - CELL 5 FORT NELSON, BRITISH COLUMBIA

JUNE 2016  
PROJECT NUMBER: 20123525-12  
ISSUED FOR: INFORMATION

**NLR/AE**  
**CONSULTANTS**

## LIST OF DRAWINGS

3525-12-DP000	COVER PAGE
<b>CIVIL</b>	
3525-12-DP101	DEVELOPMENT PLAN - CELL 5 SITE PLAN - CELL
3525-12-DP102	DEVELOPMENT PLAN - CELL 5 SITE PLAN - WASTE SHEET 1 OF 2
3525-12-DP103	DEVELOPMENT PLAN - CELL 5 SITE PLAN - WASTE SHEET 2 OF 2
3525-12-DP104	DEVELOPMENT PLAN - CELL 5 WASTE FILL PHASE PLANS SHEET 1 OF 2
3525-12-DP105	DEVELOPMENT PLAN - CELL 5 WASTE FILL PHASE PLANS SHEET 2 OF 2
3525-12-DP106	DEVELOPMENT PLAN - CELL 5 WASTE FILL PHASE SECTIONS SHEET 1 OF 3
3525-12-DP107	DEVELOPMENT PLAN - CELL 5 WASTE FILL PHASE SECTIONS SHEET 2 OF 3
3525-12-DP108	DEVELOPMENT PLAN - CELL 5 WASTE FILL PHASE SECTIONS SHEET 3 OF 3

ASSOCIATED ENGINEERING QUALITY MANAGEMENT SIGN-OFF
Signature: <i>[Signature]</i>
Date: <i>June 19, 2016</i>

*[Signature]* 2016 JUN 14  
PROJECT MANAGER DATE

**LEGEND**

450m

TOPOGRAPHIC MAJOR CONTOUR  
CONTOUR INTERVAL = 2.5m

TOPOGRAPHIC MAJOR CONTOUR

**EARTHWORKS SUMMARY**

CELL CONSTRUCTION CUT = 776,550 m<sup>3</sup>

CELL CONSTRUCTION FILL = 143,350 m<sup>3</sup>

CELL CONSTRUCTION STRIPPING = 10,800 m<sup>3</sup>

CAPPING SOIL LAYER(S) = 75,350 m<sup>3</sup>

\*BASED ON STRIPPED SURFACE OF 6,550mm

\*NO FACTORS ADDED TO CUTS OR FILL

**NOTES**

1. SOLID LINE & TEXT REFERS TO NEW CONSTRUCTION

2. DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED

E	2015/04/16	REVISED - ISSUED FOR INFORMATION	1040	10
D	2015/04/16	REVISED - ISSUED FOR INFORMATION	1040	10
C	2015/04/16	REVISED - ISSUED FOR INFORMATION	1040	10
B	2015/04/16	REVISED - ISSUED FOR INFORMATION	1040	10
A	2015/04/16	ISSUED FOR DRAFT	1040	10
No.	DATE	REVISION	BY	APP
PROJECT No.	20152525			
DRAWN BY	B. SMITH			
DESIGNED BY	N. RICHARDS			
SCALE	1:2000			

**CLIENT**

**TERVITA**

**EARTH MATTERS**

**PROJECT**

NORTHERN ROCKIES

SECURE LANDFILL

**TITLE**

DEVELOPMENT PLAN - CELL 5

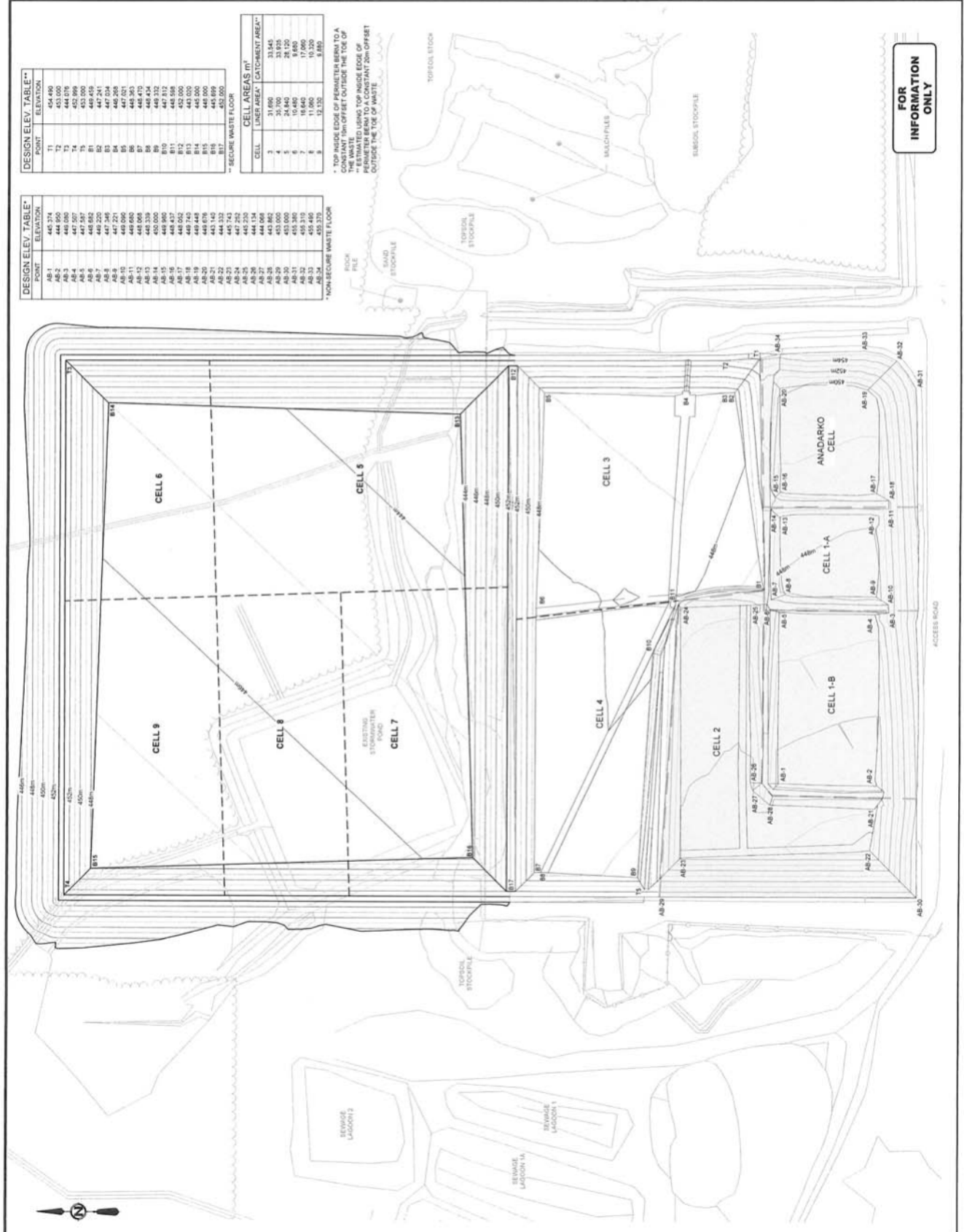
SITE PLAN - CELL

**DRAWING NUMBER**

3525-12-DP101

**REV. NO.**

E





LEGEND

TOPOGRAPHIC MAJOR CONTOUR  
CONTOUR INTERVAL = 2.0m  
TOPOGRAPHIC MINOR CONTOUR

POINT	ELEVATION
ABW1	482.515
ABW2	481.815
ABW3	481.899
ABW4	481.629
ABW5	481.525
ABW6	481.500
ABW7	481.500
ABW8	481.500
ABW9	481.500
ABW10	481.500
ABW11	481.500
ABW12	481.500
ABW13	481.500
ABW14	481.500
ABW15	481.500
ABW16	481.500
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ABW18	481.500
ABW19	481.500
ABW20	481.500
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ABW95	481.500
ABW96	481.500
ABW97	481.500
ABW98	481.500
ABW99	481.500
ABW100	481.500

POINT	ELEVATION
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W2	488.000
W3	488.000
W4	488.000
W5	488.000
W6	488.000
W7	488.000
W8	488.000
W9	488.000
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W94	488.000
W95	488.000
W96	488.000
W97	488.000
W98	488.000
W99	488.000
W100	488.000

\*\* SECURE WASTE OVERALL

- NOTES:
1. BOLD LINES & TEXT REFERS TO NEW CONSTRUCTION
  2. DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED

NO.	DATE	REVISION
1	2019/11/16	ISSUED FOR INFORMATION
2	2019/11/16	ISSUED FOR INFORMATION
3	2019/11/16	ISSUED FOR INFORMATION
4	2019/11/16	ISSUED FOR INFORMATION
5	2019/11/16	ISSUED FOR INFORMATION
6	2019/11/16	ISSUED FOR INFORMATION
7	2019/11/16	ISSUED FOR INFORMATION
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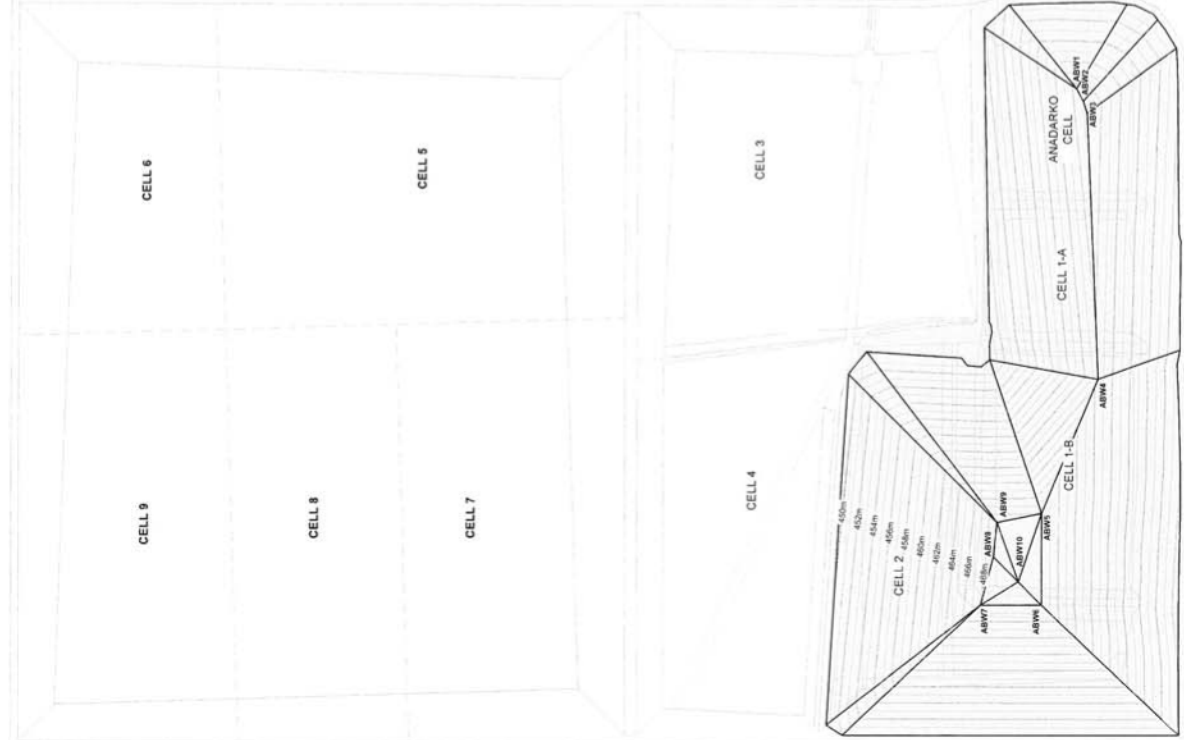
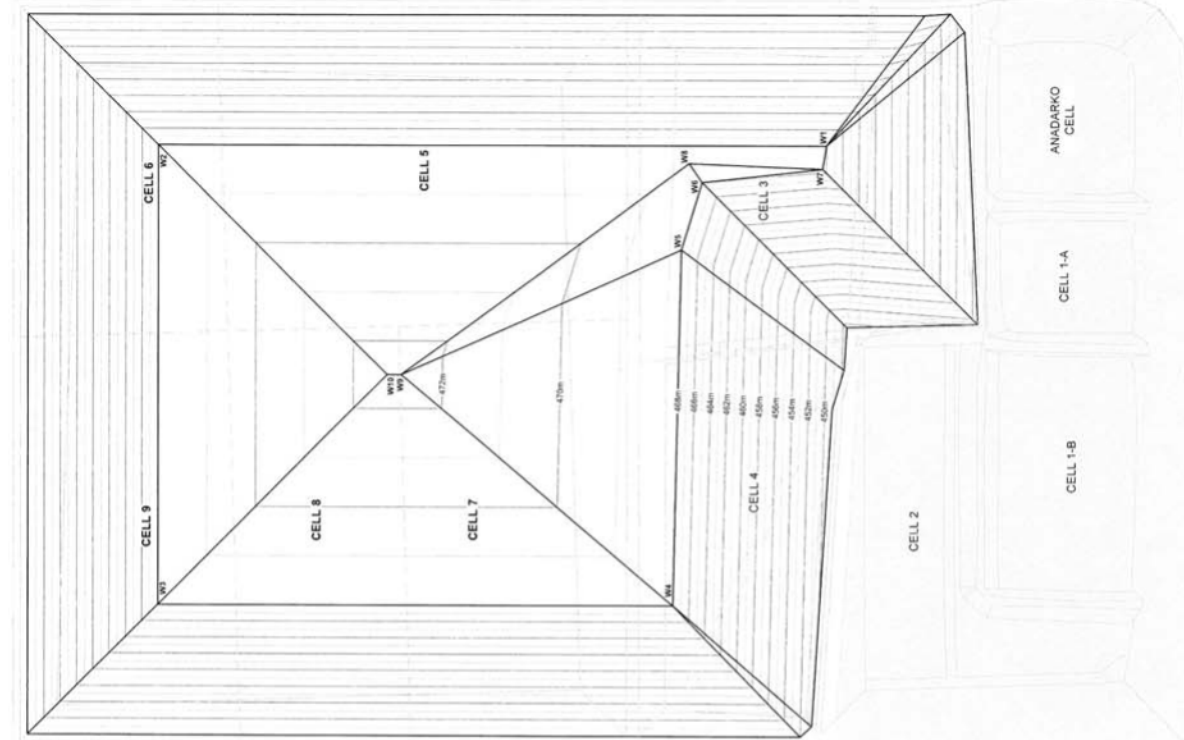


**NLR/AF**  
CONSULTANTS



**EARTH MATTERS**  
PROJECT  
NORTHERN ROCKIES  
SECURE LANDFILL

TITLE  
DEVELOPMENT PLAN - CELL 5  
SITE PLAN - WASTE  
SHEET 1 OF 2  
DRAWING NUMBER  
3525-12-DP102



FOR  
INFORMATION  
ONLY

PLAN  
SECURE WASTE

PLAN  
NON-SECURE WASTE

**LEGEND**

450m

TOPOGRAPHIC MAJOR CONTOUR  
CONTOUR INTERVAL = 1.5m

TOPOGRAPHIC MAJOR CONTOUR

**CLOSURE CAP DETAIL**

0.300m

0.150m

1.00m

SURFACE OF FINISHED  
(VEGETATED) CLOSURE CAP

SURFACE SEEDED WITH SHALLOW  
ROOT VEGETATION

SOIL LAYER

COMPACTED WASTE  
FOUNDATION LAYER

APPROVED LINER OR  
APPROVED EQUIVALENT

SURFACE OF WASTE TO BE  
GRADED AND CONTOURED PRIOR  
TO FINAL PLACEMENT OF THE  
LINER

**NOTES**

1. DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED

2. DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED

**REVISIONS**

NO.	DATE	REVISION	BY	APP.
1	2012/05/10	ISSUED FOR INFORMATION	MAN	BU
2	2012/05/10	ISSUED FOR INFORMATION	JAH	BU
3	2012/05/14	ISSUED FOR INFORMATION	MAN	NA
4	2012/05/20	ISSUED FOR INFORMATION	MAN	DS
5	2012/05/20	ISSUED FOR DAMP	MAN	DS
6	2012/05/20	ISSUED FOR DAMP	MAN	DS

PROJECT No. 2012/05/20

DESIGNED BY: B. SMITH

CHECKED BY: N. RICHARDS

SCALE: 1:2000

PROJECT No. 2012/05/20

DESIGNED BY: B. SMITH

CHECKED BY: N. RICHARDS

SCALE: 1:2000

**DESIGN ELEV. TABLE\*\***

POINT	ELEVATION
WP1	468.000
WP2	468.000
WP3	468.000
WP4	468.000
WP5	472.700
WP6	472.700

**CLIENT**

**TERVITA**

**EARTH MATTERS**

**PROJECT**

NORTHERN ROCKIES  
SECURE LANDFILL

**FILE**

DEVELOPMENT PLAN - CELL 5  
SITE PLAN - CELL

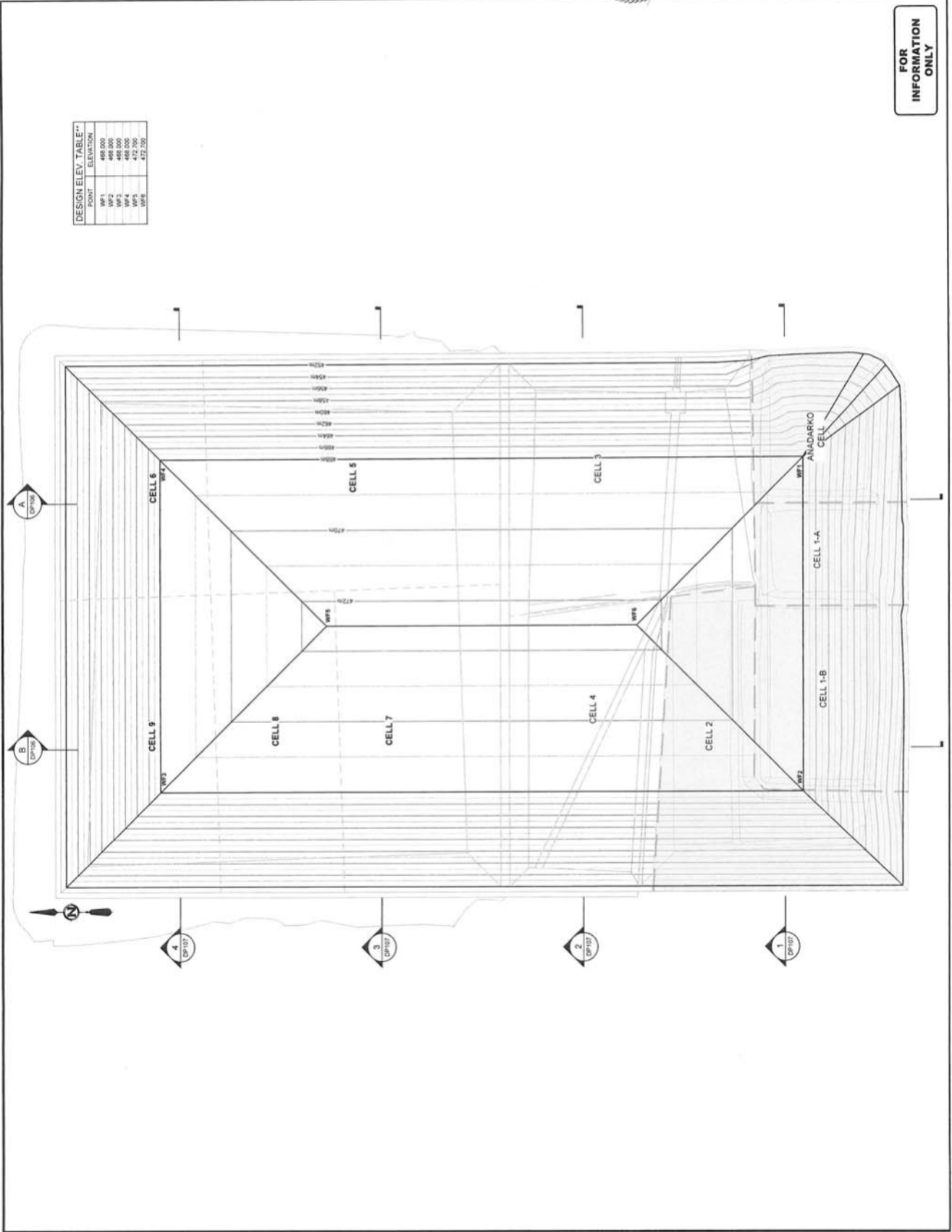
**DRAWING NUMBER**

3525-12-DP103

**REV. NO.**

E

**FOR INFORMATION ONLY**



LEGEND

450m

TOPOGRAPHIC MAJOR CONTOUR  
INTERVAL = 5.0m

TOPOGRAPHIC MINOR CONTOUR

WASTE CELL FILL SUMMARY (m³)		
PHASE	FILL PER PHASE	CUMULATIVE
DEV A	324,980	324,980
DEV B PHASE 1	142,500	467,480
DEV B PHASE 2	77,410	544,890
DEV B PHASE 3	112,310	657,200
DEV B PHASE 4	172,310	829,510
DEV B PHASE 5	322,000	1,151,510
DEV B PHASE 6	357,000	1,508,510
DEV B PHASE 7	432,780	1,941,290
POTENTIAL FUTURE DEV	419,010	2,360,300

TOTAL NON-SECURE DEV A = 324,980  
TOTAL NON-SECURE DEV B = 1,616,310  
TOTAL POTENTIAL FUTURE DEV = 419,010

NOTES:  
1. BOLD LINES & TEXT REFERS TO NEW CONSTRUCTION  
2. DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED

DATE	2017/05/05	BY	LAND
PROJECT NO.	2017/05/05	REVISION	
DESIGNED BY	N. RICHARDS	SCALE	1:2000
CHECKED BY			
APPROVED BY			



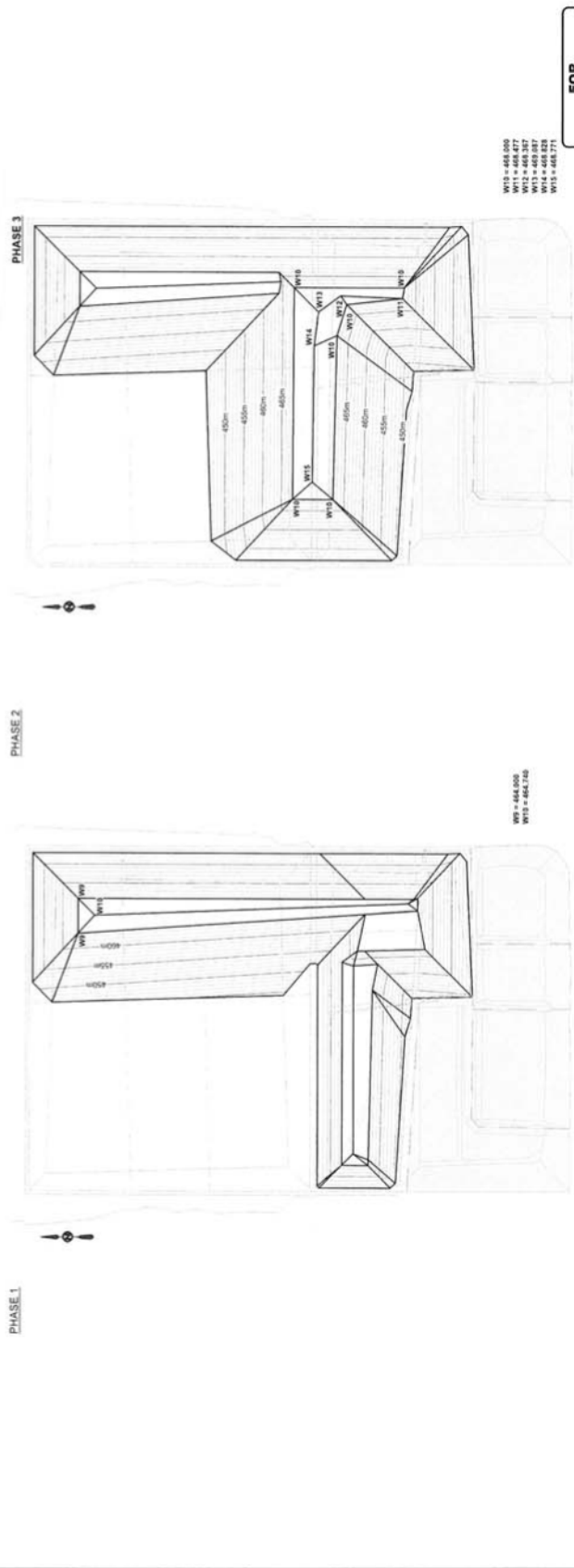
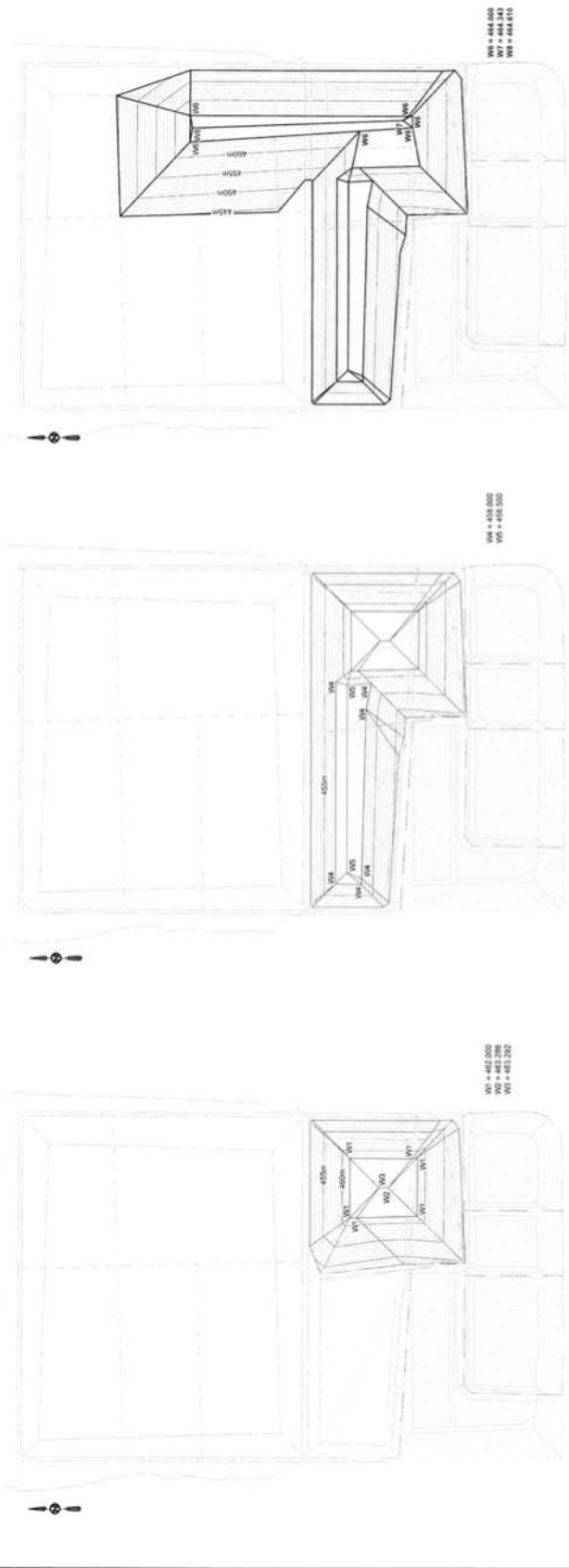
**NLR/AF**  
**CONSULTANTS**



PROJECT  
NORTHERN ROCKIES  
SECURE LANDFILL

TITLE  
DEVELOPMENT PLAN - CELL 5  
WASTE FILL PHASE PLANS  
SHEET 1 OF 2

3525-12-DP104  
D



FOR  
INFORMATION  
ONLY

LEGEND

TOPOGRAPHIC MAJOR CONTOUR  
 CONTOUR INTERVAL = 1.0m  
 TOPOGRAPHIC MINOR CONTOUR

NOTE:  
 1. BOLD LINES & TEXT REFERS TO NEW CONSTRUCTION  
 2. DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED

NO.	DATE	REVISION	BY	APP.
1	20120513	REVISED - ISSUED FOR INFORMATION	JH	SL
2	20120514	REVISED - ISSUED FOR INFORMATION	BB	HA
3	20120520	REVISED - ISSUED FOR INFORMATION	BB	SL
4	20120520	REVISED - ISSUED FOR DAMT	BB	SL
5	20120520	REVISED - ISSUED FOR DAMT	BB	SL

PROJECT No.	20120525	DETAILS
DRAWN BY	B. SMILL	
CHECKED BY	N. RICHARDS	
SCALE	1:2000	



**NLR/AF**  
 CONSULTANTS

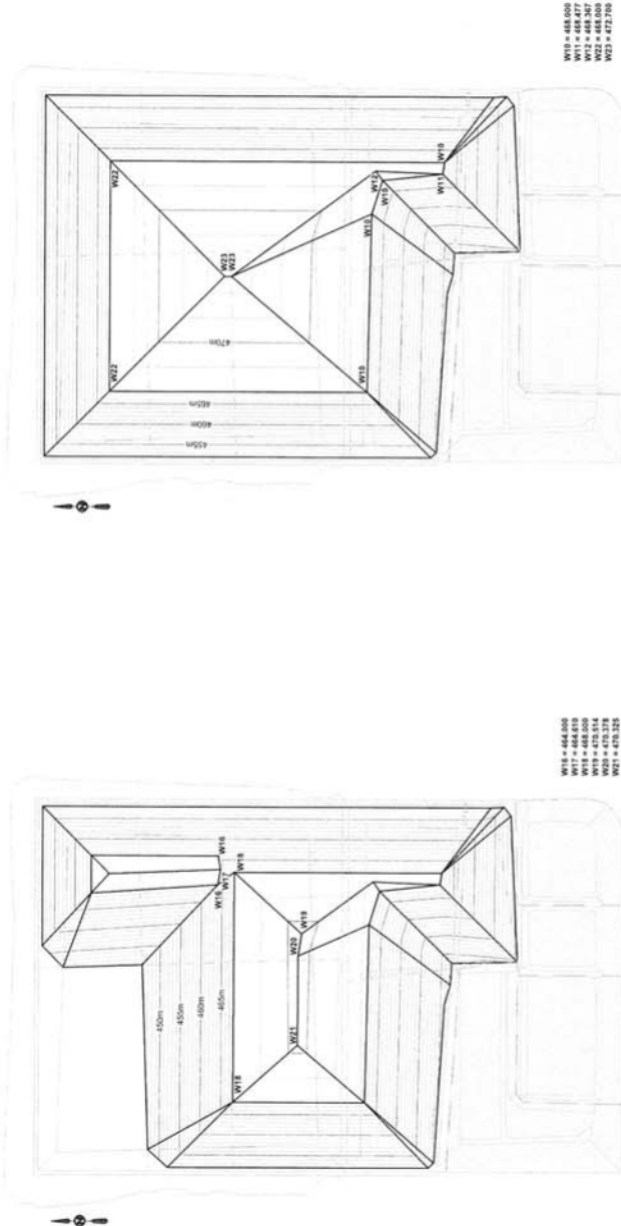


PROJECT  
 NORTHERN ROCKIES  
 SECURE LANDFILL

TITLE  
 DEVELOPMENT PLAN - CELL 5  
 WASTE FILL PHASE PLANS  
 SHEET 2 OF 2

Drawn by: [Name]  
 3525-12-DP105  
 D

FOR  
 INFORMATION  
 ONLY



LEGEND

- FUTURE WASTE FILL PHASE  
 PROPOSED WASTE FILL PHASE  
 EXISTING WASTE FILL PHASE  
 ORIGINAL GROUND

PHASE 9

PHASE 3

NOTES

1. BOLD LINES & TEXT REFERS TO NEW CONSTRUCTION  
 2. DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED

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PROJECT NO.	2012/05/16
DRAWN BY	B. SMITH
CHECKED BY	N. RICHARDS
SCALE	1:2000



**NLR/AF CONSULTANTS**

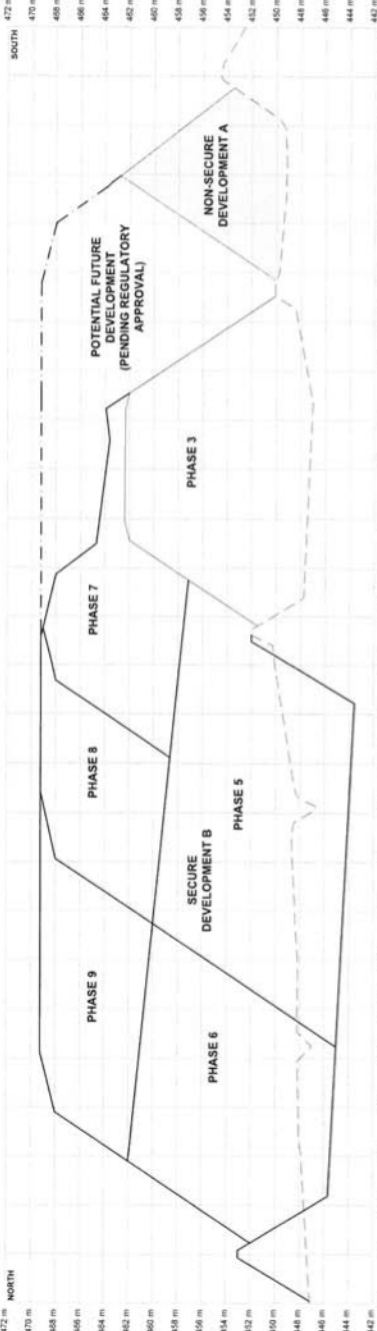


**PROJECT**  
NORTHERN ROCKIES  
SECURE LANDFILL

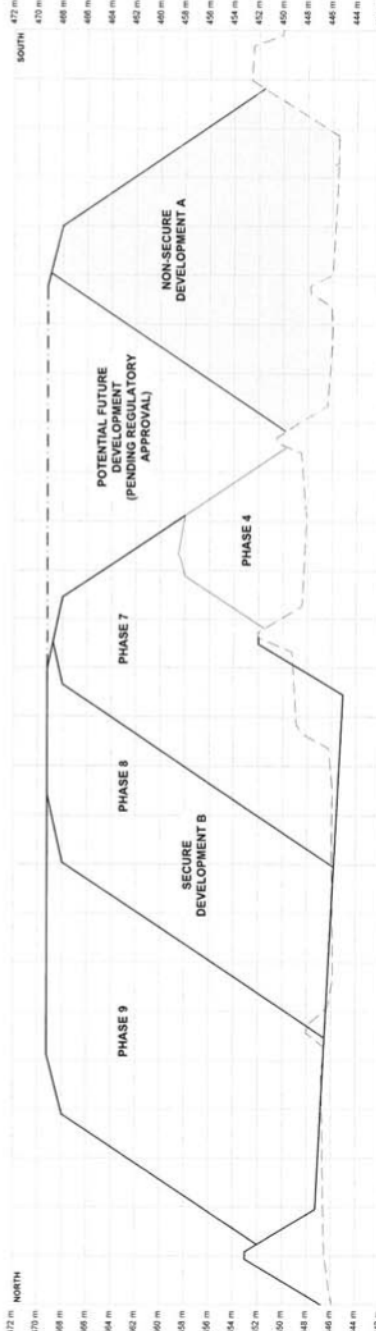
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DEVELOPMENT PLAN - PHASE 5  
WASTE FILL PHASE SECTIONS  
SHEET 1 OF 3

**DATE**  
3525-12-DP106

**REV**  
D



**DETAIL A**  
H: 1:2000 V: 1:400  
DP103



**DETAIL B**  
H: 1:2000 V: 1:400  
DP103

**FOR INFORMATION ONLY**

LEGEND

FUTURE WASTE FILL PHASE  
PROPOSED WASTE FILL PHASE  
EXISTING WASTE FILL PHASE  
ORIGINAL GROUND

PHASE 9

PHASE 3

NOTES

1. BOLD LINES & TEXT REFERS TO NEW CONSTRUCTION DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED

NO.	DATE	REVISION	BY	APP.
1	2017/03/25	ISSUED FOR INFORMATION	JAN	JD
2	2017/03/24	REVISED - ISSUED FOR INFORMATION	BBS	PA
3	2017/03/23	ISSUED FOR INFORMATION	BBS	DS
4	2017/03/23	ISSUED FOR DRAFT	BBS	DS

PROJECT No.	2017/03/25	INITIALS
DESIGNED BY	B. SNELL	
DRAWN BY	N. RICHARDS	
SCALE	1:2000	



**NLR/AF**  
CONSULTANTS

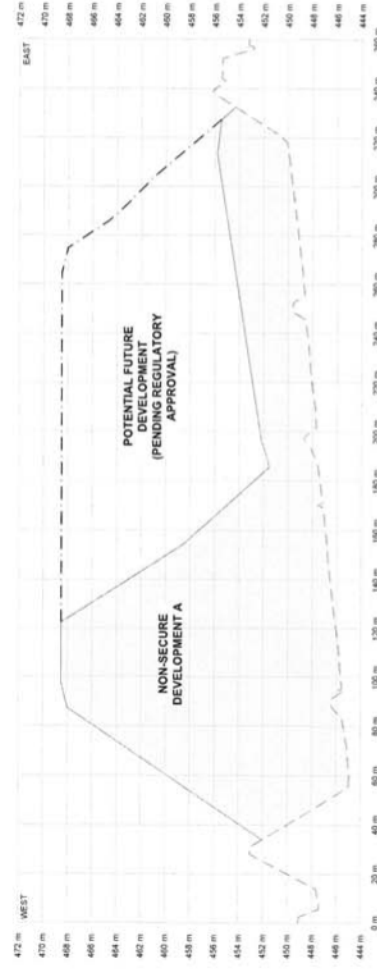


PROJECT  
NORTHERN ROCKIES  
SECURE LANDFILL

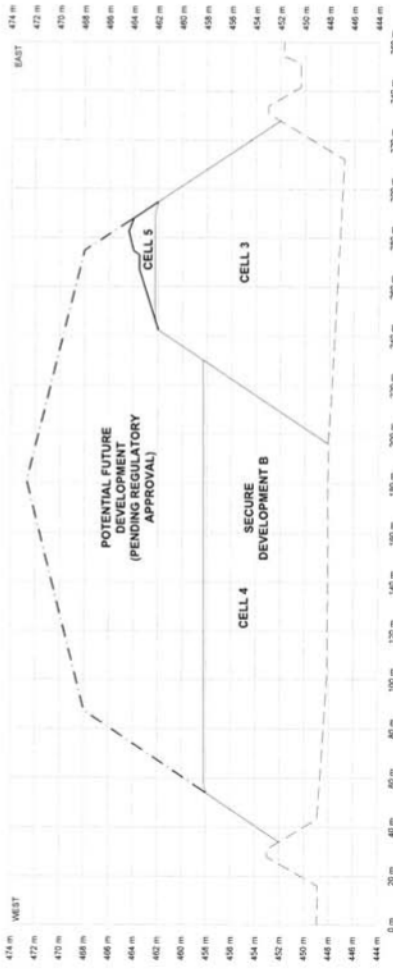
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DEVELOPMENT PLAN - PHASE 5  
WASTE FILL PHASE SECTIONS  
SHEET 2 OF 3

DATE  
3525-12-DP107

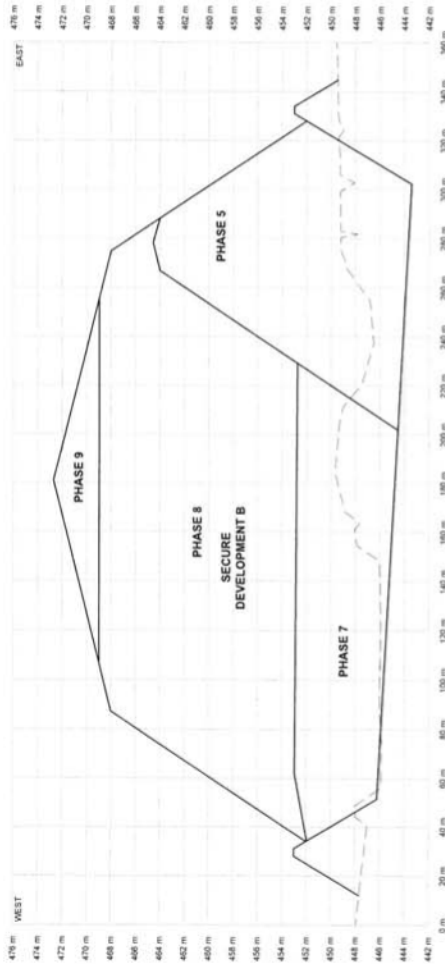
FOR  
INFORMATION  
ONLY



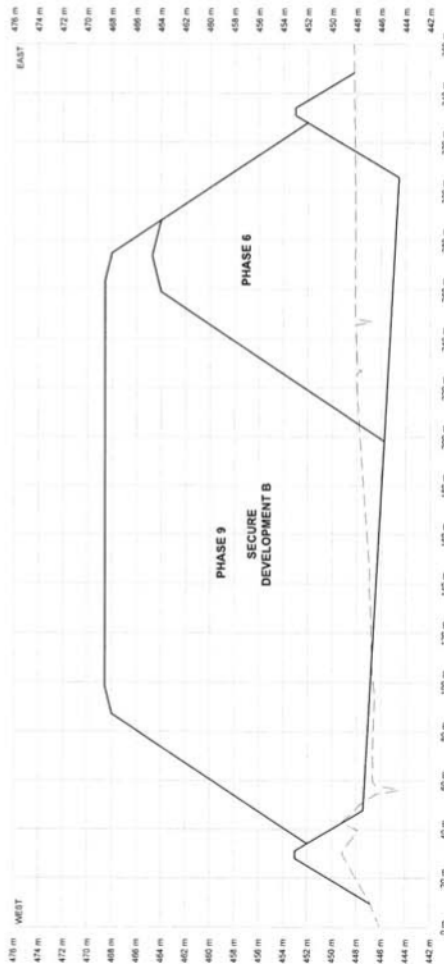
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H: 1:2000 V: 1:400  
DP107



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DP107



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DP103  
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4  
DETAIL  
DP103  
H 1:2000 V 1:400

# LEGEND

PHASE 9

PROPOSED WASTE FILL PHASE

PHASE 3

EXISTING WASTE FILL PHASE

ORIGINAL GROUND

## NOTES

- BOLD LINES & TEXT REFERS TO NEW CONSTRUCTION
- DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED

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**NIRAE**  
CONSULTANTS



PROJECT  
NORTHERN ROCKIES  
SECURE LANDFILL

DATE  
DEVELOPMENT PLAN - PHASE 5  
WASTE FILL PHASE SECTIONS  
SHEET 3 OF 3  
DRAWING NUMBER  
3525-12-DP108  
REV. NO.  
D

FOR  
INFORMATION  
ONLY

**Figure 1 – Groundwater Well Network**



